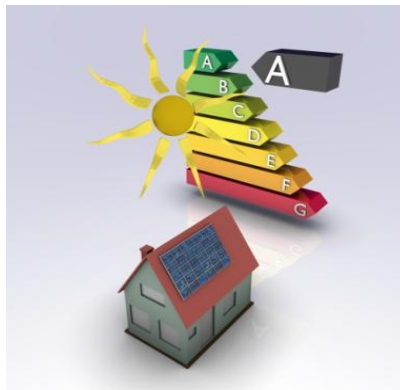

Identifying Specific Policy Options with the Aim of Reducing Carbon Intensity in India

Final Report



Final Report for British High Commission, New Delhi, India

Date 12th of September 2012

Customer:

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List of Abbreviations

ADaRSH	Association for Development and Research of Sustainable Habitats
AECB	Association for Environment-Conscious Builders
AEEG	Regulatory Authority for Electricity and Gas (Aeeg)
APP	Asia Pacific Partnership
APPC	Average Power Purchase Cost
AR4	Fourth Assessment Report
ARR	Annual Revenue Requirement
ASC	Adaptation Sub-Committee
BEE	Bureau of Energy Efficiency
BETC	Business Energy Tax Credit
BFI	Bilateral Finance Institutions
BMC	Bombay Municipal Corporation
BREEAM	BRE Environmental Assessment Method (BREEAM)
CCC	Committee on Climate Change
CCC	Committee on Climate Change
CCP	Climate Change Programme
CCPR	Climate Change Program Review
CCU	Climate Change unit
CEA	Cambridge Energy Allowance
CERC	Central Electricity Regulatory Commission
CFD	Contract for Difference
CHP	Combined Heat and Power
CII	Confederation of Indian Industry
C-STEP	Centre for Study of Science, Technology and Policy
COP	Conference of Parties
CPD	Continuing professional development
CPP	Captive Power Plants
CPWD	Central Public Works Department
CSR	Corporate Social Responsibility
DDA	Delhi Development Authority
DECC	Department of Energy and Climate Change
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DISCOMS	Distribution Companies
DO	Demi-official letter
DTI	Department for Trade and Industry
ECBC	Energy Conservation Building Code

EEM	Energy Efficient Mortgages
ESF	Energy Savings Fund
EU	European Union
EVI	Emergent Ventures India
FAR	Floor-to-Area Ratio
FI	Financial Institutions
FiT	Feed-In Tariff
FYP	Five Year Plan
GBI	Generation Based Incentive
GCF	Green Climate Fund
GDP	Gross Domestic Product
GEF	Global Environment Fund
GHG	Green house gas
GIB	Green Investment Bank
GME	Gestore dei Mercati Energetici S.p.A (Italian Power Exchange)
GoI	Government of India
GRIHA	Green Rating for Integrated Habitat Assessment,
GSE	Gestore dei Servizi Energetici (Italian Renewable Energy support institution)
HAREDA	Haryana Renewable Energy Development Agency
HCA	Homes and Communities Agency
HVAC	Heating Ventilation and Air Conditioning
IECC	International Energy Conservation Code
IGBC	Indian Green Building Council
IISc	Indian Institute of Sciences
IITs	Indian Institute of Technology
IMG	Inter Ministerial Group
IPCC	Intergovernmental Panel on Climate Change
IPP	Independent Power Producer
IREDA	Indian Renewable Energy Development Agency
IRADe	Integrated Research and Action for Development
LED	Light emitting diode
LEED	Leadership in Energy and Environmental Design
MFI	Multilateral financial institutions
MNRE	Ministry of New and Renewable Energy
MoEF	Ministry of Environment and Forests
MoP	Ministry of Power
MoUD	Ministry of Urban Development
MRV	Monitoring, Reporting and Verification
MW	Megawatt
MWh	Megawatt hour

NABERS	National Australian Built Environment Rating System
NAMAs	Nationally Appropriate Mitigation Actions
NAPCC	National Action Plan on Climate Change
NBC	National Building Code
NCEF	National Clean Energy Fund
NGO	Non-government organization
NMEEE	National Mission on Enhanced Energy Efficiency
NMSH	National Mission of Sustainable Habitat
O&M	Operation and Maintenance
OCC	Office of Climate Change
OE	Obligated Entities
Ofgem	Office of Gas and Electricity Markets
PAT	Perform, Achieve and Trade
PC	Planning Commission
PHARE	Poland and Hungary: Assistance for Restructuring their Economies
PM	Prime Minister
PT	Preferential Tariff
PV	Photovoltaics
R&D	Research and Development
RAPCC	Rajasthan Action Plan on Climate Change
RE	Renewable Energy
REC	Renewable Energy Certificate
RES	Renewable Electricity Standard
RIBA	Royal Institute of British Architects
RO	Renewable Obligation
ROC	Renewable Obligation Certificate
RPCB	Rajasthan Pollution Control Board
RPO	Renewable Purchase Obligations
RPS	Renewable Portfolio Standard
RSPB	Royal Society for Protection of Birds
SAPCC	State Action Plans on Climate Change
SBI	State Bank of India
SEM	Special Energy Meters
SERC	State Regulatory Commissions
SME	Small and Medium Enterprises
SPF	Strategic Programme Fund
TERI	The Energy and Resources Institute
TFG	Technology Finance Group
TOD	Time of Day
UK	United Kingdom

UN	United Nations
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNISON	United Nations Framework Convention on Climate Change
US	United States of America

Executive Summary

The study's objective was to provide practical recommendations on low carbon policy options to support the 'Expert Group on Low Carbon Strategies for Inclusive Growth' appointed by the Planning Commission to reduce Indian's emission intensity

India is the world's third largest emitter of carbon-dioxide (CO₂) in terms of absolute emissions. As the economy expands, these emissions will continue to rise. In the business as usual scenario, India's CO₂ emissions will multiply five-fold by 2050, while remaining heavily dependent on already scarce fossil fuels. Rising global emissions, high dependence on fossil fuels and consequent changes to India's climate will have major impacts on all spheres of the Indian economy including livelihoods, water supplies, agriculture, food production and infrastructure.

Recognizing these risks posed to the nation, India is now taking a leading role in driving low carbon development, both internationally and at home. The National Action Plan on Climate Change (NAPCC) and its constituent eight missions prepared under the aegis of the Prime Minister's Council on Climate Change provide a range of key policy and regulatory drivers and incentives for low carbon growth. India is actively involved in UNFCCC negotiations with G-77 countries and China to evolve common positions on the climate negotiations and has made nine submissions to UNFCCC on Finance, Technology, Forestry and other areas. Furthermore, an 'Expert Group on Low Carbon Strategies for Inclusive Growth' chaired by Dr. Kirit Parikh has been set up to provide technical and policy options to reduce 20-25% emission intensity by 2020.

As pointed out in the interim report of the Expert Group, India has one of the lowest per capita emissions but is highly vulnerable to impacts of climate change. Therefore, India has decided to take a progressive stance in terms of emission reduction profile and has put forward voluntary targets of reducing emission intensity by 20-25% by 2020 across all sectors excluding agriculture sector with 2005 as the base year. The Expert Group's findings are particularly encouraging in terms of mitigation potential that exists in India. As per the findings of the interim report of the Expert Group, a reduction in India's emissions intensity of 23-25% would be possible in the "determined effort" scenario and a reduction of 33-35% would be possible in the "aggressive effort" scenario. It is this potential for India to move beyond its voluntary targets that is particularly encouraging. However, the real challenge exists in developing policies to deliver these potential reductions and in overcoming barriers to implementation. These are precisely the areas on which this study is focused.

By rapidly disseminating the lessons that have been learned globally and particularly from UK/EU experience and applying them to the challenges faced in India, India may be able to leapfrog these experiences and accelerate the implementation of policies that are a deviation from the business as usual scenario. This project has aimed to do this through continuous engagement with Indian stakeholders in the form of interviews, discussions and roundtables. The study aims to provide practical recommendations for the policy landscape in India specifically in three key domains identified by stakeholders:

- Renewable Energy Certificates (RECs),
- Green/Energy Efficient Buildings and
- Low Carbon Institutional Framework.

A key aim of the study was to provide specific and practical recommendations that would help the Expert Group prepare its final report.

1. Renewable Energy Certificates (RECs)

Renewable Energy Certificates (RECs) have been introduced in India to meet its ambitious target for Renewable Energy generation. Renewable energy will play a key role in improving India's energy security which is vital for India's future economic growth.

The renewable energy capacity which has come on stream in India has been limited to 3000 MW per year in the last 3-4 years. However, to meet the targets specified in the NAPCC, additional renewable energy capacity of 5000-6000 MW is required annually. The Renewable Energy Certificate (REC) Mechanism has been introduced in India in order to enable a large number of stakeholders to purchase renewable energy in a cost effective manner and to ensure long term investments in renewable energy. This market based mechanism is about to complete its first year which has resulted in the observation of various strengths and issues which need to be addressed to make it more effective.

India can build on the lessons learnt from the UK, which has had a mandatory Renewables Obligation (RO) scheme since 2002. The RO is the main support mechanism for renewable electricity projects in the UK. Smaller scale generation is mainly supported through the Feed-In Tariff scheme (FITs). The purpose of the UK Renewables Obligations (RO) was to stimulate the development of the domestic renewable electricity industry and contribute to meeting a target of 10% renewable electricity supply by 2010, with an intermediate target for 2003. The RO is currently the central UK renewable electricity policy mechanism towards meeting the UK's national target (of 15% renewable energy consumption by 2020) under the EU Renewables Directive. Over the lifetime of the RO, numerous changes have been made to the scheme to increase transparency and effectiveness of ROCs for providing certainty to generators and investors. Recent consultations on setting obligation levels and eligibility of technologies also provided vital insights for the Indian context.

Based on the initial stakeholder consultation and focussed discussions among key market players in the UK and India, the study team has identified the following issues and recommendations.

Key issues

- 1) One of the major market concerns vis-a-vis REC mechanism is that **banks are still reluctant to consider RECs in project financing** due to policy uncertainty, price uncertainty and absence of price guarantee mechanism of RECs. All these three factors directly affect market demand for RECs.
- 2) The other concern is **regulatory compliance** of obligated entities as there are still lack of statutory provisions for enforcement. In addition, the financial distress of obligated entities, especially Discoms, further impacts on their compliance with RPO targets.
- 3) Finally, the **dual mechanism of preferential tariff and RECs** also has some market impact on RECs as there is uncertainty regarding which policy instrument is favoured by government.

Key recommendations

Ensuring policy certainty and regulatory compliance

There is significant lack of policy certainty due to variation in state-specific regulations regarding RPO targets. At the state level these targets are set on a short term basis being declared only for the next 1-3 years. This in many ways affects the confidence in the long term demand for RECs as states may

set less ambitious targets. Also, such variation in target setting can do not help to achieve the national level commitments on renewable energy generation. Moreover, the co-existence of two policy instruments for renewable energy i.e. REC mechanism and preferential tariff mechanism also has been identified as a key issue by the main market players.

To ensure policy certainty there are two recommendations that could be explored further.

1. Demonstrate a national policy commitment for RECs by setting appropriate targets that aligns with national level targets of renewable energy generation. This can be ensured by two following alternative options:

A. Setting uniform RPO targets across states in India.

Uniform RPO targets would ensure demand certainty over a longer period of time and the national level targets of renewable energy generation could easily be tracked and necessary planning could be done. Also, uniformity in RPO targets would ensure that all energy consumers in the country are treated equally i.e. the burden of additional renewable energy purchase cost is borne by them in same way assuming that additional cost for Discoms is fully passed on to consumers

This option would have certain implementation challenges. First, the ability to bear the burden of additional cost is not uniform across states. Also, there would be less political buy-in as consumers may not be willing to pay any additional price. Finally, there could be regulatory issues also as there are lack of regulatory provisions as per current Electricity Act 2003 and national level RPO targets cannot be imposed on states as electricity is a state subject.

However, despite of the issues associated with this option in terms of achieving low carbon growth it will provide a definite policy direction in terms of resource allocation and other necessary strategies to achieve renewable energy generation target of the country as per National Action Plan on Climate Change. The regulatory concern and non-uniformity in ability of states can be addressed by creating mechanisms of providing financial support to states by central government. Other funding mechanisms could also be created using international financing mechanisms.

- B. The other option could be to develop forecasted RPO trajectories for India** and for each state also so that the national target as per NAPCC could be met. This is a simple option which will send clear signals to market players to participate in the renewable energy market by ensuring certainty over demand of RECs.

Although this option takes into consideration the renewable energy potential of each state and past generation trend, such an analysis would be highly complex and subjected to numerous assumptions.

2. Measures that ensure demand of RECs such as open access regulations and guidelines for renewable energy projects and making off-grid renewable energy projects also eligible for REC benefits would enable obligated entities to comply with RPO targets.

Regulatory compliance can be ensured by following measures which has also co-benefit of bringing in policy certainty:

1. Statutory provisions such as amendment of existing Electricity Act for penalty of non compliance to RPO or a separate RE Act to ensure compliance.
2. Supporting mechanisms such as option of passing through the REC cost to consumers to ensure compliance by obligated entities which are in financial distress.

Mechanisms for REC's price certainty

There is a lack of REC price certainty due to short term horizon (five years) for setting REC floor prices and no clear formula for forecasting future REC prices. The method does not currently consider the additional cost burden for RE promotion, such as the infrastructure cost and is based on the concept of assumed grid parity of RE power. The current method for calculation of these prices is linked with the difference between the 'preferential tariff' and the average cost of power, also called the APPC. Given that the APPC prices are expected to increase at a much greater rate than the FIT, this method would lead to a net zero price for RECs in the coming years, seriously undermining investment decisions in the future. Following options can ensure REC price certainty:

- The first option is to forecast a minimum floor price for a longer time horizon say 20 years. This will ensure that the lowest price for RECs would not fall below this particular price. The current mechanism the floor price for five years could be reset every five years as it is being planned currently.
- The second option could be to keep the floor price constant for a longer period of time. However, to account for future changes in renewable energy cost structure a weightage for vintage can be assigned.

The first option would be a better choice as it could be based on the existing pricing system and also would be simpler to implement.

Price guarantee for RECs

There is a lack of minimum price guarantee for RECs as there is no support or guarantee for minimum price realisation from RECs even though a price band has been declared. As the demand for RECs would depend on enforceability of penalties, there could be instances where the RECs remain unsold. This could be primarily due to an imbalance in the demand-supply equation of RECs, caused either by a surge in supply or reduced demand owing to insufficient RPO targets or improper enforcement of the RPO targets. The lack of minimum price guarantee for RECs is another concern that is weakening lender confidence in the REC mechanism.

There are two options to address this concern:

1. **Strengthening the penalty mechanism** so that this issue could be completely avoided. This will be a simpler mechanism which not only would create demand of RECs but also lead to creation of fund which can be utilized to support REC mechanism. In addition, a minimum price could also be set so that it provides confidence among financial institutions regarding the viability of the projects.
2. The other option could be **setting a 'REC Price Guarantor' at the national level to stabilise the demand** – supply imbalances in the REC market. This may be required because theoretically it is likely that despite of the effective enforcement, there may not be any buyer

of RECs¹. This body should be accorded exclusive provisions, with regards to longer life for RECs and power for multiple trading of RECs. The Guarantor would act as a:

- “buyer of last resort”, purchasing the RECs at the floor price, when any REC is getting expired, due to completion of life period, and
- “seller of last resort”, selling RECs at the forbearance price, to the defaulting Obligated Entities.

The seed funding for this body could be sourced from the National Clean Energy Fund. The CERC could appoint a national body to oversee the roles of the REC price guarantor. This could be an agency with an existing role in development or promotion of RE projects in India. A typical example could be IREDA (Indian Renewable Energy Development Agency), which is responsible for promoting debt-funding for renewable energy projects. IREDA has played a crucial role in encouraging private and public bank participation in funding RE projects by showcasing and funding RE projects across the country. However, such a mechanism may be less effective as the new authority could have lot of institutional limitations.

2. Green and energy efficient building standards

Green and energy efficient building standards can help India reduce its emission intensity specially as India is yet to build 70% of the buildings targeted for 2030

Driven by large scale urbanisation, population growth and expansion of the service sector, the buildings and construction sector is growing at a fast pace. Demand for commercial office space by Multinationals, IT hubs and Special Economic Zones (SEZs) is growing annually at a rate of 9% and 12% respectively. In 2009, there was close to 200 million m² of built office space in India and this number is expected to grow to 890 million m² by the year 2030. Energy use in commercial and residential buildings currently contributes approximately 30% of India’s electrical energy consumption and this is being observed to grow at more than 8% per annum².

The process for developing Green and Energy Efficient Buildings is gaining momentum in India. Considerable progress has been made for defining new and sustainable ways of planning, construction and operation of buildings. There are three voluntary codes and rating systems that are being followed in India in support of Green/ Energy Efficiency building design practises:

- Energy Conservation Buildings Codes (ECBC)- For commercial buildings
- IGBC’s LEED India rating system India- For commercial buildings
- Green Rating for Integrated Habitat Assessment (GRIHA)- Primarily for government buildings

Most indicators suggest that **70% of the buildings targeted to be completed by year 2030 are yet to be built**. Due to the huge potential of energy saving and emission reduction in the building sector, this sector has been identified as one of the core sector for low carbon growth in the Low Carbon Expert Group’s interim report on ‘Low Carbon Strategies for Inclusive Growth’ published by the Planning Commission. However, achieving this would require compliance to the Energy Conservation Building Code, response to existing green building rating systems and retrofitting. Furthermore, a

¹ Recent initiatives such as allowing public sector entities to offset carbon footprint by purchasing RECs has been significant in this direction. Also, there is potential of fungibility of RECs with Energy Saving Certificates under PAT mechanisms which also create demand of RECs.

² Interim Report of the *Expert Group on Low Carbon Strategies for Inclusive Growth*

number of barriers exist for large scale adoption of green/energy efficient buildings. Market and institutional barriers can restrict the full emission reduction potential from commercial buildings

Important lessons can be learnt from the development of green building codes in the UK and EU. These codes have been around since 1990 when the BREEAM system was introduced to assess the sustainability of the new non-domestic buildings in the UK. Since then, a number of targeted BREEAM assessment systems have been developed for use in particular types of building, including offices, retail, prisons, education, healthcare and others. There are BREEAM systems for assessing both new construction and existing buildings. BREEAM International has been developed and there is now a BREEAM Europe assessment scheme. At the EU level, the EU Energy Performance of Buildings Directive (EPBD)^[1] was adopted on the 16 December 2002 and is the main legislative instrument for improving the energy efficiency of the building stock in Europe. Under the 2002 Directive, all Member States the following obligations were introduced in all Member States.

Promoting uptake of green and energy efficient building standards requires incentivising owners and developers to overcome barriers related to capital intensity, high cost and general reluctance to move from existing practices

The key issue is that developers and end users have split incentives for adopting green building standards. Tenants not willing to pay high rents and factor in future resource cost savings whereas developers are looking for short payback periods. Providing fiscal incentives for developers in the form of reduced property tax, reduced stamp duty and density bonus for green/energy efficient buildings can reduce any additional cost of complying with green building standards. Financial incentives for developers and end users in terms of reduced interest on loans for green/energy efficient buildings have been used in other parts of the world and can be applied in the Indian context. Quickening the process approval of building plans and reducing the costs for obtaining building permits through single window clearances can also provide the incentives for adoption of green building standards.

The above measures can be implemented using short term policy options focussing on certain type of buildings to provide the initial impetus to the green building construction sector. Central financial assistance could be provided to city municipalities and other local bodies to finance these incentives.

Reducing knowledge gaps and promoting greater sharing of information amongst technical experts and developers to incorporate Green building/ energy efficiency techniques in building design and construction is extremely important in the Indian context.

Low awareness among end users and developers about cost savings and wider benefits from energy efficient/green buildings is a major barrier for uptake of green building standards. It is crucial to recognise that many different stakeholders influence the decision-making process on the location, design and construction of new buildings. These stakeholders range from central government authorities, planning authorities, developers, architects, suppliers and consumers. Information sharing and education is central to this process. As long as the development needs of all these parties to this process are taken into account, there is no reason why green building codes cannot be successfully delivered in India. Creating awareness amongst the main stakeholders about benefits of

^[1] Directive 2002/91/EC – see http://europa.eu/legislation_summaries/other/l27042_en.htm

green building, maintaining transparency and providing supporting case studies and cost benefit analysis can be highly effective in supporting the development of a green building market. These measures can be implemented by municipalities with support from central government agencies including ADARSH and BEE.

There is also the issue of limited institutional capacities for effective implementation and enforcement of these standards. Currently, the technical knowledge related to green/energy efficient buildings is limited to few architects and designers in tier 1 cities in India. The knowledge level of government bodies responsible for implementation and enforcement is very low. Training programmes can be provided to municipalities and other stakeholders including public works department to enhance their technical knowledge of green building standards. Nodal ministries including Ministry of Urban Development, Ministry of New and Renewable Energy and Ministry of Power can work jointly with local level institutions in identifying capacity building needs and thereby providing required training through its specialized agencies or external experts.

Strengthening the supply chain of green building materials will ensure that the green building market operate can operate at scale

The availability of green building construction materials is limited in India. Additionally, the penetration of high end energy efficient appliances and equipments in Indian market is still in a nascent state. Greater availability of green building materials and at lower cost would provide buildings with a stronger incentive to adopt these standards. Providing monetary benefits such as tax exemptions and import duty reduction for manufacturing and import of green building products can greatly assist in strengthening the supply chain in India. Short term policy options based on the above measures to provide initial support to industries manufacturing green/energy efficient materials and appliances can be considered in India.

From international experience, stricter regulatory provisions and mandating standards have been highly successful for making designers and contractors get up to speed with techniques and technologies for green and energy efficient buildings

To ensure regulatory effectiveness, it is important that sustainability/green attributes are included in building bye laws. Municipal building bye laws should include sustainability parameters as recently included in National Building Code and incorporated in ECBC provisions. Aggressive efforts and outreach programmes can be launched by Bureau of Indian Standards and Bureau of Energy Efficiency to facilitate inclusion of ECBC provisions in building bye laws.

3. India's low carbon governance and institutional framework

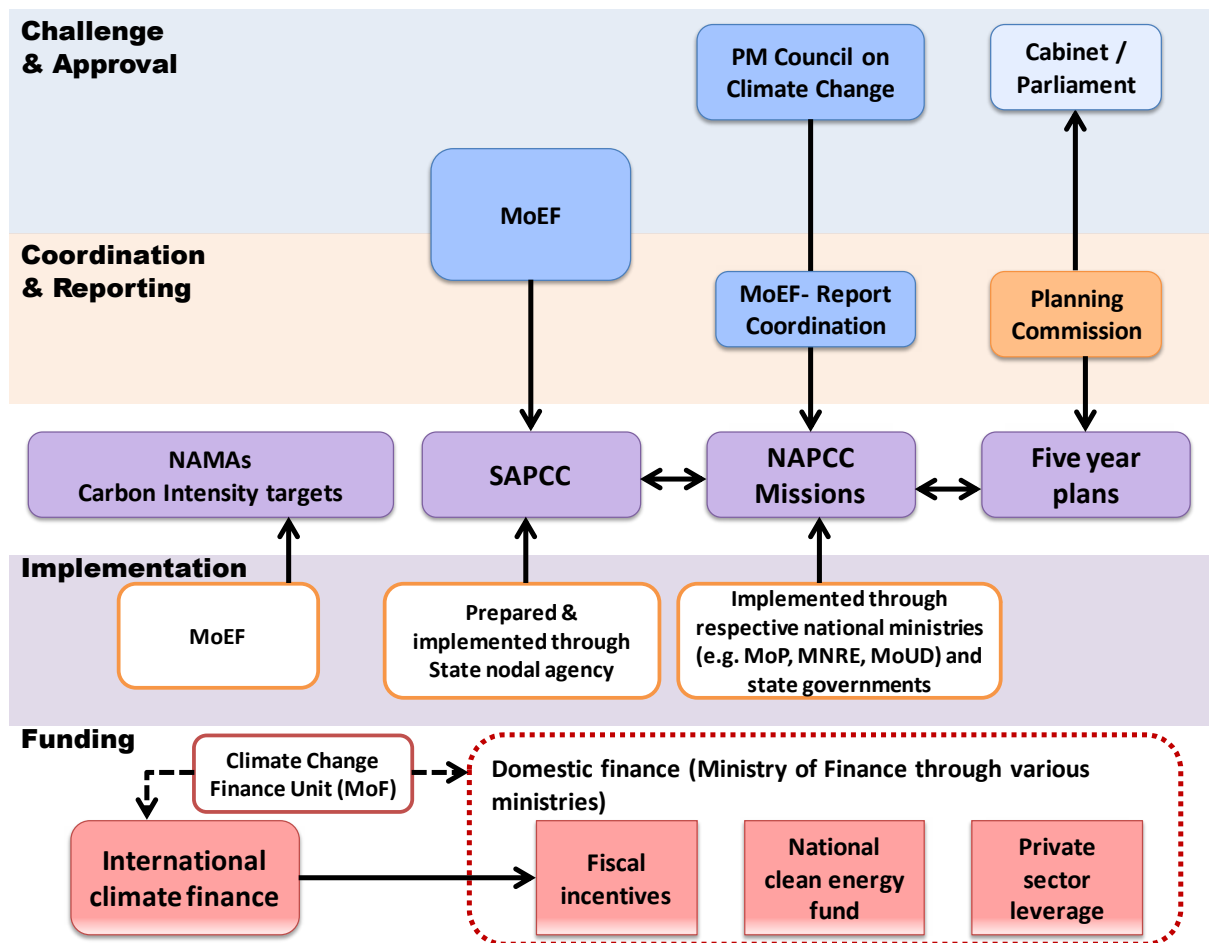
Delivering the National Action Plan on Climate Change (NAPCC) critically requires further strengthening the capacity and role of existing governance and enabling institutions for low carbon growth in India.

In India, the overarching national policy on climate change is set out in the National Action Plan on Climate Change (NAPCC) which has eight different missions to tackle climate change. A special body namely the Prime Minister Council on Climate Change has been formed to approve all the missions

strategically by aligning them with the socioeconomic development growth aspirations of the country. State Action Plans on Climate Change (SAPCCs) have also been sanctioned to build on the existing policies of the respective state governments by taking into consideration the ongoing programmes and schemes being implemented at the state level as well as within the NAPCC. In addition, India has announced a voluntary national target of reducing the carbon intensity of its economy by 20-25% by 2020.

In addition to the PM Council on Climate Change, the Planning Commission has also formed an Expert Group to develop low carbon growth strategies for inclusive growth in India. The group will advise the government on meeting carbon intensity targets in a manner that is consistent with the overall socioeconomic objectives of the nation and will be a part of the twelfth Plan document. Furthermore, a Climate Change Finance Unit has been set up within the Ministry of Finance to better integrate climate change into development frameworks and financial systems which signifies the importance given to climate finance in Indian context. The unit will advise Union Government to help concrete its position on many existing and emerging climate issues and also analyse financial pledges made by the developed countries in addressing the climate challenge. The current institutional landscape to deliver the NAPCC missions and report internationally is shown in the figure below.

INDIA'S LOW CARBON INSTITUTIONAL FRAMEWORK



The principle challenge which India now faces is how to develop and implement the specific policies and measures needed to accelerate low carbon growth in line with the plans set out in the NAPCC

Missions and other initiatives. Overcoming this challenge requires the answers to the following questions: what new institutions or improvements to existing institutions are necessary to help India achieve its goals given its priorities and the current institutional landscape? What governance structure would be most appropriate in the Indian context in order to ensure accountability for implementing the recommendations of the Expert Group? Who is going to monitor the progress of any implemented actions?

Some of the potential roles and responsibilities which might be taken on by low carbon institution in India are:

- Increase regulatory effectiveness of low carbon policies and strategies,
- Reduce compliance cost for industry,
- Remove market failures – for uptake of cost effective measures, promote R&D, and provide greater market signals,
- Correct inadequate private market incentives for innovation,
- Provision of information on low carbon development and clean technologies
- Understanding and developing risk-assessment frameworks, and
- Greater monitoring and evaluation of targets and progress under National Action Plan on Climate Change (NAPCC) and its eight different missions to tackle climate change.

A key lesson from UK Climate Change policy over the last 15 years is that effective policy development and implementation requires an effective institutional framework consisting of both:

- “Governance” institutions to oversee implementation and provide independent advice on how to overcome challenges (see Section 3.1)
- “Enabling” institutions to support private sector in realising the benefits from incentives and compliance with regulatory approaches (see Section 3.2)

3.1 IMPROVING GOVERNANCE OF LOW CARBON POLICY

On the governance side, the difficulties encountered in meeting the ambitious voluntary targets in its Climate Change Programme prompted a review of existing institutional structure and in particular the role of the Department of the Environment, Food and Rural Affairs. This coincided with the Stern Review’s reframing of climate change as an economic issue rather than an environmental one and the political conditions for bolder action, through NGO campaigning, the Conservative Party’s adoption of stronger credentials on climate and the appointment of a rising political star, David Miliband, as Secretary of State at Defra. The result was the establishment of a much more robust statutory regime, including the creation of the independent Committee on Climate Change (CCC). The CCC has statutory responsibilities to propose appropriate carbon budgets, assess progress towards the government’s long-term emission reduction targets and give advice to the government on climate-change policies.

Summary of key messages for India from UK CCC experience

The impact of an effective low carbon governance structure stems from a combination of (1) statutory authority via the Climate Change Act and (2) building and maintaining trust and credibility, similar to a central banker. This credibility is obtained in several ways, including: the technical robustness of the advice, the reputation of the committee members and the chair, the use of technical yet accessible language in reports and the ability for the recommendations to be seen as achieving their climate objective yet feasible for business and government.

Other key lessons are:

- **Building credibility and trust.** The ability to separate out politics from analytical problems by using clear performance indicators based on real world measures is key for maintaining influence and trust.
- Important that the Annual Progress Report is a **report to Parliament, not to Government**. This places the onus on Government to respond to that report and face debate in Parliament rather than simply sit on it.
- As part of this reporting role, it is important to track **performance indicators** other than simply emissions reductions or improvements in energy intensity. CCC has identified indicators other than emissions reductions which provide visibility of what you can expect in future – is implementation on track? E.g. Renewables: what's going into planning system and going into construction.
- **Distinction between technical advice and policy:** CCC is responsible for advice on where abatement but not detailed advice on specific policies which remain with Departments. In some areas it is inevitable that this distinction can be blurred, for example in energy market reform. There was huge sensitivity about CCC role on policy initially. CCC clearly has a role in identifying where policies are failing with clear evidence.
- Membership:
 - selection of the chair is key: Lord Turner combined being a political operator with someone in whom business could have confidence.
 - independent expertise of members.
- Funding: CCC is funded by the main government departments affected by climate policy, who also have a say in commissioning CCC's research. However, the government departments do not have a say in the study process except for testing emerging conclusions. An annual budget of £4m is used for external consultant (£2m) and internal administration and research (£2m).

In this context, the study explored the possibilities of setting up governing institutions and enhancing the roles and responsibilities existing institution in India.

The NAPCC has been designed not just as plan to address climate change in abstract but also address the challenges of sustainable development in the context to Climate Change. In this regard, the eight missions and its activities address both, the challenges related to sustainable development and climate change. Hence, the governance and coordination function of any institution has to incorporate the wider socio-economic impacts of the missions in addition to the environmental dimension.

In-depth stakeholder consultations and discussions during the main workshops and roundtables provided two main options for improving the India's low carbon governance and institutional framework.

The two options have been developed keeping in mind that the existing institutional structure is already a step in the right direction. New institutions should not be created which would invariably lead to resource constraints and bureaucratic issues. Thus, there is no need for reinventing in entirety the governance structure of the nation for bringing in low carbon growth. In addition, stakeholders strongly believed that it cannot be the case that the system is tweaked so that it differentially delivers more on climate change than it delivers on all the other programmes and responsibilities included in the broad ambit of public policy in the country. Instead, it is required that climate change policies and programmes be mainstreamed into the existing structure, so that the nation moves towards a path of not just development but sustainable and inclusive development. Mainstreaming climate change policies would require a strong network of states, regulatory bodies, think-tanks, financing organizations and society.

On the basis of these principles and the existing situation with respect to India's low carbon governance and institutional framework, the two main alternatives considered were as follows:

1. Planning Commission to appoint a dedicated Low Carbon Growth Unit (LCGU)

The Planning Commission is a natural place for housing and coordinating action on any cross-cutting issues, not just for climate change. Twelfth plan has for the first time a chapter on Climate Change to follow up on the recommendations of the Expert Group on Low Carbon Strategies for Inclusive Growth. A special unit such as the Low Carbon Growth Unit (LCGU) could be set up to focus expressly on delivery of those aspects of the 5-Year Plan with climate elements linked to the NAPCC. Having a technically qualified unit there would give it a much easier and non-adversarial role to coordinate policy and measures at a national and state level. The LCGU could have representation from the already established division on Plan Coordination and Management, which coordinates between centre and state.

The LCGU would provide clear institutional recognition that climate change is a cross-cutting issue rather than an environmental one. The LCGU could improve institutional coordination between central and state organisations and mainstreaming of climate issues into budget decisions at both federal and state level. In order to boost the technical credibility of this new Unit, the Expert Group on Low Carbon Strategies for Inclusive Growth could be given a permanent role to provide technical review and advisory service to the LCGU. Finally, since the Planning Commission also carries out a mid-term appraisal to review targets and progress of the Five-Year Plan, it could regularly report on the measures and outcomes to track progress of the climate-related policy thrusts as part of the Five Year Plan process. The Unit could then recommend ways to reach targets or revise the targets.

Further consideration would need to be given to the precise role which such a unit would be given in relation to raising and allocation of funding for mission activities at national and state level. The Planning Commission has the appropriate procedures for raising funds through established instruments or creating new fiscal instruments, such as carbon cess. NAPCC missions also provide additional provisions to develop new financing channels. In addition, the LCGU would need to work closely with the new Climate Change Finance Unit in the Ministry of Finance in relation to the design

of fiscal instruments aimed at leveraging private sector funding. The Planning Commission is also able to monitor and coordinate funds that can come as international climate finance.

2. A new dedicated committee established by the Prime Minister

Alternatively a separate expert body operating outside Ministerial structure could be created to report to the Prime Minister's office (and possibly to Parliament) on progress of NAPCC and climate aspects of Five-year plan. This body can be appointed informally by the PM Council on Climate Change or formally under the Environment Protection Act 1986.

This expert committee would guide individual ministries regarding key actions and outcomes related to the NAPCC and climate aspects of Five-year plan. The expert committee will also undertake research and analysis into climate change science, economics and policy related to national and state targets and action plans. Taking a leaf from the UK experience with regards to funding such an institution; the expert committee can be funded by the main government departments affected by climate policy, who also have a say in commissioning this kind of research.

The key roles of the committee could be to:

- Produce summary scrutiny reports on the progress of the NAPCC Missions with clear recommendations of what improvements can be made.
- Produce scrutiny reports and recommendations for State Action Plans by engaging relevant stakeholders from the Council.
- Produce annual progress reports on meeting national and state targets and recommending any actions necessary given budget allocations.
- Stimulating 'innovation' through relevant council members by engaging them to share evidence and analysis, especially on science and technology.

The option for a dedicated committee under the PM Council is an attractive option from the point of view that it would not require complex bureaucratic structures.

However, a risk associated with this option is that maintaining economic development as the key policy agenda could be diluted. Having a committee formed either by PM or under any Act for governance may escalate climate change as a top priority, which is not appropriate in current context. However, in the medium term, when there is stronger acceptance that economic development and climate change strategies are linked, this option could become more viable. An alternative could be that the existing PM Council, or the LCGU under the Planning Commission, could provide updates to the Cabinet Secretariat annually to ensure that national goals related to climate change and development are being met.

The main advantages and disadvantages of these two options are discussed in Table A below.

Table A: Pros and cons of two options for improving the India's low carbon governance institutional framework

Option	Recommended options		Existing situation
	Pros	Cons	
1. Planning Commission: dedicated Low Carbon Growth Unit (LCGU)	<ul style="list-style-type: none"> - Reinforces fact that climate concerns are cross-government issue - Provides long term focus and complements enhanced status of climate within the 12th 5YP - More likely to increase likelihood of delivery of Missions - More control over implementation and monitoring of plans. - There was a strong steer to ensure good inter-ministerial and centre-state coordination which the PC can perform for effective governance and accountability which seems very difficult under the current set up. - Greater control over allocation of funds and other resources to nodal ministries and for State Action Plans on CC 	<ul style="list-style-type: none"> - Unusual for Planning Commission to set up specialist unit of this type - Risk that LCGU will not engage regularly enough to cause impact - May not be seen as sufficiently independent voice - Challenge for ensuring consistency between missions objectives and targets and the 12th 5yr plan. 	<ul style="list-style-type: none"> - The ministries responsible for the missions face conflicting challenges for delivery of missions versus delivery of regular policies. - There is no formal involvement of PC with the NAPCC. There is no official link between the sustainability/climate objectives in the 12th 5YP and the NAPCC. - PC has appointed an Expert Group on Low Carbon Strategies for Inclusive Growth (not a permanent body). - Well-defined coordination and reporting frameworks, government accountability is not demonstrated for effective support from states, businesses and society. - Implementation of NAPCC at the State level is still a concern
2. Committee set up by PM a. PM appointed (informal) b. Under Environment protection act (formal route)	<ul style="list-style-type: none"> - Independent review and analysis based on sound and authoritative research - Very powerful and accountable structure - Option (2b) would provide NAPCC function through a statutory authority to implement legislation. 	<ul style="list-style-type: none"> - Resources and time involved in setting up independent body - May be seen as putting climate too high on the agenda - Adds additional layer of bureaucracy to system - May not be suited for State level support and engagement 	<ul style="list-style-type: none"> - Provides guidance and recommendations based on the reports it receives but no authority to provide advice to GoI and States - The PM Council on climate change is very remote from the core actions of NAPCC and not responsible for outcomes. It does not undertake any authoritative research of its own to verify the reports. It does not coordinate NAPCC and climate aspects of the Five-year plan.

