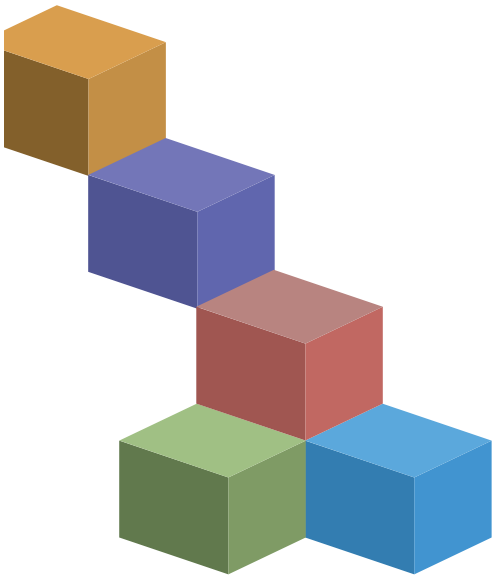
Integrated Research and Action for Development



Annual Report 2014-15

IRADe

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  Executive Director, IRADe

IRADe Integrated Research and Action for Development

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About IRADe

IRADe is an independent advanced research institute which aims to conduct research and policy analysis to engage stakeholders such as government, non-governmental organizations, corporations, academic and financial institutions. Energy, climate change, urban development, poverty, gender equity, agriculture and food security are some of the challenges faced in the 21st century. Therefore, IRADe research covers these, as well as policies that affect them. IRADe's focus is effective action through multi-disciplinary and multi-stakeholder research to arrive at implementable solutions for sustainable development and policy research that accounts for the effective governance of techno-economic and socio-cultural issues, based on research for effective action and implementation. IRADe is a 'think tank' that works with 'action tanks'.

IRADe was established under the Society's Act, in 2002 at New Delhi, India. It is certified as a Research& Development Organization by the Department of Scientific and Industrial Research (DSIR), Ministry of Science and Technology (MoST). It has also been selected as a Centre of Excellence (CoE) by the Ministry of Urban Development (MoUD) for urban development and climate change. In addition, it provides expertise to other ministries, national and international institutions and partners with other reputed organizations.

Objectives

- Integrate multi-disciplinary and multi-stakeholder perspectives concerning issues of development.
- Promote wider consensus, through research and analysis, on effective policies.
- Engage and work at local, district, state, national, South Asia regional and global levels.
- Provide research support to developing countries for development and for negotiation process for international agreements.
- Carry out policy research that accounts for the political economy of the society and effectiveness of governance.

Our Mission

To explore new opportunities and promote paradigm shifts to provide optimum solutions in sustainable development to include vulnerable groups in decision making process.

Our Vision

To be a leading independent policy research organization and a think tank that suggests implementable policies in energy, environment and climate change with a focus on poverty alleviation, gender equity and inclusive growth, using multi-disciplinary, multi-stakeholder framework which provides holistic solutions.

Thematic Areas of IRADe

1. Energy and Power System
2. Sustainable Urban Development
3. Climate Change and Environment
4. Poverty Alleviation and Gender
5. Agriculture and Food Program

IRADe activities in the above areas have cross-cutting themes such as technology assessment and policy reforms. The key activities are:

1. Policy Dialogues and Dissemination
2. Training and Capacity Building
3. Research and Analysis for Decision Support
4. Research in Action, Monitoring and Evaluation Projects

Preface

It is my great pleasure to present the 2014-2015 Annual Report of the activities of IRADe. This Annual Report provides an opportunity to reflect on the significance of research and development that makes an impact on economic growth and sustainable development by IRADe. This year, IRADe has worked on 16 projects of which 9 are successfully completed and 7 are in different stages of accomplishment.

The Ministry of Environment, Forests and Climate Change (MoEF & CC) requested IRADe to estimate the GHG emission intensity of the Indian economy through macro-economic growth model which includes assessment of implications in various developmental pathways, structural shifts or technological changes on national Greenhouse Gas Emission (GHG) trajectories in the time frames 2020-2030, 2030-2040 and 2040-2050.

In the power sector, IRADe is involved in the South Asian Regional Initiative for Energy Integration (SARI/EI) funded by USAID, is preparing Regional Regulatory Guidelines through consultations with South Asian countries and other think tanks. We are also working towards a Sustainable Integrated Energy plan for Gujarat with Gujarat Energy and Petrochemicals and Gujarat Power Corporation Limited. Further, in-depth research tasks are carried out on Advanced coal technologies for power generation with both the Ministry and Department of Science and Technology.

IRADe as CoE, Ministry of Urban Development assessed disaster resilience of 10 cities, expanding its horizon to 29 cities in 19 states. Four Capacity Building Regional workshops were organized to further integrate disaster resilience in city plans. IRADe also engaged in pushing the policy envelopes for developing climate resilient smart cities at the city, state and national levels. Additionally, we completed work on Himalayan agriculture due to climate change supported by the Department of Science and Technology, Government of India.

IRADe's environment project portfolios include national study on economics of Ecosystems and Biodiversity with GIZ , management of Marine National Parks with MoEF and widespread policy engagement work to educate decision makers to integrate climate change resilience in city plans. In addition, IRADe has also addressed themes on poverty, gender, agriculture including the analysis of the Kerosene free Delhi scheme with International Institute for Sustainable Development (IISD) and analysis of food and livelihood productivity in flood plains of Uttar Pradesh with Sir Dorabji Tata Trust (SDTT).

I take this opportunity to express my sincere thanks to all our sponsors, well-wishers and Governing Council of IRADe for their continued support and encouragement. I express my sincere appreciation to the IRADe team and thank them for their cooperation and devotion to work.

Professor Jyoti Parikh

1 Climate Change and Environment

1.1 Modelling Studies on Greenhouse Gas Emissions (GHG) and Emission Intensity of Indian Economy

The Ministry of Environment Forest and Climate Change (MoEF &CC) invited three think tanks, one of which is IRADe to answer key questions through different approaches to address the issues relating to climate negotiations. IRADe attempts to estimate the GHG emission intensity of the Indian economy up to 2050 through macro-economic growth model. The project involves focus on key economic sectors such as energy including (electricity), transport, buildings, industries, agriculture, land use and land-use change and forestry (LULUCF) and wastes among others. Further, the project also includes assessment of implications of various developmental pathways, structural shifts or technological changes on national Greenhouse Gas Emission (GHG) trajectories in the time frames 2020-2030, 2030-2040 and 2040-2050. The project also requires the analysis of ongoing and planned policies with assessment of their impact on the GHG emission intensity of Indian economy, including the cost/economic implications thereof.

To achieve the project objectives, IRADe is upgrading its activity analysis model (IRADe AA 2030)up to 2050. The IRADe AA 2030 is a dynamic multi-sectoral, inter-temporal, linear programming activity analysis model based on an input–output framework. There are five major sectors that account for production activities in the model that includes agriculture, primary energy, industry, power, and services and their 38 sub sectors. The model incorporates intervention in these areas to achieve low carbon pathways. Further, the household consumption is the final sector and accounts for final consumption in the economy. The growth rate of household consumption and its composition over time is what drives the economy. The model projects the changing demand structure of the economy over a period of 50 years in a dynamic manner using a combination of log normal population distribution and expenditure class specific linear expenditure systems which are consistent along classes as they reflect an underlying non-linear demand system.

The outputs from the model include the following:

- Sectoral outputs of investments in 38 production activities.
- Commodity-wise household consumption, government consumption, investment, intermediate demand, exports and imports.
- Total investment demand, foreign investment flow.
- Class wise total and commodity wise consumption expenditure, population in both rural and urban areas.
- Poverty at each time period in rural and urban areas.
- Emissions from each production activity.
- Emissions by households from consumption of fossil fuels.

The IRADe team discussed the preliminary results at the (MoEF & CC) giving the model results as GHG emissions and emissions intensities, energy mix, power mix and economic pathways up to 2050.