3.2 IMPROVING THE INSTITUTIONAL FRAMEWORK TO SUPPORT PRIVATE SECTOR ACTION

In India, the private sector requires specialist technological support to implement low carbon projects, including advice as well as financial assistance/incentives to comply with climate change policies and capture the benefits from policy and regulatory incentives

The industry stakeholders consulted in this study explained that the industry is looking for stability and predictability of climate change policies both to comply with new legislation and rising energy prices as well as capture new market opportunities. The proposed Perform, Achieve and Trade (PAT) scheme in India focuses on large industries, but there are millions of small and medium industries which also need to be targeted. Even though a range of institutions already exist in India for supporting low carbon growth; the government still needs to strengthen existing institutions or create new structures using the available institutions to support low carbon growth. Major win-win opportunities are being missed due to lack of awareness and guidance. Indian industry and business sectors will benefit from technology, capacity building and financial support in order to maintain or increase their competitiveness in both domestic and international markets.

Even when policy objectives appear simple, there may still be actual or perceived risks associated with their implementation. Therefore, an appropriate institution or mechanism to reduce the perceived risks and motivate households and businesses to take action becomes necessary. Private sector requires specialist technological support, advice as well as financial assistance/incentives to implement low carbon projects. A variety of institutions and private consultants such as the IITs, IISC, IRADe and TERI do exist that have the technical expertise in the areas of clean technologies. Private sector consultants such as Deloitte and Emergent Ventures India also provide strategic advice but are not accessible to all businesses. Think-tanks mainly work on public policy and do not normally give commercial advice to private sector unless through collaboration with other partners. 'Not for profit' organisations which have to justify their status to tax authorities tend not to work for private sector companies. They also prefer to do visionary road map type of analysis rather than technology and policy strategy analysis for a company.

Financial support and investment are provided by institutions such as IREDA for renewable energy projects to catalyze financing by commercial banks. The study looked at the possibility of creating similar institutions for other low carbon sectors in India. Also most banks and private institutions are still wary of financing a number of low carbon projects. This is because they follow the conventional methods to determine the viability of projects. However, low carbon projects require innovative ways for financing as well as different market mechanisms to leverage private finance. Institutions like New Ventures India aim to mobilize the finances from private sector and lead banks to promote SME's producing green products can also play a role in strengthening the capacity of SMEs and promote low carbon growth in India. The study looked at whether a network of these and similar institutions can be created for positive spiral growth for clean technologies in India. Options were analyzed regarding strengthening of existing institutions by giving them additional responsibilities and providing required technical capabilities. Institutions such as the Carbon Trust in the UK that provide hand-holding to address perceived risks may also be useful in the Indian context (see box below).

Key lessons for India from the UK Carbon Trust experience

The experience of Carbon Trust in the UK is an interesting example that can be adapted in India to provide for independent advice and capacity building of the private sector. It is a unique organisation because it also plays an important role in the UK market as a financial institution. In this regard, it has

introduced many financing schemes such as interest free loans for energy efficiency in small and medium enterprises and other commercial finance schemes.

In addition, it has been involved with the following activities:

- provides impartial confidential advice to businesses
- has engaged people to create awareness about energy efficiency
- created various types of services such as strategic energy management advice for large businesses and energy audits for medium businesses
- advises the public sector and works with all the local authorities to set targets, identify opportunities and implement them
- introduction of the accreditation/ labelling scheme
- measures product carbon footprints
- provides incubation support for new technologies. It helps businesses to identify target market and create a business case for private sector investment.

While closeness to government can both help and hinder an organisation's reputation, the Carbon Trust has developed itself as a strong brand with a positive reputation for providing fact based independent authoritative advice. Credible authority and reputation is important to ensure private sector buy-in from both large companies and SMEs.

Carbon Trust has been active in supporting companies through the early stages of the "innovation chain". This is an area that has seen significant evolution within the CT portfolio of activity over recent years. Technology incubation is supported to provide venture capital funds where there is a credible technology with a credible route to market. Support from CT venture capital sources has been highly successful in leveraging in Private Sector investment (averaging £13 of private investment for every £1 of CT investment). CT has assessed more than 3,500 potential projects funding less than 10% of those that apply. CT investment is seen as a signal from the wider venture capital community of the significant quality of potential investment.

The Carbon Trust appears to have been able to balance its impartiality and public service role with a deep understanding of business. This is because, from the outset, the Carbon Trust recruited very senior leaders from the private sector and valued a private sector skill set within the staff group, operating with a strong commercial focus.

Recognising the impact of tailoring advice to size of organisation and risk profile of the technology/investment ensures cost-effective results and instils business confidence.

Early investment in marketing and reputation building pays long term dividends, as demonstrated by the evolution in the UK's private sector on carbon saving over the years. Strong brand identity has ensured that as business comes to appreciate the benefits of low carbon technologies, the Carbon Trust is well regarded as a potential partner in that journey.

Developing the right skills set internally can be achieved by providing tailored training, focussed recruitment and strong leadership.

The trust funds its activities through grant funding from the government and from revenue generating activities by its main subsidiaries. For 2010/11 the Group received grant funding from DECC, the

Devolved Administrations, Defra, Department for Transport (DfT) and the Foreign and Commonwealth Office (FCO) of £142.8 million (2009/10 – £244.4 million). In 2010/11 the Group generated revenues from sales and licensing agreements of £7.8 million (2009/10 – £5.3 million) via its main subsidiaries:

1. Carbon Trust Advisory
2. Carbon Trust Implementation
3. Carbon Trust Certification

A number of public and private institutions exist in India to provide private sector support with respect to finance and capacity building. A number of industry-led initiatives for India's low carbon growth have been established such as the CII's Sohrabji Green Business Centre (CII - Godrej GBC) Hyderabad. The Centre offers advisory services to the industry in the areas of green buildings, energy efficiency, water management, environmental management, renewable energy, green business incubation and climate change activities. The Centre provides support and information to key stakeholders to embrace Green practices and facilitates market transformation, paving way for India to become one of the global leaders in Green businesses by 2015.

Some other key institutions are summarised in the table below.

Institutions	Description
New Ventures India	New Ventures India is a joint initiative of the CII - Sohrabji Godrej Green Business Centre, Hyderabad and the World Resources Institute, Washington DC. The initiative was established and supported by USAID under the Global Development Alliance. The programme is currently supported by British High Commission under the Strategic Programme Fund (SPF), USDoS under the Asia Pacific Partnership (APP) programme and Citi Foundation. New Ventures India promotes sustainable growth by accelerating the transfer of talent and capital to businesses that deliver social and environmental benefits. Their mission is to match scalable green business opportunities with skills, talent, technology, markets and money. It focuses on enterprises working in renewable energy, energy efficiency, clean technology, sustainable agriculture, green building materials, recycling, water technologies and eco-tourism.
Inter Ministerial Group: National Clean Energy Fund (NCEF)	The Finance Bill 2010-11 provided for creation of a corpus called National Clean Energy Fund to invest in entrepreneurial ventures and research in the field of clean energy technologies. The fund is financed by levying a cess of Rs 50 per tonne on coal, lignite and peat. The fund receives almost US\$ 500 million every year. The National Clean Energy Fund is used for funding research and innovative projects in clean energy technologies. Any project/scheme using innovative methods for adopting clean energy technology or within research & development is eligible for funding under the NCEF.
Indian Green Building Council (IGBC)	The Indian Green Building Council (IGBC) is a part of CII-Godrej Green Business Centre, which is actively involved in promoting the Green Building movement in India. The council is represented by all stakeholders of the construction industry comprising government and nodal agencies, architects, product manufacturers, institutions, etc. The council is industry-led, consensus-based and member-driven. The vision of the council is to serve as single point solution provider and be a key engine to facilitate all green building activities in India.
Tata Energy Research Institute	The TERI is an independent not-for-profit organisation that works extensively on

Institutions	Description
(TERI)	<p>environment, energy and sustainable development issues. TERI has also created the TERI University to provide academic courses on these issues. As a scientific research organisation it has 17 divisions ranging from Climate Change, Biotechnology and Bioresources, Energy Environment Technology Development, Sustainable Development and Outreach, and Regulatory Studies Governance among others. It also provides consultancy and capacity building services in these areas. TERI has also created the TERI University to provide academic courses on these issues. They also have departments and divisions that covers Climate Change, Biotechnology and Bioresources, Energy Environment Technology Development, Sustainable Development and Outreach, and Regulatory Studies Governance among others institutes</p>
Academic and Research institutions	<p>Academic institutes such as the Indian Institute of Technology (IIT) and Indian Institute of Sciences (IISc) and the independent not-for-profit organisation such as TERI, IRADe that work extensively on energy, environment, and sustainable development issues and also provide consultancy and capacity building services in these areas.</p> <p>IRADe has worked in technology assessment often in long term perspective. Private consultancy firms are continuously involved in developing low carbon technologies and providing capacity building to various stakeholders.</p>
ICICI Bank Technology Finance Group (TFG)	<p>The Technology Finance Group (TFG) of ICICI Bank implements various programmes for international agencies such as World Bank and USAID. The programmes currently running are designed to help the industry and institutions undertake collaborative R&D and technology development projects. The core group handling these programmes assists projects, which introduce new concepts, products, and processes that will have a positive impact on the industry and help in improving competitiveness and operational efficiencies. The TFG has provided over two decades of experience in assisting various clean technology initiatives in India. It has also assisted in implementing programmes for bilateral/multilateral agencies on behalf of the Indian government.</p>
SAMEEEKSHA	<p>SAMEEEKSHA is a collaborative platform aimed at pooling the knowledge and synergizing the efforts of various organizations and institutions – Indian and international, public and private – that are working towards the common goal of facilitating the development of the SME sector in India through the promotion and adoption of clean, energy efficient technologies and practices. SAMEEEKSHA provides a unique forum where industry may interface with technology development specialists, R&D institutions, government bodies, training institutes, funding agencies and academia so as to facilitate this process. It enables like-minded organizations to coordinate and increase the impact of their activities in different areas in the SME sector. It has more than 33 reputed organizational members such as IREDA, CII, WORLD BANK, UNDP and SIDBI. Its core committee, comprises of:</p> <ul style="list-style-type: none"> • Bureau of Energy Efficiency (BEE) • Climate Change and Development Division, Embassy of Switzerland, India • Ministry of Micro, Small, and Medium Enterprises (MoMSME) • The Energy and Resources Institute (TERI)

A series of workshops and stakeholder consultation provided a number of suggestions and options for further reform. There was a common understanding that setting up new institutions should be avoided as much as possible. Replicating UK Carbon Trust functions through existing institutions in India is a more suitable option. This can be done by increasing the capacity of existing institutions or creating new networks or partnerships to address the gaps in the support provided to the private sector.

Some of the main recommendations are summarised below:

- It was suggested that technology-level institutions are crucial. In this regard, **technology innovation centres with respect to certain technologies should be promoted**. These could be promoted through research with coordination and cooperation of various existing institutions in India such as IISCs, IITs TERI and IRADe(which has done work on bio energy, solar energy and rural electrification, Carbon Capture and Storage, techno economic modelling work etc) , and also with support from other countries. It is important to see technologies holistically and hence multidisciplinary and multi stake holder analysis should be carried out more widely.
- In addition to technology innovation centres, Department of Science and Technology plans to have Technology Watch centres/groups, which will assess and evaluate various emerging and new low carbon technologies from Indian perspectives to give latest updates on the various technological developments across the globe.
- In addition to the availability of the technology, it is imperative that there is enough **skilled manpower to run the technology**. In this regard, it is important to emphasise education, capacity building and vocational training. Action from industries, industry associations, states, national government, NGOs, think-tanks and technical institutions will be essential to create awareness, capacity building and information dissemination. New supporting institutions such as the Energy Management Centre could also be created. The Energy Management Centre is the state designated government agency in Kerala devoted to the improvement of energy efficiency, promotion of energy conservation, small hydro power and encouraging development of technologies related to energy through research, training, demonstration programmes and awareness creation. The centre networks with institutions within and outside the state for research and training.
- Further solutions for **increased financial support and investment for low carbon technologies** were also identified as a requirement for moving forward. In India, the National Clean Energy Fund has been created by levying a cess of INR 50 per ton of coal, lignite and peat. The fund is a potential source of financing for renewable clean technology projects and can be accessed by submitting a funding proposal, routed through the Ministry of Finance to the relevant ministry. The size and scope of the fund should be reviewed on regular basis to ensure most appropriate technologies are targeted.
- Indian Renewable Energy Development Agency (IREDA) finances renewable energy and energy efficiency projects and catalyzes the financing of renewable energy projects by commercial banks. IREDA can be further empowered to play a bigger role in financing low carbon projects in India.
- New Ventures India (discussed above) promoted by Confederation of Indian Industry is a recommended private initiative but with limited funding. It aims to mobilize finance from private

sector and lead banks to promote SME's producing green products. It can also play a role in strengthening the capacity of SMEs and promote low carbon growth in India. It is important to create similar institutions and understand how larger funding can be made available under this initiative.

- A number of speakers at the workshops indicated that existing financial institutions (FIs) such as IDFC and ICICI bank can provide similar services to the Carbon Trust by scaling up exiting activities. Banks and FIs require advisory and technology screening services in order for them to fund unproven technologies. This service can be provided by upgrading the bank's existing advisory and technological support team or develop joint partnership or endorsement agreements with specialist technology institutions or private sector to screen technologies.

1 Introduction

1.1 Purpose of the study

This is the final report for the project titled 'Identify Specific Policy Options with the Aim of Reducing Carbon Intensity in India' (hereafter, the 'study'). The report is submitted by AEA, Emergent Ventures India (EVI) and Integrated Research and Action for Development (IRADe), the consultants appointed to conduct this evaluation. For this project, the lead firm from within the consortium was AEA.

The objective of this study is to share lessons learned from experiences of overcoming practical challenges when implementing low carbon policy in the UK and Europe, and to then apply those lessons to the challenges and context currently faced in India. By doing so, the aim of the study is to provide tailored and practical recommendations so India can 'leapfrog' some of these experiences and make rapid progress in developing its own policy approach, tailored to the Indian context, and facilitate the implementation of its National Action Plan on Climate Change. Three policy areas were specifically identified as the focus for this study:

1. **Renewable Energy Certificates (RECs)** – these incentivise the development and deployment of renewable energy to a level and at a pace that would not otherwise arise. This study investigates the key lessons learned mainly from the implementation of tradable RECs in the United Kingdom and brief analysis of evidence from the European Union and the United States of America and their applicability to the current Indian context.
2. **Green/energy efficient buildings standards and codes** – these have been developed principally in order to measure and rate the environmental performance of buildings in order to drive sustainable construction. This study explores the links between the evolution of green/energy efficient building codes in the United Kingdom, European Union and the United States of America and the equivalent rating system in India.
3. **Climate change institutions** – these have greatly helped to increase the effectiveness of climate policy by providing statutory force as well as support structures for both policy development and implementation by industry. The study explored the potential to create new institutions similar to those in the United Kingdom (e.g. the Climate Change Act, the UK Committee on Climate Change, Carbon Trust, Green Investment Bank etc.).

1.2 Study approach

The overall approach of this study is based on the analysis of the different approaches and pros and cons of carbon intensity reduction policies in the area of renewable energy, green and energy efficient buildings, climate change policy and institutions, using literature review, expert interviews and in-house expert knowledge in India and the UK. The study particularly examines different design parameters of the policies used in the European Union (EU), with special focus on the United Kingdom (UK) and United States of America (US) and how these policy parameters can inform the design of the proposed policies in India.

We have conducted a systematic literature search:

- Reviewing official policy documents available from the Indian Government websites (e.g. MNRE, BEE, MOEF, Planning Commission), UK Government websites (e.g. Department of Energy and Climate Change <http://www.decc.gov.uk>; Ofgem <http://www.ofgem.gov.uk>), EU

official websites (e.g. <http://europa.eu> - the official information and data website of the European Union), and US Government online sources (e.g. US AID).

- Researching the ‘grey literature’ related to: on-going work commissioned by policy makers (e.g. AEA and EVI project reports), by independent academic institutions and activists (i.e. NGOs, policy think-tanks); by industry associations and international initiatives.
- Tapping knowledge networks and information sharing initiatives within AEA (e.g. transport team knowledge sharing network, energy and climate change team knowledge sharing network and the economics team knowledge sharing network).

The three policy options were further developed and analysed with close consultation with relevant stakeholders in India³ and the UK. A series of workshops and roundtables were undertaken at regular stages of the study to:

- provide critical steer and targeted inputs to further refine the policy options
- help to understand how best to translate overseas experience into the Indian context
- increase the level of buy-in from local stakeholders.

1.3 Structure of the report

The report comprises of the following sections:

- Chapter 2 provides a brief **overview of India’s Climate Change policy** and the current state of play
- Chapter 3 looks at the Indian **renewable energy certificates (RECs)** scheme
- Chapter 4 looks at **green and energy efficient building standards and codes** in India
- Chapter 5 looks at developing **an effective low carbon institutional framework** in India.

³ See Annex for list of stakeholders

2 Renewable Energy Certificates (RECs)

2.1 Introduction

The National Action Plan on Climate Change (2009) set a national level target of 15% renewable energy by 2020 for India. Subsequently, the Central Electricity Regulatory Commission came out with the regulations for the Renewable Purchase Obligations (RPO) and the Renewable Energy Certificates (RECs) in India. These regulations act as model guidelines for the various State Regulatory Commissions (SERCs) to develop state specific RPO-REC regulations, which are required to roll-out the state level plan for compliance linked promotion of renewable energy. These state level plans (RPO targets) are then expected to aggregate into the national level RPO trajectory for the Renewable Energy (RE) development through till 2020. In the last 3- 4 years, the renewable energy capacity which has been realised in India has been limited to 3000 MW per year. However, to meet the targets specified in the NAPCC, an additional renewable energy capacity of 5000-6000 MW is required annually.

The wide variability in the geographical availability of renewable energy resources across India limits the potential for generation of renewable energy and hence the RPO target for each state. The Renewable Energy Certificates were conceptualised in order to address this mismatch and to overcome this limitation. The REC mechanism also seeks to avoid the financial burden of additional RE installation on the resource-rich states, by creating a national level market for RE generators to recover their costs, and hence pass this burden to resource-scarce states. The RPO-REC regulations aim to create a larger demand for renewable energy in India and simultaneously create a market based incentive to encourage greater participation and allow RE generators to recoup their investments.

Since its launch, the REC market has been functional for over a year, with over 1 million RECs traded to date. Over 2660 MW of RE generation from 444 projects has been registered under the REC mechanism during this period. Although there has been visible interest from generators in REC-based RE investments, several issues remain in the system; these could undermine the success of the REC mechanism in the long term.

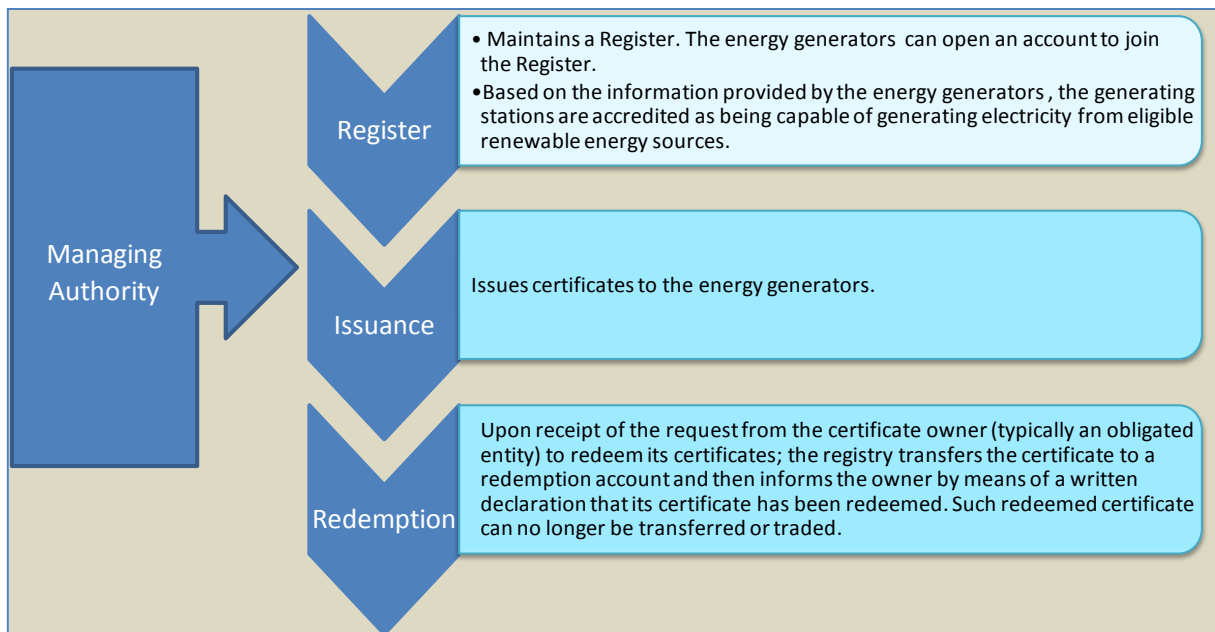
The UK has had a mandatory Renewables Obligation (RO) scheme since 2002. The RO is the main support mechanism for renewable electricity projects in the UK. Smaller scale generation is mainly supported through the Feed-In Tariff scheme (FITs). The purpose of the RO is to stimulate the development of the domestic renewable electricity industry and contribute to meeting a target of 10% renewable electricity supply by 2010, with an intermediate target for 2003. The RO is currently the central UK renewable electricity policy mechanism towards meeting the UK's national target (15% renewable energy consumption by 2020) under the EU Renewables Directive. Constant changes have been made to the scheme to increase transparency and the effectiveness of RO certificates for providing certainty to generators and investors. Recent consultations on setting obligation levels and the eligibility of technologies can provide vital insights to the Indian context.

One of the aims of this study is to establish the role that the RECs could play in low-carbon growth in India, as well as identify possible issues impeding the overall effectiveness and suggest possible solutions by drawing on past experience from the more successful and mature markets such as the UK's Renewable Obligation Certificate (ROC) market.

2.2 Conceptual issues and key design elements

Renewable Energy Certificates (RECs) offer a means to incentivise the development and deployment of renewable energy to a level that would not otherwise arise. Under such a mechanism, tradable certificates are earned by the generators of renewable electricity in relation to the amount of qualifying energy generated and a requirement is placed on suppliers or consumers to acquire and surrender a certain quantity of certificates in relation to the total amount of energy supplied or consumed. This chapter examines the role and design aspects relating to REC schemes for renewable electricity generation, drawing on experience in the UK and elsewhere.

Figure 2-1 Operational Lifecycle of a REC Mechanism



Compared to grant schemes, feed-in-tariffs, carbon pricing for carbon intensive generation sources and a mandatory supply mix disclosure for electricity suppliers, REC schemes offer the following benefits:

- REC schemes can be most cost effective for technologies that are beyond the demonstration stage because the scheme can provide uniform incentives across a supply system with the level of the incentive directly related to the amount of renewable electricity generated.
- REC schemes can allow national and regional targets to be met at minimum cost since the trading of certificates between participants means that the most cost effective opportunities are incentivised.
- From a policymaker's perspective, REC schemes can provide a long term trajectory for renewable deployment with a price signal that increases in response to shortfalls against the target.

The design issues that require careful consideration when developing a new REC scheme have been reviewed in the following sections with reference to a number of international examples.

2.2.1 On whom is the obligation placed?

The obligation is generally enforced on licensed suppliers (who provide electricity through the grid system), large consumers (who generate their own electricity or receive it via a private wire network from a neighbouring installation) or electricity generators.

The obligation may be mandatory or voluntary. The system requires a clear target with a form of financial underpinning (penalties, buyout price) to create a stable incentive; therefore a mandatory scheme is more effective than a voluntary one. A voluntary scheme may be useful as an introductory measure or learning phase, allowing institutions to be developed and capacity to be built, prior to full implementation.

2.2.2 Which renewable sources are eligible?

Countries often place limitations on eligible renewable sources so as not to over-subsidise installations. For example:

Exclusion of existing installations. RECs provide an income stream that plays a material part in the business case for a new installation; therefore it is desirable that the start date corresponds to a point of commitment on the part of the generator, such as being granted planning consent or licence to begin construction. Projects are generally registered to earn RECs prior to the start of generation. However, RECs are only earned for actual (subsequent) generation. In the UK, there are exclusions related to the renewal of existing stations, which is especially relevant for hydropower stations, since these can have long lifetimes.

Exclusion of certain technologies. Technologies can be excluded from earning credits if there are alternative support mechanisms, such as the exclusion of photovoltaics (PV) from the green certificate system in Italy because of its inclusion already in a designated feed-in tariff, or the removal of microgeneration technologies (PV, hydropower, wind and anaerobic digestion) from the RO in the UK upon their inclusion in a new feed-in tariff system.

Limitations on the eligibility of certain technologies. Restrictions on technologies may be applied on sustainability or additionality⁴ grounds. In the UK, for example, there is a limit on the use of biomass co-firing at fossil fuel stations (specified as a percentage of total site generation), on the basis that the incentive provides indirect support for fossil fuel combustion. Also, there is a maximum carbon intensity threshold for the use of solid biomass and biogas electricity in the UK system⁵. In addition, for larger generating stations, the UK has introduced mandatory sustainability reporting requiring the use of a reference GHG calculating tool.

Differentiated support levels for different technology types (banding). Differential levels of support are required if multiple technologies are sought to be incentivised by the scheme. This will avoid over-subsidising the cheaper technology types and see a range of technology types encouraged. Such a banding system has been in operation for several years in the UK and also applied in the Italy. A challenge with banding is that technology costs change with time, suggesting regular updating of the banding levels, whereas investors require a level of certainty on the REC returns they will get. One solution is to grandfather ROC allocations. In Italy, it is written into law that the banding multiplication coefficients will be updated every 3 years⁶. In the UK, reviews of banding levels are programmed in advance (albeit have been subject to change⁷). These measures help to some extent to manage market expectations. To implement a banding system, however, requires a detailed knowledge of the costs and implementation potential for existing and emerging technologies.

⁴ In Economic terms, 'Additionality' is defined as the Net positive difference that results from economic development intervention. The extent to which an activity (and associated outputs, outcomes and impacts) is larger in scale, at a higher quality, takes place quicker, takes place at a different location, or takes place at all as a result of intervention. Additionality measures the net result, taking account of deadweight, leakage, displacement, substitution and economic multipliers.

⁵ <http://www.decc.gov.uk/assets/decc/Consultations/Renewables%20Obligation/1059-gov-response-ro-order-2011-cons.pdf>

⁶ http://ec.europa.eu/energy/renewables/transparency_platform/doc/national_renewable_energy_action_plan_italy_en.pdf

⁷ http://www.decc.gov.uk/en/content/cms/meeting_energy/renewable_ener/renew_obs/renew_obs.aspx

2.2.3 How is the obligation level set?

A common approach for determining the obligation level is to set medium term targets, but to determine the actual annual target levels, consistent with that aim, on a shorter term basis. In the EU, longer term targets generally align with the targets for 2020 for each Member State under the Renewables Directive⁸. In the shorter term, in the UK, a predetermined formula is used to calculate the obligation level on an annual basis, taking account of the target penetration of renewables but recognising the actual renewables mix and the effect that has on the number of ROCs generated under the banding system. In Italy, an initial target was set following introduction of the scheme in 2001, followed by an annual increase in the obligation at a fixed percentage set for three years for 2004-2006 and then for the subsequent six years. Regional targets may be considered where electricity supply systems are distinct and renewable resources vary by region such as in Northern Ireland and the rest of UK.

2.2.4 How the level of incentive is maintained in the event of market scarcity or non-compliance?

In the UK, there is a buyout mechanism to cover market scarcity. There are penalties for non-compliance and arrangements for mutualisation which protect the buyout fund value in the event that a supplier fails to pay its required buyout payments, for example in instances of insolvency. In Italy, GSE provides market stability by purchasing (or creating) when there is excess supply and selling green certificates when they are scarce. Regarding the former, the withdrawal price (or buy-out) is the average price over the previous three years for exchanges of all green certificates regardless of the reference year, either on the GME-regulated market or through bilateral contracts. The 2010 withdrawal price for green certificates was €88.90/MWh⁹. For the latter, GSE releases certificates into the market at a price equal to €180 minus the annual average electricity transfer price for the previous year (defined by the AEEG). The green certificate reference price set by the GSE for 2010 was €113.8/MWh¹⁰. In Sweden, failure of a supplier or consumer to meet its obligation results in a fee being levied equal to 150 % of the volume-weighted average of the certificate price during a period from 1 April of the calculation year to 31 March of the following year inclusive for the shortfall¹¹.

2.3 International experience

A Renewable Portfolio Standard (RPS)/Renewable Electricity Standard (RES) seeks to drive the increased production of energy from renewable energy sources, such as wind, solar, biomass and geothermal. Table 2-1 presents the relevant RPS that supports REC/ROC schemes in different countries. The regulatory framework for a REC specifies the responsibilities of the managing authorities. One common approach for defining regulatory responsibilities for the management of REC schemes are presented in Figure 2-2.

⁸ See for example for Sweden:

http://ec.europa.eu/energy/renewables/transparency_platform/doc/national_renewable_energy_action_plan_sweden_en.pdf

⁹ http://ec.europa.eu/energy/renewables/transparency_platform/doc/national_renewable_energy_action_plan_italy_en.pdf

¹⁰ Ibid.

¹¹ http://ec.europa.eu/energy/renewables/transparency_platform/doc/national_renewable_energy_action_plan_sweden_en.pdf

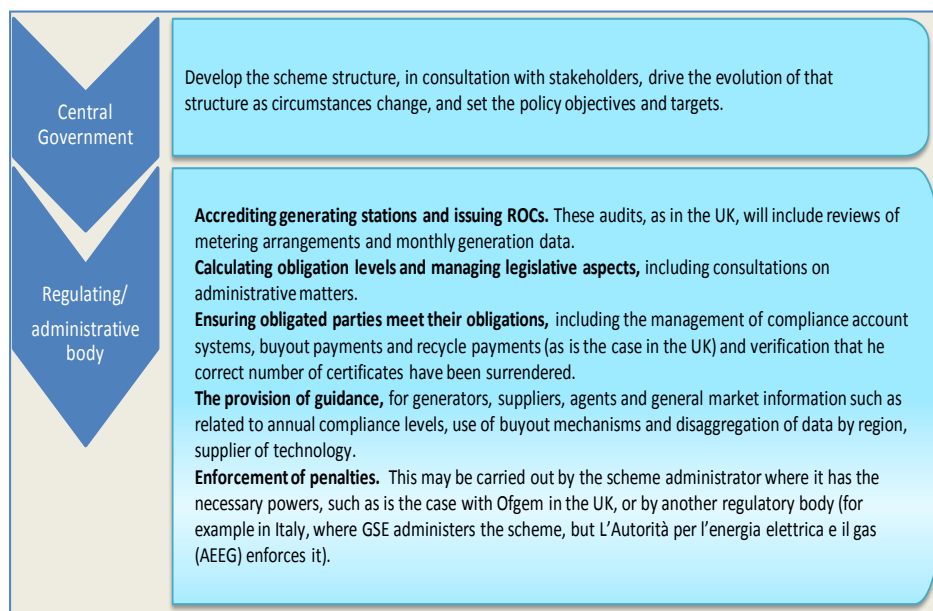
Figure 2-2 An example approach for defining regulatory and administrative responsibilities


Table 2-1 discusses and summarises the overall characteristics of the REC mechanism in the UK, USA, Sweden and Italy.

Table 2-1 A comparison of the REC mechanisms across selected countries

	UK	Sweden	Italy	USA
Supporting Regulation	EU Directive 2009/28/EC	Electricity Certificate Act 2003	Legislative Decree n.79/99, also known as the Bersani Decree	Support Renewable Energy Act 2010 (amendment of Public Utility Regulatory Policies Act)
Type of obligation	Mandatory	Mandatory	Mandatory	Mandatory/Voluntary (depending on States)
Obligation on	Licensed electricity supplier	Electricity suppliers and large electricity consumers	Electricity generators	Licensed electricity supplier
Issuing body	OFGEM (Public sector)	Svenska Kraftnat (Public sector)	GRTN (Public sector)	ERCOT*/NE-GIS-NEPOOL etc. (Non-public sector)
Accreditor	OFGEM	SEA	GRTN	DOER
Size of 1 Certificate	1 MWh	1 MWh	100 MW	1 MWh
Energy banding	Yes	No	Yes	No
Penalty/buy out	Yes	Yes	Yes	Yes
Validity	2 Years	Any period	2 years	3 years
Ineligible technologies	Large Hydro with reservoirs (>20MW)	-	Solar	Separate REC for solar.

*ERCOT, a membership-based 501(c)(4) non-profit corporation in Texas; NEPOOL, the voluntary unincorporated association with its subsidiary NE-GIS in Massachusetts.

UK Renewables Obligation Certificate: The purpose of the UK Renewables Obligation (RO) was to stimulate the development of the domestic renewable electricity industry and contribute to meeting a target of 10% renewable electricity supply by 2010, with an intermediate target for 2003. The RO is currently the central UK renewable electricity policy mechanism towards meeting the UK's national target (15% renewable energy consumption by 2020) under the EU Renewables Directive¹².

The Renewables Obligation is a mandatory scheme, implemented by the Office of Gas & Electricity Markets (Ofgem). Under the RO, licensed electricity suppliers in England and Wales, Scotland and Northern Ireland have an obligation to source an increasing proportion of the electricity they supply from renewable sources. To meet their obligations, suppliers can present Ofgem, with the corresponding number of ROCs, pay a buy-out payment or use a combination of ROCs and buy-out to meet their obligations. The Renewables Obligation has been extended until 31st March 2037. There is a predetermined list of eligible fuels, shown together with the banding rates in Table 2-2.

Table 2-2 Energy banding for issuance of ROCs & NIROCS (2011)

Technology	Total declared net capacity (DNC)		ROC/SROC/NIROC	NIRO amended (2010 and 2011)
	Minimum	Maximum	ROC/MWH	NIROCs / MWh
Hydro	0 kW	<=20 kW	1	4
	> 20 kW	<=250 kW		3
	> 250 kW	<= 1 MW		2
	> 1 MW			No change
Onshore Wind	0 kW	<= 250 kW	1	4
	> 250 kW			No change
Offshore wind; Co-firing of energy crops with CHP; Dedicated biomass			1.5	No change
Solar Photovoltaic	0 kW	<= 50 kW	2	4
	> 50 kW			No change
Anaerobic Digestion	0kW	<= 500kW	2	4
	> 500kW	<= 5MW		3
	> 5MW			No change
Landfill Gas	0kW	<=50kW	0.25	No change
	>50 kW			1
Wave; Tidal stream Advanced gasification or pyrolysis; Energy crops (with or without CHP); Dedicated biomass with CHP; Solar photovoltaic; Geothermal; Tidal			2	No change

Source: OFGEM

Consequently, there is a market in which ROCs are traded between generators and suppliers (of course, many suppliers are also generators themselves). The ROCs can be traded independently of the electricity, and it is the surrender of ROCs that constitutes compliance against the RO, not

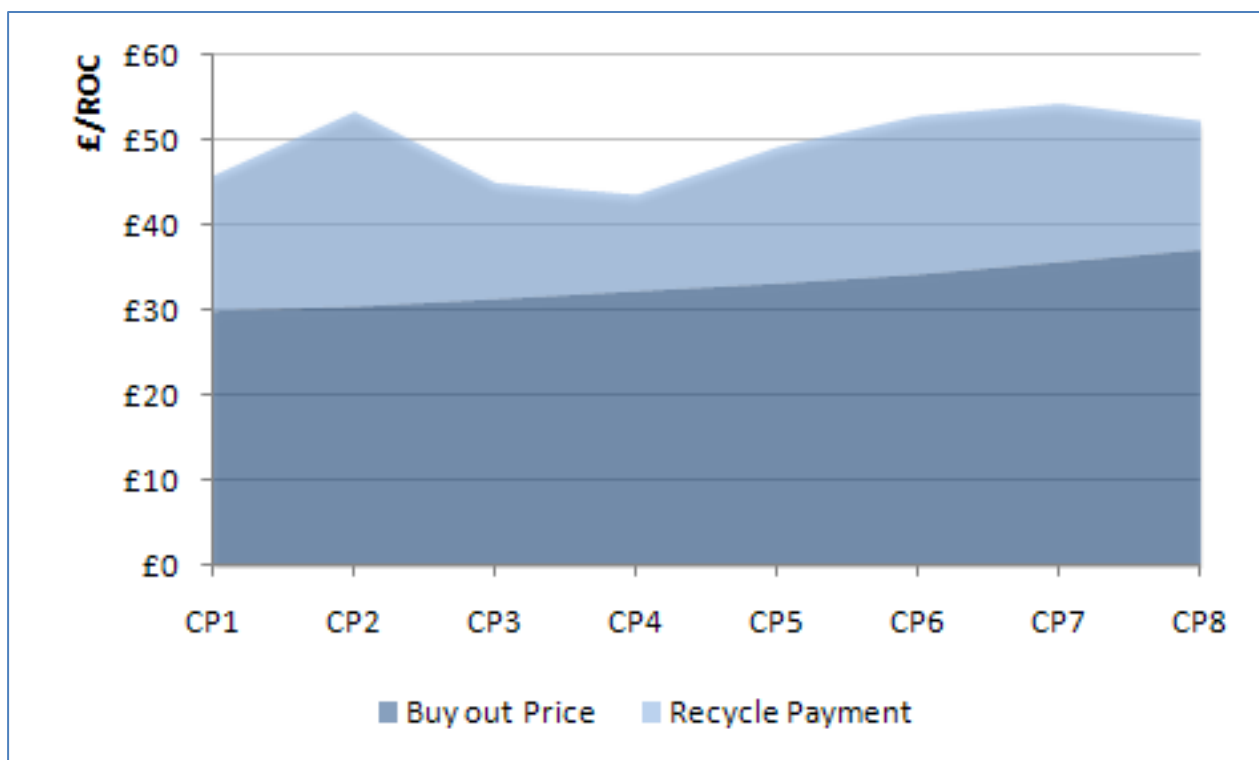
¹² <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:en:PDF>

supply of the corresponding electricity. ROCs are traded through auctions, brokers, bilateral trades with electricity suppliers and there are arrangements whereby smaller generators can trade their ROCs via agents who aggregate the ROCs from many generators.