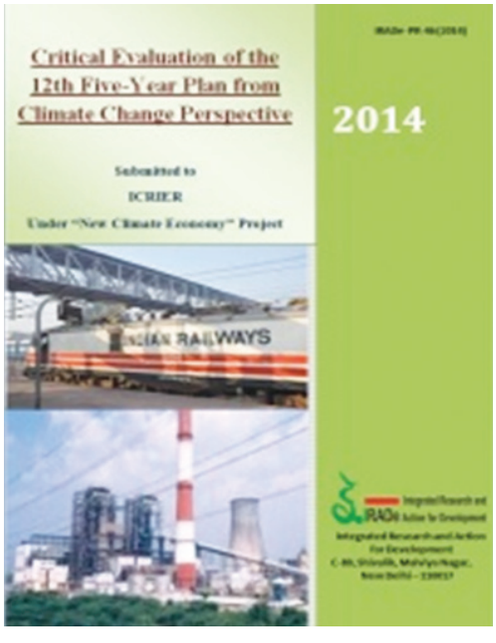
Supported by The Ministry of Environment Forest and Climate Change (MoEF &CC), GoI

1.2 Critical Evaluation of the 12th Five-Year Plan from a Climatic Perspective

The objective of this study was to demonstrate how a plan evolves and where are the entry points for introducing climate at each step. What are the climate

change concerns in terms of targets and policies related to various sectors.

IRADe carried out critical evaluation of the Twelfth Plan (GOI 2012), which focuses on faster, more inclusive and sustainable growth from a climatic perspective. It emphasizes the need for reversing the currently observed deceleration through investment in major sectors. The plan states that 'no development process can afford to neglect the environmental consequences of economic activity, or allow unsustainable depletion and deterioration of natural resources'.

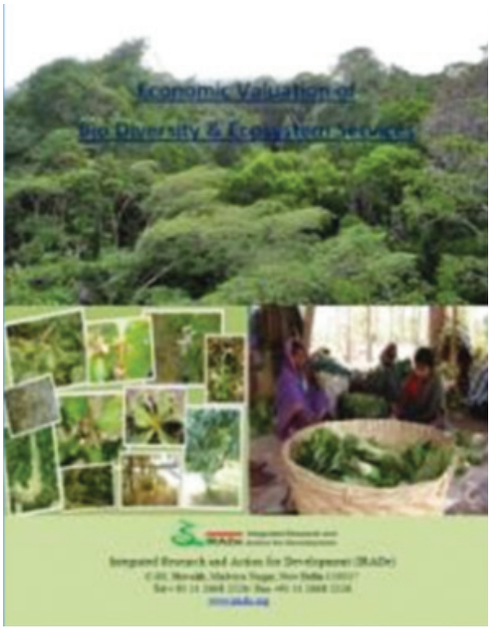


Broadly the evaluation found that climate change has been explicitly addressed in India's 12th five year plan. The plan document in corporates a chapter on sustainable development which outlines the required policy measures for low carbon strategy for inclusive growth and focuses on a number of mitigation measures. It was observed that by and large, the 12th plan is an important vehicle to follow climate mitigation and adaptation in each sector. As a major departure this year it has a specific chapter on low-carbon sustainable development. Earlier, IRADe provided considerable analytical support in formulating the strategy and helped outline this chapter. It shows that India's planners and policy makers take climate change seriously. Many initiatives are under way and a number of new ones have been suggested for both mitigation and adaptation. A broad strategy for low carbon growth has evolved and is reflected in the plan.

Supported by ICRIER "The New Climate Economy Project".

1.3 Supporting National Study on The Economics of Ecosystems and Biodiversity (TEEB-India Initiative)

Estimation of economic value of ecosystem services and biodiversity can be useful to enhance effectiveness of conservation and management.



GIZ in partnership with the Ministry of Environment and Forests (MoEF), is implementing a technical cooperation project "Incentives for sustainable management of biodiversity and ecosystem services". Under this initiative about 12 fields based primary case studies on valuation of ecosystem services in forests, inland wetlands and coastal and marine ecosystems have been undertaken. For this 12 case studies covering three priority ecosystems viz. forests, inland wetlands, coastal and marine ecosystems were launched.

To support a national study on The Economics of Ecosystem and Biodiversity (TEEB-India), IRADe is doing extensive literature survey to review the existing knowledge and studies on valuation of biodiversity and

ecosystem services. IRADe is also providing technical support to the STAG(Scientific and Technical Advisory Group)Chairman, Dr. Kirit Parikh also Chairman IRADe for preparing an overall structure/wireframe of TEEB-India report.