The RO operates in a series of compliance periods, each period being a year from 1st April. The amount of supply required from renewable sources is set at least six months in advance and there are more significant milestone dates or aspirations which are determined over longer periods. The level is set by the Department of Energy and Climate Change according to a predetermined formula that takes the larger of either a fixed target of ROCs per MWh supplied or the expected number of ROCs generated plus a 10% uplift (known as the headroom)¹³. This formula takes account of the banding of ROCs and aims to ensure a stretch target that maintains a desired and stable level of incentive for renewable generators. For 2011/12, the number of ROCs that would be needed for suppliers to meet their targets will be 0.124 ROCs per MWh from eligible renewable sources in England, Scotland and Wales and 0.055 ROCs per MWh in Northern Ireland.

As mentioned above, suppliers can comply with their obligation through a mix of ROC surrender or buy-out payments. The buy-out price per ROC is normally adjusted by Ofgem each year to reflect changes in the Retail Prices Index. It was £30 per MWh in the base year (2002-03). The buy-out price is currently £38.69 per ROC. However, the buy-out payments are distributed to suppliers in proportion to the number of ROCs that they surrendered. This means the worth of a ROC is greater than the buyout price; it equals the buy-out price plus a recycle element. The historic worth of a ROC is shown in Figure 2-3.

Figure 2-3 Worth of a ROC derived from Ofgem data



In the above figure, it can be seen that the recycle payment can be around 30% of the worth of a

13

<http://www.decc.gov.uk/assets/decc/What%20we%20do/UK%20energy%20supply/Energy%20mix/Renewable%20energy/renewable%20energy%20policy/renewables%20obligation/585-RO-level-2011-12-methodology.pdf>

ROC. The recycle of buyout payments creates an additional incentive for the generation of renewable electricity; however this ROC pricing mechanism creates uncertainty in the worth of a ROC. As the obligation level is approached then the value of the recycle payment decreases to zero. To address this, a headroom system has been introduced in setting the obligation, aimed to ensure there is always a shortfall against target. In principle, if there was oversupply then there would be no demand for excess ROCs and they would have no value; to overcome this possibility, ROCs can be banked for future years which, combined with the headroom, ensures there is an ongoing demand for them.

The ultimate cost of the RO is borne by electricity consumers. The RO introduces an additional marginal cost associated with each kWh of electricity supplied (the buy-out price) and this is therefore reflected in the price that is paid for it. The cost of the RO scheme can be estimated at £1.487 billion by multiplying the estimated supply of electricity in the UK in 2010/11 (310 TWh – DECC UEP prediction) by the obligation level (12.4 ROCs per 100 MWh) and then multiplying by the 2011/12 ROC buy-out price (£38.69). In summary, this cost corresponds to a price of £4.8/MWh or 0.48p/kWh. This is about 8% of the retail price for large industrial consumers and 4% for domestic consumers.

US Renewable and Alternative Energy Portfolio Standards¹⁴. These schemes place an obligation on electricity utilities and retail providers to supply a minimum level of electricity from eligible renewable sources. Its stated aim is to stimulate market and technology development. Around 33 states have such schemes, although some of them are implemented on a voluntary basis. Given the diversity in natural renewable resources, the targets do vary significantly between States. Most of these targets are expressed as a % of electricity sales, although there is at least one target expressed in terms of installed capacity. Many states have set sub-targets for specific technologies. The eligible technologies vary by state, with some including CHP, energy efficiency and use of waste-to-energy. Many states allow trading of certificates for compliance.

Swedish Electricity Certificate Scheme¹⁵. This mandatory scheme aims to increase renewable electricity generation by 25TWh from 2002 levels by 2020 and is a key policy for meeting the country's targets under the Renewable Energy Directive. It was implemented in May 2003. The scheme awards new qualifying renewable installations with certificates for 15 years or until 2035 (when the scheme ends), whichever is shorter. The obligation, which increases each year, is placed on electricity suppliers and certain electricity consumers, who must acquire certificates to match a defined proportion of their supply or consumption respectively. Unlike the UK, there is not specific technology banding within the obligation. It covers hydropower, wind power, solar energy, wave energy, geothermal energy, biofuels and electricity produced in cogeneration plants using peat. Suppliers or consumers that fail to meet their obligation must pay a fee of 150% of the certificate value for each certificate shortfall.

Italian Green Certificates¹⁶. Legislation places an obligation on generators (and importers) to meet a minimum quota for the supply of renewable electricity to the grid, and green certificates are a voluntary means of contributing towards that obligation. The certificates are earned by generators and can be traded to meet their compliance obligation. The quota is a percentage of the total electricity produced from conventional sources in the previous year. There are exemptions for certain types of generation, such as CHP, and small generators. There is a banding system to enhance the incentive for less developed technologies (and reduce it for more established or cheaper technologies). Italy has a separate feed-in tariff covering photovoltaic energy and this is excluded from the green certificate scheme. There is an obligation on state-run energy management agency

¹⁴ http://www.epa.gov/chp/state-policy/renewable_fs.html

¹⁵ http://ec.europa.eu/energy/renewables/transparency_platform/doc/national_renewable_energy_action_plan_sweden_en.pdf

¹⁶ http://ec.europa.eu/energy/renewables/transparency_platform/doc/national_renewable_energy_action_plan_italy_en.pdf

GSE to support the incentive for renewables by purchasing excess credits. The scheme started in 2001 and does not have a stated end date, but generators are guaranteed to receive credits for 15 years.

2.3.1 *Lessons learned*

None of the schemes described above have remained static over the period in which they have been implemented (over 10 years in each case). They have been updated in response to lessons learned and changing circumstances. Some of the main changes are listed below:

- The targets for the REC schemes have been regularly updated, to maintain a long term signal and in response to new national objectives. The end dates for the schemes have been extended in Sweden and the UK, and in the former the period over which generation projects can earn certificates has been progressively increased.
- In the UK, it was decided to publish the mechanism by which the obligation level is set, including the introduction of a headroom mechanism (which was subsequently increased).
- In Sweden, it was initially a requirement that suppliers declared the element of the electricity price that was due to the REC costs, but this was subsequently stopped.
- In the UK and Italy, banding was introduced, to differentiate between technologies. In the UK, certain technologies were excluded as they were subsequently included in a new feed-in tariff. Arrangements for phased registration of significant offshore wind generating stations have also recently been introduced.
- In the UK, the eligibility requirements have changed, with limits on co-firing, biomass and bio-gas.
- In Italy, mechanisms to manage excess supply of or demand for green certificate were introduced.

The examples above illustrate some important lessons for the development of an obligation in India.

From a regulator's perspective:

- An obligation system can be a cost effective mechanism to incentivise the deployment of renewable energy generation. Such a mechanism is necessary to stimulate market activity and enable renewable technologies to compete with conventional technologies. It should be mandatory for those with an obligation.
- The obligation does not need to be placed on suppliers; there are examples where large consumers or producers have an obligation. However, a supplier obligation on a small number of entities, as implemented in the UK, can be cost effective.
- The obligation should provide a long term signal for the level of incentive provided, with clear medium to long term targets. The mechanisms for setting the obligation level should be transparent and any changes to the level of support (for example, changes to technology banding) should include grandfathering provisions for existing installations.
- Banding among the eligible RE technologies is a useful tool to enable the incentivisation of multiple renewable technologies, each of which have their own cost profiles, whilst avoiding over-subsidising any one technology.

- Banding of RE technologies can be challenging if the generation cost difference between technologies is very large, since small quantities of high banded generation can significantly affect supply of certificates and create uncertainty in the certificate market. Detailed analysis of technology costs and deployment potential is required to inform a banding process.
- An authority must be established to oversee the obligation, with responsibility for accrediting generating stations, auditing their output, administering the certificate system and monitoring compliance by those entities with an obligation.
- Capacity building and knowledge transfer arrangements will be required to enable generators and suppliers to understand their role in the process.
- It is necessary to define eligible generating technologies with consideration to: existing and business as usual technologies, other incentive mechanisms, potential perverse incentives such as support for fossil fuel through co-firing and sustainability impacts such as due to the use of biomass or biogas.

From a market perspective:

- There should be enforcement arrangements and penalties to manage non-compliance.
- There should be provisions made for the mismatch between supply and demand for credits. This could include:
 - A buyout and recycle mechanism, as in the UK
 - Intervention by the regulator to acquire or sell additional certificates, as in Italy
 - A penalty payment, as in Sweden

Of these options, the UK's approach appears favourable as the scheme remains revenue neutral to the government. In addition to these options, banking of certificates should be allowed to provide market stability.

- There will be the need for capacity building and development of institutional arrangements to support certificate trading. Trading platforms will need to include exchanges, auctions, bilateral and multilateral trades, and potentially futures contracts.
- Streamlined process should enable small generators to realise the value of their certificates without high administrative costs or poor sales prices. This could include arrangements for agents to act on behalf of multiple sellers, or simplified selling platforms.

2.4 Indian context

2.4.1 Objectives for REC in India

Under the Electricity Act 2003 and National Electricity Policy 2006, every state in India through its state electricity regulatory commission is under an obligation to purchase a certain percentage of power from renewable energy sources. In response to this policy, various states in India have set a renewable purchase obligation target. Some states in India have a larger renewable energy generation potential compared to other states. In order to address the mismatch and facilitate compliance of renewable purchase obligations (RPO), a market based instrument namely the Renewable Energy Certificate (REC) mechanism was initiated in India in 2010.

2.4.2 Approach to introducing REC in India

The first step to initiate the REC mechanism was to set state-specific RPO targets and enforcement mechanisms. Although the RPO targets were in place in some states before the beginning of the REC mechanism, the penalties for non-compliance were not efficiently enforced. Therefore, with the introduction of REC in 2010, the RPO targets, the associated penalty mechanism and applicability of RECs to meet the RPO targets were strengthened. This involved the State Electricity Regulatory Commissions (SERCs) playing a significant role, from setting up RPO targets to implementation of the REC mechanism. The idea was to ensure localised selection of eligible projects (controlled through State Nodal Agencies), centralised issuance and national trading of RECs.

To systematise the REC mechanism, the Central Electricity Regulatory Commission (CERC) which is the central, national authority under the Electricity Act 2003 to regulate electricity market in India issued model guidelines for accreditation, registration and issuance of RECs, which have been accepted by several SERCs¹⁷. It also outlined the institutional framework for implementation of the REC mechanism in all the states. The CERC has appointed the National Load Dispatch Centre as the central agency for registration and issuance of RECs while the SERCs have appointed specific State Agencies (generally the State Renewable Energy Agency).

The REC mechanism in India currently co-exists with the feed-in-tariff (FiT) or the preferential tariff mechanism for renewable energy. The FiT for renewable energy, including both wind and solar energy, was introduced by CERC in September 2009.

The incentives for a developer under both systems can be summarised as follows:

- Feed-in Tariff mechanism- The developer/investor can sell power to state electricity grid at the state regulated preferential tariff for various renewable energy technologies.
- REC mechanism- The developer/investor can sell power to the state grid at an average pooled cost of power purchase of distribution companies¹⁸ and sell RECs in the power exchanges.
- REC allows investors/developers to sell the electricity generated and the environmental attributes associated with RE generation separately.
- Investors/developers have the choice to sell electricity generated from RE either under a Feed-in-tariff scheme or the REC scheme. (A later amendment introduced a lock-in for existing projects under the FiT scheme).
- The obligated entities, i.e. distribution companies, open access consumers, and captive power plants (CPPs), have the option of purchasing RECs to meet their RPOs.
- The regulations distinguish RECs from solar and those from non-solar projects.
- The RECs can be traded only in power exchanges approved by the CERC within the band of a floor price and a forbearance (ceiling) price to be determined by the CERC from time to time.
- India is perhaps the only country where the feed-in-tariff scheme and the REC scheme run concurrently for a Renewable technology. This introduces a number of complexities in its regulation and market design. In most countries, there is a clear delineation between renewable technologies under RECs and FiTs.

2.4.3 Main drivers for developing the REC scheme in India

Although the REC scheme in India has been initiated to assist obligated entities to meet their RPO compliance, one of the main drivers of promoting the REC mechanism is to facilitate faster development of renewable energy in India in light of targets set under the National Action Plan on

¹⁷ SERCs in India are guided by the CERC but they take state level decisions on their own as electricity is a state topic.

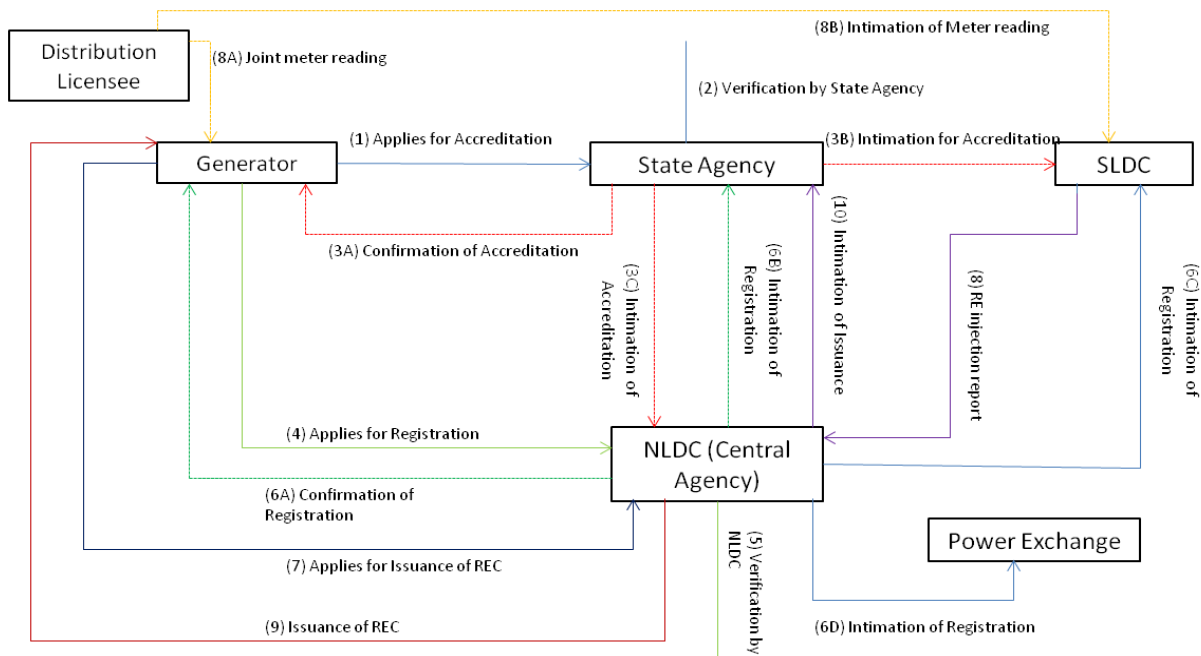
¹⁸ Weighted average pooled price at which distribution licensee has purchased electricity (including cost of self generation, long term and short term purchase in the previous year), but excluding the cost of RE power purchase.

Climate Change (NAPCC). The NAPCC has set a target of 5% in 2010 which it aims to increase by one percent every year till 2020.

In addition, although the current feed in tariff system for renewable energy in India has triggered development of renewable energy in the country, developers are also looking towards some market based measures to get maximum value of the renewable energy generated by their projects. This factor, combined with the government's plan to phase out subsidies, influenced development of a market based mechanism for rapid development of renewable energy in India. Moreover, the RPO targets are not economically related to the prescribed level of the FiT in most states, leading to a demand-supply mismatch for electricity generated from RE sources. This is reflected in the failure of RPO compliance across many states. The prevailing RPO regulations across various states specify procurement of electricity generated from RE sources at a separately specified FiT. Since the supply curve of RE generation is unobservable to the regulators, FiTs are not ensuring sufficient supply of RE to ensure RPO compliance.

The RECs have been designed to be nationally traded and hence uniform price discovery mechanisms were introduced, with trading only allowed on exchanges to exercise control and ensure minimum price support. The two power exchanges in India, Indian Energy Exchange and the Power Exchange of India Limited, were selected to conduct the REC trade. A single national registry for RECs has been developed and the same was made readily available for Stakeholder usage.

Figure 2-4 REC mechanism in India



In the first control period (till 2012) of the REC mechanism, CERC has set floor (minimum) and forbearance (maximum) prices in order to support the projects with the highest generation costs while being on par with the applicable preferential tariffs.

With a significant difference between the generation costs of solar PV compared to other renewable sources, the respective RECs generated from solar PV had specific price ranges specified.

2.4.4 Existing regulatory framework in India

The REC mechanism in India was initiated under CERC's Regulation 2010 titled 'Terms and Conditions for recognition and issuance of Renewable Energy Certificate for Renewable Energy Generation' which was published on 14th January 2010. The regulation was passed in exercise of powers conferred under sub-section (1) of Section 178 and Section 66 read with clause (y) of sub-section (2) of Section 178 of the Electricity Act, 2003 of Government of India. The regulation is valid for all Indian states. The REC mechanism is also regulated by state specific orders on renewable purchase obligations by State Electricity Regulatory Commissions (SERCs). Therefore, the CERC is the main regulatory body for the REC mechanism while the SERCs are the regulatory bodies for RPO compliance.

2.5 Improving the REC mechanism in India

The additional renewable energy capacity which has come on stream in recent years has been limited to 3000 MW per year in the last 3 – 4 years. However, in order to meet the targets specified in the NAPCC, an additional capacity of 5000 – 6000 MW is required annually. The current FiT mechanism is unlikely to meet these additional requirements and therefore a market based mechanism like REC is important to consider for India. Although the REC policy has been launched in India and the trading of RECs has started, there are key design and implementation aspects of the system which need to be addressed in order to make the policy more effective. Experience from countries where RECs are more widely developed and implemented offers a rich set of experience from which India can draw. Based on detailed consultation and focused discussions among key market players and stakeholders in India and discussions with Ofgem and DECC in the UK, the following areas of improvement have been identified with the REC mechanism in India.

2.5.1 Policy certainty

Given the variation in state-specific regulations and in absence of an umbrella regulation at the national level, REC-based investments are fraught with risks of possible shifts in government stance on RPOs and RECs. There is a possibility of certain states promoting regulations which might not be in line with the NAPCC targets. In the past year, certain states have indeed reduced their overall RPO targets or have been slow in coming out with the regulations in the first place. There have been instances where the control period for RPO regulations has been shifted by a year or so. At state level, the obligation targets are set on a short term basis, declared only for the next 1-3 years. In principle this could affect confidence in the long term demand for RECs, although in practice it is expected that demand will outstrip supply. Thus, there is lack of clarity on the long-term trajectory of RPO targets, which is another cause of uncertainty on RECs for investors.

The lack of certainty on the RPO-REC policy front creates doubts on the long-term curve of the RPO and REC markets. This needs to be addressed on the national level, with direct linkages built between the state-level regulations providing clarity on the RPO trajectories for a longer time period while considering the viability argument of the investments.

Recommended reform: There needs to be a National Policy Commitment for RECs, with forecasted RPO trajectories beyond 2020, and in-built linkages with the state-specific RPO targets.

There is a dilemma among developers and financial institutions regarding the government's position on Feed-in-Tariff and RECs. There are also concerns regarding grid infrastructure that restrain renewable energy surplus states in generating additional renewable energy.

Therefore, a national policy commitment needs to be established beyond 2020 regarding the importance of REC as a key market based incentive for generation of renewable energy power. Such a commitment could be part of the Planning Commission's Five-Year plans, national climate change plans and, most importantly, state action plans on climate change. In addition, policy announcements are required to confirm that the necessary support to obligated entities to achieving compliance will be provided (e.g. the development of grid infrastructure and transmission and distribution system to absorb renewable energy power in surplus states). In this context, central government and state government coordination needs to be established to create funds which can support the development of such infrastructure. This coordination should also include establishing corresponding state level commitments to the continuing role of the REC system.

2.5.2 Price certainty

The floor price provides the basis for calculating returns, and most investment decisions assume these prices for providing revenues for five years. This is because the current REC floor prices have been set for a second control period of five years only. The reliability of long term returns is influenced by the strength of policy commitment to supporting renewable generation in general and to the REC system in particular. There is no formal commitment to either of these beyond 2020. The REC prices have currently been declared for the control period till 2017, but there is no clear formula available for forecasting the REC prices beyond this period.

The current method for calculation of these prices is linked with the difference between the 'preferential tariff' and the average cost of power, also called the APPC. Given that the APPC prices are expected to increase at a much greater rate than the FiT, this method would lead to a net zero price for RECs in the coming future, much before the 2020 period. This particular method does not currently consider the additional cost burden for RE promotion, such as the infrastructure cost and is based on the concept of assumed grid parity of RE power.

There are several possible formulas that can be used for the REC prices and ensure it provides an effective premium for generators rather than just a 'cost+' incentive, as it stands now. The key issues here are effective pricing and long-term visibility on the floor as well as forbearance prices.

The forbearance prices are calculated so that when combined with the APPC prices, these guarantee returns similar to that from the highest preferential tariff available across the country. But there exists a flaw in the formula for setting preferential tariffs, which are again 'cost+' rather than premium-based. The CERC on a regular basis sets the return % (both pre tax: 24% and post tax: 19%) from RE investments, while also setting into place a uniform project cost figures across technologies. The assumed costs are significantly lower than the actual on-ground project cost (which varies across geographies and could be anywhere between 10-25% and even higher than the assumed figures). The SERCs use similarly flawed cost estimates and the same return figures (as issued by CERC) to calculate the preferential tariffs. These, in reality, lead to even lower returns from RE projects and hence make investments unviable.

The floor prices on the other hand are calculated based on the difference between the minimum "Viability Requirement" tariff and the APPC prices. And, just as with FiTs, in the future, the APPC prices will overshoot these figures as well.

The CERC is restricted from declaring the REC prices for a longer term period (Say 10-12 years which is normally the debt repayment period), given the inherent issues with reducing APPC and FIT tariffs. There needs to be a definite de-coupling of REC prices and APPC prices, given that in future, the APPC might overshoot both the FiT and the "Viability Requirement".

This is an inherent characteristic of any REC or FIT regime, i.e. to support RE investments till they reach 'grid-parity' or in this case are viable at APPC tariffs. But the lack of long-term visibility on when would this happen and that investments at current APPC tariffs (or similar fixed cost mechanisms in an open access or merchant sale route) would not be viable without similar REC price support as exists currently.

A possible solution to this problem is to establish long-term clarity and price support throughout the life-time of supported projects. However, the lack of clarity on the movement of APPC prices and hence the possible prices of the RECs in general, brings ambiguity in the expected returns from RE projects. The current system is based on a fixed 'APPC + REC' combination (which is the highest possible preferential tariff), with the REC making up the deficit between APPC. In the future, this deficit is expected to go down, but as an effect of the APPC going up, which would still make up for the fixed return gearing.

Recommended reform: REC price certainty could be achieved through the following two options:

1. The first option is to forecast a minimum floor price for a longer time horizon say 20 years ensuring that the lowest price for RECs would not fall below this particular price. The current mechanism the floor price for five years could be reset every five years as it is being planned currently.
2. The second option could be to keep the floor price constant for a longer time. However, to account for future changes in renewable energy cost structure a weightage for vintage of the renewable energy project can be assigned.

The first option would be a better choice as it could be based on the existing pricing system and also would be simpler to implement.

2.5.3 Minimum Price Guarantee

Though a price band has been declared, there is no support or guarantee for minimum price realisation from RECs. As the demand for RECs would depend on enforceability of penalties, there could be instances where the RECs remain unsold. This could be primarily due to an imbalance in the demand-supply equation of RECs, caused either by a surge in supply or reduced demand owing to insufficient RPO targets or improper enforcement of the RPO targets. The lack of minimum price guarantee for RECs is another concern that is weakening lender confidence in the REC mechanism.

Recommended reform: Setting a 'REC Price Guarantor' at the national level to stabilise the demand – supply imbalances in the REC market. This body should be accorded exclusive provisions, with regards to longer life for RECs and power for multiple trading of RECs. The Guarantor would act as a:

- "buyer of last resort", purchasing the RECs at the floor price, when any REC is getting expired, due to completion of life period, and
- "seller of last resort", selling RECs at the forbearance price, to the defaulting Obligated Entities.

The seed funding for this body could be sourced from the National Clean Energy Fund. The CERC could appoint a national body to oversee the roles of the REC price guarantor. This could be an agency with an existing role in development or promotion of RE projects in India. A typical example could be IREDA (Indian Renewable Energy Development Agency), which is responsible for promoting debt-funding for renewable energy projects. IREDA has played a crucial role in encouraging private and public bank participation in funding RE projects by showcasing and funding RE projects across

the country. IREDA also happens to be the nodal agency for disbursement of the Generation Based Incentive (GBI) for IPP promoted wind power projects in the country. However, given the lack of funds available to IREDA, it has been unable to either promote “Non-Recourse” financing or popularising funding of solar projects (which face the greatest deficit compared to grid prices). Similar bodies and agencies could be explored for overseeing the REC trade, whilst using the funds thus generated, both to revitalise the REC market and/or to promote RE project development in the country.

The UK perspective

The UK has had a mandatory Renewable Obligation scheme since 2002. The RO is the main support mechanism for renewable electricity projects in the UK. Smaller scale generation is mainly supported through the Feed-In Tariff scheme (FITs). The purpose of the UK Renewables Obligations (RO) was to stimulate the development of the domestic renewable electricity industry and contribute to meeting a target of 10% renewable electricity supply by 2010, with an intermediate target for 2003. The RO is currently the central UK renewable electricity policy mechanism towards meeting the UK's national target (of 15% renewable energy consumption by 2020) under the EU Renewables Directive. Constant changes have been made to the scheme to increase transparency and effectiveness of ROCs for providing certainty to generators and investors.

The Renewable Obligation (RO) system is written into legislation as extending to 2037, with each generator receiving certificates (ROCs) for 20 years. The investment case is underpinned by a buyout price – obligated entities can comply with their obligation level by purchasing credits and/or paying the buyout. The future value of the buyout price is written into legislation until 2037 and is equal to the system starting value increased by the rate of inflation each year. On top of this is a headroom mechanism that improves the business case from a generator's perspective.

The headroom mechanism concerns the setting of the obligation level. The obligation is calculated each year as the higher of either a predetermined value or the predicted level of renewable generation plus 10%. This should ensure that ROC demand always exceeds supply, so avoids the risk of a price crash. Also, the buyout payments are recycled to obligated entities in relation to the proportion of total ROCs they surrendered, therefore this headroom increases the worth of a ROC to at least 10% above the buyout price.

In the UK, the RO system is banded, meaning that the number of ROCs earned per MWh generated is technology specific. Banding levels are periodically reviewed but to encourage investor confidence there is a commitment to grandfathering banding rates according to the prevailing values at the time a generating station becomes accredited to earn ROCs.

In addition to having a long legislative horizon, the certainty of ROC returns is enhanced by the policy position. Repeated ministerial commitments that discount retrospective changes, together with a track record of those commitments being honoured, helps to provide long term confidence for investors. In addition, long-term government commitment to support for renewable generation is clearly set out in proposals for electricity market reform.

Lastly, it is important to note planned changes to the UK renewable support landscape. The RO will be closed to new entrants in 2017. Under current proposals, new generators after that point will be able to enter into contracts for difference (CFDs) to ensure a minimum level of return for up to 20 years accounting for average electricity prices. The CFDs will be entered into between generators and an administering entity and the costs recovered by a levy on suppliers. The benefits of this to generators is that the contractual agreement is legally more secure than a benefit established through public policy and legislation, and the CFD should enable generators to raise capital more cheaply.

2.5.4 Obligated entity Compliance

Obligated entities are primarily distribution companies (DISCOMS) and also open access consumers and captive power plants. The forbearance price is also the penalty paid by obligated entities for non-compliance. The current year is the first compliance period for the REC system, but anecdotal evidence and experience at a state level suggest that there is a risk of non-compliance. Successful obligated entity compliance is essential to underpin generator confidence in the demand for their RECs and the revenues that they can expect to receive. The likely cause of any non-compliance by obligated entities would be the financial pressures that many are under, leading to non-purchase of required RECs and non-payment of the forbearance price. This may be more likely to arise should regulators fail to enforce compliance.

The RPO-REC regulations and compliance to RPO targets are the backbone of the REC mechanism in India. The RPO regulation, unlike the RO system in UK, is not written into law and hence there is a lack of a statutory provision for legal enforcement of the RPO targets. In addition, a variation in the stringency of the regulations in different States including specific RPO trajectories affects the obligated entities as well as the penal clauses. Stricter enforcement norms and options to improve effectiveness of regulations need to be identified to ensure the required volume of RECs in the market. Concerns with regards to the poor financial situation of the state-run DISCOMs also undermine the overall effectiveness of the RPO targets.

2.5.5 Buy-out Price Mechanism

There are only two options for Obligated Entities to comply with their RPO targets: either purchase RECs or purchase renewable power. The RPO regulations do not have provisions for Obligated Entities to comply with their RPO targets, in case of non-availability of RECs or renewable energy. Given that the expected RPO trajectory far outpaces the RE capacity addition in long term, and therein the supply of RECs, it is possible that a situation may arise where there could be a lack of sufficient REC supply to meet the overall RPO demand. This could promote instances of non-compliance. This would undermine RPO compliance and the enforceability of regulations and thereby influence the participation from Obligated Entities.

Recommended reform: The enforcement for meeting RPO targets has not been effective so far. The real impact though would be clear only after the end of the first financial year. In addition to the enforcement measures which are described in the next sections, one of the options for RPO compliance could be a buy-out price mechanism which currently exists in UK. Therefore, there could be a provision for Obligated Entities (OEs) to comply with their RPO targets, by payment through a buy-out price, an option available to OEs in case of unavailability of RECs in the market. The buy-out price should be kept either at the forbearance price of RECs or at the highest traded price of RECs in the previous year. The fund, thus collected, could be channelled into the National Clean Energy Fund. Though, in order to ensure that the buy-out option does not discourage OEs to purchase RECs, this option should only become available, in case of established lack of RECs on the exchanges.

Pricing of the buy-out is a sensitive issue. The question is not just about the unavailability of RECs but the actual intent by the OEs to purchase RECs in the market. The failure to purchase RECs could be based on the low buy-bids, non-participation in bids by OEs or for another genuine reason. A cautious approach could include keeping the buy-out price at either the forbearance price or the maximum price at which RECs were transacted in the previous year.

In a free market scenario, with shortage of supply against demand, the REC prices should, theoretically, reach the forbearance price. Hence, this could be changed to:

1. Buy-out price option only being available if no RECs are present in the market.
2. Buy-out price being kept at the maximum sale price from the previous year.

The UK Perspective

The Renewable Obligation (RO) in the UK is regulated by the Office of Gas and Electricity Markets (Ofgem). Ofgem accredits generators, issues ROCs and enforces compliance. It regulates the electricity market and grants supply licenses. This ensures consistency of implementation and avoids any regional bias or variation for enforcement. There is a tiered approach to penalties for obligated entities, which are electricity suppliers:

- The buyout price is not a penalty, but a compliance option.
- Should the obligated entity fail to comply then the options available to the regulator include fines of up to 10% of the supply company's annual turnover, or ultimately it has the authority to withdraw a supply licence. Either of these would be financially catastrophic for the obligated entity.

In practice there has been little experience of non-compliance. The only instances relate to supply companies entering into administration. In response to that, a mutualisation mechanism was introduced to address buyout fund shortfalls resulting from non-compliance amongst other obligated entities, up to a ceiling value. The option of the buyout price exists for Obligated Entities to meet their compliance targets, strengthened with high penalties to the extent of cancellation of supply licenses for suppliers acting as effective deterrent against default.

2.5.6 Absence of Effective Deterrent for Non-Compliance

The current regulations outline insufficient penalties, which again create doubts about there being sufficient 'stick' for Obligated Entities to act. The overall cost of penalties is not significantly higher than the cost of compliance and hence there is a low cost for inactivity from the Obligated Entities' side. National level enforcement of RPO targets in individual states is also not possible as power is regulated at a state level. Few states are revising their RPO targets by lowering it resulting in less demand of RECs. Certain states even allow a pass-through of targets to the next fiscal. In addition, whether the State Nodal Agencies can legally enforce penalties on the OEs is still an open question which needs to be addressed. The penal mechanisms also vary from state to state and hence significant drivers might not exist across several geographies, thereby affecting the success of the RPO targets at the national level. In certain cases, the applicable penalties are open to interpretation, and there needs to be a clear indication from the relevant SERCs on the penalty clauses.

Potential reform: There should be provisions for significantly higher penalties, these could be:

- A multiple of the REC- forbearance prices,
- A percentage of the company's annual turnover or
- Cancellation of the operating license.

Also, the specific penal mechanisms should be clearly outlined. Applying RPO targets on a quarterly basis, instead of on a yearly basis, would support more consistent compliance from the Obligated Entities.

2.5.7 Lack of Statutory Provisions

There is no statutory provision for legal enforcement of the RPO targets. The case for enforcement as per the current regulations, being state specific, is based on penal mechanisms outlined in the

respective regulations. In the absence of a RE specific statutory provision, promotion of RE and effective enforcement of RPO would be difficult.

Recommended reform: The Government of India needs to establish separate statutory provisions for RE promotion in India or modify the current Electricity Act with amendments on penal mechanisms, RPO trajectory, transmission planning and vintage based multipliers.

2.5.8 Financial State of DISCOMs

The Distribution Companies (DISCOMs) make up for most of the Obligated Entities under the RPO regulations. Most of the state-run DISCOMs in India are under severe financial distress and are operating under heavy losses. This is primarily due to high inertia in increasing consumer tariffs (owing to political considerations) and rising end-user electricity costs. In addition to this, further subsidies to certain sections of consumers lead to greater operating losses for DISCOMs.

Expecting DISCOMs to bear the additional cost of RPO Compliance does not seem to be a likely proposition. While there are provisions to pass through the REC compliance costs onto the consumer tariffs, this is a politically sensitive issue and hence such pass throughs may always not occur in practice. As per recent regulations, the consumer tariffs need to undergo annual revision, and should thereby better reflect the operating margins for DISCOMs. However, the total losses aggregated in past years present a significant concern.

Recommended reforms: A provision should be created to pass the RPO compliance cost through to the consumer tariffs. The compliance cost can be passed onto consumer tariffs based on a review of total compliance costs in the previous year and adjusting the additional amount in the tariff of the current year. The tariff revision in India is currently based on the Annual Revenue Requirement review of Discoms which include cost of power purchase (except renewable power), operation and maintenance (O&M cost and other related costs). The accounting for additional compliance costs should be done separately from the general ARR review so that the change in tariff clearly shows the impact of compliance costs and general power purchase and O&M costs separately.

2.5.9 Coexistence of REC and Preferential Tariff (PT)

India is the only country internationally to have kept the REC option voluntary for both the OEs and generators, with the co-existence of these two mechanisms intended to promote greater participation from investors with varied risk-return requirements. Given the bankability of preferential tariff based projects along with the long-term surety of payments, there is some preference from generators towards the preferential tariff based sale of renewable energy power. While a preferential tariff ensures investment security, on the other hand, REC mechanisms can ensure policy outcomes such as the achievement of greater renewable energy mix target. Therefore, it is important that the options complement rather than compete with each other. While having choices for generators can be beneficial, co-existence of two mechanisms can also create uncertainty among market players regarding the policy that the government will back in the future.

The preferential tariff is currently more of a “Cost +” mechanism and not “Preferential”, unlike earlier provisions with markedly higher premiums for renewable energy as compared to conventional energy. However, with RECs even at the floor price, projects become far more viable, thus making it more of a “preferential” option compared to conventional power unlike the existing preferential tariff mechanism.

2.5.10 Future Policy Compared to RECs

Though the REC and PT appeal to investors with varied risk-return requirements, there needs to be clarity on the instrument that will be promoted in the future. There are indications that the CERC is inclined to promote RECs as the sole option in the future.