Supported by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

1.4 Review of status of Marine National Park (MNP), Jamnagarand evolving vision statement for management of MNP

The Marine National Park located in Jamnagar district of Gujarat is a vast reserve of marine life as well as is a home to some of the finest coral reefs and mangrove forests in India. Over the last few decades, immense pressure has come on MNP due to increased economic activities viz. industrialization, shipping, urbanization, tourism and salt pans in Jamnagar district. Hence, this project study aims to review the status of Marine National Park since its enactment in 1982.

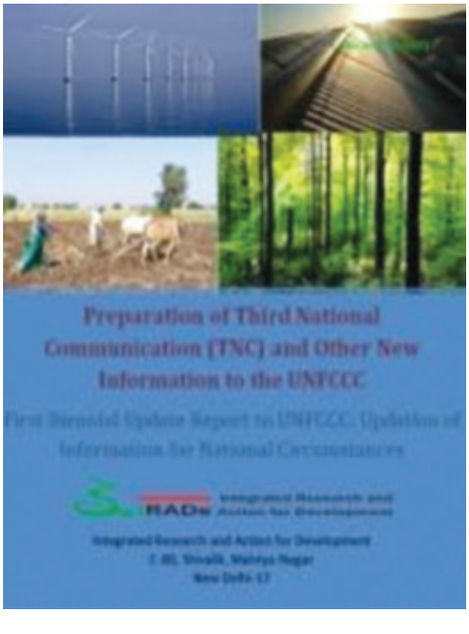
The study has undertaken macro assessment of the ecological status of Marine National Park and the impacts of all the involved stakeholders by means of primary surveys and stakeholder's consultations and mapping. Further focus has been given on understanding the existing governance & management structure of the park, review of the concerned polices regulations & notifications and identification of the loopholes. The ultimate project deliverable would be a vision statement along with a sustainable and workable management plan for the healthy co-existence of MNP with economic hotspots in Jamnagar

Project team is carrying out sectoral stakeholder's consultation identified as players from private, public and civil society. Primary surveys will be carried out to collect data and information to track the ecological status and trends for the MNP along with perception survey of local community residing in the vicinity to marine national park. An effective and workable management plan for the Marine National Park will be prepared to bring all the MNP stakeholders under a common platform through stakeholder's consultation.

Sponsored by GIZ and the Ministry of Environment, Forests & Climate Change.

1.5 First Biennial Update Report (BUR) to UNFCCC: Updation of Information on Mitigation Actions for National Circumstances

The biennial update report (BUR) provides an update on the national circumstances including updated information on status of implementation of the mitigation actions in the country explained in the second national communication (SNC) to UNFCCC. The study updated information on prevailing conditions and situations at the national and state levels regarding development priorities and objectives that serve as the basis of addressing issues relating to climate change. The study comprehensively updated national circumstances on sectors, including climate, natural resources, agriculture & livestock, natural disaster,demographic profile, households, governance profile, economic profile, energy profile,power sector, transport, reforms &greenhouse gas emissions, low carbon strategy and India's commitment to climate change and sustainable development. The study not only updated facts and figures but also indicated the structural changes over the years and positive and negative trends. The document is an abridged version of chapter on national circumstances with all necessary updates. Some of the details of the reforms in different sectors and their potential implication for GHG emission reduction are given here.



The report pointed out that India enacted the Energy Conservation Act, 2010, for efficient use of energy and its conservation. To improve energy efficiency of the coal based power plants and reduce the GHG emissions, it was decided that new thermal power plants should be based on super critical technology. India has also levied cesses on coal, petrol and diesel to fund green technologies. The Electricity (Amendment) Act, 2007 amending provision of The Electricity Act, 2003 was enacted on 29thMay 2007 and brought into effect from June 2007.

To encourage efficient use of electricity, new acts try to reduce the provision of electricity subsidy. Deletion of the provision for elimination of crosses subsidies. The provision for reduction of cross subsidies would continue.