Recommended reform: The Commission should address related issues such as arrangements for banking of power for RE projects, and establish level playing field conditions for ensuring sufficient demand for RECs. This, along with public clarity on the instrument to be preferred in the long term, would significantly benefit investor and lender confidence. The latest provisions for public sector entities in India to buy RECs to offset their carbon footprint is seeking to increase demand for RECs thereby providing more boost to the REC market. This could be promoted more aggressively by central government and in addition similar guidelines could also be provided for state public sector organisations and other agencies to increase their participation in the REC market.

As part of creating a REC market, it is essential that off-grid power projects also enjoy REC benefits. CERC is currently considering a mechanism to address this. Learning can be drawn from UK experience whereby off-grid projects receive two RECs compared to one REC for grid connected projects, for the same number of units of power produced.

These initiatives would establish a government position in support of RECs as an important policy instrument, along with a preferential tariff for promoting renewable energy generation in India.

2.5.11 Open-Access Provisions

RECs combined with the merchant sale of electricity increases the attractiveness of RE investments. However, this requires RE generators to take Open-Access approvals, which are quite stringent and are restricted in several states.

Recommended reform: Open access provisions currently exist as per CERC's regulations for the inter-state sale of electricity and as per SERC's regulations for intra-state sale of electricity to third parties. However, there are concerns regarding limited open access approvals citing technical reasons such as availability of special energy meters (SEMs) which work on Time of Day (TOD) based power procurement. In addition, open access charges in case of REC based power transaction are still not clear in few states. Therefore, CERC should issue consistent guidelines for all states in this regard.

The UK Perspective

There is a clear delineation of FIT and RO schemes in UK, with some (but only insignificant) overlap. The feed-in tariff covers certain technologies up to 5MW. There is a slight overlap with the RO, whereby the RO covers all technologies and all capacities, unless the technology is eligible for FITs in which case it is only eligible for ROs if the project is over 50kW. Operators can only claim one of the two support mechanisms, and hence must choose between one of the two instruments since operators cannot switch between the schemes. In practice, the proportion of each scheme that overlaps with the other is insignificant.

Table 2-3 Summary of main Issues and Recommendations

Issues	Sub-Issues	Recommendations
Bankability of RECs	Long Term Demand for RECs	<ul style="list-style-type: none"> • Policy certainty and demand creation <ul style="list-style-type: none"> ○ Uniform RPO targets for all states in India in accordance with national level targets ○ Establish a National Policy Commitment for REC system beyond 2020
	Long term REC Price Uncertainty	<ul style="list-style-type: none"> • Price certainty - establish a minimum floor price for a long period
	Guarantee the minimum prices	<ul style="list-style-type: none"> • Price guarantee <ul style="list-style-type: none"> ○ Strengthening the enforcement mechanism ○ Establish a price guarantor (National RECs Authority) to guarantee minimum realization from RECs
Obligated Entity Compliance	Insufficient Stick and lack of movement from OEs	<ul style="list-style-type: none"> • Regulatory compliance <ul style="list-style-type: none"> ○ Greater penalties ○ RPO Compliance to be done on quarterly and not annual basis
	DISCOMs in Financial distress and cost pass through	<ul style="list-style-type: none"> • Supportive mechanisms for regulatory compliance, such as separate mechanisms for pass the REC cost through to tariffs, instead of the ARR
	Lack of Statutory Provisions	<ul style="list-style-type: none"> • Regulatory compliance - establish separate statutory provisions such as RE Law or amend the Electricity Act on penal mechanisms, RPO trajectory, Transmission planning and Vintage
	No Buyout price	<ul style="list-style-type: none"> • Supportive mechanisms for regulatory compliance <ul style="list-style-type: none"> ○ Forbearance price as buyout ○ Clear interpretation of applicable penalties
Co-existence of Preferential Tariff and RECs	Lack of policy clarity for the long-term	<ul style="list-style-type: none"> • Policy certainty and demand creation <ul style="list-style-type: none"> ○ Address bankability and RPO enforceability to make RECs viable solutions in the long term ○ Create demand of RECs through policy initiatives e.g. carbon footprint offsetting and sustainability

Issues	Sub-Issues	Recommendations
		promotion in public sector units through purchase of RECs. ○ RECs for off-grid renewable energy projects
	Open Access	<ul style="list-style-type: none"> • Policy certainty and demand creation <ul style="list-style-type: none"> ○ Promotion of Open Access and decentralized installations. ○ Guidelines for open access charges for REC power transaction

3 Green and energy efficient buildings

3.1 Introduction

Increases in GDP, population and standard of living (per capita consumption) leads to increased demand for energy resources, making energy a critical parameter for economic growth and human development. With an average growth of 5.5%, 7.2% and 8.33% for the 9th five year plan, 10th five Year plan and 11th five year plan respectively¹⁹, India is now targeting an annual growth of 9% for the 12th five year plan²⁰. Recent liberal policies of India have allowed for high growth of corporates and multinationals in India. This has resulted in an extraordinary demand for commercial space in the real estate sector. It is observed that the increase in demand for commercial spaces directly contributes to higher energy consumption in this sector.

This chapter discusses the importance of accelerating green buildings in India, identifies the main barriers and recommends policy options for energy efficiency and carbon reduction in commercial buildings. Commercial buildings in the context of this study includes offices, hospitals, hotels, retail outlets, educational buildings, utility houses and public service buildings; having a connected load of higher than 100kW.

3.2 Building Sector and Low Carbon Inclusive Growth in India

In order to fulfil the economic growth targets, it is essential to provide world class business infrastructure, state of the art cities, fast transportation facilities, top sanitation and water management facilities to attract global investors. Incidentally, the construction industry has been the most capital intensive sector with long gestation period. It is a major consumer of steel, cement, specialized machinery. The past decade has observed a period of economic transformation in the real estate industry. The highest growth in demand in the building sector by 2030 will be for commercial buildings (Figure 3-1). However, most indicators suggest that 70% of the buildings targeted to be completed by year 2030 are yet to be built.

Investment in the construction industry accounts for nearly 11% of India's GDP²¹. It is evident that the increase in commercial buildings will put pressure on resources including energy, water and land. Therefore, greater consideration of climate change impacts and specifically energy efficiency in the building sector would not only ensure that the sector's growth remains sustainable in long term but also contribute significantly to climate change mitigation goals of India.

Most countries have already constructed buildings to meet demand up till 2030. Europe will have 80-90% of its existing building stock standing in 2030; China has constructed almost 90% of their targeted built up space²² by 2030. Hence, India can learn from international construction precedence

¹⁹ Report on 'Towards Faster and More Inclusive Growth – An Approach to the 11th five Year Plan' by Government of India – Planning Commission

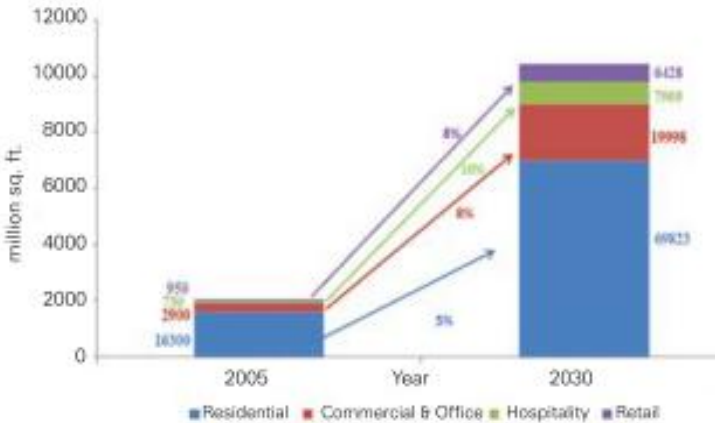
²⁰ Report on 'Faster Sustainable and More Inclusive Growth – An Approach to the Twelfth five Year Plan' by Government of India – Planning Commission

²¹ Report on Incredible India by Ministry of Commerce & Industry, Government of India and Federation of Indian Chambers of Commerce and Industry (FICCI)

²² Interaction with Dr. P.C. Jain, Chairman – Indian Green Building Council (IGBC) in workshop for 'Achieving India's 2020 goal to reduce carbon intensity: Discussion of the Indian policy context and lessons learned from UK/EU policy instruments', 28-29th, March, 2012

and develop a strategy to incorporate energy efficiency at the design stage of commercial buildings yet to be built.

Figure 3-1: Future trends of Building Sector in India

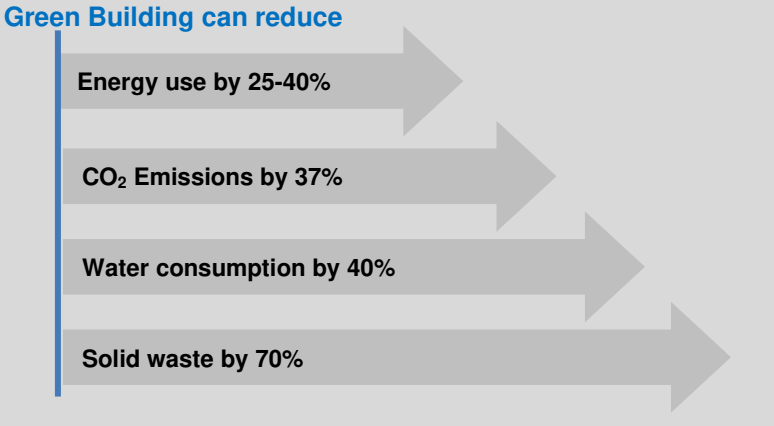


Source: Low Carbon Strategies For Inclusive Growth – An Interim Repor, (ADAPTED from: CWF, 2010)

3.2.1 Importance of Green/Energy Efficient buildings in Climate Change Mitigation

The built environment has immense impact on the natural environment, resources, health of living beings, economy, performance and productivity. The environmental impact can be reduced and economy, performance, health parameters can be enhanced by adapting green building strategies. ‘Green buildings’ are defined as the one which uses less water, optimizes energy efficiency, conserves natural resources, generates less waste and provides healthier spaces for occupants, as compared to a conventional building²³. Green buildings are also sometimes called high performance buildings, sustainable design and construction, energy efficient buildings, net zero or energy positive buildings.

Figure 3-2: Benefits of green buildings

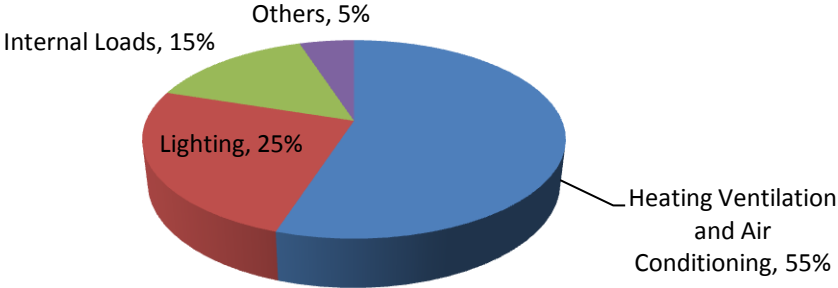


Source: Green Building consultants Austin, Texas²⁴

²³ Indian Green Building Council (IGBC)
²⁴ <http://www.green-potential.com/>

Currently, building sector in India consumes approximately 30% of total electricity consumption and is rising at the rate of 8% annually.²⁵ Figure 3-3 shows the energy consumption pattern in commercial buildings in India.

Figure 3-3 Energy consumption pattern for commercial buildings



Source: Low Carbon Strategies For Inclusive Growth – An Interim Report (Adapted From: Bureau Of Energy Efficiency: Ministry Of Power)

There is tremendous opportunity for reducing greenhouse gas emission by optimizing Heating Ventilation and Air Conditioning (HVAC) Systems and Lighting (internal and external) for both new and existing buildings, as they account for approximately 80% of the total building energy consumption. It is estimated that there is the potential to abate 142 MtCO₂ per year for projected commercial area of 152262 (Million Sqft) by 2020 and 296 MtCO₂ per year for the projected commercial space of 34276 (Million Sqft) by 2030 respectively.²⁶

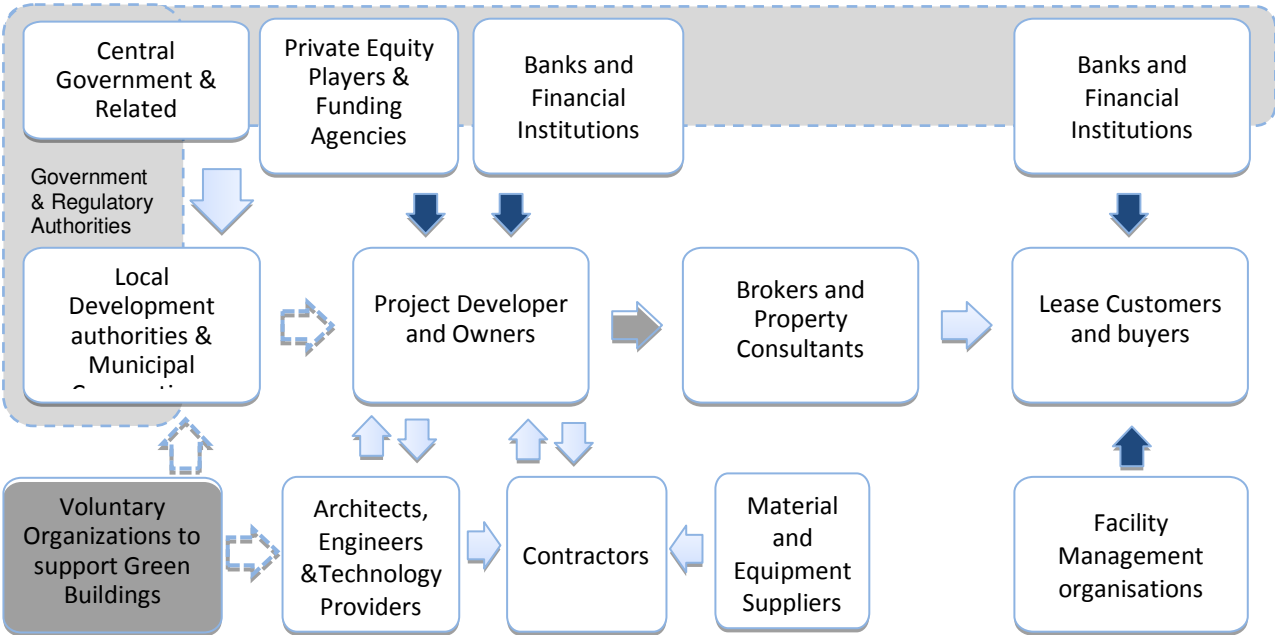
3.2.2 Building Sector Value Chain

The building market is very diverse and complex. The sector is characterized by the fragmentation within sections of the value chain. The building sector comprises of different stakeholders such as: architect, engineers, technology providers, project developers, government and other regulatory authorities, bank and financial institutions, private equity players, other funding agencies, consumers/ buyers, brokers, property consultants and technology providers. Figure 3-4 illustrates the most significant relationships in the building supply chain. More details of the roles and responsibilities are provided in the Annex.

²⁵ Report on Low carbon strategies for inclusive Growth – An Interim Report by Government of India – Planning Commission

²⁶ Report on Low carbon strategies for inclusive Growth – An Interim Report by Government of India – Planning Commission

Figure 3-4: Building Sector Value Chain

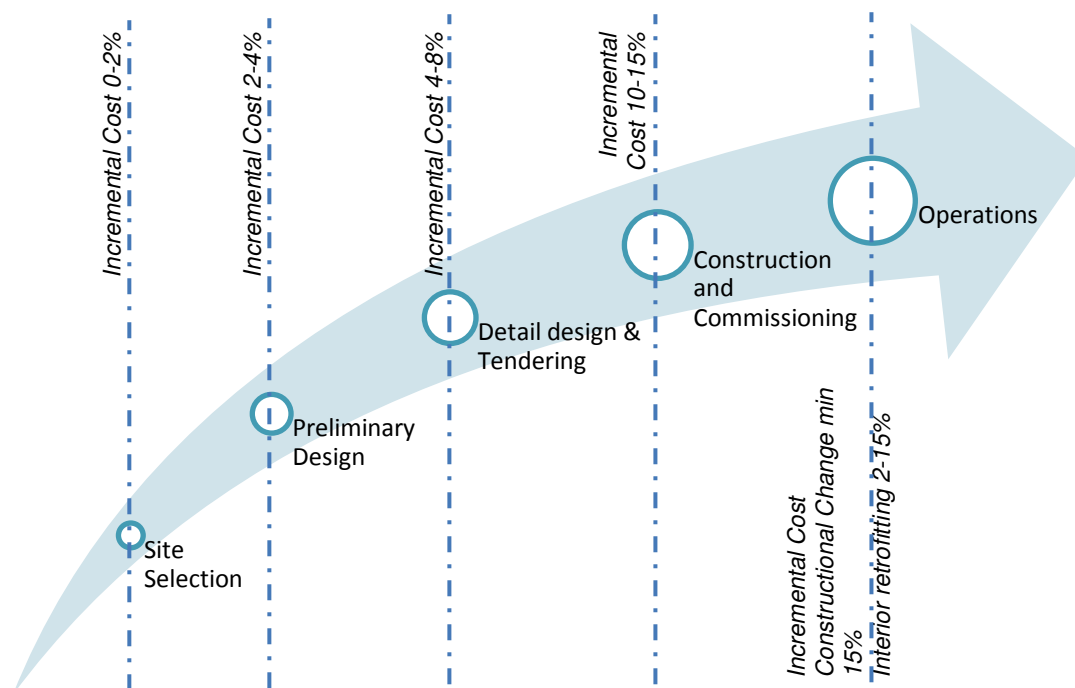


The central government and regulatory authorities have set targets for reducing greenhouse gas emissions from adoption of green buildings standards. However, they now need to consider the right policies and provide incentives to create a market driver for adoption of these standards. Financial institutions also have to be incentivised to ensure they provide additional financing for developers and owners for the upfront capital costs of the building projects. Currently organizations such as the Bureau of Energy Efficiency (BEE), Indian Green Building Council (IGBC) and The Energy and Resource Institute (TERI) have developed various voluntary guidelines for the design, construction and operations of green buildings and their systems. Brokers and property consultants play an integral role in marketing of the commercial space to the lease customers or buyers. Facility management establishments are responsible for maintenance and operation of a commercial building. They generally maintain records for the energy and water consumption and can play an important role in saving energy and water by controlling their excess consumption and wastage.

3.2.3 Economics of Sustainable Building Design

Green and energy efficient practices can be incorporated into a building at any stage. The most common reason for not incorporating green elements into a building is the capital cost. The cost of integrating sustainable building design elements depends on a wide range of factors including building type, location, micro and macro climate, site conditions, stage at which the sustainable design is incorporated and expertise of the project team in sustainable design. Even though these cost factors are perceived as major market barriers; these factors have a relatively small impact on the overall cost. A key factor for determining cost is the stage at which sustainable building design is incorporated. As examined from the successful case-studies of ECBC compliant buildings, the incremental cost for energy conservation varies at different stages of the building delivery process is described in Figure 3-5.

Figure 3-5: Relation of Incremental Cost for Energy Efficiency with the Building Delivery Process



3.3 Existing Policies for Green/Energy Efficient Buildings in India

Climate change affects all sectors of the economy, at all the levels. The Fourth Assessment report of the Intergovernmental Panel on Climate Change (IPCC-AR4) determines from direct observation changes in temperature, sea level and change in snow cover level in northern hemisphere as compared to 1850. *The global atmospheric concentration of carbon dioxide has increased from a pre-industrial value of about 280 ppm to 379 ppm in 2005. Multi-model averages show that the temperature increases during 2090-2099 relative to 1980-1999 may range from 1.1 to 6.4°C and sea level rise from 0.18 to 0.59 meters*²⁷.

The current policies in India are discussed below.

3.3.1 BEE, ENERGY Labelling Program for appliances

An energy consumption certification program for electrical appliances was launched in 2006. It is a comparative 'star' based system, whereby labels provide information about the energy consumption of the appliances, as compared to a benchmark. It has been introduced by Bureau of Energy Efficiency (BEE). These tags enable the customer to make informed decisions on their choice of appliances. It was initially introduced for the labelling of fluorescent tube lights, air conditioners, refrigerators and distribution transformers, and has now been extended for almost all the available electrical equipment available in the market. The Bureau of Energy Efficiency has made it mandatory for refrigerators to display energy efficiency labels and is expected to do so for air conditioners as

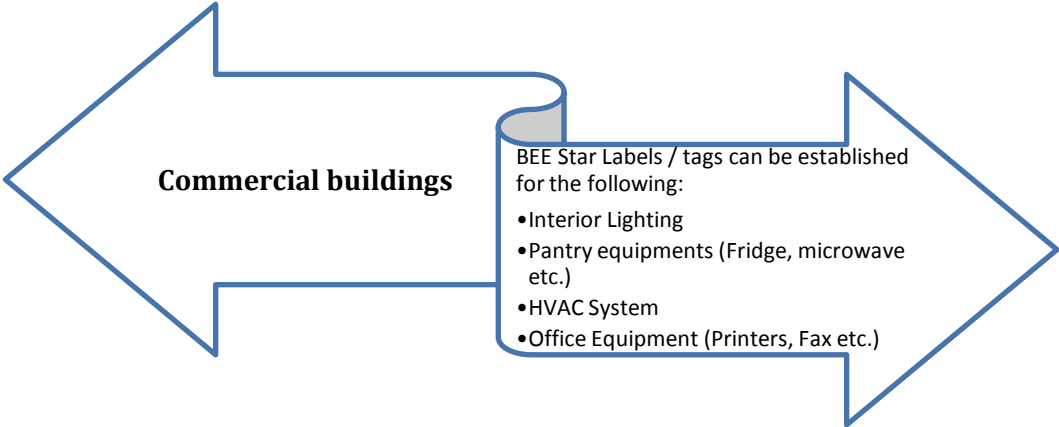
²⁷ National Action Plan for Climatic Change

well. The standards and labelling program for manufacturers of electrical appliances is expected to lead to significant savings in electricity annually.

Applicability to Commercial Buildings

In-order to successfully apply to the BEE labelling system, it is essential to identify the high energy consuming appliances and equipment that are used within the commercial buildings and set benchmarks for maximum energy consumption. The scheme of tagging should be extended to the office appliances and equipment such as printers, fax, photocopier machines, microwaves, hand dryers, dishwashers. It should be mandated to use 5 star rated regular equipment such as: refrigerators (in pantry), ceiling fans, fluorescent lamps, individual ac units, Colour TVs etc., within the office premises.

Figure 3-6 Office appliances and equipment that can qualify for BEE labelling program



3.3.2 Energy Conservation Building Code

The Energy Conservation Building Code (ECBC) was launched in May, 2007, which addresses the design of new, large commercial buildings to optimize the buildings' energy demand based on their location in different climatic zones of India. Nearly one hundred buildings are already following the code, and compliance with the code has been incorporated into the mandatory Environmental Impact Assessment requirements for large buildings. Compliance with ECBC norms is voluntary at present but is expected to soon become mandatory. The code has been designed precisely for effective energy conservation in commercial buildings of all types.

3.3.3 National Action Plan on Climate Change (NAPCC)

The National Action Plan for Climate Change responds to the decision of the PM's Council made during their first climate change meeting on 13th July 2007, as well as updates to India's national programs relevant to addressing climate change. This policy and program outlines broad objectives and strategies for responding to the impacts and challenges of the climate change. It conveys a national policy framework to alleviate the causes of climate change and adapt to its impacts in a coordinate, effective and sustainable manner. NAPCC is committed under the United Nations Framework Convention on Climate Change (UNFCCC) to reduce the greenhouse gas emission, transfer new and additional financial resources and climate friendly technologies from developed countries, to support both adaptation and mitigation in developing countries. NAPCC is guided by the following key principles:

- protecting the poor and vulnerable sections of society through an inclusive and sustainable development strategy, sensitive to climate change
- achieving national growth objectives through a qualitative change in direction that enhances ecological sustainability, leading to further mitigation of greenhouse gas emissions
- devising efficient and cost-effective strategies for end-use demand side management
- deploying appropriate technologies for both adaptation and mitigation of greenhouse gases emissions extensively as well as at an accelerated pace
- engineering new and innovative forms of market, regulatory and voluntary mechanisms to promote sustainable development
- effecting implementation of programs through unique linkages, including with civil society and local government institutions and through public private-partnership
- welcoming international cooperation for research, development, sharing and transfer of technologies enabled by additional funding and a global IPR regime that facilitates technology transfer to developing countries under the UNFCCC
- to deal with challenges of climate change an action plan is required along several fronts simultaneously; this shall be achieved by forming institutional mechanisms in form of ‘National Missions’, with Eight National Missions that form the core of the National Action Plan.

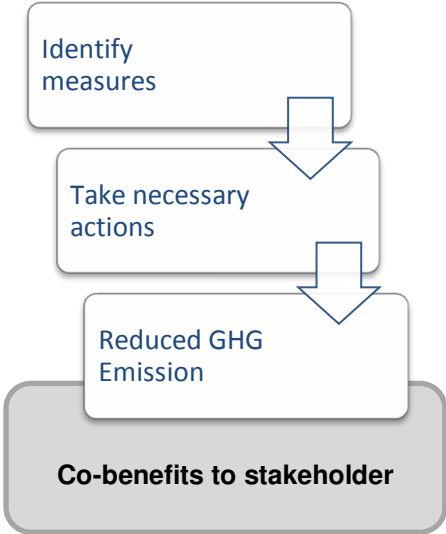


Figure 3-7: Approach to sustainability

3.3.4 National Mission of Sustainable Habitat (NMSH)

The National Mission on Sustainable Habitat aims to make habitat sustainable through enhancements in energy efficiency in buildings, management of solid waste and modal shift to public transport. This is done through the following two initiatives:

- The application of ECBC will be extended to Retrofitting buildings, which is currently relevant for new and large commercial buildings. Incentives shall be provided for retooling of existing building stocks.
- It targets recycling of material and urban waste management. This mission shall include a major R & D program, focusing on bio chemical conversion, waste water use, sewage utilization and waste recycling options.

In addition, the mission focuses on improving resilience of infrastructure, community based disaster management and measures for improving the warning system for extreme weather events. Capacity building is a significant part of this mission.

3.3.5 National Mission for Energy Efficiency (NMEEE)

The National Mission for Enhanced Energy Efficiency intends to save 10,000 MW of energy by the end of 11th Five-Year Plan in 2012. This is targeted to be achieved by encouraging schemes and programs of Bureau of Energy Efficiency (BEE) through the associated central and state agencies. To enhance energy efficiency the following four new initiatives have been put place:

- To improve in energy efficiency in energy-intensive large industries and facilities and enhance cost-effectiveness through certification of energy saving, enabling their trading as well.
- Accelerate the shift to energy efficient appliances in designated sectors through innovative measures to make them affordable
- Create finance mechanisms to support demand side management programs in all sector by capturing energy savings
- Develop fiscal instruments to promote energy efficiency.

3.3.6 Eleventh Five Year Plan

The 11th Five-Year Plan was launched in December 2007, providing a comprehensive strategy for inclusive development building on the growing strength of the economy, while also addressing weaknesses that have surfaced. The plan emphasizes on the need for increasing energy efficiency. This is essentially required to economize on the growing prices of the petroleum products and to reduce carbon emission. The plan targets to increase energy efficiency by 20% by 2016–17. An action is initiated to increase access on cleaner and renewable energy such as energy from biofuels, agro waste and solar energy. The following measures have been proposed to fulfil the target:

- Energy auditing of large energy consumers
- Benchmarking with more efficient units
- Labelling and rating energy consuming equipment
- Forcing higher efficiency standards in major energy consuming sectors such as automobiles
- Promoting energy efficient buildings
- Changes to be made in procurement policies so that government departments buy equipment based on life cycle costs.

3.3.7 Other Policies and Programs²⁸

A number of other policies and programmes currently in place are summarised in Table 3-1.

Table 3-1 Other climate change mitigation policies in India

Climate Change Mitigation Policy	Objectives	Application in Commercial Buildings
Integrated Energy Policy (2006)	Promotion of energy efficiency in all sectors	Promote use of ECBC labelled equipment within building can create a market for energy

²⁸ See Annex for more details.

Climate Change Mitigation Policy	Objectives	Application in Commercial Buildings
		efficiency.
	Focused R&D for several clean energy related technologies	R & D can be organized for innovating micro level clean technologies that can be implied within commercial buildings for energy generation.
Electricity Act (2005) Tariff Policy (2003) Petroleum & Natural Gas Regulatory Board Act (2006)	Remove entry barriers and raise competition in exploration, extraction, conversion, transmission and distribution of primary and secondary energy	Developing a transmission, distribution system and other infrastructure for feeding excess energy generated through captive clean energy plant can contribute to address the very high energy demand in commercial buildings
	Provide feed-in tariffs for renewables (solar, wind, biomass cogeneration)	Providing 'Feed-in-tariffs' for feeding surplus clean energy generated within the building complex into the grid can demonstrate a shift towards generation and use of clean energy
National environmental policy (2006)	Identify and address environmental concerns at planning stage	Requires preparing the environment impact assessments and environment management plans for every building. In was made mandatory in March 2006.
Energy Audits for Large Industrial Consumers (2007)	The large energy consuming units in the nine industrial sectors have to conduct energy audits.	These units referred to as "Designated consumers" are required to employ "Certified Energy manager" to review and report energy consumption and energy conservation data annually.

3.4 Major Barriers for Promoting Green Building in India

Despite the high momentum for green building all across the country, there are significant barriers that impede growth of green/energy efficient buildings. This forces the usual design and construction techniques to flourish at the same pace.

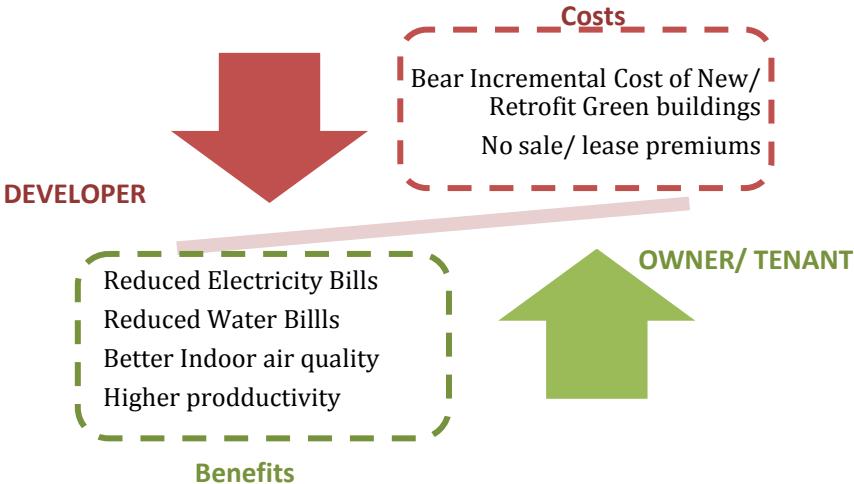
The major barriers to the growth of green and energy efficient building in India are:

- split incentive
- additional investment required for green buildings
- limited adoption of codes and regulation
- low awareness.

3.4.1 Split Incentives

Generally for commercial constructions, a developer develops a property and sells/ leases it to the consumers after completion. This gives them a reason for not investing for the green features, since firstly, the green feature increase the initial cost of the project and secondly, the benefits of the green buildings such as - low electricity and water bills, better working environment and productivity, improved indoor air quality are all availed by owners or tenants. Since the tenants are not willing to pay high rents and developers look for short payback periods. This is referred to as 'Split Incentive'. One of the eminent green building experts, while assisting a corporate to obtain a green space in Bangalore commented: "In Bangalore, there is not even a single commercial building that provides green space to the corporate tenants." This problem is particularly evident for new and existing office spaces that are leased or non-owner occupied premises.

Figure 3-8 Split Incentive

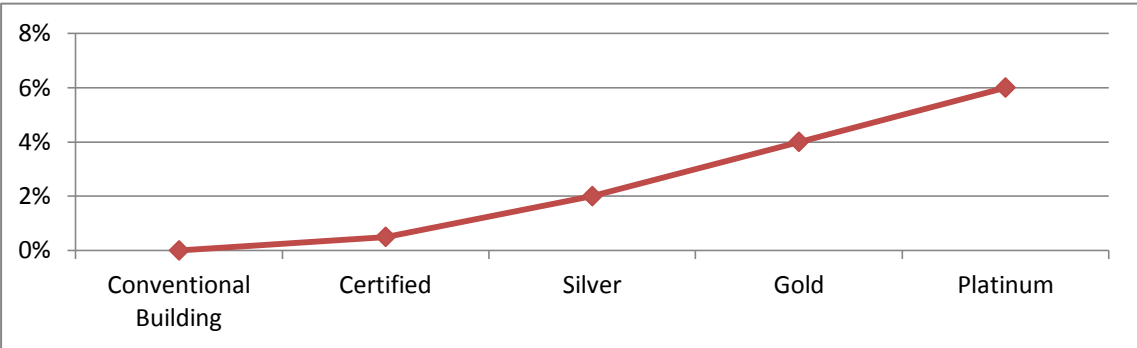


3.4.2 Additional Investment required for Green Buildings

Another barrier that obstructs the growth of green/ energy efficient buildings in India are the perceived higher upfront capital costs for such buildings and technologies. An independent study

conducted on green buildings identified that the incremental cost of an IGBC Certified Green Commercial Building is low, but only if sustainability is incorporated within the design stage. “It states that the incremental cost for constructing ‘IGBC Certified’ building ranges from 0-1% of the conventional building, whereas constructing a Platinum rated building shall range from 4-6% where the major cost involvement is with the technological enhancement.”²⁹

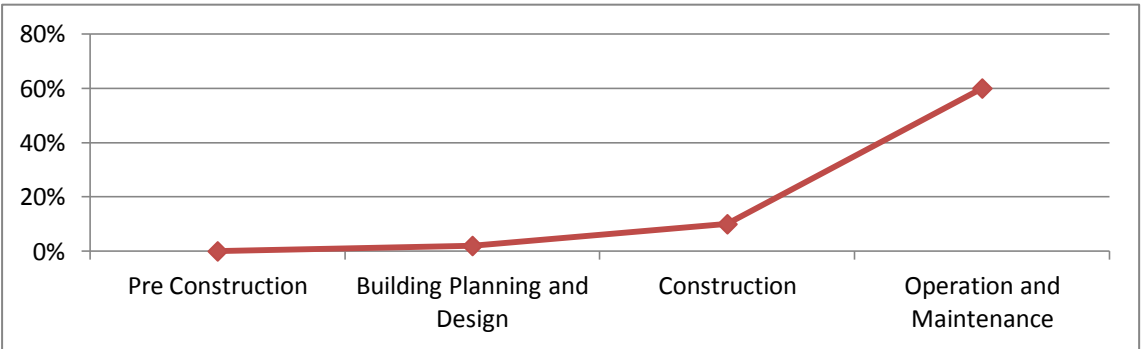
Figure 3-9: Incremental Cost of IGBC Certified Buildings



Source: Seminar Report on Cost Benefit Analysis of Green Buildings, School Of Planning and Architecture, Department of Building Engineering and Management, 2009.

This result is supported by an interview with a senior member of BEE. According to BEE, the incremental cost also varies according to the stage where energy efficiency measures are implemented. “The cost of converting a conventional building to 4-5 star rated GRIHA building during Pre-construction stage ranges from 0-2% where site selection is the most vital activity. But if the same measures are incorporated after completion of design phase, the cost shoots up to 3-5%. But if the decision is taken during or after the construction stage, the cost increment is major and might even rise up to 60% of the building cost, since it would incorporate reinstatement of the building envelop elements with energy efficiency.”³⁰

Figure 3-10: Incremental Cost for Incorporating Sustainability at Different Stages of Construction



It was revealed, by one of the Indian green building experts that a green building has a payback period of 3-4 years depending on the grading of sustainability, for self-financed projects. But in case

²⁹ According to a Seminar Report on Cost Benefit Analysis of Green Buildings, School Of Planning and Architecture, Department of Building Engineering and Management, 2009

³⁰ Discussion With Mr. Girija Shanker, BEE

of investor financed projects, considering a Rate of Return for investment of 18-20%, the payback period for green buildings increases to 7-8 years, making the project economically unviable.”³¹

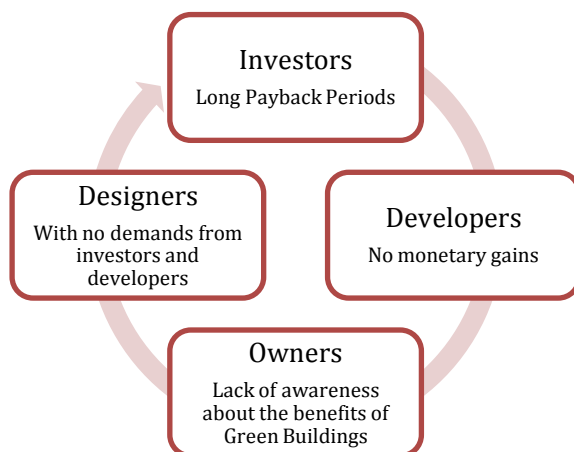


Figure 3-11: Demand and Supply chain for Green Buildings

As a result of the long payback period for green building investments, there is low demand for these investments. Buyers are generally not aware of the benefits of the sustainable construction. Without demand, designers are hesitant to invest in learning new skills and capacity building, leading to the use of conventional material and resources in buildings. Low demand, and no monetary benefits for developers, further reduces the supply of green buildings. Measures are needed to break this cycle and promote green buildings.

3.4.3 Limited Adoption of Codes and Regulation

The National Building Code (NBC) is a voluntary guideline that governs local building byelaws. New and retrofitted constructions abide by the respective local building byelaws that are applicable in the local area. But with challenges such as lack of coordination and consistency in government policies, no sustainability and energy efficiency parameters can be incorporated into the Local Building Byelaws. The voluntary green building codes (IGBC Rating system and GRIHA rating) available in India target concerns such as, energy efficiency, water conservation, indoor and outdoor environment preservation, health and wellbeing and sourcing local materials. However, the government is proposing to mandate the Energy Conservation Building Code and its parameters that address only one arena of sustainability. “We are in the process of implementing our Energy Conservation Code for Buildings but ideally a Green Building Code should address all aspects of sustainability,” said an Indian Green building expert³². It was revealed during discussions with other experts that the current ECBC is difficult to adapt and implement, and could be further simplified. “Particular emphasis should be placed on transaction cost, accountability and transparency”.³³ With reference to the history of implementation of LEED Rating systems, another barrier was identified by Professor Bob Lowe of University College London³⁴, UK. He suggested that caution is needed to ensure the objectives of the codes are met in practice as well, since that is a legion potential problem.

In discussion with the developers and stakeholders it was discovered that the delay caused by government approvals and environment impact assessment was one of the major causes that limited the adoption of green building standards. This delay often leads to greater risks and higher project costs, which many developers would rather avoid given tight budgets and time frames. “In India ‘low

³¹ With interaction with Mr. Satish Kumar in workshop for ‘Achieving India’s 2020 goal to reduce carbon intensity: Discussion of the Indian policy context and lessons learned from UK/EU policy instruments’, 28-29th, March, 2012

³² Interview with Mr. Satish Kumar, an Indian Green Building Expert

³³ Interview with Mr. Prashant Kapoor, an Indian Green Building Expert

³⁴ University College London

cost' is synonymous with 'eco-friendly', cost saving have to be a main driver, at least for the first tranche of mandatory regulations."³³

3.4.4 Low Awareness

Knowledge gap is one of the key barriers. There is need for more information on reliable performance parameter and greater understanding of the costs and benefits of complying green building standards. Without successful case studies and information, it is difficult to explain and convince customers to pay for the high upfront costs incurred for application of green techniques. Benchmarks are developed at a very slow pace that quantifies the energy savings, building life, environmental impacts, higher productivity and other public health benefits. There is lack of awareness regarding the alternative technologies and materials that are readily available in the market and can be used interchangeably with conventional materials and also add up to resource conservation. There is also a lack of expertise and resources for green buildings such as skilled labours, tools and techniques for design, assessment and monitoring techniques. "Only 5% of construction workers are skilled leading to a difficult time for developers to find the required skill set."³⁵ Another barrier that needs addressing is strengthening of green/ sustainable materials supply chain. There is lack of availability of green and alternate materials. The sustainable materials that are available in the market lack the information regarding cost benefit analysis as well as their life cycle cost.

3.5 Analysis of Strategies to Address the Barriers

In general, commercial real estate has always been notably ahead of residential real estate when it comes to sustainable practices. Recently green/ energy efficient buildings have overcome challenging technical and economical hurdles, but still the adoption of green building practices within the design and construction field remains low. The following incentives and strategies could support greater uptake of green buildings in India.

Table 3-2 Suggested Strategies to Increase the Uptake of Green Buildings in India

Strategy 01: Monetary and Non Monetary Incentives
<ul style="list-style-type: none"> ● tax credits and abatements ● reduction in permit and processing fees ● density bonus ● expedite permit process and plan review
Strategy 02: Increase Adoption of Green building Rating Systems and Standards
<ul style="list-style-type: none"> ● establish key metrics for high-performance commercial buildings in local building byelaws ● mandate available codes
Strategy 03: Financing mechanisms
<ul style="list-style-type: none"> ● green loan ● green bonds or funds ● feed-in tariffs for generating renewable energy power within the buildings

³⁵ With interaction with Mr. Satish Kumar in workshop for 'Achieving India's 2020 goal to reduce carbon intensity: Discussion of the Indian policy context and lessons learned from UK/EU policy instruments', 28-29th, March, 2012

Strategy 04: Increase Knowledge Base

- build capacity of local agencies for verification and monitoring
- establish tools and professional education programs needed to support the design and verification processes
- recognize efforts of the people and organizations that contribute to energy efficiency by awards
- marketing assistance to the developers
- strengthening the supply chain for green materials

3.5.1 Financial & Non-financial Incentives

It is observed that most effective strategy to encourage green buildings is through financial and non-financial incentives. Rewarding developers and commercial space purchasing or leasing companies, who choose to adopt green approaches is an effective way to encourage the adoption of best practices in design, construction and operations.

Tax Credits and Abatements

The tax credits and abatements work by exempting the property owners and developers from paying taxes for a period of time. However, such reductions have upfront costs for the development authorities and municipalities, but the increased property value from energy efficiency offsets, compensates for it. This contributes to achieving the reduction target for GHG emission by increasing the adoption of green and energy efficient buildings. Several types of Tax Credits and Abatements are implemented in other countries, including:

- income tax credit schemes
- reduced property tax
- stamp duty / registration charges waive off

Income Tax Credit Schemes

A Tax Credit Scheme provides income tax incentives to the corporates and the developers who pledge to go green, by either constructing, purchasing or leasing green office space. These programs offer tax deductions for approx. 50% of the incremental cost incurred for green building measures.

Property tax abatement

The owner is required to pay the property tax that is levied by the governing authority on the commercial property. An appraisal is performed for the monetary value of the asset and the tax is assessed in proportion to the value. Certain schemes offer nearly 50% property tax rebate.

Stamp Duty / Registration Charges exemptions

Stamp duty is the tax levied for legal documentation of the property purchased. It requires a revenue stamp on the document to denote the payment of the stamp duty and also to convert the paper into a legal document.

International Scenario (UK and other countries)

UK Experience

The overarching aim of several policies is to reduce the rate / cost of duty paid on a new home. In the UK this comes in the form of 'stamp duty' paid by the purchaser of a new property. Stamp Duty Land Tax (and its variations) are payable at different rates dependent on the value of the property. The main incentive in the UK is the zero stamp duty on new build zero carbon homes. However, this scheme does not necessarily incentivise the builder to build a zero carbon home as they do not receive any of the cash saving. There is often a cost uplift in designing and building a zero carbon home. Hence, there will be an incentive only if the developer can pass on some of the additional uplift in cost to the purchaser by raising the price in line with the tax threshold. However, due to the economic climate and the availability of mortgage finance this is a thin incentive for consumers.

Key attributes and mechanisms (including rating systems/methods, standards and metrics used):

The primary metric used to assess tax exemptions is often based on a local certification standard. For new builds (both domestic and non-domestic) it is often a requirement to meet a specific certification standard to allow for the tax exemption. In the UK domestic market, this is the zero carbon definition. This is tied to the Government Code for Sustainable Homes scheme. The UK Government announced that zero carbon homes up to the value of £500,000 would be exempt from stamp duty in 2007. Stamp duty is otherwise charged at 1% on properties that cost £125,000 to £250,000, then at 3% from £250,001 to £500,000, and at 4% on properties costing more than £500,001. In America it is often tied to LEED and in Australia in the refurbishment market their NABERS scheme prevails. There are a range of international case studies available of buildings that receive tax breaks for their green credentials.

Strengths and weakness

Strengths

- Rigorously enforced
- Long term approach to sustainability in retrofit options
- Real cash savings makes the incentives tangible for all types of developer

Weaknesses:

- Often a relatively low threshold on price / cost of building to which tax break applies
- Potentially not an incentive for the constructor but the purchaser
- Only applies at point of purchase. No incentive for long term sustainability if the scheme only applies to lower carbon buildings

Any changes recommended or incorporated over time: The tax breaks available fall into two categories, for new build properties and for refurbishment. As such the designed mechanisms both work well within their respective market. The potential to tie long term tax incentives to energy efficiency in new builds could support long term carbon emissions reductions but the mechanism for support would be complex and difficult to enforce.

Examples from the US

A previous scheme in the United States saw builders receiving a credit for energy-efficient homes that are substantially completed after August 8, 2005 and purchased for use as a residential property from January 1, 2006 through December 31, 2009. Homes must achieve reductions in heating and cooling energy consumption relative to the 2004 International Energy Conservation Code (IECC) and supplements. Home builders can receive a credit of USD\$2,000 for homes achieving a 50% energy savings with at least 1/5 of the savings coming from building envelope improvements. This credit also applies to contractors of manufactured homes

Brief summaries of some other US States tax credits and incentive programmes for green and energy efficient buildings are given below:

State of New Mexico	State of New Mexico created legislation that provides tax credits for building green. The amount of the sustainable building tax credit that may be claimed with respect to a sustainable commercial building calculated on the base of the certification level that the building has achieved in the LEED rating system and the amount of occupied square footage of the building. For commercial buildings, the tax credits range from \$3.50 per square foot for buildings that achieve LEED for New Construction Silver certification to \$6.25 for buildings that achieve LEED for New Construction Platinum certification. ³⁶
State of New York	The New York State Green Building Tax Credit Program provides an income tax incentive to commercial developments incorporating specific green strategies informed by LEED. This law encourages the building owners or developers to design, construct and operate buildings that are energy efficient, utilize recycle material, provide clean air, and incorporate renewable and energy efficient power generation. ³⁷
State of Oregon	A LEED Business Energy Tax Credit (BETC) is being administered by the state Office of Energy. LEED for New Construction, Core and Shell, or Commercial Interiors projects achieving a minimum Silver certification are eligible. The tax credit is 35% of the eligible project cost (the incremental cost of the system or equipment that is beyond standard practice). This is applicable for 5 years with 10% in the first year and second year and 5 % for each year thereafter. There is also an option of carrying forward the unused credit up to eight years. ³⁸
Baltimore County, MD	The Baltimore County has passed a bill that incentivizes the existing commercial construction which holds a minimum Silver LEED Certification with 40% property tax rebate. The higher rating such as LEED Gold and LEED Platinum offer eligibility of 60% and 100% property tax reduction respectively. The tax credit is applicable for duration of 3 years and up to a total of \$1 million will be in effect for 3 years or up to \$1 million in total incentives. LEED for New Construction earns 50% property tax abatement for Silver rating, 60% for Gold rating, and 80% for Platinum Rating. The duration of the LEED NC tax credits are available for five years consecutive years.
Cincinnati, OH	Cincinnati has established an ordinance providing an automatic 100% real property tax exemption of the assessed property value for newly-constructed or rehabilitated commercial that receives a minimum of LEED Certification up to a maximum of 500,000, with no limit for platinum rated buildings.
Honolulu, HI	The City and County of Honolulu passed a bill providing an exemption from property taxes on the building improvements for a period of one year on all new commercial, resort, hotel and industrial construction that achieves minimum LEED Certification.

Applicability in Indian context

Income Tax Credit programs

A Tax Credit Program could be devised to provide income tax incentives to corporates and developers who pledge to go green - either by constructing, purchasing or leasing green office space. The program could offer claim of bonus tax deduction for the 50% of the incremental cost incurred for building green. In order to maximize the effect, and lower the upfront cost of the abatement, it could be applicable for,

³⁶ The Legislature of The State Of New Mexico - Sustainable Building Tax Credit

³⁷ Department of Environmental Conservation - State Aid for Environmental Conservation Programs - Part 638: Green Building Tax Credit

³⁸

1. IGBC – Gold or Platinum rated buildings or GRIHA Four or Five star rated buildings, where ECBC Compliance is a must
2. New construction or interior refurbishment projects only, since the incremental cost of such projects is hardly 0-5% of the total cost of project.

This would reduce energy consumption by 100-150 kWhr/sqm/year or 3.45 units/sqft (against 18.5 units/sqft), with practically no pressure on municipal water supply or sewerage lines.

Property tax abatement

Currently, property tax is as high as 5% of the value of a property. This accounts for approximately 4% of the total commercial project cost. An exemption or reduction in this tax can greatly lower the initial costs for the developer or owner of the building. There have already been some examples of this incentive in India:

- The Greater Hyderabad Municipal Corporation has rolled out a Government Order No. 86, which covers common building rules and offers 10 per cent concession on property tax for buildings for deploying solar systems, and another 10 per cent for building having water harvesting systems.
- The Municipal Corporation of Pimpri Chinchwad offers a 50% rebate on property tax.
- Bombay Municipal Corporation (BMC) provides a discount of 50% on property tax.

After analysis of several cases, it was observed that reduction of 50% property tax covers up for approximately 70% of the incremental cost incurred for the construction of the New Gold or Platinum rated green buildings. As seen from international experience of similar programs, if this scheme were made available for minimum of 3 years, it will benefit the builder or commercial property owner, as he shall recover the incremental cost in 1.5 years only and receive the benefits of energy efficiency and less water consumption for next 20 years.

The property tax rebate can provide big saving for developers of commercial buildings. Since a commercial building owner typically pays about INR 2.5 – 3 Crore per annum towards the property tax, even a saving of 10% will be quite substantial.

Stamp Duty / Registration Charges Waive off

Stamp duty and registration charges account for almost 12-14% of the value of the land and vary with the location of the site and the Municipal Corporation. Since this explains for approximately 9% of the total building project cost, an offer from the Municipal Corporation to reduce stamp duty by 25-30% for green and energy efficient buildings can account for 100% of the incremental cost incurred to construct Gold or Platinum rated green buildings and Four to Five Star GRIHA rated buildings.

3.5.2 Reduction in Permit and Licensing fees

Some municipalities and development authorities charge fees for scrutinizing and approving building plans. Reduction in these fees can also help to comply with green and energy efficient standards.

Green building projects incur three types of fees:

1. The GRIHA/ LEED Registration charges
2. The Building Scrutiny and Approval Fees
3. Energy Audit and Reporting Fees

International Scenario

UK Experience

The UK experience of the non-monetary incentives cited above is quite different. There is no precedent in the UK for expediting a review or permit process; in any case such a move would probably not comply legislation on other commercial areas in the UK.

US Experience

Experiences from the US on offering reduced permit and license fees to incentivise green and energy efficient buildings is provided below:

California Coastal Commission	The California Coastal commission has offered 40% discount on application fees of the commission for project Gold or Platinum certified projects by USGBC.
County of San Diego, Department of Planning and Land Use	<p>The County of San Diego allows the building permit applicants to submit a reduced Plan Check and Permit Fees. This amounts to 7.5% of the total charges. To qualify this fee reduction, the project needs to comply with the following:</p> <ul style="list-style-type: none"> • The project shall exceed California Energy Commission standards by 25% for commercial and industrial developments. • The project shall incorporate straw bale construction for all exterior walls or use recycled content in the building system. The applicant must demonstrate to the satisfaction of the Building Official that 20% or more of the primary materials being used in the building system contain 20% or more post-consumer recycled content. Any reused materials will be found to satisfy the 20% post-consumer recycled content requirement. A fee reduction may also be approved when the applicant demonstrates to the satisfaction of the Building Official that at least one primary building material (e.g. roofing material) is 50% or more post-consumer recycled content. • The project shall include the installation of a grey water system. A permit is required from the Department of Environmental Health for the grey water system in addition to the building permit issued by Department of Planning and Land Use.

Applicability in Indian context

The cost of registration with GRIHA or IGBC and approval charges of the authority account for less than 1% of the total green building project cost. If 100% GRIHA/ IGBC Registration fees are waived,

10% of the incremental cost is removed. Since its contribution is relatively small as compared to the overall project cost, it can be teamed up with a variety of other non-monetary incentives to increase the adoption of green buildings measures.

Examples of fee waiving in India are:

- MNRE offers 90% reimbursement of the GRIHA Registration sum rating fees.
- HAREDA is promoting ‘Energy Audit’ for large government buildings carried out by BEE approved consultants. To encourage energy audits in industrial, institutional, commercial and government buildings, the HAREDA has initiated a new scheme to meet 50% of the energy audit cost subject to maximum Rs.50,000/- per unit as financial assistance.

3.5.3 Density Bonus

‘Density bonus’ refers to the incentive provided to the developer or the property owner to build up extra floor space which can be put for sale or leased. Municipalities can develop schemes, where the developer is allowed for percentage increase of Floor Area Ratio (FAR); if the building is pre-certified with LEED or GRIHA Ratings.

International Scenario

UK Experience

Density bonuses are designed to promote the efficient use of land, mixed use development and the use of previously developed land and buildings. In the UK, Planning Policy Statement 1 (PPS1) of the National Planning Policies sets out to encourage density in urban areas and local planning authorities have been obliged to demonstrate how this aim, among others, will be achieved in regional spatial strategies. The floor-to-area (FAR) ratio is not used as a measure of density in the UK; it is more likely that requirements for density would be imposed through planning conditions.

US Experience

Examples of the use of density bonuses in the United States are provided below:

Acton, MA	The town has adopted a zoning Bye law allowing for the density bonus for buildings achieving LEED certification in the East Acton Village district. There is an extra 5% of Floor Area awarded to the developers or the owners who have a LEED Certification. This can exceed to a maximum of 7500 sq ft. ³⁹
Seattle, WA	The city of Seattle enacted a zoning regulation that provides the chargeable additional FAR for commercial projects that achieve at least LEED Silver Rating and contribute to affordable housing in their project. There is an allowance to increase the base FAR value by 1.0, if the building achieves minimum Silver LEED Certification. The average Far Value offered by the Seattle Municipal Code ranges from 5.0-6.0 (depending on the location) ⁴⁰

³⁹ East Acton Village Plan

⁴⁰ City of Seattle Legislative Information Service; Council Bill Number: 115524; Ordinance Number: 122054

Applicability in Indian Context

Increasing the floor area ratio (FAR) value is an effective method to promote green buildings in India. Since developers get to sell of the extra built up space and also the cost incremented for building the same is negligible. Noida Development Authority has approved a 5% increase in FAR for GRIHA- rated building that maintain a Green status for three years. Constructing an additional FAR of 5 % gives the developer a 20-50% benefit on the added floor space depending on the project and location.

3.5.4 Expedite Permit process and Plan review

The current permit and review process is complex and time consuming to undertake. The municipal corporations and authorities have to review and scrutinize many projects simultaneously. This involves coordinating various architectural drawings with the services design (such as plumbing, fire, electrical etc.) and conducting inspection to confirm work is being undertaken in accordance with the plans submitted. All these processes are also coordinated amongst other building departments to check the land use, understand if necessary fire mitigation systems are designed and implemented, study its environmental impact etc. The permit and review process can take months or even years, resulting in increased project costs and delays on returns. Reducing the duration of the reviewing and permitting for green developments can result in key cost saving for the developers.

International scenario

There is limited international experience on this mechanism. The city council of Costa Mesa in California has developed a Build Green incentive program that includes the following key features⁴¹:

- A 9-month incentive program for maximum participation and to allow ample time for incorporation of Green Building elements in the project design.
- All or a portion of plan check and inspection fees will be waived for green installation such as adding solar panels, skylights or green certification.
- Express Planning and Building plan checks shall be offered. As such, build green plans will be given first priority over all other plans in processing
- Preferred morning or afternoon inspections will be offered.

Applicability in Indian Context

In India, a successful Commercial Building permit or approval is provided after inspection from six different departments:

1. municipal corporation/ development authority
2. environment and forest department
3. fire department
4. urban planning and control
5. urban arts commission (for heritage conservation of the urban fabric)
6. electricity authority.

⁴¹ The council Agenda report for City of Costa Mesa

The review and approval process is time consuming, since it involves interaction of the various above mentioned departments and authorities. Generally the approvals take 6 months to 1 year.

Thus expediting this procedure will reduce the cost of delays and result in cost saving. It can act as an important incentive for the developers to adopt these standards.

MOEF has recently announced for a speedy approval for 4-5 Star GRIHA Rated Buildings.

3.5.5 Increasing Adoption of Green Buildings Rating Systems and Standards

Since the green building codes and standards are voluntary, uptake has been limited. Only organizations and people who are already 'environmentally conscious' are following them. Any building that is constructed in any locality has to follow the local zoning laws or local building byelaws. The implementation of a Green Building Rating System can be increased by:

- establishing key metrics for high-performance commercial buildings in local building byelaws
- mandating existing codes.

3.5.6 Establish key metrics for high-performance commercial buildings in local building byelaws

Modifications in the local building byelaws by incorporating Energy Conservation or Green Building Codes encourage the adoption of sustainable practices. Local building byelaws generally consist of regulations for the following:

- built up area or number of floors and height restrictions
- ground coverage limitation
- fire suppression and safety regulations
- day lighting and ventilation regulation
- minimum area for various spaces
- plumbing and electrical design considerations,

Providing key metrics for high performance commercial buildings gives a handy checklist to support developers and owners with the implementation of the energy efficient measures.

Mandate Available Codes

A third party rating system makes it easier for the consumers to identify green building parameters. These rating systems if not mandated by the government agencies limits their acceptance and adoption by developers. These systems are generally used for marketing buildings without comparing the performance with the other available voluntary rating systems.

In order to assess performance of buildings on a common platform, mandating any available Green building Code is a key requirement.

International Scenario

UK Experience

The dominant Certification standards in the UK are **BREEAM** (for non-domestic buildings) and the **Code for Sustainable Homes** (for domestic buildings). BREEAM is in effect a private certification standard operated by the construction industry and applied to projects in the non-domestic sector. It is operated by BRE under a licensing and certification business model. The Code for Sustainable Homes was, in effect, adopted by Department for Communities and Local Government as a central Government policy from BRE. The Government are the 'owners' of the scheme and it is operated by BRE under a long term contract.

BREEAM is an environmental assessment method and rating system for buildings. It sets the standard for best practice in sustainable building design, construction and operation. It includes verifiable aspects such as energy, water use, internal environment (health and well-being), pollution, transportation of material, waste, ecology and management processes. It is a mandatory assessment tool for many municipal corporations in UK.

Central government departments that fund the construction of specific buildings (education / healthcare / prisons) specify the achievement of certain levels of BREEAM as a funding requirement. Beyond this, it is up to respective local authorities to require specific standards based on their local requirement(s).

For housing, the UK Government launched the Code for Sustainable Homes as a roadmap to carbon neutrality by 2016. The Code has 6 levels of attainment and tracks the update of building regulations to drive continuous improvement in the sector. Where public funding for social housing is provided via the Homes and Communities Agency (HCA), achievement of a specified level (currently level 4) of the Code is a funding requirement.

In the non-domestic sector, there are no real 'incentives' to use green building standards beyond the fact that it is a requirement of funding for specific building types where there is financial support from government. If you do not achieve a specific level then funding is withheld. However, beyond the requirements of central government, local government can specify that buildings meet a specific BREEAM rating through planning conditions. Planning can be withheld if a building fails to meet a specific level.

In the domestic sector, the government sought to incentivise the construction of zero carbon buildings by establishing a roadmap and incremental policy framework to progress towards the standard. Where central government has offered funding support for the development of housing, it has often been a requirement that this is assessed against the requirements of the Code. Again, local authorities can stipulate that housing meets a specific Code rating as a planning condition. As such, the incentive for building green buildings has been driven much through a requirement for funding support at a central level, and as a planning condition at a local level.

Key attributes and mechanisms (including rating systems/methods, standards and metrics used):

BREEAM and The Code are typically updated every 2 years. They are industry recognised and have representative boards that guide the scheme operators and respective scheme management on how the scheme should progress.

BREEAM is a well-established long running assessment scheme and as such has a wealth of support mechanisms to support people using the scheme.

Assessors for each scheme are rigorously trained and their assessments are continually monitored by the scheme operators. BRE is also established as a charitable foundation and as such represents itself as a completely impartial voice in the construction industry.

Key achievements: The Code was launched by Government has had a significant impact on the whole construction industry. Due to the broad scope of the Code, it was a challenge to the whole industry, from design through to the supply of products and as such has acted as a catalyst for innovation.

For BREEAM the achievement has been its market adoption and breadth of market transformation. It is the de-facto assessment methodology in the UK and is growing its market presence internationally, where its use is comparable to LEED. BREEAM is dominant in Europe.

The strengths and weakness of BREEAM and Sustainable code for building is summaries in Table 3-3.

Table 3-3 Strengths and weakness of BREEAM and Sustainable code

	Strengths	Weakness
BREEAM	<ul style="list-style-type: none"> ● Driven by constructors who take a longer term view of buildings as a fixed asset ● Increasingly seen and recognised by occupiers as a mark of quality ● Growing body of evidence that green buildings attract higher rental values, lower rates of occupancy and generate higher yields for funds ● Full and well established suite of tools to assess all building types and scenarios 	<ul style="list-style-type: none"> ● Lack of central Government support ● Lack of understanding in application at a local authority level leads to challenges in supply ● Additional cost to ‘business as usual’ growth
Code for Sustainable Homes	<ul style="list-style-type: none"> ● Central Government policy and so incentivised a lot of investment in innovation ● Assesses the holistic sustainability of a project rather than just energy 	<ul style="list-style-type: none"> ● Potentially soon to be abolished or ‘watered down’ due to changes in central Government policy ● Zero carbon has been redefined several times ● House builders are a powerful economic lobby group at a time of austerity. The Code is seen as a burden to growth due to increased cost.

As BREEAM and the Code are updated every two years there is, in effect, a sliding performance scale. These updates are designed to fit with the updates to UK building regulations which set a baseline performance. As such, the standards always build on a minimum performance level and as such are seen as going beyond the minimum.

The upper levels are meant as stretch targets and as a marketing tool to promote and prioritise green buildings.

BRE, as sole operator, collate feedback and increasingly engage industry stakeholders to understand how schemes are being implemented and challenges that the industry faces in delivering buildings.

Applicability in Indian Context

There are several examples of similar approaches being undertaken in India already:

- The Energy Conservation Handbook for Buildings & Homes in (English and Hindi) has been prepared and distributed in Haryana. The energy efficient parameters, in consultation with BEE, are in a process to be adopted in the local building byelaws.
- The Green building parameters from Energy Conservation Building Codes, GRIHA Rating and IGBC Rating are in progress to get imbibed in the National Building Code through an addendum called “Approach to Sustainability”.
- The Haryana Government has decided to adopt the Energy Conservation Building Codes (ECBC) into their Haryana Urban development Authority (HUDA) Byelaws.
- Municipal Corporation of Pimpri Chinchwad has adopted GRIHA parameters in byelaws.
- The Bombay Municipal Corporation (BMC) has re-drafted its building byelaws for compulsory implementation of Rain water harvesting and Effluent Treatment Plant for residential projects. It has been made mandatory for all new constructions with a plot size of more than 2,000 sq. m to have a rainwater harvesting system and for over 20,000 sq. m it is mandatory to install an effluent treatment plant for treating 20% of the sewage generated by the residents. The byelaws also include the areas required for such structures.

With effect of these strategic decisions, the uptake of Energy Efficient or High performance buildings has increased in the respective area.

3.5.7 Financing Mechanisms and Green Loans

Finance mechanisms are one of the successful means to encourage developers and owners to build green. These finance mechanisms provide support to the developers by providing the necessary cash-flow for construction, lease or purchase of green buildings measures. Such mechanisms are generally funded by the state and local government, who receive dividends in form of reduced GHG emissions.

Green loans are the loans provided for verifiable green structures that provide support to the developers. These loans can be issued at a lower rate of interest, than the rates prevailing in the market, creating a support structure for the emerging green building market. Green loans can also offer add on feature like less documentation to attract more customers. These funds can be revolving in nature, where initially government supports for the financing needs and later on the reserves get replenished by the interest earned on the loaned amount, and similarly government can also retrieve the invested amount. This results in removal of one of the major financial barriers for greater uptake of green and energy efficient buildings.

International Scenario

UK Experience

In the UK, private banks (and respective lenders) have designed a range of incentives designed to support the uptake of green buildings. There has also been a growth in green insurance schemes for specific types of low carbon building (straw bale/timber frame) where traditional insurance companies often raise premiums as they are not familiar with the construction method. This is a growing niche market due to the growth in alternative construction methods.

The UK Government has also formed a Green Investment Bank (GIB). The initiative is part of the Government's commitment to setting the UK firmly on course towards a green and growing economy, while also delivering long-term sustainable growth. Its mission will be to provide financial solutions to accelerate private sector investment in the green economy. Capitalised with £3 billion, the GIB will play a vital role in addressing market failures affecting green infrastructure projects in order to stimulate a step up in private investment.

Also in the UK, the Ecology Building Society specialises in providing mortgages for new homes with innovative construction, which may otherwise be hard to mortgage through conventional lenders.

In other parts of Europe, there are a range of schemes offered by lenders to support green buildings:

- In France, there are interest free mortgages available through the high street banks for works of home energy conservation. These mortgages are not subject to any test of resources and the generic term used for the loans is l'éco prêt à taux zéro. New mortgages for energy conservation are available for a sum of up to €30,000, subject to a limit of €300 per m² of the property. They are only available on a property constructed before 1st January 1990, as all properties built since this date should meet the minimum energy performance standards.
- In the Czech Republic the PHARE loans scheme has been established. The PHARE Energy Saving Fund was established by the European Commission and the Czech Ministry of Industry and Trade to enable financing small and medium-sized energy efficiency projects. PHARE is a revolving fund i.e. part of its principal repayments is used for new loans. Eligible projects for Energy Savings Fund (ESF) loans generate savings by reducing energy consumption, but also by reducing the costs of energy (using cheaper fuel), by lower operating and maintenance costs, etc. To qualify for assistance through the ESF, at least 40% of the total savings achieved by the implementation of the project must originate from reduced energy consumption. All projects must demonstrate energy savings on the demand side.

In the United States, Energy Efficient Mortgages (EEM) are available for households. EEM helps homebuyers and homeowners to finance the cost of adding energy efficiency features to new or existing housing as part of their home purchase or refinancing mortgages. There are also mechanisms through the Energy Efficient Commercial Building Tax Deduction (for energy efficient commercial buildings that reduce annual energy and power consumption by 50% compared to ASHRAE, standard).

In addition, fund managers are increasingly establishing 'green' funds designed to specifically fund and manage sustainable buildings, or to generate funds for investment by green investors.

Key attributes and mechanisms (including rating systems/methods, standards and metrics used):

The key mechanism through which these schemes work is the same as any funding mechanism, but they specifically require the acquisition of an energy efficient or green building.

Key achievements: There is a range of evidence based on the uptake of green mortgages and bank loans. The range of products available internationally show that they are successful but they appeal to a specific niche within the market. In addition, property managers are starting to see increased yields from green buildings and so investors will increasingly seek out higher value properties to finance as they will receive a higher return.

Strengths and weakness:

Strengths

- Financially driven, real savings for clients
- Specifically targets people interested in financing the purchase of green buildings

Weaknesses

- Often requires specific standards are met before finance is released, risk of not achieving specific targets is very real
- Finance is still difficult to obtain due to the recession.

Any changes recommended or incorporated over time: Funding often based on ‘current’ prescribed performance or specific certification standard. As such there is no future incentive to improve energy efficiency if there is scope to achieve this. For long term mortgages, there could be commitment to maintain the energy efficiency of the building and to ensure that this remains at a suitable level.

Some examples from US States are given below:

Cambridge, MA	The Cambridge Energy Allowance (CEA), a city sponsored non-profit organization has invested over \$100 Million for next 5-6 years in order to support the energy efficient retrofits for half of the cities buildings. This has contributed to the reduction in electricity demand by 15 % and annual GHG emission by 150,000 tons (10% of the city’s total). CEA arranges financing with a repayment period of 10 years such that the loan repayments are matched or exceeded by annual energy bill savings. This results in no upfront cost for energy efficient retrofitting installations.
Milwaukee, WI	Sonoma County gives commercial land owners the opportunity to borrow funds for retrofitting their premises with energy saving insulations, cool roofs, heating and air conditioning systems, waterless urinals, solar panels etc. The money is paid back after an assessment of the property with the following timelines such five, ten and twenty year’s repayment terms. It offers a very low interest rate of 7%.

Applicability in Indian Context

As described earlier, the biggest barrier in India that hampers the growth of green buildings are the high upfront cost for such projects. Also taking a home loan is a very challenging and complex task for potential home owners. The procedure and documentation for the loan application and approval is quite complex. These issues can be addressed by Financial Institution by providing supporting funds at lower interest rates for the green infrastructure and ease out the complex procedure of taking loan.

Presently, the State Bank of India (SBI) offers Green Home loans to customers who buy certified which reduces GHG Emissions and promote renewable energy. The interest rate for the first year is

8% and for 2nd and 3rd year is 8.5%. After 3rd year the customer can chose for a fixed or floating interest based on the prevailing SBAR. The maximum tenure for the loan is 25 years (or up to a maximum age of 70).

Such schemes would be welcomed from the tenants and owners of commercial properties. Banks also benefit from this scheme, since the owners and customers are quite aware and conscious for environment improvement, the risk for non-repayment of loans reduces.

Green Bonds or Funds

Green bonds refer to a tax-exempt bond which is issued by the recognized and qualified authorities or municipalities for development of green construction projects on a reused site. These bonds encourage sustainability and development of brownfield sites. The tax- exempt status makes purchasing a 'green bond' a more attractive investment when compared to comparable taxable bonds. Green funds refer to mutual funds or other investment vehicles that shall invest in companies that are deemed to social consciousness and committed to environment conservation in their business dealings.

International Scenario

World Bank Green bonds

The World Bank Green Bonds give an opportunity to invest in climate solutions through a high quality credit fixed income product. Since its inaugural issue in 2008, the World Bank has issued approximately USD 3 billion in Green Bonds through 46 transactions and 17 currencies.⁴²

Green Investment bank, UK

The UK Government tasked an independent group of business experts—the Green Investment Bank Commission—to identify how the UK could accelerate the private sector investment required to deliver the UK's transition to a low carbon economy. The Commission reported in June 2010 and called for a Green Investment Bank to be established quickly to tackle the barriers and market failures limiting private sector investment in green infrastructure, including investment opportunities not currently being aggregated in a form suitable for large investors—particularly for energy efficiency improvements where millions of homes will need retrofitting.

The Commission set out a number of models for a bank that would raise finance from a range of sources, including institutional investors and the general public, and use this to fund different types of low-carbon infrastructure. In July 2010, the new government published its Annual Energy Statement, which aimed to set out how government would develop a clear, transparent, and long-term policy framework to act as a catalyst for private sector investment. Alongside a Green Investment Bank, the Annual Energy Statement set out a range of other prospective initiatives such

⁴² <http://treasury.worldbank.org/cmd/htm/WorldBankGreenBonds.html>

as the 'Green Deal' to improve domestic energy efficiency, a review of the electricity market, measures to bolster the carbon price, and publishing a national renewables delivery plan.

Although committed to set up a Green Investment Bank, the Government has not formally responded to the Green Investment Bank Commission's recommendations, but it is carrying out its own work looking at 'the market and institutional failures and constraints that can limit the availability of finance needed to deliver the scale and pace of investment required to deliver the Government's green growth objectives'.

Applicability in Indian Context

Green Bonds or Funds if initiated in India would revolutionize the market and provide significant support for green and energy efficient infrastructure. Credit Guarantee and venture funds for promoting performance contracting is also a model that can be looked upon.

Feed-in Tariffs for generating renewable energy power within the buildings

The buildings that are equipped with latest renewable energy systems can not only meet the building's energy demand but also be sustainable source of energy if connected to the grid. The following small-scale low-carbon technologies can contribute to energy generation in a building:

- wind
- solar photovoltaic (PV)
- micro-hydro
- anaerobic digestion
- domestic scale micro CHP (with a capacity of 2kW or less).

Buildings that produce surplus of energy during the portion of the year are known as "Energy-Plus buildings". This surplus energy is fed back to the grid and the owner of the building receives financial gain in form of 'Feed in Tariff' or 'FIT'.

International Scenario

UK

DECC provides a FIT for renewable energy generation within buildings. The FIT is available for technologies such as anaerobic digestion, hydro, micro CHP, PV and Wind. It ranges between 12-18 p/kWh, excepting hydro (tariff 4.5 – 20 p/kWh)

Applicability in Indian Context

Since buildings contribute to 30 % of the energy consumption in India, any contribution towards energy sufficiency of building will reduce demand from the non-renewable resources. However, to include small scale renewable system in the national electricity grid some basic but important infrastructure will be required.

The Hyderabad government is keen to have systems for developing rooftop solar panels and would provide an option to trade excess power generated by them. It is expected to encourage the developers to set up solar power plants on rooftops.

3.5.8 Increase knowledge base and greater communication

Since the potential for growth in green building sector is quite high in India it is vital that the capacity building of this sector and the various stakeholder involved are improved over time.

Build capacity of local agencies for verification and Monitoring

In order for the market to adopt green building practices it is essential to create a quantifiable green building performance database. This performance information will provide a benchmark for verification and validation of other green building projects and would help in their categorization. Also the insurers need quantifiable information to determine whether projects can be insured and at what price.

In addition to cost and performance data for a green/ energy efficient building, information on occupant's health, satisfaction and productivity shall provide design parameters for better indoor air quality, building orientation patterns, and indoor space planning alternatives. An additional data bank for local environment such as traffic pattern, congestion, storm water flow shall provide a better case for green development. R&D on energy and water usage behaviours by different types of corporates can benefit from more precise energy and water efficiency benchmarks and design solutions. It is essential to assess areas where performance does not match design intent.

Establish tools and professional education programs needed to support the design and verification processes

Development of tools and professional education programs is vital to educate the designers and architects to embrace green building measures. It is important to provide this information during engineering, architecture, construction, maintenance and operation study programs. Developing a mind set for sustainable development in schools also plays a vital role in educating an individual and equipping them with necessary knowledge on sustainability issues. Training sessions can be conducted to demonstrate these practises. Universities can also incorporate such courses in their curriculum. Develop Green Training and Certification Programs for representatives such as appraisers, brokers, and lenders to help them recognize and communicate the value of green buildings.