Refining & Marketing is another important sector and its development is crucial for having self-sufficiency in petroleum products and in moving towards a consumer oriented competitive market. "India hydrocarbon vision 2025" laid out to make available un-adulterated quality products at reasonable prices, provide incentives for cleaner, greener and quality fuels to promote environment friendly hydrocarbon sector, promote new investments, by ensuring adequate protection to domestic producers and remove subsidies and cross subsidies to promote efficient and optimal utilization of scarce resources and also to eliminate adulteration.

Sponsored by InsPIRE Network for Environment

1.6 Socio-economic Vulnerability of Himachal Pradesh to Climate Change

Himachal Pradesh, one of the Himalayan states in India, is particularly vulnerable to climate change due to its geo-ecological fragility and its potential for rapid economic development. Himachal Pradesh has widely varying micro climatic conditions. The varying elevation plays a pivotal role in deciding the suitability of an area for growing cash rich temperate fruits like apple and other fruits. In Himachal Pradesh, rural regions constitutes 90% of the population and has very high dependency on climate sensitive agriculture and allied sectors and forests. The objective of this study was to develop methods to determine climate variability at a regional scale and assess the impacts of climate change particularly for agriculture/horticulture and forestry sectors.

Vulnerability assessment of the selected sectors has been carried out based on different time scales taking into account future projected economic activities. The study has been accomplished by means of primary

survey in 5 districts of Himachal Pradesh viz: Chamba, Shimla, Kangra, Mandi and Kullu and secondary data collection along with stakeholder consultation. The study captured the status of local socio-economic and ecological conditions, climate change trends, local perception about climate change impacts, especially in terms of livelihood. The sectoral findings of the primary survey validated the secondary data analysis. The criticality of the climate change, in context of Himachal Pradesh, is further substantiated by future climatic projection, using RCP scenarios (IPCC AR5 Report) for 2050 and 2070.

The changing climatic conditions have a greater impact on horticulture/ agriculture sectors in the state specifically, further resulting in major shifts in crop pattern, increasing risks of crop failure, invasion by alien species, increasing cost of crop production, increasing

crop damage by wild and stray animals, decrease in domestic cattle count and increase in lossess due to extreme climatic events. It was observed that apple crop which is the major horticulture crop of the state is highly vulnerable to the vagaries of the climate. As a result of warming in the state, a clear shift of apple belt to higher altitudes has taken place. On one hand, farmers at lower altitudes are incurring heavy lossess due to failures of apple crop; while on the other hand, the area under apple and other fruits in higher altitudes including the cold deserts like Lahaul spiti have increased. Moreover, there is a significant gap between plantation of new orchards (low chilling requirement fruits) and its fruit bearing phase which makes socio-economic condition of farmers at lower elevation more vulnerable.

This situation is further aggravated due to very low adaptive capacity of marginal and small farmers, due to poor accessibility of extension advices and government benefits. As a result, their condition becomes miserable, particularly in times of crop failures, disease outbreaks, and extreme climatic events. The greater financial viability of fruits and vegetables and changing climatic conditions are the major drivers behind the decreased area under cereal crops in the state.

The forest wealth in the state is extremely diverse due to its varied topography. Many forest areas in the state have depleted and degraded due to impact of immense biotic pressures. As a result of climate change, alteration in the productivity of NTFPs, fodder and fuel wood is observed, which in turn has a negative impact on the livelihood of the forest dependent communities. The state forests are also experiencing changing biodiversity and phenology of plants, increased forest fragmentation and increase in migration of wild animals to human settlements & farmlands; subsequently leading to increase in man-animal conflicts and invasion of alien species competing with the indigenous species; hence posing serious threat to their existence.

The encroachment of Pinus species in higher altitude forests coupled with increased invasion of forest lands by highly combustible invasive species like Lantana Camara and longer dry spells are primarily responsible for inducing frequent and intense forest fire incidences in the state. It has been analyzed that the increased anthropogenic pressure as well as changing climatic conditions resulted in drifting of medicinal plants to higher altitudes and deeper forests of the state.