Many municipal authorities and renewable energy development authorities organise workshops to promote the Energy Conservation Building Code (ECBC). HAREDA organised a program for capacity building and creating awareness among the architects, Engineers, Builders, SDA's & other stake older departments about Energy Efficiency Building design and the Energy Conservation Building code.

Recognizing efforts of the people and organizations that contribute to energy efficiency by awards

Case studies of exemplar projects can provide crucial evidence for greater adoption of current green building design and construction standards. The documentation of cost, benefit and performance of the Green building increase transparency amongst the stake holders. Other benefits of green buildings are often intangible and can be clearly perceived over a longer period. Communicating and recognising the efforts of people and organisation that contribute to green buildings can also be a motivating factor, to increase the uptake of the green buildings.

Marketing Assistance to the developers

Only developing green structures is not sufficient to increase the uptake of green buildings. But it is equally important to promote and deliver the required information to the consumers. In order to assess the value the properties, it essential to develop tools on green building performances. This shall assist the estate agents and brokers to convey the features and comparative performance to their client. Advertising successful case studies showcasing energy efficiency in print and television media can also be a key strategy to encourage adoption of green buildings.

Strengthening the Supply Chain for Green Materials

Sourcing green materials, their proper usage and installation is also an essential part for increasing uptake of green buildings. It is important to assess the life cycle cost of such products and quantify benefits. An integrated design approach can contribute to maximizing the performance of such materials and equipment. There is a need to strengthen the supply chain for green materials and improve accessibility in remote locations of the country. This can be helpful in controlling the cost increments as well. Since technology and materials are the most expensive aspect of green buildings. "As CPWD and DDA are the large construction organizations undertaking many government building projects, they can set examples by exploiting the energy efficient materials rather than conventional systems."⁴³

UK Experience

The UK experience shows that communication and knowledge sharing is extremely important for promoting energy efficiency and green buildings. Many different stakeholders influence the decision-making process on the location, design and construction of new buildings. Key parties include:

- central government
- planning authorities
- building control
- developers
- designers
- suppliers
- consumers.

By educating each of these parties on environmental issues connected with buildings and the consequences of decisions, green buildings will be supported. The importance of the consumer

⁴³ In discussion with Ms. Lakshmy Gopan, Additional Chief Architect, DDA

should not be underestimated - just as it is no longer acceptable to smoke in enclosed public spaces, it may become unacceptable in societal terms to build unsustainable buildings. A respect for the environment is also now taught in most schools and television programmes on building design regularly showcase the benefits of green construction. Communication is not one-way in this process. Pioneers including green developers have consistently influenced government in the UK by demonstrating cost-effective ways to reduce the environmental impact of the built environment.

Central government initiatives in the UK: The UK Government has undertaken a range of knowledge sharing activities in this area including:

- Original funding of Building Research Establishment
- Technology Strategy Board – knowledge sharing platform
- Building Regulations Research Programme (CLG)
- Department of Energy and Climate Change research
- Environment Agency research
- Defra research.

Research reports commissioned by UK Government are normally publically available. However, the majority of this information has been aimed at the professionals involved with building design and construction.

In addition, the Energy Savings Trust (domestic sector) and Carbon Trust (non-domestic sector) were established with the key aim of encouraging energy efficiency.

The Energy Saving Trust in particular has engaged with the public through public events and the media in order to spread the message of energy efficiency. It has also run major programmes such as the Low Carbon Buildings Programme.

In setting the policy agenda for the development of Building Regulations, the UK government has also driven standards in new construction – although this is limited to energy efficiency and water efficiency. It is important to recognise that regulation has moved in advance of developers and has pushed them to improve standards in this area. The Government has also taken a lead by setting BREEAM targets for renovation and extension of its own estate, and by requiring high levels of achievement of the Code for Sustainable Homes for all publically funded housing. This acts as a further method of informing policymakers and the wider public of the benefits of green buildings.

Industry initiatives: Formal information sharing initiatives on sustainable buildings, such as those run by the Construction Skills Council, have had limited impact in the UK. The nature of the construction industry is such that contractors follow drawings and specifications and any other requirements imposed upon them.

Designers are increasingly aware of all the issues relevant to green building. In part this is because many designers are obliged to meet the requirements of BREEAM or the Code for Sustainable Homes on some or all of their developments. Continuing professional development (CPD) is partly responsible for knowledge sharing within the profession but the professional body (RIBA) has also played a leading role in disseminating this new agenda to their members.

Increasingly, large organisations are incorporating sustainability within their corporate and social responsibility (CSR) policies. By disseminating information to suppliers, customers, shareholders and employees, such organisations can demonstrate their commitment to sustainability

Role of Green developers: Green developers and third sector organisations have had a major impact on the development green buildings policy in the UK. By creating exemplar developments

showcasing sustainable technologies and construction methods, pioneering developers have demonstrated that it is both possible and profitable to build sustainably. Site visits, information sharing networks, websites, printed material and trade shows (the largest of which being Ecobuild) are the principal means of information dissemination in this area.

Sector-leading organisations such as the Association for Environment-Conscious Builders (AECB) and campaigning organisations such as Friends of the Earth have set the agenda for policy development on green building in the UK.

3.6 Final recommendation and Conclusions

With the construction sector aiming to maintain an annual growth of 8% while increasing the uptake of energy efficiency measures, there is a vital need for greater adoption of Green Building standards in India by removing the main market and institutional barriers. Green development practices can yield economic, environmental and social benefits. It is essential to incorporate sustainability in standard practices for new and existing buildings.

A summary of the main barriers, recommendations and implementation strategy is given in Table 3-4.

Table 3-4 Summary of main barriers, recommendations and implementation strategy

Main Barriers	Explanation	Recommendations	Implementation strategy
Split Incentive between developers and end users	Tenants not willing to pay high rents and factor in future resource cost savings; Developers look for short payback periods	Fiscal incentives for developers in terms of reduced property tax, reduced stamp duty and density bonus for green/energy efficient buildings Financial incentives for developers and end users in terms of reduced interest on loans for green/energy efficient buildings Faster/single window clearances for required permits for construction of buildings	Short term measure to provide initial boost to green building construction sector. Central financial assistance could be provided to city municipalities and other local bodies to finance these incentives.
Limited knowledge base and awareness	Low awareness among end users and developers about cost savings from energy efficient/green buildings	Creating awareness amongst the main stakeholders about benefits of green building, maintaining transparency and providing supporting case studies and cost benefit analysis can be highly effective in supporting the development of a green building market.	To be carried out by municipalities with support from central government agencies including ADARSH and BEE.
	Limited institutional capacities at implementation and enforcement level; The technical knowledge related to green/energy efficient buildings is limited to few architects and designers in tier 1 cities in India. The knowledge level of government bodies responsible for implementation and enforcement is very low	Training programs for municipalities and other stakeholders including public works department to enhance their knowledge base on green buildings.	Nodal ministries including Ministry of Urban Development, Ministry of New and Renewable Energy and Ministry of Power can work jointly with local level institutions in identifying capacity building needs and thereby providing required training through its specialized agencies or external experts.
Weak supply chain of green building	Availability of green building construction materials is limited in India. Additionally, the penetration of high end energy	Providing monetary benefits such as tax exemptions and import duty reduction in production and import of green products can help in strengthening the	A short term measure providing initial support to industries manufacturing

Main Barriers	Explanation	Recommendations	Implementation strategy
materials	efficient appliances and equipments in Indian market is in a nascent state. This also has an implication on overall construction cost of which building materials have significant share.	supply chain to some extent.	green/energy efficient materials and appliances.
Lack of strict regulatory provisions		Municipal building bye laws should include sustainability parameters as recently included in National Building Code and incorporate ECBC provisions.	Aggressive efforts and outreach program to be launched by Bureau of Indian Standards and Bureau of Energy Efficiency to facilitate inclusion of ECBC provisions in building bye laws.

4 Low Carbon Institutional framework

4.1 Introduction to Indian context

In India, the overarching national policy document on climate change is the National Action Plan on Climate Change (NAPCC) which was published in 2008. The NAPCC has eight different missions aimed at tackling the key challenges faced by India as a result of the threat of climate change. A special body chaired by the Prime Minister - the Prime Minister's Council on Climate Change - has been formed to approve all the missions and to ensure that they are strategically aligned with the socio-economic development growth aspirations of the country. In addition to the missions set out in the NAPCC, India has been implementing programs in some low carbon areas for some time including energy efficiency, renewable energy, sustainable transport (especially public transport) and afforestation under the guidance of a range of Ministries such as Ministry of Environment and Forests (MoEF), Ministry of Power (MOP), Ministry of New and Renewable Energy (MNRE) and Ministry of Urban Development (MOUD).

A number of other initiatives and commitments have been adopted by India since the setting up of the NAPCC:

- **August 2009: The Prime Minister called for the development of State Action Plans on Climate Change (SAPCCs).** SAPCCs are expected to build on the existing policies of the respective state governments by taking into consideration the ongoing programmes and schemes being implemented at the state level as well as within the NAPCC.
- **January 2010: India submitted a voluntary and non-binding target of reducing emissions intensity by 20-25% by 2020** across all sectors excluding agriculture sector with 2005 as the base year⁴⁴. This will be achieved through a multi-sector low carbon development strategy. It is intended that lower carbon sustainable growth be a central element of India's 12th Five Year Plan.
- **February 2010: The Planning Commission also formed an Expert Group to develop low carbon growth strategies for inclusive growth in India.** The group will advise the government on meeting carbon intensity targets in a manner that is consistent with the overall socio-economic objectives of the nation.
- **October 2011: Publication of the approach paper for India's 12th 5 Year Plan entitled "Faster, Sustainable, and More Inclusive Growth".** Recognising the growing significance and cross-cutting nature of climate policy, the plan outlines 12 "policy thrust" areas which will integrate climate concerns into national planning and development processes (see Table 3-3 below). For the first time, environment and related livelihoods issues are included in several chapters of a 5-Year Plan.
- **2012: A dedicated Climate Change Finance Unit was set up within Ministry of Finance** to integrate climate change into development frameworks and financial systems and to provide guidance and inputs to MoEF to feed into climate change negotiations⁴⁵.

⁴⁴ http://unfccc.int/files/meetings/cop_15/copenhagen_accord/application/pdf/indiacphaccord_app2.pdf

⁴⁵ http://finmin.nic.in/the_ministry/dept_eco_affairs/economic_div/ccfu_index.asp

Given the increasingly high profile that low carbon policies are being given in India, it is essential that policy proposals and specific measures to reduce emissions are implemented effectively. For this to happen, an effective institutional framework is a key requirement. In this regard, the UK's climate change policy has greatly benefited from the creation of governance institutions (such as the UK's Committee on Climate Change) and a variety of enabling institutions (such as the UK's Carbon Trust and Energy Saving Trust). These institutions have successfully brought policy makers, industry and the research community together to collectively address the challenges of climate change. Equivalent institutions have the potential to play an important role in achieving India's low carbon targets.

This study facilitated discussions to gain expert opinions and insights for strengthening the capacity and role of existing governance and enabling institutions for low carbon growth in India. In particular, two key requirements for the success were identified:

1. the provision to government of independent advice on how to achieve targets and then monitor progress towards them
2. the engagement and support of the private sector in delivering of low carbon policies.

Table 4-1 sets out a brief summary of the key institutions addressing these challenges in India and the UK.

Table 4-1 Summary of key institutions and roles for governance and enabling low carbon growth

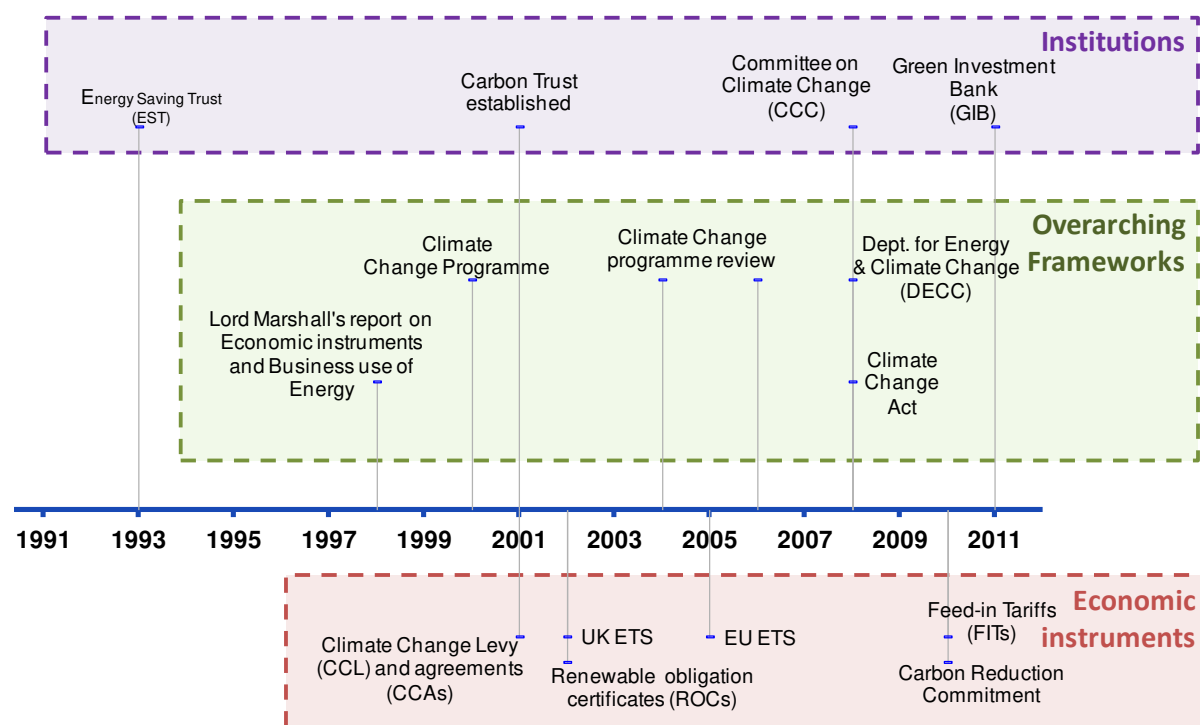
	Independent advice to government and appraisal of progress	Private sector engagement (for capacity building, guidance and support) and financial support	
Description	Independent evidence based advice to Gol and States to set targets and measures to achieve them. Develop appropriate frameworks for low carbon economy.	Accelerate move to low carbon economy by removing barriers, reducing compliance cost and risk, provide technological support and leveraging investment in the private sector.	Low carbon transition also requires significant investment in key green sectors and new financial instruments for providing economic incentives and reducing risks.
Current institutions in India	Prime Minister Council on Climate Change Expert Group on low carbon strategies for inclusive growth	TERI, IITs, IISc, New Ventures India, IGBC, NGOs, IDFC	IREDA finance renewable energy projects; Inter-Ministerial Group chaired by Finance Secretary to approve projects for financing under the National Clean Energy Fund; initiatives like New Ventures India, leading banks like HSBC & ICICI & emerging venture capital fund agencies
UK Experience	Committee on Climate Change	Carbon Trust and Energy Saving Trust	Carbon Trust and Green Investment Bank

4.2 Overview of UK Experience

Over the last 20 years, the UK has established a number of institutions to support the implementation of the government’s policy priorities regarding low carbon growth, reducing CO2 emissions and increasing investment in renewable technologies. These institutions have successfully brought policy makers, industry and the research community together to collectively address the challenges of climate change. The Carbon Trust, Energy Saving Trust and the Committee on Climate Change together provide a range of independent, trusted advice to the public and private sector, along with a variety of funding mechanisms to support on-site investigations of opportunity, carbon footprinting and investment in innovative technologies with the potential to yield substantial returns and carbon savings, as well as a mechanism for leveraging significant capital investment in renewable and renewable infrastructure projects. It is possible that low carbon and climate change institutions can similarly play an important role in achieving India’s low carbon targets.

These institutions were established at arms length from government, giving them greater flexibility of action and timely response to market developments than what is possible within a government department. However, the closeness to government of these institutions provides comfort to those who work with them regarding their stability and robustness. The development of these institutions has been incremental, with each institution has undergoing some evolution during its lifetime. The genesis, evolution, key activities and success of these institutions in the UK has been significantly affected by complementary legislations, key economic instruments and low carbon programmes over time (Figure 4-1).

Figure 4-1 UK climate change related institutions and policy framework



The first institution to be established was the Energy Saving Trust in 1993. The Energy Saving Trust, as its name implies, focuses on the sustainable use of energy. It has a federal structure with

operational units spread throughout the UK. The Energy Saving Trust primarily serves individual householders, small to medium sized enterprises (in the private sector) and the public sector. It provides services to organisations such as (for example) hospitals, schools and universities.

In parallel with the introduction of the UK's Climate Change Levy (essentially a tax on usage of energy in industry, commerce and the public sector), and in response to the demands of business, the Carbon Trust was established (beginning work in 2001) to provide more direct support to the larger companies targeted by the levy (see further section 3.4 below).

In 2000, the first Climate Change Programme (CCP) was published and projected that carbon dioxide emissions would be cut 19% by 2010, which would exceed the UK's Kyoto target of 12.5% (1990 baseline). In 2003, the Department for Trade and Industry (DTI) published *'Our Energy Challenge: Creating a Low Carbon Economy'*.

Despite these policy initiatives, delivery was falling significantly short of the above targets. By 2003, the government's sustainability watchdog noted that the CCP was failing to reduce total carbon dioxide emissions and that the projection of a 19% cut had been over-optimistic. The Climate Change Program Review (CCPR) was initiated by the Department for Environment, Food and Rural Affairs (Defra) in 2004 to put the UK back on track but failed to achieve objectives. Defra's problem was that, while it owned the issue of climate change, other departments led on policy areas or sectors which would need to change if emissions were to be cut. Defra – at both an official and ministerial level – failed to persuade other departments of the necessity of taking additional measures to reach the UK's 2010 target. The CCPR overran its timetable as officials and ministers failed to agree on measures to bridge the gap – and, when the final report was published two years later, the government admitted it was unable to address the failure.

As summarised in a UK Institute of Government report⁴⁶, following the CCPR, four factors – a campaign by non-government organisations (NGOs), political competition, a reframing of climate change as an economic issue and an engaged political owner within government – came together to make the political environment more propitious for bold action on climate change than it had been earlier.

Amongst the NGOs, FoE led the way, for the first time more than a hundred NGOs including Action Aid, CAFOD, Friends of the Earth, The National Trust, Oxfam, RSPB, UNISON, the Women's Institute and the WWF came together as part of the Stop Climate Chaos coalition. The Big Ask campaign was launched in 2005 asking people to write to their MPs to secure legislative commitment. The business community became convinced of the evidence of climate change between 2004 and 2005. A group of influential business leaders from companies including Shell, BP and HSBC sent a letter to Tony Blair calling for a "transition to a low carbon economy". Finally the Stern Review – Economics of Climate Change report was a turning point in the climate change debate because, although it did attract criticism, it was an authoritative and rigorous expression of the economic case for combating climate change, stressing that taking early action was the lowest cost policy option. The Stern review helped accelerate a change of opinion that was occurring inside the Treasury in 2006. The fourth and final factor responsible for the dramatic turn-around in climate change policy was the appointment of David Miliband as Secretary of State at Defra. This occurred in May 2006, following Labour's poor

⁴⁶ <http://www.instituteforgovernment.org.uk/sites/default/files/publications/The%20S%20Factors.pdf>

performance in the local elections. The appointment of one of Labour's rising stars to what had always been seen before as a low profile department may in itself have been a reaction to the increasing political salience of climate change. Some those who worked with Miliband emphasised his reforming energy (i.e. "vigorous political leadership"), the way he energised the team around him and the quality of Miliband's relationship with Alistair Darling at DTI as key enabling factors.

One of David Miliband's first acts on appointment to Defra in 2006 was to write to the Prime Minister asking for permission to set up a new Office of Climate Change (OCC). The OCC was designed to provide a cross-departmental resource to consider climate change issues and provide ministers with shared analysis. Following calls for some time to establish new departmental structures which recognised the importance of climate change, in 2008 the then Labour Government decided to establish a Department of Energy and Climate Change which brought together policy for both regulation of greenhouse gas emissions and fossil fuel combustion for energy use (the greatest source of greenhouse gas emissions).

In 2008, the Climate Change Act was passed by Parliament, which gave statutory force to domestic carbon reduction budgets (Box 4-1). Just as significantly, the Act set up an independent body, the Committee on Climate Change (CCC), with statutory responsibilities to: propose the level of the five-year carbon budgets, assess progress towards the government's long-term emission reduction targets up to 2050, give advice to the government on appropriate climate change policies, and report to Parliament on progress made in reducing greenhouse gas emissions. Detailed description of the UK's CCC and its set up and functions are provided in section **Error! Reference source not found..**

Box 4-1 UK's Carbon budgeting system

The government has set budgets for the UK carbon account over consecutive five-year periods. The government has a legal duty under the Climate Change Act to ensure that the net UK carbon account for a given budgetary period does not exceed the level of the carbon budget. The Act required that the first three carbon budgets (2008-2012, 2013-2017 and 2018-2022) were set by 1 June 2009.

The carbon budgets are intended to set the trajectory for emissions reductions between 2008 and 2050. The budgets must be set with a view to meeting the 2050 target and complying with the UK's EU and international obligations. The level of the budgets which include the years 2020 and 2050 respectively must comply with the targets for those years. Accordingly, the budget which includes the year 2020 must include at least a 34 percent emissions reduction, and for 2050 at least an 80 percent emissions reduction.

Carbon budgets are set by the government through a statutory order, following advice from the CCC, consultation with the devolved administrations, and approval by parliament.

DECC may be the lead department but the UK's ability to meet the carbon budgets relies on action from several key departments. In March 2011, the Government published its first Carbon Plan, setting out a Government-wide plan of action on climate change, setting out department by department actions and deadlines for the next five years.

4.3 Low carbon institutions – Governance framework

4.3.1 India's low carbon governance framework

India has three main overarching frameworks which provide the policy and institutional framework on climate change.

1. **India's National Action Plan on Climate Change (NAPCC)** was released by the Prime Minister in 2008. In view of the need to balance measures to address the challenges posed by climate change with the imperatives of poverty alleviation and economic growth for India, the NAPCC 'identifies measures that promote development objectives while also yielding co-benefits for addressing climate change effectively'. The focus of NAPCC is to improve the understanding of climate science, adaptation, mitigation, energy efficiency and natural resource management and conservation. The NAPCC sets eight priority missions to respond to climate change: Solar Energy, Enhanced Energy Efficiency, Sustainable Habitats, Water, Sustaining the Himalayan Ecosystem, Greening India, Sustainable Agriculture and Strategic Knowledge for Climate Change (see Table 4-2 below for further details).

As an extension to NAPCC, in 2009 the Prime Minister announced at a conference with the State Environment Minister that each of the 28 states of India would be required to prepare States Action Plan on Climate Change (SAPCC). State Action Plans on Climate Change are now being prepared by many states in India, using the guidelines provided by the Ministry of Environment and Forests with support from international agencies such as UNDP and GIZ.

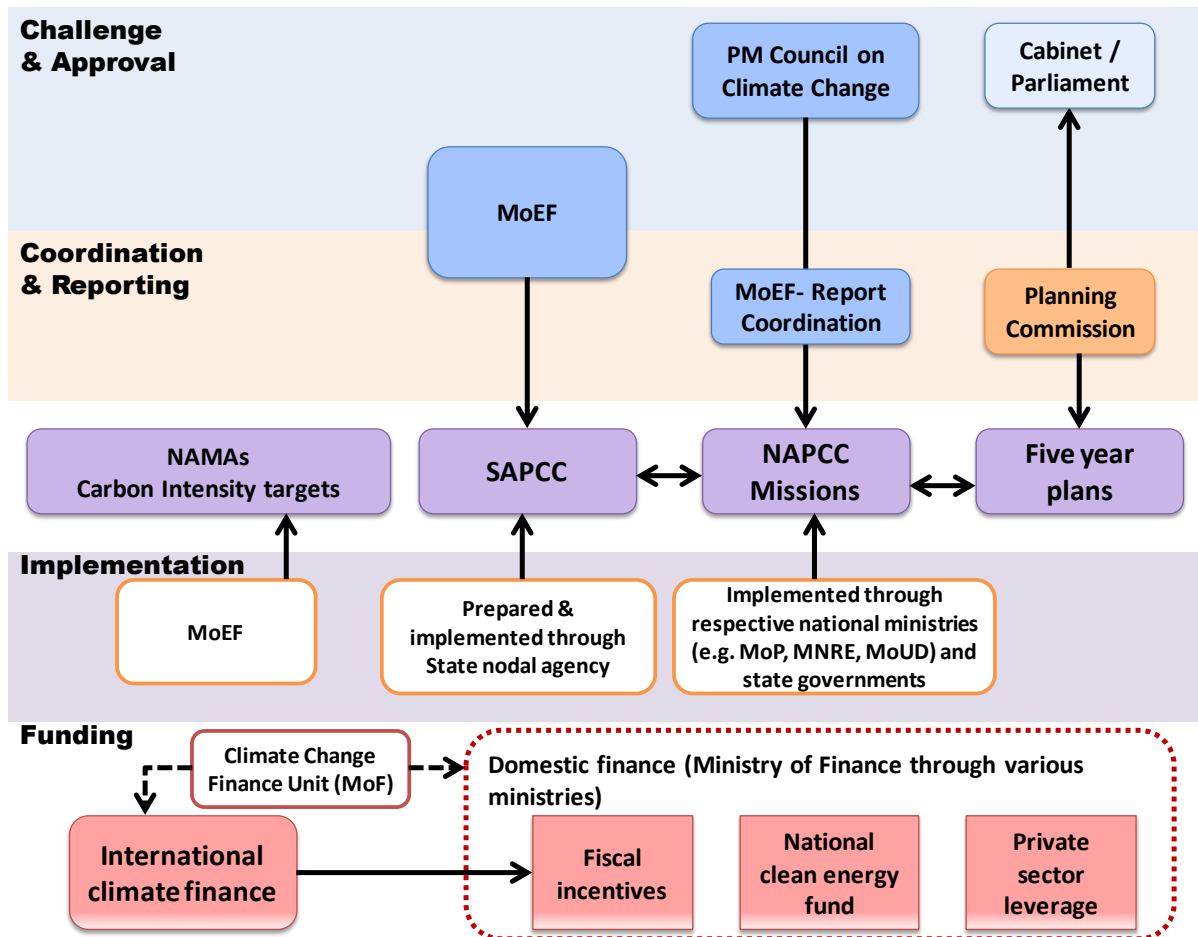
2. **India has taken a voluntary and non-binding target of reducing emission intensity by 20-25% by 2020** across all sectors except agriculture with 2005 as the base year. The announcement was made in COP 15 in Copenhagen, Denmark and the official submission of this target to UNFCCC was made on 30th January 2010.
3. The **12th Five-Year Plan** is focused on "faster, sustainable, more inclusive growth" and outlines 12 policy areas with potential to integrate climate concerns into national planning and development processes. In addition, the 2011-12 annual economic survey by the Ministry of Finance tabled before the parliament included a chapter on climate change for the first time.

India has also made significant progress and commitment in developing an Monitoring, Reporting and Verification (MRV) framework under the UNFCCC. In addition to its importance in tracking national implementation, MRV is seen as essential to the effective tracking of progress by parties to the UN Framework Convention on Climate Change. It was first formally introduced into the international legal climate regime in the 2007 Bali Action Plan, which called for all countries' mitigation actions and support to developing countries to be activities that are "measurable, reportable, and verifiable". India was instrumental in brokering the compromise approach adopted in the 2010 Cancún Agreements, which set out important steps toward an operational system for MRV by agreeing a regime of enhanced reporting and review processes for mitigation actions including an international registry of 'nationally appropriate mitigation actions' (NAMAs).

4.3.2 Delivering the NAPCC missions

The current institutional landscape to deliver the NAPCC missions and report internationally is shown in Figure 4-2.

Figure 4-2 India's low carbon institutional framework



The **National Action Plan on Climate Change (NAPCC)** is India's overarching climate policy document approved by the Prime Minister's Council on Climate Change. The NAPCC has eight missions each of which is tasked to evolve specific objectives spanning the remaining years of the 11th Five-Year Plan and the 12th Five-Year Plan period (2012-13 to 2016-17). The **Prime Minister's Council on Climate Change** is the Advisory Council on Climate Change created by the Government and chaired by the Prime Minister. It reviews the implementation of the National Action Plan on Climate Change and the progress of the each of the eight missions under the NAPCC. In addition, the Council provides guidance on matters relating to coordinated national action on the domestic agenda. The Council has broad based representation from key stake-holders, including Government, Industry and Civil Society and sets out broad directions for National Actions in respect of Climate Change.

Delivery of each of the eight missions under the NAPCC (Table 4-2) is delegated to a specific **nodal ministry**. Comprehensive Mission documents that detail objectives, strategies, plan of action, timelines and monitoring and evaluation criteria were developed by the respective ministries and submitted to the Prime Minister's Council on Climate Change and the Union Cabinet for approval. The Council also is also responsible for periodically reviewing and receiving reports on each Mission's progress. To be able to

quantify progress, appropriate indicators and methodologies were developed to report progress on the tasks undertaken. Each Mission (via its nodal ministry) reports publicly on its annual performance. The Ministries only publish the status of the mission and not performance. While activities are underway in areas covered by the other Missions, the only NAPCC Mission which is currently active is the Solar Mission and MNRE has published the status of projects commissioned under this mission.

The objectives of the NAPCC Missions will be reflected in the Five-Year plans. Each Mission will be tasked to evolve specific objectives spanning the remaining years of the 11th Five-Year Plan and the 12th Five-Year Plan period 2012-13 to 2016-17. Where the resource requirements of the Mission call for an enhancement of the finance allocation in the 11th Five-year Plan, this will be suitably considered, keeping in mind the overall resources available and scope for re-prioritisation.

Table 4-2 NAPCC Missions

Mission	Nodal Ministry	Status ⁴⁷
National Solar Mission	Ministry of New & Renewable Energy (MNRE)	<ul style="list-style-type: none"> • Approved by the PM Council on Climate Change • Approved by the Union Cabinet (Jan 2010)
National Mission on Enhanced Energy Efficiency	Ministry of Power (BEE)	<ul style="list-style-type: none"> • Approved by the PM Council on Climate Change • Approved by the Union Cabinet (June 2010)
National Mission for Sustainable Habitat	Ministry of Urban Development (MoUD)	<ul style="list-style-type: none"> • Approved by the PM Council on Climate Change
National Water Mission	Ministry of Water Resources	<ul style="list-style-type: none"> • Approved by the PM Council on Climate Change • Approved by the Union Cabinet (April 2011)
National Mission for Sustaining the Himalayan Ecosystem	Ministry of Science & Technology/MoEF	<ul style="list-style-type: none"> • Approved by the PM Council on Climate Change
National Mission for Green India	Ministry of Environment & Forests (MoEF)	<ul style="list-style-type: none"> • Approved by the PM Council on Climate Change
National Mission for Sustainable Agriculture	Ministry of Agriculture	<ul style="list-style-type: none"> • Approved by the PM Council on Climate Change
National Mission on Strategic Knowledge for Climate Change	Ministry of Science & Technology	<ul style="list-style-type: none"> • Approved by the PM Council on Climate Change

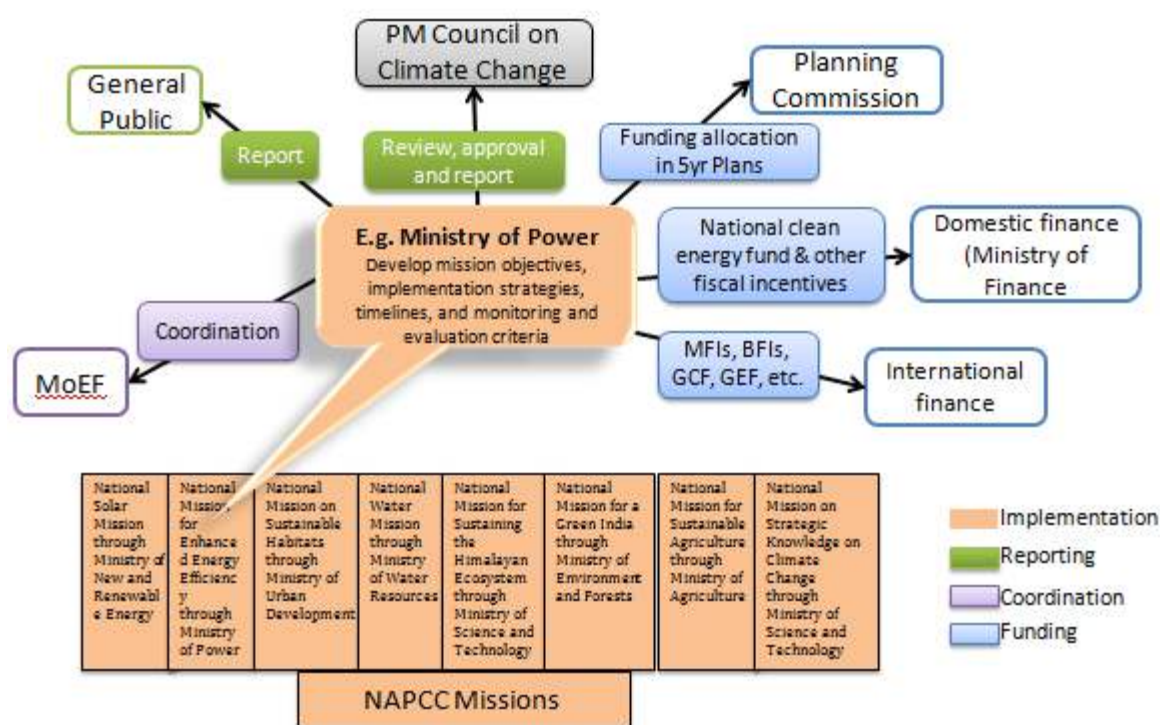
The detailed function of a ministry responsible for a particular Mission is shown in (Figure 4-3) using the Ministry of Power as an example. Figure 4-3 shows how various Missions under the NAPCC are implemented, reported, coordinated and funded with the example of the National Mission of Enhanced Energy Efficiency. The Ministry of Power is the nodal ministry responsible for the implementation of the National Mission on Enhanced Energy Efficiency (NMEEE). It is responsible for preparation of

⁴⁷As in October 2011, http://planningcommission.nic.in/aboutus/committee/wrkgrp12/enf/wgsub_climate.pdf

comprehensive mission documents detailing objectives, strategies, plan of action, timelines and monitoring and evaluation criteria. These are then submitted to the Prime Minister's Council on Climate Change and the Union Cabinet for approval. The progress of the mission is also periodically reviewed by the Prime Minister's Council with coordination support from the Ministry of Environment and Forests.

Funding for the implementation of the Missions is still being considered. The funding can be provided from various domestic and international sources. Domestic sources could include funds allocated to missions by the Planning Commission in its Five Year Plans, the National Clean Energy Fund and other financial and fiscal incentives. International funds could include the Green Climate Fund (GCF), Global Environment Fund (GEF) and other funds through various multi- and bi-lateral agencies.

Figure 4-3 Delivery functions for ministry in charge of a Mission (e.g. MoP)



4.3.3 State Action Plans On Climate Change (SAPCC)

In August 2009, at the Conference of State Environment Ministers, the Prime Minister called upon the States to prepare State Action Plans on Climate Change (SAPCCs) consistent with the strategy outlined in the NAPCC. The SAPCCs are expected to build on the existing policies of the state government by taking into consideration the ongoing programmes and schemes being implemented at the state level as well as within the NAPCC. See Box 4-2 for a brief description of Rajasthan's SAPCC.

Box 4-2 Rajasthan Action Plan on Climate Change (RAPCC)

The proposed institutional structure for the implementation of the SAPCC is under the Chairmanship of the Chief Minister under whom the Steering Committee will directly operate that is headed by the Chief Secretary. The nodal department for overseeing all related activities to the

SAPCC is the Climate Change and CDM Cell in the Rajasthan Pollution Control Board (RPCB) headed by the Principal Secretary and under the task forces would operate under the aegis of this department. The RAPCC will be overseen under the institutional structure of the Rajasthan Environment Mission.

Linkage with NAPCC

SAPCCs are expected to be consistent with the NAPCC and to build on the existing policies of the state Government, by taking into consideration the ongoing programmes and schemes being implemented at the state level. Depending on state government priorities, the SAPCC may include additional plans to address additional climate change issues of the respective states.

The guiding principles of SAPCC (links with adaptation and mitigation)

The main guiding principles of SAPCC focus on both climate change mitigation and adaptation. However, most of the SAPCCs prepared so far emphasise adaptation. The key guiding principles⁴⁸ are:

- implementing inclusive and sustainable development strategy that **protects the poor and vulnerable sections of society** from adverse effects of climate change
- undertaking actions that deliver **benefits for growth and development while mitigating climate change**
- ensuring and improving **ecological sustainability**
- building climate scenarios and investing in **knowledge and research to reduce uncertainty** and improve knowledge about appropriate responses
- assessing **impacts of climate change on existing vulnerabilities**, and identifying and enhancing risk management tools for addressing climate change
- setting out options and evaluating and ranking them according to criteria (cost effectiveness, cost benefit, feasibility, ease of implementation, no regrets, robust to different scenarios etc)
- identifying and implementing state planned and **community based voluntary/autonomous adaptation**
- building broader **stakeholder engagement** to maximise perspectives and involvement in implementation
- **addressing state-specific priority issues, while also creating appropriate enabling environment for implementation of NAPCC at state level**
- considering governance and institutional contexts and ensuring appropriate institutional arrangements and building capacities, keeping in view the coordination, inter departmental consultations, stakeholder involvement and integration with regular planning and budgetary processes

⁴⁸ The principles are given in 'Framework for preparation of State Level Action Plans on Climate Change'; hardcopy was provided to the study team by Climate Change Division, MoEF.

- estimating additional resources requirements and exploring existing and new and additional carbon finance potential
- linking up with national policies and programmes to ensure consistency and identify financial or policy support that may be available.

Role of MoEF in preparation of SAPCC

MoEF provides guidance for the states' action plans. The ministry has issued directions to all states to develop action plans for environment protection. MoEF established a comprehensive framework to guide the states in the preparation of SAPCC. MoEF has also established a comprehensive framework to guide the states in the preparation of SAPCCs. In addition, technical assistance for preparation of SAPCC is provided by MoEF, through multilateral and bilateral agencies such as GIZ and UNDP. MoEF also provides financial support of INR 10 lakhs for preparation of SAPCC.

Process of review and finalization of SAPCC

- An Expert Committee under the Chairmanship of Adviser, Climate Change Division, MoEF, with members from various Nodal Ministries/ Departments has the task of reviewing the draft documents and providing suggestions/recommendations to States for incorporation in their final SAPCC reports. The Committee functions to screen the SAPCCs and recommend them to the Steering Committee for consideration.
- A National Steering Committee under the Chairmanship of Secretary, Ministry of Environment and Forests has been set up to consider and approve/recommend the SAPCC. The Committee endorses the final SAPCC.
- Technical support to the state governments for preparation of SAPCC is provided by bilateral agencies such as GIZ and UNDP.

Next steps after endorsement of SAPCC by MoEF

- State governments need to include the SAPCC into their annual and five year plan and submit to the Planning Commission for budget allocation. The Ministry of Environment and Forests has also written a demi-official letter (DO letter) to the Planning Commission for appropriate consideration of the SAPCC while considering the state plan.
- State governments may also approach bilateral/multilateral financial agencies for financial support to implement some of the activities envisaged in the SAPCC.

4.3.4 The Planning Commission's Five Year Plans and Low Carbon Strategies

The five year plans are formulated by the **Planning Commission**. The Planning Commission was set up in 1950 by the resolution of the government of India and is chaired by the Prime Minister. The Planning Commission works under the overall guidance of the National Development Council.

The five year plans, after being approved by the Planning Commission, are considered by the **Union cabinet**. After approval, they are placed before the **National Development Council**, which is the central body for decision making and deliberations on development matters. It is presided over by the Prime Minister of India and comprises of all Union Ministers, Chief Ministers of all the states and

Administrators of Union Territories and Members of the Planning Commission. Ministers of State with independent charge are also invited to the deliberations of the Council. After approval by the Council, the Plan is placed before the two houses of the **Parliament**.

The objectives of India's 12th **Five-Year plan** (2012-2017) are set out in the approach paper published in October 2011 entitled "Faster, Sustainable and More Inclusive Growth. This is for the first time that the word 'sustainable' has been brought forth in India's growth policy. The Approach Paper to the twelfth plan contains a number of progressive recommendations regarding environment, natural resources, climate change and related livelihoods issues. The 12 thrust areas in plan for policy push to integrate climate concerns into national planning and development process is provided in Box 4-3. Once the thrust areas are approved, the planning commission will lay out a strategy including setting a budget to achieve the outcomes and will have the right to monitor and evaluate whether national ministries and state governments are pursuing the actions or not. The strategy would consider:

- What can be achieved by regulatory action? Including decision about using existing budgetary resources or looking at new sources, such as carbon cess.
- What can be mobilised from the private sector? For example, using cap and trade, surcharge and leveraging private investment.
- What amount of financial support might be provided as international climate finance?

Box 4-3 Sustainable Development and Climate Change Chapter in 12th Five Year Plan

In the twelfth plan, twelve thrust policy areas have been identified, where a push in policy would be needed to mainstream climate change mitigation and adaptation activities into the overall planning and development process. These twelve areas as follows:

1. Stopping investment clearance for thermal coal plants that are subcritical.
2. Streamlining complex energy certificate trading mechanisms.
3. Harnessing wind and solar potential to the maximum possible.
4. Reforms in the power sector, particularly on the distribution side. These include incentives/disincentives for letting state tariff regulators function independent of political governments and of putting in mechanisms where distribution utilities can regain financial health.
5. Efficient and super-efficient appliances programme which will be coordinated and delivered by BEE in collaboration with the industry.
6. Making cement, iron and steel and small and medium industries internationally competitive, energy efficient and green.
7. Implementing simple surcharge/tax/cess to collect green fund outside the government budget. This can be supplemented by the government of India and international donors.
8. Fuel efficiency norms in the transport sector
9. Shifting passengers and freight from road to railways.
10. Efficient intra-city public transport.
11. Green buildings and mainstreaming them into the Urban Renewal Mission.

12. Green India Mission: Increasing the growing stocks of forest and tree cover and finding budgetary resources for the same.

The Government of India has also committed itself to making India a 'low carbon' economy. It has recently announced voluntary and unilateral targets to reduce the emissions intensity of its GDP. It is planning to build the implementation of these targets into a strategy for the twelfth five year plan, consistent with the national objectives of poverty alleviation, sustainable development and inclusive growth. To meet this objective, in February 2010, the Planning Commission constituted an Expert Group on Low Carbon Strategies for Inclusive Growth. In May 2011, the Expert Group presented the interim report providing a variety of options to reduce GHG emission intensity in critical sectors of the economy. The main sectors examined in the report are power, transport, industry, buildings, and forestry. The report indicates that with Determined Efforts India's emission intensity can be brought down by 23 to 35 percent and with Aggressive Efforts, it can be brought down by 33 to 35 percent over the 2005 levels, while sustaining an average real GDP growth rate of 8-9 percent over the decade.

4.3.5 Funding Mechanisms

National Clean Energy Fund (NCEF)

The Finance Bill 2010-11 provided for creation of a corpus called National Clean Energy Fund to invest in entrepreneurial ventures and research in the field of clean energy technologies. The fund is financed by levying a cess of Rs 50 per tonne on coal, lignite and peat. The fund receives almost US\$ 500 million every year.

The National Clean Energy Fund is used for funding research and innovative projects in clean energy technologies. Any project/scheme using innovative methods for adopting clean energy technology or within research & development is eligible for funding under the NCEF.

An Inter Ministerial Group (IMG) assesses and approves the projects/schemes eligible for financing under the National Clean Energy Fund. Members of IMG include the Secretary (Expenditure) and the Secretary (Revenue) from the Union Finance Ministry, as well as representatives from Ministries of Power, Coal, Chemicals and Fertilisers, Petroleum & Natural Gas, New and Renewable Energy and Environment and Forests.

Other Funds and Initiatives

In 2012, the Indian Government established a Climate Change Finance Unit under the Chief Economic Advisor for India's Finance Ministry, to better integrate climate change into development frameworks and financial systems. The unit has been set up to propel analytical thinking around climate change and low carbon economic opportunities, discussion of which is gaining momentum since India's deeper involvement in the international negotiations on climate change with the proposed National Action Plan on Climate Change.

Program implementation at state level is done either through state funds or central funds. Under the NAPCC, central funds are created which can be utilised by states e.g. preferential tariff provided by centre under the solar mission. If a state is implementing solar projects under Solar mission, they can use this incentive. Also, through regulatory measures, the implementation of missions is influenced at state level. For example, the Energy Conservation Act 2001, to implement the Perform Achieve and Trade Scheme for energy efficiency in industries, and the Electricity Act 2003, to enforce Renewable Purchase Obligation.

Other fiscal incentives that have been taken by the government include:

- the exemption of some parts of hybrid vehicles from custom duties,
- imposition of a concessional 5 per cent rate of excise duty to increase the domestic production of hybrid vehicles
- lower customs duty on light emitting diodes (LEDs) and solar lanterns
- subsidies to renewable energy projects.

In addition, as part of the budgetary process, the NAPCC outlines a number of steps to be taken in critical sectors along with required financial outlays. State Action Plans have estimated costs which are significant for implementation of its various missions. For example, a rough and ready estimate puts the resource requirement at Rs. 17,000 crore over a period of five years for the state of Odisha.

4.4 Governance Institutions - key lessons from UK and principles for effective institutional framework

4.4.1 Key messages for India from UK Committee on Climate Change

As explained above, in 2008 the UK established an innovative and independent approach to the governance of its national climate change policy through the establishment of the Committee on Climate Change (CCC). Annex 5.5 sets out a detailed summary of the Committee's functions and activities as well information on its decision making process, membership and resources. It also includes information on Australia's new Climate Change Authority which has been established along a similar mode.

A summary of the key messages for the Indian context based on the UK's experiences of the CCC is provided in **Error! Reference source not found.**

Box 4-4 Summary of key messages for India from CCC experience

The impact of an effective low carbon governance structure stems from a combination of (1) statutory authority via the Climate Change Act and (2) building and maintaining trust and credibility, similar to a central banker. This credibility is obtained in several ways, including: the technical robustness of the advice, the reputation of the committee members and the chair, the use of technical yet accessible language in reports and the ability for the recommendations to be seen as

achieving their climate objective yet feasible for business and government.

Other key lessons are:

- **Building credibility and trust.** The ability to separate out politics from analytical problems by using clear performance indicators based on real world measures is key for maintaining influence and trust.
- Important that the Annual Progress Report is a **report to Parliament, not to Government**. This places the onus on Government to respond to that report and face debate in Parliament rather than simply sit on it.
- As part of this reporting role, it is important to track **performance indicators** other than simply emissions reductions or improvements in energy intensity. CCC has identified indicators other than emissions reductions which provide visibility of what you can expect in future – is implementation on track? E.g. Renewables: what's going into planning system and going into construction.
- **Distinction between technical advice and policy:** CCC is responsible for advice on where abatement but not detailed advice on specific policies which remain with Departments. In some areas it is inevitable that this distinction can be blurred, for example in energy market reform. There was huge sensitivity about CCC role on policy initially. CCC clearly has a role in identifying where policies are failing with clear evidence.
- Membership:
 - selection of the chair is key: Lord Turner combined being a political operator with someone in whom business could have confidence.
 - independent expertise of members.
- Funding: CCC is funded by the main government departments affected by climate policy, who also have a say in commissioning CCC's research. However, the government departments do not have a say in the study process except for testing emerging conclusions. An annual budget of £4m is used for external consultant (£2m) and internal administration and research (£2m).

Note: See Annex for a detailed description of CCC activities in the UK

4.4.2 Principles for an effective low carbon governance framework

The establishment of a robust and effective low carbon institutional framework that is flexible to deal with the myriad of differentiated challenges and varying development timescales is clearly not an easy task. This is particularly true when institutional structures have evolved and grown over time to work with new institutions to meet new demands and reflect changes in policy direction.

Evidence from the UK and published literature have identified several key features which should underpin low carbon institutional frameworks in order to have an effective response to climate change. This will require tough decisions and possibly new or reformed existing institutional frameworks.

Common characteristics and principles of a good low carbon governance institution are:

1. **An overarching objective and long-term focus, with a legal basis.** The starting point for economy-wide decarbonisation is a strong legislative basis. The fundamental reforms to energy, transport, industrial, agricultural and fiscal policy that will follow need statutory legitimacy. The

adoption of a climate change law is a way of forging the broad political consensus that will be needed during implementation. Climate change laws in most major economies have been bipartisan efforts⁴⁹. The UK Climate Change Act of 2008, for example, was passed near unanimously, with the carbon budgets enshrined in law.

2. **Clear alignment between the overarching objectives and the objectives of delivery bodies.** This requires visibility in terms of government, business and general public perception of government priorities, reinforcing required institutional and behavioural change at all levels. In the UK, the CCC is an independent body which reports directly to Parliament.
3. **Influence on high-level decision makers and funding decisions** for budget allocation, favourable policy development and to reconcile conflicting mandates of nodal ministries and improve inter-ministerial coordination and responsibility. Government has to respond to CCC recommendations and it has appointed politically influential person as CCC Chair.
4. **Technical expertise and resources** in terms of having the resources to engage with expert nodal ministries on technical detail rather than simply accept information and evidence at face value. The CCC's expert secretariat conducts independent research.
5. **Minimal development of new bureaucratic structures** to enhance rather than reinvent existing structures
6. **Monitoring, Reporting and Verification (MRV) frameworks** that:
 - provide feedback to objectives
 - track progress rigorously using relevant metrics and indicators across all key aspects of national activities and programme delivery
 - ensure technical expertise and authoritative advice for verification
 - allow flexibility to adapt the approach in light of scientific, technological or policy developments.

CCC reports cover carbon budgets, policy milestones and other indicators on a regular basis.

Table 4-3 summarises India's current position with respect to the common characteristics and principals of good low carbon governance institution framework.

Table 4-3 Low Carbon Governance Principles and Indian Scenario

	Current Indian position
Overarching objective and long-term focus	Considerable uncertainty about the path from 2020 to 2050, the measure and technologies that this will require, and implications for capacity building, finance and technology support over the next few years. In addition, India's international climate commitments also need to be incorporated in domestic plans.
Clear alignment between overarching objective and objectives of delivery bodies	<p>The number of bodies and differences in approach mean that the landscape is quite complex. Objectives of delivery bodies need to be fully consistent with ministry and five year plan objectives.</p> <p>The ministries responsible for the missions face conflicting challenges for delivery of missions versus delivery of regular policies. Most missions have wider remit than what the responsible ministry can manage.</p> <p>Each of the eight missions in the NAPCC has a designated nodal agency. At the official level, there is the cabinet secretariat that is involved with coordination of all missions. At a non-official, non-political level, India has the PM's Council on Climate Change as the coordinating and reviewing body. It is responsible for approval and</p>

⁴⁹ Townshend, T., S. Fankhauser, A. Matthews, C. Feger, J. Liu and T. Narciso (2011). "Legislating Climate Change at the National Level", in: Environment 53(5): 5-16.

	Current Indian position
	<p>coordination of all the eight missions. However, a supra mechanism for further strengthening of the existing coordination mechanism may be needed to connect the eight missions together</p> <p>Even though the policy initiative is Government owned, with well-defined coordination and reporting frameworks, government accountability is not demonstrated for effective support from states, businesses and society.</p> <p>The implementation of NAPCC at the state level is still a concern. The funds required for implementing some of the State action plans are very high and needs further evaluation at the national level. Separating what is needed for climate change and what is for development is not easy and appropriate guidelines are required.</p>
Influence on high-level decision makers and funding decisions	<p>The PM Council on Climate Change provides guidance and recommendations based on the reports it receives. Missions are only approved before they are tabled in parliament. Even though the PM council is the approval authority for the NAPCC, it does not have the authority or accountability to provide independent advice to GoI and States to verify whether targets are appropriate and the steps required to meet them are adequate.</p> <p>The council provides in-principle approval and afterwards the final approval is obtained from Cabinet as per India's constitutional process.</p> <p>The PM Council on climate change is remote from the core actions of the NAPCC and not responsible for outcomes. The core actions and outcomes are fully dependent on individual ministries only.</p> <p>Even though a number of new funding sources such as the National Clean Energy Fund (NCEF) have been announced, lack of adequate funding for mission activities at national and state level has been identified a serious issue.</p> <p>The Planning Commission and the Ministry of Finance has the authority to allocate funding for any new committee or authority provided the parliament/cabinet approves such an authority.</p>
Technical expertise and resources	<p>There are huge pressure on administrative requirements and shortage of human resources for scientific and technical requirements for delivery of the Missions.</p> <p>The PM council does not undertake any authoritative research of its own to verify the reports it receives or provide minimum guidelines for reporting. The involvement of technical and academic institutions is also minimal.</p>
Light in bureaucratic working	<p>Existing structures and institutions are being utilized with internal changes and responsibilities.</p>
MRV frameworks	<p>India's carbon intensity target and some targets in the NAPCC need timely and reliable data. This can affect transparent monitoring of targets and quality of any decisions based on this data.</p> <p>Little evaluation evidence is available on the tracking and effectiveness of national missions, as well as of state plans and spending.</p> <p>Few resources have been dedicated to the long-term monitoring of measures.</p>

4.5 Options for improvement of India's governance framework

In-depth stakeholder consultations and discussions during the main workshops and roundtables provided two main options for improving the India's low carbon governance institutional framework.

1. Planning Commission to establish a dedicated Low Carbon Growth Unit (LCGU)

The Planning Commission is a natural place for housing and coordinating action on any cross-cutting issues, not just for climate change. A special unit such as the Low Carbon Growth Unit (LCGU) could be set up to focus expressly on delivery of those aspects of the 5-Year Plan with climate elements linked to the NAPCC. Having a technically qualified unit outside the MOEF would allow the MOEF to adopt a much easier and non-adversarial role of coordinating policy and measures at a national and state level. Housing such a unit in the Planning Commission would also provide clear institutional recognition that climate change is a cross-cutting issue rather than an environmental one. The LCGU could improve institutional coordination between central and state organisations. To increase the accountability of the states, the central sponsored schemes could have a share of state funds which would automatically result in the formation of joint central-state committees to oversee implementation.

In addition, the existing Expert Group on Low Carbon Strategies for Inclusive Growth could be given a permanent role to provide technical review and advisory service to the LCGU.

Since the Planning Commission also carries out a mid-term appraisal to review targets and progress of the Five-Year Plan, it could regularly report on the measures and outcomes to track progress of the climate-related policy thrusts. It could then recommend ways to reach targets or revise the targets. Progress reports would be published as part of Five-Year Plan process. In addition, the Planning Commission also has the appropriate procedures for raising funds through established instruments or creating new fiscal instruments.

There has been some progress already in the Planning Commission in this area. A separate climate change chapter in 12th Five-Year plan clearly shows that climate change and its socio-economic impacts have moved up the agenda. In addition, the entire 12th Five-Year plan provides leadership towards the sustainable development of India. The proposed climate change unit should focus on sustainable development and green growth in a more integrated manner rather than just on low carbon. India has many adaptation and mitigation related challenges which have not been currently included in NAPCC e.g. intercity transport, freight transport, etc.

Further consideration would need to be given to the precise role which such a unit would be given in relation to raising and allocation of funding for mission activities at national and state level. The Planning Commission has the appropriate procedures for raising funds through established instruments or creating new fiscal instruments, such as carbon cess. NAPCC missions also provide additional provisions to develop new financing channels. In addition, the LCGU would need to work closely with the new Climate Change Finance Unit in the Ministry of Finance in relation to the design of fiscal instruments aimed at leveraging private sector funding. The Planning Commission is also able to monitor and coordinate funds that can come as international climate finance.

2. A new dedicated committee established by the Prime Minister

Alternatively a separate expert body operating outside Ministerial structure could be created to report to the Prime Minister's office (and possibly to Parliament) on progress of NAPCC and climate aspects of Five-year plan. This body can be appointed informally by the PM Council on Climate Change or formally under the Environment Protection Act 1986.

This expert committee would guide individual ministries regarding key actions and outcomes related to the NAPCC and climate aspects of Five-year plan. The expert committee will also undertake research and analysis into climate change science, economics and policy related to national and state targets and action plans. Taking a leaf from the UK experience with regards to funding such an institution; the expert committee can be funded by the main government departments affected by climate policy, who also have a say in commissioning this kind of research.

The key roles of the committee could be to:

- Produce summary scrutiny reports on the progress of the NAPCC Missions with clear recommendations of what improvements can be made.
- Produce scrutiny reports and recommendations for State Action Plans by engaging relevant stakeholders from the Council.
- Produce annual progress reports on meeting national and state targets and recommending any actions necessary given budget allocations.
- Stimulating 'innovation' through relevant council members by engaging them to share evidence and analysis, especially on science and technology.

The option for a dedicated committee reporting to the PM is an attractive option from the point of view that it would not require complex bureaucratic structures.

However, a risk associated with this option is that maintaining economic development as the key policy agenda could be diluted. Having a committee formed either by PM or under any Act for governance may escalate climate change as a top priority, which is not appropriate in current context. In the medium term, when there is stronger acceptance that economic development and climate change strategies are linked, this option could become more viable. An alternative could be that the existing PM Council, or the committee formed under Planning Commission, could provide updates to the Cabinet Secretariat annually to ensure that national goals related to climate change and development are being met.

The main advantages and disadvantages of these two options are discussed in Table 4-4.

Table 4-4 Pros and cons of the two options

Option	Recommended options		Existing situation
	Pros	Cons	
Planning Commission: dedicated Low Carbon Growth Unit (LCGU)	<ul style="list-style-type: none"> - Reinforces fact that climate concerns are cross-government issue - Provides long term focus and complements enhanced status of climate within the 12th 5YP - More likely to increase likelihood of delivery of Missions - More control over implementation and monitoring of plans. - There was a strong steer to ensure good inter-ministerial and centre-state coordination which the PC can perform for effective governance and accountability which seems very difficult under the current set up. - Greater control over allocation of funds and other resources to nodal ministries and for State Action Plans on CC 	<ul style="list-style-type: none"> - Unusual for Planning Commission to set up specialist unit of this type - Risk that L will not engage regularly enough to cause impact - May not be seen as sufficiently independent voice - Challenge for ensuring consistency between missions objectives and targets and the 12th 5yr plan. 	<ul style="list-style-type: none"> - There is no formal involvement of PC with the NAPCC. There is no official link between the sustainability/climate objectives in the 12th 5YP and the NAPCC. - PC has appointed an Expert Group on Low Carbon Strategies for Inclusive Growth (not a permanent body).
Committee set up by PM <ul style="list-style-type: none"> ○ PM appointed (informal) ○ Under Environment protection act (formal route) 	<ul style="list-style-type: none"> - Independent review and analysis based on sound and authoritative research - Very powerful and accountable structure - Option (2b) would provide NAPCC function through a statutory authority to implement legislation. 	<ul style="list-style-type: none"> - Resources and time involved in setting up independent body - May be seen as putting climate too high on the agenda - Adds additional layer of bureaucracy to system - May not be suited for State level support and engagement 	<ul style="list-style-type: none"> - Provides guidance and recommendations based on the reports it receives but no authority to provide advice to Gol and States - The PM Council on climate change is very remote from the core actions of NAPCC and not responsible for outcomes. - Does not undertake any authoritative research of its own to verify the reports

4.6 Private sector capacity building and financial support

4.6.1 Why India needs enabling institutions for private sector support

The private sector requires specialist technological support, including advice as well as financial assistance/incentives to comply with climate change policies and implement low carbon projects. Building the private sector's capacity and providing it with support to comply with policy and capture the benefits from policy incentives was highlighted as an important issue in the Indian context.

Even when policy objectives appear simple, there may still be actual or perceived risks associated with their implementation. Therefore, an appropriate institution or mechanism to reduce the perceived risks and motivate households and businesses to take action becomes necessary. Institutions such as the Carbon Trust in the UK that provide hand-holding to address perceived risks may be useful in the Indian context also (Box 4-5).

The proposed perform and trade (PAT) scheme focuses on large industries, but there are millions of small and medium industries which also need to be targeted. A range of institutions already exist in India for supporting low carbon growth. However, the government still needs to strengthen existing institutions or create new structures using the available institutions to support low carbon growth. Major win-win opportunities are being missed due to lack of awareness and guidance. Indian industry and business sectors are looking for stability and predictability regarding policies and energy pass-through costs.

In the meantime, a number of industry-led initiatives for India's low carbon growth have been established such as the CII's Green Business Centre in Hyderabad. A majority of banks and private institutions are wary of financing some low carbon projects because conventional methods are used to determine the viability of projects. However, low carbon projects require innovative ways for financing as well as different market mechanisms to leverage private finance.

Box 4-5 Key lessons for India from the UK Carbon Trust experience

The experience of Carbon Trust in the UK is an interesting example that can be adapted in India to provide for independent advice and capacity building of the private sector. It is a unique organisation because it also plays an important role in the UK market as a financial institution. In this regard, it has introduced many financing schemes such as interest free loans for energy efficiency in small and medium enterprises and other commercial finance schemes.

In addition, it has been involved with the following activities:

- provides impartial confidential advice to businesses
- has engaged people to create awareness about energy efficiency
- created various types of services such as strategic energy management advice for large businesses and energy audits for medium businesses
- advises the public sector and works with all the local authorities to set targets, identify opportunities and implement them
- introduction of the accreditation/ labelling scheme
- measures product carbon footprints
- provides incubation support for new technologies. It helps businesses to identify target market and create a business case for private sector investment.

While closeness to government can both help and hinder an organisation's reputation, the Carbon Trust has developed itself as a strong brand with a positive reputation for providing fact based independent authoritative advice. Credible authority and reputation is important to ensure private sector buy-in from both large companies and SMEs.

Carbon Trust has been active in supporting companies through the early stages of the "innovation chain". This is an area that has seen significant evolution within the CT portfolio of activity over recent years. Technology incubation is supported to provide venture capital funds where there is a credible technology with an credible route to market. Support from CT venture capital sources has been highly successful in leveraging in Private Sector investment (averaging £13 of private investment for every £1 of CT investment). CT has assessed more than 3,5000 potential projects funding less than 10% of those that apply. CT investment is seen as a signal from the wider venture capital community of the significant quality of potential investment.

The Carbon Trust appears to have been able to balance its impartiality and public service role with a deep understanding of business. This is because, from the outset, the Carbon Trust recruited very senior leaders from the private sector and valued a private sector skill set within the staff group, operating with a strong commercial focus.

Recognising the impact of tailoring advice to size of organisation and risk profile of the technology/investment ensures cost-effective results and instils business confidence.

Early investment in marketing and reputation building pays long term dividends, as demonstrated by the evolution in the UK's private sector on carbon saving over the years. Strong brand identity has ensured that as business comes to appreciate the benefits of low carbon technologies, the Carbon Trust is well regarded as a potential partner in that journey.

Developing the right skills set internally can be achieved by providing tailored training, focussed recruitment and strong leadership.

The trust funds its activities through grant funding from the government and from revenue generating activities by its main subsidiaries. For 2010/11 the Group received grant funding from DECC, the Devolved Administrations, Defra, Department for Transport (DfT) and the Foreign and Commonwealth Office (FCO) of £142.8 million (2009/10 – £244.4 million). In 2010/11 the Group generated revenues from sales and licensing agreements of £7.8 million (2009/10 – £5.3 million) via its main subsidiaries:

- Carbon Trust Advisory
- Carbon Trust Implementation
- Carbon Trust Certification

Note: See Annex for detailed description of Carbon Trust activities in the UK

4.6.2 Indian experience in providing private sector support

A number of public and private institutions exist in India to provide private sector support with respect to finance and capacity building. Some of the main institutions are summarised below:

New Ventures India

New Ventures India is a joint initiative of the CII - Sohrabji Godrej Green Business Centre, Hyderabad and the World Resources Institute, Washington DC. The initiative was established and supported by USAID under the Global Development Alliance. The programme is currently supported by British High

Commission under the Strategic Programme Fund (SPF), USDoS under the Asia Pacific Partnership (APP) programme and Citi Foundation. New Ventures India promotes sustainable growth by accelerating the transfer of talent and capital to businesses that deliver social and environmental benefits. Their mission is to match scalable green business opportunities with skills, talent, technology, markets and money. It focuses on enterprises working in renewable energy, energy efficiency, clean technology, sustainable agriculture, green building materials, recycling, water technologies and eco-tourism.

Key functions and activities are:

- mentoring and technical assistance through an extensive network of financial institutions, business consultants and technical experts
- connecting with potential investors through targeted investor events
- training programs and sector based workshops for sustainable enterprises
- access to New Ventures global resources through World Resources Institute (WRI)
- engaging and partnering with local institutions to generate local capacity for sustainable.

Inter Ministerial Group: National Clean Energy Fund (NCEF)

As mentioned earlier the National Clean Energy Fund has been set up for funding research and innovative projects in clean energy technologies. Any project/scheme using innovative methods for adopting clean energy technology or within research & development is eligible for funding under the NCEF.

Indian Green Building Council (IGBC)

The Indian Green Building Council (IGBC) is a part of CII-Godrej Green Business Centre, which is actively involved in promoting the Green Building movement in India. The council is represented by all stakeholders of the construction industry comprising government and nodal agencies, architects, product manufacturers, institutions, etc. The council is industry-led, consensus-based and member-driven. The vision of the council is to serve as single point solution provider and be a key engine to facilitate all green building activities in India.

The IGBC has developed the following green building rating systems for different types of buildings:

- LEED India for New Construction
- LEED India for Core and Shell
- IGBC Green Homes
- IGBC Green Factory Building
- IGBC Green SEZ
- IGBC Green Townships.

To facilitate the spread of green building concepts throughout India and with a mission to outreach at a regional levels, local chapters were launched in Ahmadabad, Baroda, Bengaluru, Chennai, Delhi, Hyderabad, Goa, Kochi, Kolkata, Mumbai and Pune. These have been created with the aim of

allowing faster penetration and outreach to a broader cross-section of stakeholders and to involve local agencies and institutions in the green building movement.

The IGBC also provides a single-point reference on green building products and technologies. It has developed a directory on green building materials and service providers, the first of its kind in India. The directory will serve as a ready reference to all builders, consultants, architects, contractors etc, and also serve as a single-point reference to those seeking inputs / details on green building material and equipment

TERI and other academic institutes

The TERI is an independent not-for-profit organisation that works extensively on environment, energy and sustainable development issues. TERI has also created the TERI University to provide academic courses on these issues. As a scientific research organisation it has 17 divisions ranging from Climate Change, Biotechnology and Bioresources, Energy Environment Technology Development, Sustainable Development and Outreach, and Regulatory Studies Governance among others. It also provides consultancy and capacity building services in these areas.

Other academic institutes such as the Indian Institute of Technology (IIT) and Indian Institute of Sciences (IISc) and also private consultancy firms are continuously involved in developing low carbon technologies and providing capacity building to various stakeholders.

ICICI Bank Technology Finance Group (TFG)

The Technology Finance Group (TFG) of ICICI Bank implements various programmes for international agencies such as World Bank and USAID. The programmes currently running are designed to help the industry and institutions undertake collaborative R&D and technology development projects. These programmes focus on the following sectors:

- Biotechnology/ Healthcare
- Electrical
- Electronics & communication
- Energy
- Environment
- Materials
- Manufacturing/ Control technologies
- Financial/ Security services.

The core group handling these programmes assists projects, which introduce new concepts, products, and processes that will have a positive impact on the industry and help in improving competitiveness and operational efficiencies.

The TFG has provided over two decades of experience in assisting various clean technology initiatives in India. It has also assisted in implementing programmes for bilateral/multilateral agencies on behalf of the Indian government. Assistance is given to projects which are

- innovative
- bridge technology gaps
- first of their kind in India
- replicable
- in line with the strategic objectives of the funding agency.

Some example so of TFG's key clean technology initiatives

- promoting eco-friendly technologies – e.g. clean coal technologies
- initiatives to reduce emissions, such as:
 - Energy Service Companies
 - Demand Side Management
 - Waste heat recovery
 - Biomass cogeneration
 - Energy Efficient air-conditioning
 - Zero Emission Initiative
 - Green Building Initiatives
 - National Initiatives
 - Social Initiatives.

4.7 Options for creating enabling institutions for private sector support

A series of workshops and stakeholder consultation provided a number of suggestions and options for creating enabling institutions for private sector support. There was a common understanding that setting up new institutions should be avoided as much as possible. Replicating UK Carbon Trust functions through existing institutions in India is a more suitable option. This can be done by increasing the capacity of existing institutions or creating new networks or partnerships to address the gaps in the support provided to the private sector.

It was suggested that technology-level institutions are crucial. In this regard, **technology innovation centres with respect to certain technologies should be promoted**. These could be promoted through research with coordination and cooperation of various existing institutions in India such as IISCs, IITs and TERI and also with support from other countries.

In addition to the availability of the technology, it is imperative that there is enough **skilled manpower to run the technology**. In this regard, it is important to emphasise education, capacity building and vocational training. Action from industries, industry associations, states, national government, NGOs, think-tanks and technical institutions will be essential to create awareness, capacity building and information dissemination. New supporting institutions such as the Energy Management Centre could also be created. The Energy Management Centre is the state designated government agency in Kerala devoted to the improvement of energy efficiency, promotion of energy conservation, small hydro power and encouraging development of technologies related to energy through research, training, demonstration programmes and awareness creation. The centre networks with institutions within and outside the state for research and training.

Further solutions for **increased financial support and investment for low carbon technologies** were also identified as a requirement for moving forward. In India, the National Clean Energy Fund has been created by levying a cess of INR 50 per ton of coal, lignite and peat. The fund is a potential source of financing for renewable clean technology projects and can be accessed by submitting a funding proposal, routed through the Ministry of Finance to the relevant ministry. The size and scope of the fund should be reviewed on regular basis to ensure most appropriate technologies are targeted.

Indian Renewable Energy Development Agency (IREDA) finances renewable energy and energy efficiency projects and catalyzes the financing of renewable energy projects by commercial banks. IREDA can be further empowered to play a bigger role in financing low carbon projects in India.

New Ventures India (discussed above) promoted by Confederation of Indian Industry is a recommended private initiative but with limited funding. It aims to mobilize finance from private sector and lead banks to promote SME's producing green products. It can also play a role in strengthening the capacity of SMEs and promote low carbon growth in India. It is important to create similar institutions and understand how larger funding can be made available under this initiative.

A number of speakers at the workshops indicated that existing financial institutions such as IDFC and ICICI bank can provide similar services to the Carbon Trust. The other option was to combine technical institutions (e.g. IISCs, IITs and TERI) with financial support by linking technology centres with funding agencies. See Box 4-6 for suggested proposition for banks and financial institutions.

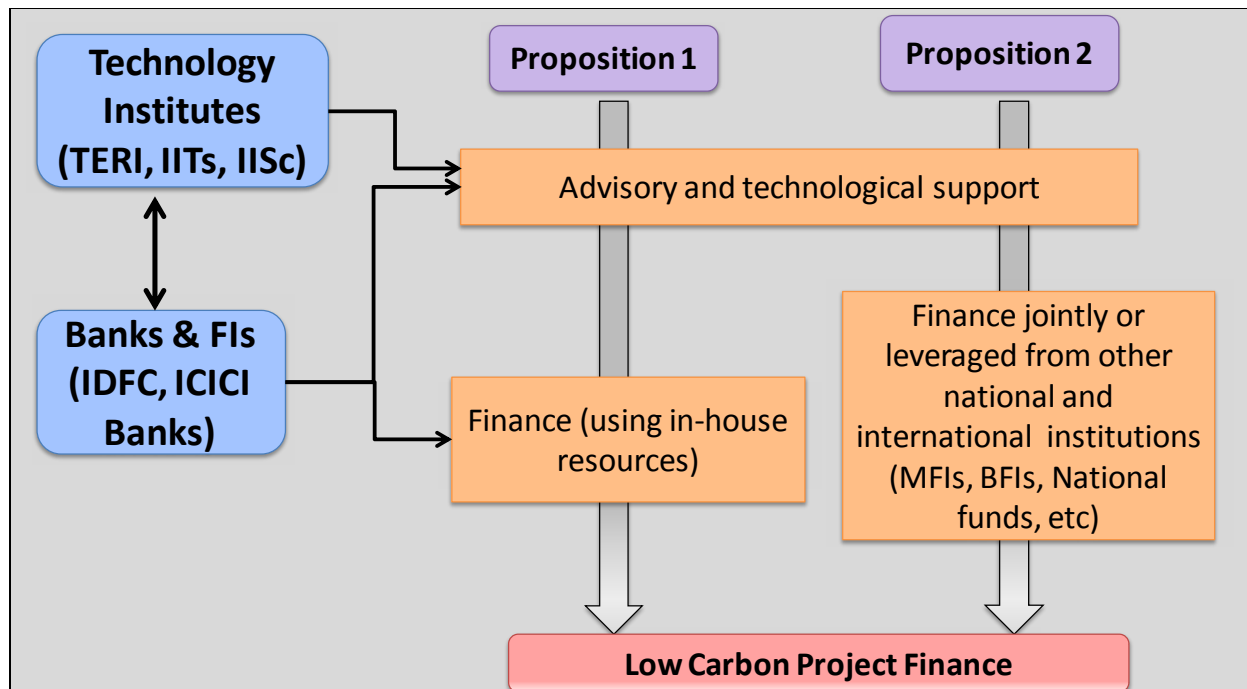
Box 4-6 Proposition for banks and financial institutions to assist new low carbon technologies and scale up existing proven technologies

It was identified that India needs substantial implementation support to achieve low carbon targets. In addition, there is co-existence of private and public sector in the domain of environment and climate change. Therefore, it becomes crucial that instruments and institutions are designed giving detailed attention to these multi disciplinary aspects, or else the policy objectives may not be realized.

Therefore, an appropriate institution or mechanism to reduce the perceived risks and motivate people to take action becomes necessary. Institutions such as the Carbon Trust that provides hand-holding to take care of the perceived risks of low carbon investment through various stages of technology development and commercialisation may be important for India too.

Banks and Financial Institutions such as ICICI and IDFC are uniquely placed in India to accelerate move to low carbon economy by removing barriers, reducing compliance cost and risk by providing technological advisory, financial support and leveraging investment in the private sector.

Two propositions can be considered to support new (unproven) technologies as well scale up existing technologies with proven track record:



Proposition 1 – Bank/FI provides advisory and technological support using in-house capacity of technical experts which is used as a screening mechanism for project finance using own resources. The advisory and technological support team may need to be upgraded for advising on new technologies and scaling up existing technologies. The other option is that joint partnership or endorsement agreements are developed by technology institutions (e.g. TERI, IITs) to screen technologies.

Proposition 2 – Bank/FI or technology institutions provide advisory and technological support as proposition 1. But the service is recognised by national and international funding sources for joint funding or leveraging of Bank/FI’s initial investment. Bank/FI may need additional support from national (e.g. clean energy fund) and international funds (World Bank’s Partnership for Market Readiness) to manage a network of finance institutions for co-funding low carbon projects.

5 Annex

5.1 List of stakeholders

India

Name	Designation	Organization
Green/Energy Efficiency Buildings		
Ms. M Z Bawa	Director, Buildings	Delhi Development Authority
Mr. Khikadiwala	Chief Architect	Delhi Development Authority
Mr. Akhilesh Gautam	Deputy Manager, Buildings	DLF Limited
Ms. Priyanka Kochhar	Programme Manager	ADaRSH (Association for Development and Research of Sustainable Habitats)
Dr. Prem Jain	Chairman	Indian Green Building Council
Mr. Ashish Rakheja	Ass. Director	Spectral services consultants Pvt Ltd
Mr. Tanmay Tathagat	Director	Environment Design Solutions Ltd
Mr. Piyush Verma	Project Engineer (ECBC)	Bureau of Energy Efficiency
Mr. Saurabh Yadav	Knowledge Management Specialist	Bureau of Energy Efficiency
Dr Ajay Mathur	Director General	Bureau of Energy Efficiency
Dr Sandeep Garg	Energy Economist	Bureau of Energy Efficiency
Ms. Lakshmy Gopan	Additional Chief Architect	Delhi Development Authority
Dr. Satish Kumar	Energy Efficiency Ambassador and Vice President, Energy Management Services	Schneider Electric
Dr. Hina Zia	Fellow	TERI
Saacketh Chawla		Colliers International
Mr. Nagesh Gupta		Indian Green Building Council
Low Carbon Institutional Framework		
Dr. Prodipto Ghosh	Member	PM council on climate change
Dr. Navroz Dubash	Senior fellow	Centre for Policy Research
Aditi Dass	Consultant	The Climate Group
Seema Arora	Director	CII-ITC Centre of Excellence for Sustainable Development
Rajiv Kumar	Dy Secretary	Ministry of Environment and Forests
Dr. P C Maithani	Director	Ministry of New and Renewable Energy
Dr. Ambuj Sagar	Member	Low Carbon Expert Group
Debashish Majumdar	CMD	IREDA
Mr Ashish Khanna	Senior Energy Specialist	World Bank

Name	Designation	Organization
Mr. Siddhartha Singla	Advocate	Ministry of Petroleum and Natural Gas
Dr. D.Raghunandan	Secretary	Delhi Science Forum
Mr V Raghuraman	Former Principal Advisor and Head, Energy, Environment and Natural Resources	Confederation of Indian Industries (CII)
Dr. Basudev Mohanty	Senior Advisor	Ministry of Petroleum and Natural Gas
Dr. Dipak Dasgupta	Principal Economic Adviser, Dept Of Economic Affairs.	Ministry of finance
Ambassador Chandrasekhar Dasgupta	Distinguished Fellow	TERI
Honorable Mr. Gregory Barker	Minister of State	Department of Energy and Climate Change, United Kingdom (UK)
Mark Runacres	Independent Consultant	
Arunish Chawla	Convener/ PS to Dy. Chairman	Expert Committee on Low Carbon Strategies for Inclusive Growth/ Planning Commission
Dr. S. Satapathy	Director (Scientific)	Climate Change Division, Ministry of Environment and Forests
Mr. Robert Donkers	Minister Counsellor for Environment	Delegation of the European Union to India
Ms. Katie White	Head	International Climate Change Engagement at Department of Energy and Climate Change
Renewable Energy Certificates (RECs)		
Vibhav Nuwal	Director	REConnect
Rajesh Mendiratta	Vice President	India Energy Exchange (IEX)
Anoop Singh	Associate Professor	IIT Roorkee
P V Tayde	Manager	Maharashtra Energy Development Agency
Jami Hossain	Treasurer	World Wind Energy Association and Chief Mentor Windforce Management Pvt. Services
Mr Rakesh Shah	Advisor	Central Electricity Regulatory Commission (CERC)
Ms. Minaxi Garg	Deputy General Manager	National Load Dispatch Center
Mr. Bikram Singh	Associate Vice President	India Energy Exchange
Mr. AA Khatana	Chief General Manager	Indian Renewable Energy Development Agency (IREDA)
Dr. NP Singh	Adviser	Ministry of New and Renewable Energy
Dr. Jyoti Prasad Painuly	Chief Advisor (Economics)	Central Electricity Regulatory Commission (CERC)
Mr. Debashish Majumdar	Chairman & Managing Director	Indian Renewable Energy Development Agency Limited (IREDA)
Mr. V. Subramanian	Former Secretary	Ministry of New and Renewable Energy

UK

Name	Position	Organisation
Renewable Energy Certificates (RECs)		
Richard Vianello	Head, Renewables Obligation	Office For Renewable Energy Deployment
Charles Hargreaves	Head of Environmental Programmes	Ofgem
Richard Bellingham	Manager RO Supplier Compliance	Ofgem
James Wilde - as below	Director of strategy	Carbon Trust
Low carbon institutions		
Chiara Sorisi	Senior Policy Advisor in DECC Strategy	DECC
Sarah Montgomery	Strategy Directorate	DECC
James Wilde	Director of strategy	Carbon Trust
Adrian Gault	Chief Economist	Committee of Climate Change
Ajay Gambhir	Senior research fellow	Grantham Institute for Climate Change, Imperial College London (ex CCC)
Karen Lawrence	Director of Delivery	EST
Paul Turner-Smith	Senior Policy Advisor at BIS	Green Investment Bank
Alex Kazaglis	Senior Analyst	Committee of Climate Change
Green Buildings		
Simon Brown	Policy Officer for Code for Sustainable Homes	CLG
Penny Dunbabin or Tina Dallman		DECC
Andy Simmonds		AECB (Association for Environment Conscious Builders)
Paul King	Chief Executive (also on board of World GBC)	UK Green Building Council

5.2 Green and energy efficient buildings

5.2.1 Roles and responsibilities of Building Sector stakeholders

The building sector comprises of numerous stakeholders creating a very complex value chain. These participants have interventions at various stages of building construction and operation. It is very important to understand their roles, responsibilities and contribution to the building industry. Some of the stake holders with reference to are described below

5.2.2 Government and Regulatory Authorities

The government and regulatory authorities comprise of the Central, State, district and Local level development Authorities, Municipal corporations, Urban Arts and Planning departments, Town Planning departments, Forest and Environment Departments, Airport and Port Authorities, Controllers of Explosives departments, Irrigation departments, Water supply and sewerage boards, Pollution Control Boards, Electricity boards etc.

These authorities and departments are responsible for exercising the policies and regulations throughout construction of new commercial buildings at various stages of building project. These bodies influence the value chain by developing policies and incentives to enhance the market and provide larger acceptance of for Green building practices.

5.2.3 Private Equity Players & Funding Agencies, Banks and Financial Institutions

Private Equity Players, Funding Agencies, Banks and Financial Institutions provide capital for the development of the project in form of equity and debt. They intrude into the value chain at the project initiation or conceptualization stage and have a greater concern with the project risks and return equations. The banks and Financial Institutions provide support to the property buyers and lease customers after the completion of the project.

5.2.4 Project Developers and Owners

The project developers and owners are the primary performers in the commercial building projects. They are often involved at the various stages of construction that are quite complex and require a team of highly trained professionals to design, execute and coordinate all aspects of the project development ranging from the land/ site selection, design development and construction process including approvals, permits and licenses to project operation and maintenance phases. Developers or owners are usually the equity partners of the project. They are generally are not able to reap any benefits for the additional investments into green buildings, as the energy and water cost savings go to the occupiers and the developers still have to incur the initial venture cost or the cost of modification to higher technologies (in case of leased space). This weakens the incentive for the energy efficiency investments. Owners or project developers have the options to either sale the property/ space or lease space and in-turn maintain the ownership in the property.

5.2.5 Architects Engineers, Technology Providers and Contractors

Developers assign Architects Engineers and Technology providers who have expertise in technical aspects of design, construction, including energy efficiency. This team of highly trained professionals works in an integrated fashion in order to deliver the successful project. Often this intricate coordination process is taken care by Project Management Consultancies (PMC). Their key responsibility is to adherence to local codes, management of timetables and coordination amongst the entire workforce, analyzing and implementing developer's requirements.

5.2.6 Material and Equipment Suppliers

The material and equipment suppliers are responsible for delivering construction materials and equipment. They are closely associated with the product manufacturers and understand the need of the end users/ clients. However, in order to build green, it is essential to purchase product only after considering the various environmental impacts over the building lifecycle (from the extraction of the raw material to its disposal). Since maximum green product and technologies are imported from the developed countries that increase its upfront cost, there is a need to strengthen the supply chain for green materials by improving the R & D and promote development of such domestic industries.

5.2.7 Brokers and Property Consultants

The role of brokers and property consultants is to facilitate sale or lease deals between developer and tenants or property buyers. Typically their financial interests are short-term.

5.2.8 Facility Management Organisations

The facility management organizations are associated with the smooth operations and maintenance of commercial spaces, office buildings; shopping complexes etc. They provide support the developers and owners when the building is leased.

5.2.9 Lease customers and buyers

The lease customers and buyers often refer to the multinational companies or retail brands that buy/ rent space in commercial buildings for company operations. They are generally in the best position to benefit from the energy and water saving without making necessary investments. This also depends on the financial arrangements among owners, agents and users, which may include a fixed energy and water fee regardless of consumption.

5.3 Other existing policies and programs in India related to green buildings

5.3.1 Integrated Energy Policy-2006

The Integrated Energy Policy was adopted in 2006. This is a detailed policy, regulatory, and legislative structure that relates strongly to GHG mitigation. Some of its key provisions are:

- Promotion of energy efficiency in all sectors
- Accelerated development of nuclear and hydropower for clean energy
- Focused R&D on several clean energy related technologies

5.3.2 Electricity Act-2005, Tariff Policy-2003, Petroleum & Natural Gas Regulatory Board Act-2006

The provisions of the Electricity Act 2005, Tariff Policy 2003, Petroleum & Natural Gas Regulatory Board Act, 2006, are taken together and are designed to:

- Remove entry barriers and raise competition in exploration, extraction, conversion, transmission and distribution of primary and secondary energy
- Accomplish price reform, through full competition at point of sale
- Promote tax reform to promote optimal fuel choices
- Augment and diversify energy options, sources and energy infrastructure
- Provide feed-in tariffs for renewables (solar, wind, biomass cogeneration)
- Strengthen, and where applicable, introduce independent regulation

5.3.3 National Environment Policy

The National environmental policy was implemented in 2006 as a regime to protect the environment. It was supplemented by the 'Notification of Environment impact Assessment'. It was a reform in the arena of environmental assessment. It requires a number of economic activities to prepare the environment impact assessments and environment management plans. It is evaluated by national regulatory authorities (Ministry of Environment and Forestry) and state departments (environment or forest). The EIA provisions strongly promote environmental sustainability.

5.3.4 Energy Audits for Large Industrial Consumers

The large energy consuming units in the nine industrial sectors have to conduct energy audits. These units are also referred to as "Designated consumers" and are required to employ "Certified Energy manager" to review and report energy consumption and energy conservation data annually. It was made mandatory in March 2007.

5.4 Historic evolution of UK climate-change policies

1989: The Non Fossil Fuel Obligation (NFFO) and the Scottish Renewables Obligation (SRO) were established under the Electricity Act 1989. Originally intended to support nuclear electricity generation, the NFFO and SRO were expanded in 1990 to include renewables. The NFFO and SRO were funded by a **Fossil Fuel Levy** paid by suppliers of electricity from fossil fuels.

2000: Climate Change Programme. This report set out policies and priorities for action both in the United Kingdom and internationally. Updated in 2006, the policies are supposed to reduce CO₂ emissions by 15-18% below 1990 levels by 2010 and overall GHG emissions by 23-25%.

2001: The Climate Change Levy (CCL) was introduced on 1 April 2001, effectively replacing the Fossil Fuel Levy. It is a downstream tax on non-domestic energy use by industry and the public sector, designed to incentivise energy efficiency and emission reductions, with part of the revenue being used to reduce National Insurance contributions. Energy-intensive firms can receive up to an 80% discount if they join a **Climate Change Agreement (CCA)**, which requires meeting energy efficiency or carbon saving targets. Renewable electricity suppliers are exempt from the CCL.

2001: The Carbon Trust was created in 2001 by the UK government with a mission to accelerate the move to a low carbon economy. The Trust helps to cut emissions by providing business and the public sector with expert advice, finance and accreditation and by stimulating demand for low carbon products and services. It also assist to reduce emissions by developing new low carbon technologies through project funding and management, investment and collaboration and by identifying market failures and practical ways to overcome them (for further information see below).

2002: The Renewables Obligation (RO) replaced the NFFO and SRO as the primary renewable energy policy instrument. The RO requires electricity end-suppliers to purchase a certain fraction of their annual electricity supply from producers using specific renewable technologies, and they receive tradable Renewables Obligation Certificates (ROCs) for doing so. The supplier can also “buy out” the obligation by paying a set price per MWh. The buy-out revenue is recycled to participating suppliers in proportion to their ROCs.

2002: The Energy Efficiency Commitment (EEC) was introduced, requiring energy suppliers to achieve 62TWh of savings over the period to 2005 through assisting the implementation of home energy efficiency improvements, equivalent to a reduction in domestic emissions of approximately 1%. The second phase of EEC (2005-2008) raised the total savings required to 130TWh.

2005: European Union Emissions Trading System (EU ETS). The UK Emissions Trading Scheme closed in 2006 and was replaced by the EU's that aims at ensuring compliance with the Kyoto obligations. Under the EU system, member states proposed National Allocation Plans (NAPs) to the European Commission, allocating a set proportion of a country's total 2008-2012 emission budget to sectors covered by the scheme; tradable quotas were then divided among firms (www.eea.europa.eu/pressroom/newsreleases/questions-andanswers-on-key).

2008: Climate Change Act. This Act set a legally binding target of 80% reductions in emissions from 1990 to 2050. A medium-term target of a 34% reduction by 2020 was also adopted, with the promise of a further tightening in the event of a global deal on climate change. To achieve these targets, the Act established the principle of five-year carbon budgets. The first three budgets were set in 2009 and cover 2008-12, 2013-17 and 2018-22. The fourth budget, 2023-2027, was recently proposed by the UK Committee on Climate Change. The government must submit its policies to meet these budgets to Parliament, as it did in the **Low-Carbon Transition Plan** of July 2009, which set out policies to cut emissions across the power and heavy industry sector; the transport sector; in homes and

communities, workplaces and jobs; in agriculture; and in land use and waste management. The Act also requires the government to include aviation and shipping emissions, or provide an explanation why not, by the end of 2012.

2008: Carbon Emission Reduction Target (CERT). This scheme follows on from the Energy Efficiency Commitment, with a greater focus on more substantial and robust household energy saving measures such as insulation, and a component targeted at those most vulnerable to fuel poverty. The total lifetime savings required from energy suppliers over the duration of the scheme until 2012 is 293 million tonnes CO₂.

2008: Renewable Transport Fuel Obligation (RTFO). This is administered by the Renewable Fuels Agency and requires suppliers of fossil fuels to ensure that a specified percentage of UK road fuel supply is from renewable fuels. The target for 2009-2010 is 3.25% of fuels by volume. Suppliers may buy out their obligation for 30 pence/litre. The obligation also requires companies to submit reports on the carbon content and sustainability of the biofuels used.

2009 Community Energy Saving Programme (CESP) established to complement CERT. The scheme achieves aims of both carbon reduction and addressing fuel poverty by requiring energy suppliers to achieve 19.25million tonnes CO₂ lifetime savings in the most deprived areas of England, Scotland and Wales, promoting area-based and whole-house approaches to energy efficiency improvements.

2010: Carbon Reduction Commitment Energy Efficiency Scheme (CRC EES). Established under the Climate Change Act 2008, the scheme covers emissions by firms and public bodies not already subject to the EU system or substantially covered by other agreements. It comprises reporting requirements and a carbon levy. There are also several policies to promote energy efficiency in residential buildings.

2010: Feed-In Tariffs (FITs). From April 2010, the government has offered FITs for small scale low-carbon electricity generated by households, businesses and communities. Additional payment is provided for electricity fed into the grid. FIT rates vary according to technology, will last from 10 to 25 years, and are adjusted for inflation. A pilot scheme for micro Combined Heat and Power plants has also been launched.

Proposed: Green Investment Bank (GIB). The new government plans to introduce a GIB to unlock finance for the transition to low-carbon growth. The autumn 2010 Spending Review committed £1 billion funding and promised additional future proceeds from asset sales to capitalise the Bank.

Proposed: The Energy Bill. This bill includes provisions for a “Green Deal” on energy efficiency, greater security of energy supplies and more low carbon electricity. More detailed secondary legislation will be prepared during 2011 and there will be a formal consultation process (www.decc.gov.uk/en/content/cms/what_we_do/consumers/green_deal/green_deal.aspx).

The business Plan 2011-2015 outlines plans for future policies

(www.decc.gov.uk/assets/decc/About%20us/decc-business-plan-2011-2015.pdf-2015.pdf).

Source: Adapted from OECD (2011), *OECD Economic Surveys: United Kingdom 2011*, OECD Publishing.

5.5 UK and Australian experience on low carbon governance institutions

5.5.1 Introduction to the Committee on Climate Change

The CCC is an independent body established under the Climate Change Act 2008 (the Act) to advise the UK government on setting and meeting emissions targets, to report to Parliament on progress towards meeting those targets and to advise on preparing for the impacts of climate change. The core philosophy of the Act is that this series of built-in duties, actions and reporting requirements, combined with the monitoring function of the CCC, and the scrutiny role of parliament, will create transparency, accountability and political pressure to ensure that governments will comply. Compliance with the legislation is therefore institutional and political.

The CCC was established as an independent non-departmental public body in the Climate Change Act 2008 which specifies its statutory roles and functions. The Act also introduces legally binding carbon budgets, which will set a ceiling on the levels of greenhouse gases that can be emitted into the atmosphere. The carbon budget regime provides much of the setting for the CCC's advice. For example, the CCC's first report 'Building a low-carbon economy' advises on the level of these budgets for the first three five year periods. Members of the CCC have suggested that carbon budgets "help create regulatory certainty for investors, while maintaining enough flexibility for mid-term corrections" and that "the five-year horizon is thought to be long enough to absorb short-term fluctuations in emissions, for example due to weather extremes or fluctuations in the business cycle".

A key part of the CCC's statutory mandate is that it will monitor and report back to Parliament annually on progress made by Government in meeting carbon budgets. The CCC published its first progress report in September 2009 and subsequent annual reports have been published in June 2010 and June 2011.

The Climate Change Act 2008 also established the Adaptation Sub-Committee (ASC) as a new expert body to advise the Committee on Climate Change (CCC) on climate risks in the UK. The ASC operates within a new legal framework for adaptation policy in the UK which provides for a Climate Change Risk Assessment to be conducted every 5 years (first CCRA was published in January 2012) and a National Adaptation Programme to be put in place during 2012 and revised every 5 years. The ASC will provide expert advice and scrutiny through that Committee to ensure that the Government's programme for adaptation enables the UK to prepare effectively for the impacts of climate change.

5.5.2 Key functions and activities

The CCC's functions are advisory rather than executive. The CCC has taken care to provide advice on overall priorities for action rather than on detailed policies, although part of its watchdog function is to consider the effectiveness of policy. Its analysis is impartial and this is reinforced by its independent status and by the selection of its members (see further below). There is a clear separation between the CCC and both Ministers and Parliament. The CCC reports to Parliament and the Government is then held to account via public debate on the CCC's advice. The CCC is transparent and publishes its reports together with all underpinning evidence.

The CCC aims to achieve its statutory objectives by:

- Providing independent evidence based advice to Government on the appropriate level of Carbon Budgets and targets and steps required to meet them
- Monitoring progress towards meeting Carbon Budgets and recommending any actions necessary to keep budgets on track
- Conducting independent research and analysis into climate change science, economics and policy as these relate to Carbon Budgets
- Scrutinising the preparation of the UK Climate Change Risk Assessment; and implementation of the Government's Adaptation Programme
- Engaging relevant parties with an interest in climate change to share evidence and analysis

5.5.3 Decision making process and dissemination

Decisions regarding the detail of the analytical work program and key messages of the main reports are made using a committee process. Information regarding the decisions made at various meeting is available on their website⁵⁰. The committee meets once every three weeks to discuss the CCC's work plan.

The CCC's Sponsor Group consist of senior representatives of the Department of Energy and Climate Change (DECC), Defra, Communities and Local Government, HM Treasury, Department for Transport, Business Innovation and Skills, the Devolved Administrations, the CCC and the ASC. The Group is chaired by DECC. The CCC Sponsor Group meets 3 times a year and is a route to agree commissions from specific Departments. The Sponsor Group signs these off in the CCC corporate plan and then CCC directly engages with the departments. The CCC doesn't share draft reports with commissioning departments but will have a dialogue with departments about emerging conclusions e.g. to test their feasibility.

The CCC's top priority is reporting required by the Climate Change Act:

- Annual Report to Parliament
- advice on carbon budgets (on 5 yearly cycle)
- advice on the treatment of international aviation and shipping which is specified in the CC Act.

Beyond these, reports may be commissioned on specific request from Government. For example, the aviation report was commissioned by the Secretary of State at DfT (linked to the adoption of a 2050 aviation target by the previous Government). Similarly, advice on the cap for the Carbon Reduction Commitment's second phase was requested by DECC Secretary of State; as was advice on the role of local authorities and on how to fund renewables deployment.

CCC also undertakes projects linked to providing advice on carbon budgets, such as shipping review (abatement options and projections) and competitiveness issues and leakage.

⁵⁰ <http://www.theccc.org.uk/about-the-ccc/minutes-of-meetings>

All reports are widely publicised when released (more than 10 million readers) and are publicly available on the CCC website (more than 100,000 hits in 2011), together with all supporting material. The CCC team meet government departments and business to ensure a good working relationship. Maintaining a respectable public face is very important. Business stakeholders provide a letter of support to all CCC recommendations on influential aspects.

5.5.4 Governance and Accountability

The Secretary of State (DECC) is under a statutory duty to respond to the CCC recommendations, explaining where these were not taken on board (e.g. the measures required in the Carbon Plan). The CCC can only undertake work if it falls within its statutory functions or was commissioned by DECC, Defra or the Devolved Administrations. The Carbon Budgets Analysts Group ensures a joint inter-departmental position on how to respond to CCC recommendations.

The CCC's corporate plan is signed off by the DECC Sponsorship Group but the agenda for the CCC's activities is set by the formal committee, made up of chairman Lord Turner and the 6 other permanent members. The CCC is committed to working in a transparent manner, noting that its governance, structures and expenditure are all available to the public⁵¹.

Membership of the Committee

The types of skills and knowledge required for the members of the Committee are specified in the Climate Change Act. It is important that the Committee members have sufficient independence and can bring their own expertise to bear rather than being reliant on the CCC Secretariat.

Strong leadership is demonstrated by appointing Adair Turner, as the first Chair of the CCC. Lord Turner has both an interest in climate change and a credible business background. He will be stepping down shortly and DECC are running a process to identify his replacement. Other members of the committee are appointed for their technical background and independence, with an emphasis on building a strong base of analytical skills within the committee. .

The Committee signs off each of the reports and the underpinning analysis. The monthly Committee meetings consider proposals for each project but also champions are identified from within the Committee for each project. For example, Professor Jim Skea has led on a number of projects, including the 4th Carbon Budget report (although all Committee members were engaged); likewise, Professor Julia King led the report on shipping; Lord Krebs and Professor May have led past reports on biofuels. These champions provide important internal challenge when projects are being undertaken.

The selection process for the membership of the Committee took place in early 2008, initiated by Defra and then completed by DECC. The specification was taken from the Act. The Act requires that, when making appointments to the CCC Board, national authorities have regard to the desirability of ensuring the Committee as a whole has experience and knowledge of:

- business competitiveness
- climate change policy at national and international level, and in particular its social impacts

⁵¹ <http://www.theccc.org.uk/about-the-ccc/transparency>

- climate science, and other branches of environmental science;
- differences in circumstances between England, Wales, Scotland and Northern Ireland and the capacity of national authorities to take action in relation to climate change
- economic analysis and forecasting
- emissions trading
- energy production and supply
- Financial investment
- Technology development and diffusion.

Individuals were invited to apply and the process was then overseen by the Officer of the Commission of Public Appointments. Members were then appointed by the Secretary of State for Energy and Climate Change. Term is 5 years and can be reappointed once for maximum of 10 years. All appointments were made in early 2008 (except for Julia King who was appointed in August 2008). This means that their appointments come to an end at the same time – lesson learned for next time on timing of appointments in the future. Michael Grubb has since resigned but they have held off recruiting a new economist until the new Chair is appointed.

5.5.5 Resources, budget and structure

The CCC committee of experts sign off key decisions and documents, supported by a secretariat of around 30 staff, made up of economists, policy experts (many from government), scientists and industry specialists.

The CCC Secretariat

- Secretariat = 30 people split into three teams: corporate (5); mitigation (20) and adaptation (5).
- The Statutory reports are prepared by the core team but for specialist reports additional support is brought in either via secondments or funding for external research.
- Total admin budget £4m; out of which £2m for consulting and £2 million for internal costs. Research makes up about 25% of total funding.
- Corporate team functions:
 - (1) external facing - communications and stakeholder management, publications, media coverage
 - (2) operational – budgets, HR, IT resources and buildings, procurement.

5.5.6 Experience setting up Australia's Climate Change Authority

Australia has taken a similar approach and also has an independent Climate Change Authority (the Authority). The Authority has different roles and responsibilities and level of power compared to the UK's CCC. The UK's CCC has supported the Australian government in setting up this authority providing in-house support as well hosting inter-country meetings. In terms of the applicability of the CCA to India, it is worth noting that Australia and India may share a similar governance issues at national and state level.

The Climate Change Authority Act 2011⁵² sets up the Authority, which came into operation on the 1st of July 2012. The Authority is independent and advises the Australian government on the setting of carbon pollution caps and periodic review of the carbon pricing mechanism and other climate change laws. The Authority has a Board of nine members with skills in science, economics, climate change mitigation, emissions trading, investment and business. The Board will be supported by a CEO and support staff. One of the Authority's important roles is to make recommendations to the Australian Government on the steps Australia should take towards the 2020 target and on the longer-term path towards the 2050 target. The Australian government will make the final decisions on these recommendations. The Authority has been established to ensure the public is fully informed now and into the future. Its independence is enshrined in legislation. It will conduct regular, public reviews and its reports will be made public.

Comparing the Australian and UK authorities can provide important insights in terms of lessons for the Indian context. Similarities between the Australian and UK organisations are the appointment of a high-profile chair (former governor of the Reserve Bank of Australia, Bernie Fraser) and the organisational structure of a committee underpinned by an analytical secretariat.

A key difference between the UK and Australian approaches is the level of political consensus at the time of establishing the organisations. In passing the Climate Change Act, there was cross-party support in the UK, whereas in Australia the Clean Energy package did not have the support of both major parties. Hence, a key aim of the Authority is to build political consensus and ensure its long-term acceptance and survival. The Authority has representatives from business on its Board, which is not the case in the UK where the focus is on academic representation.

There are also differences in the legislation regarding the definitions for the carbon budgets and the requirements on government to respond to the recommendations of the Committee. For example, it could perhaps be argued that the UK wording is stronger as it requires “reasons” behind a Government decision rather than simply the “response” that is required in the Australian text:

- Section 60 of Australia’s Climate Change Authority Act and Section 292 of the Clean Energy Act: “the Climate Change Minister must cause to be prepared a statement setting out the Commonwealth Government’s response to each of the recommendations ... the Commonwealth Government’s response to the recommendations may have regard to the views of the... Authority”.
- Section 9 of the UK’s Climate Change Act: “If the order makes provision different from that recommended by the Committee, the Secretary of State must also publish a statement setting out the reasons for that decision.”

⁵² <http://www.climatechange.gov.au/government/clean-energy-future/legislation.aspx>

5.6 The Carbon Trust experience in the UK

The **Carbon Trust** was established as a not-for-profit organisation created by the UK government in 2001 to help businesses and public organisations to reduce their emissions of carbon dioxide into the atmosphere, through improved energy efficiency, carbon management and developing commercial low carbon technology. Its stated mission is to accelerate the move to a low carbon economy. A brief summary of key messages and learning for India from the Carbon Trust experience is provided in Box 5-1.

Box 5-1 Key lessons for India from the UK Carbon Trust experience

The experience of Carbon Trust in the UK is an interesting example that can be adapted in India to provide for independent advice and capacity building of the private sector. It is a unique organisation because it also plays an important role in the UK market as a financial institution. In this regard, it has introduced many financing schemes such as interest free loans for energy efficiency in small and medium enterprises and other commercial finance schemes.

In addition, it has been involved with the following activities:

- provides impartial confidential advice to businesses
- has engaged people to create awareness about energy efficiency
- created various types of services such as strategic energy management advice for large businesses and energy audits for medium businesses
- advises the public sector and works with all the local authorities to set targets, identify opportunities and implement them
- introduction of the accreditation/ labelling scheme
- measures product carbon footprints
- provides incubation support for new technologies. It helps businesses to identify target market and create a business case for private sector investment.

While closeness to government can both help and hinder an organisation's reputation, the Carbon Trust has developed itself as a strong brand with a positive reputation for providing fact based independent authoritative advice. Credible authority and reputation is important to ensure private sector buy-in from both large companies and SMEs.

The Carbon Trust appears to have been able to balance its impartiality and public service role with a deep understanding of business. This is because, from the outset, the Carbon Trust recruited very senior leaders from the private sector and valued a private sector skill set within the staff group, operating with a strong commercial focus.

Recognising the impact of tailoring advice to size of organisation and risk profile of the technology/investment ensures cost-effective results and instils business confidence.

Early investment in marketing and reputation building pays long term dividends, as demonstrated by the evolution in the UK's private sector on carbon saving over the years. Strong brand identity has ensured that as business comes to appreciate the benefits of low carbon technologies, the Carbon Trust is well regarded as a potential partner in that journey.

Developing the right skills set internally can be achieved by providing tailored training, focussed recruitment and strong leadership.

The Carbon Trust's core activity consists of helping companies and organizations reduce carbon emissions through providing financial support and advice. The Carbon Trust's Business Incubator scheme helps early stage companies to take the next step and grow their business. Ambitious businesses with innovative low carbon technologies and services can receive expert advice and support on everything from technology strategy, business planning and market analysis to raising investment.

Key achievements

- To date, the Carbon Trust has helped business and the public sector make direct cost savings of over £2.6 billion and cut around 30 million tonnes of carbon dioxide (MtCO₂) emissions.
- £150m in efficiency loans to businesses that, over the lifetime of the projects, will deliver over £350 million in cost savings.
- £3bn Annual sales of products bearing the Carbon Reduction Label.
- £40m Private sector investment into marine energy leveraged By the £22.5m Marine Energy Proving Fund.
- £2bn in leveraged third party investment into delivering carbon reduction and low carbon technologies, businesses and markets to date.
- 500 Number of companies we have certified to the Carbon Trust Standard.
- £350m Low carbon refurbishment fund for existing commercial buildings launched with managers Threadneedle and property developer Stanhope.
- £143m Private sector investment leveraged by early stage investment of £26.9 million in 25 businesses.

5.6.1 Institutional Structure and funding

In the financial period ending March 2012, the Carbon Trust was receiving funding of around £50 million from the Department of Energy and Climate Change, the Department for Business, Innovation and Skills, the Scottish Government, the National Assembly for Wales, and Invest Northern Ireland. It was originally partly funded from the Climate Change Levy, a tax on electricity, gas, and coal. The Group also generates revenues from sales and licensing agreements via its main subsidiaries:

- Carbon Trust Advisory
- Carbon Trust Implementation
- Carbon Trust Certification

The DECC Secretary of State is represented on the Carbon Trust Board. The Carbon Trust agrees outcomes with it's DECC sponsors (agreement of an annual business plan setting out objectives and outcomes for the use of DECC grants) and provides regular and comprehensive reporting and liaison.

The core funding in the form of grants will cease from 2012/13. Funding will then need to be raised through the bidding for government contracts and the direct funding by business clients.

Table 5-1 Carbon Trust own cash balances

	2011 (£'000)	2010 (£'000)
Opening Carbon Trust own funds	13,883	11,580
Interest-free loan repayments received	450	1,554
Expenditure	(308)	(119)
Investment income and licence fees	1,121	988
Investment in US activity	(229)	(209)

Interest received on cash balances net of tax	52	88
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Source: Carbon Trust Annual Report 2010/11

5.6.2 Provision of advice

Carbon Trust Advisory is delivered in two ways: via internal Carbon Trust staff or via externally sourced advice. The internal team has grown from around 70 in 2003 to more than 200 people in 2012. The internal team have produced more than 600 advice publications and delivers a helpline fielding more than 40,000 calls per year and web advice pages with more than 100,000 discrete users. The external team comprises a network of accredited consultant advisors who undertake site surveys on behalf of Carbon Trust.

The advisory services have evolved considerably over the years to meet changing conditions and needs from companies. In early years larger companies wanted both site audits and more strategic advice, which in 2004/5 was fully funded through the Carbon Trust grant from government, by 2010 that had shifted to a shared 50:50 cost arrangement and in 2012 companies pay the full cost of advice themselves with the Carbon Trust providing a brokering service to secure the right kinds of consultants to provide the right kind of advice. Large companies require strategic advice on abatement cost, policy risk and what they should invest in and how. On the other hand SMEs require more simple low cost no cost options to reduce their emissions.

The Carbon Trust team developed a strong early focus on strategic marketing and building the reputation of advice services through television and radio alongside print media. There is now a strong brand identity associating the Carbon Trust with independence and integrity.

5.6.3 Measuring outcomes

The Carbon Trust also invested a lot of effort on measuring outcomes, largely in carbon terms but also cost-effectiveness (impact per pound of investment). Transparent and clear private sector investment leverage indicators were developed to demonstrate policy effectiveness. In addition, regular monitoring of funded and supported activities without burdening the customer was crucial to report back to Government (main funders).

5.6.4 Raising finance (for its niche activities as well as for new technologies)

An important strand of Carbon Trust work is in project and development finance. Carbon Trust works to accredit potential carbon and financial savings from potential investments and using an injection of approximately £100 million of funding in 2005/6. Carbon Trust is able to leverage private sector co investment with a commercial lender (following a competitive tendering exercise). The system is now self financing and generates between £70 and £100 million in loans each year.

The Carbon Trust Standards Accreditation and product labelling allows participants to gain a reputation from carbon footprinting, the association with Carbon Trust ensures consistency and credibility. As with Carbon Trust Advisory services accreditation has become progressively self financing as the market has become progressively more willing to accept the benefits of carbon footprinting. The Scheme now has more certificated products than the Fairtrade label and is widely recognised by consumers.

The Carbon Trust has been active in supporting companies through the 'innovation chain' and this is an area that has seen significant evolution within the Carbon Trust portfolio of activity over recent years. Technology incubation is supported to provide venture capital funds where there is a credible technology with a credible route to market. Support from Carbon Trust venture capital sources have been highly successful in leveraging in private sector investment (averaging £13 of private

investment for every £1 of Carbon Trust investment). Carbon Trust has assessed more than 3,500 potential projects funding less than 10% of those that apply. Carbon Trust investment is seen as a signal from the wider venture capital community of the significant quality of potential investment.

Carbon Trust also have identified a role in promoting investment in innovative sectors of the economy through a number of innovation challenge projects supporting for example the field trial of smart electricity meters and innovation in the offshore wind sector leading to significant advances in technology and reduction of costs.

5.6.5 Credible authority and reputation

Carbon Trust's success comes from its very strong ties to the private sector (throughout the organisation) and through very strong external links to the private sector investment community. The organisation's scale and reputation have allowed it to take a long term strategic view alongside its more narrowly focused direct advice to business. This strategic view allows the organisation to deal with private sector related confidentiality issues, anticipate the potential gaps and market opportunities into the future and to target investment in areas that have the greatest potential to meet those future needs. This has led, for example, to Carbon Trust supporting the formation of companies that demonstrate the potential effectiveness of new ways of working such as low carbon workplaces, and onshore wind investment on the public estate, and technology investments in next generation solar PV.

Carbon Trust also have a small policy and markets team that proposes new standards for buildings, footprinting and also makes suggestions for new legislation

5.6.6 Governance arrangements – external Board direct management by department

For most of 2010/11, the Board comprised of 18 directors – three Executive Directors, five Non-Executive Directors (representing government departments which fund or have funded the company), and ten Non-Executive Directors contributing a wide range of experience from industry, trade union and non-governmental organisations. The ten Non-executive Directors who do not represent government departments are considered independent of the Carbon Trust. These directors retire by rotation every three years and are subject to re-election (if they wish to be re-appointed) by the members in Annual General Meeting. The current Chief Executive is Tom Delay.

The Board decides on the strategy, values and standards of the company and sets the framework for prudent and effective controls. There is a schedule of reserved matters and a clear division of responsibilities between the Chairman and the Chief Executive. The day-to-day management of the company has been delegated to the management team.

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