Himachal Pradesh has micro climatic conditions and the varying elevation level plays pivotal role in deciding the area suitability for growing cash rich temperate fruits like apple and other fruits. Despite of changes in the climate almost all the agro climatic zones of the state have rich potential for production of fruits and vegetables and this potential can be tapped best by providing quality/timely extension advices and other benefits by the government. The state has rich potential for production of fruits and vegetables and government needs to take intervention measures such as providing extension advices to farmers, suitable seeds and sapling to harness this potential.

Sponsored by Department of Science and Technology (DST), GoI

2 Sustainable Urban Development

2.1 Sustainable and Disaster Resilient Cities: Case Studies and Capacity Building of 10 JnNURM Cities

IRADe conducted the research study titled Sustainable and Disaster Resilient Urban Development interventions through JnNURM, under the comprehensive capacity building program of the Ministry of Urban Development, Government of India, to augment the City Development Plans (CDPs) of 10 cities in four regions of the country viz. Dehradun, Srinagar (North India), Shillong, Guwahati (East India), Pune, Ahmedabad, Bhopal (West India), Vishakhapatnam, Hyderabad and Bhubaneswar (South India).

IRADe studied the 10 cities individually in detail and used updated data on city governance, ULB's performance, disaster preparedness, financial indicators and Service Level Benchmarks to develop a vulnerability assessment matrix. Spatial analysis was carried out through GIS to identify critical urban hotspots susceptible to disasters in the city. Four regional workshops were also conducted to build capacity of city stakeholders of India to strengthen the disaster resilient mechanism and issues of the cities and help them to deal with the related stress and formulate adaptation strategies

The study reveals that Urban Local Bodies (ULBs) have big challenges to keep pace with the need for increasing infrastructure and service provision for citizens, simultaneously ensuring inclusive growth for the urban poor while facing disasters and natural hazards.

The Service Level Benchmarks (SLBs) assessment shows that most of the infrastructure in the cities is not up to the MoUD benchmarks and most of these cities do not have a minimum coverage of the basic services. Issues of insufficient infrastructure will increase the intensity of losses caused by natural hazards in the cities. In addition to this the involvement of large number of institutions and authorities in the delivery of basic services and implementation of various public works of the cities has lead to the inefficiency and unaccountability of the agencies in service delivery.

The study recommends that the ULBs in all the cities need to work urgently for building the quality infrastructure (accessible to all) and for improving their financial health. Further IRADe recommends an integrated approach for sustainable and disaster resilient development in the cities. This will help the local governments as generally they have limited resources available to address development issues ranging from health, education, infrastructure and

services, and often disaster risks do not emerge as clear priorities. IRADe submitted workshop reports and 10 city reports having; detailed time lines for hazards and hazard mapping showing that most cities face multi-hazard risks., detailed spatial analysis using GIS maps of vulnerable locations using Cartosat data, Service level bench marks and other land posts that measure sustainable development.

Sponsored by Ministry of Urban Development, Government of India

2.2 Vulnerability of Coastal Cities on Rivers to Climate Change: Case Study of Surat

The main objective of the study was to develop an integrated analytical framework for floods and disaster management strategy for urban areas in the background of a specific case study of Surat. This is to assess the vulnerability of the city and its people to floods and to develop a procedure to incorporate climate change concern in the existing framework with a decision support system. It suggested adaptation actions that can make a city resilient to climate change induced vulnerability.

Hydro-meteorological assessment was carried out and vulnerability of the people and the public infrastructure of Surat was pointed out. The elements of infrastructure under consideration include- (buildings, schools, hospitals, slums, and industries) within and adjacent to the floodplains, roads, bridges, etc. A system analytical approach is used in the study to gather and examine available data in order to develop an understanding of the relevant climatic effects and their interactions with infrastructure. For this, a hydrological model of the river is developed to assess the extent of inundation and water depths under various scenarios under consideration, which may arise due to climate change. An integrated hydraulic modelling system and spatial analysis software have been used in the study.

With information on the likely depth of flooding in different parts of the city, citizens and local administrators can take effective measures, such as avoiding certain areas or populations, building on stilts, providing shelters etc. The study also included surveys on how schools, hospitals and industries suffer and some coping with hazards along with scientific analysis using satellite data and hydrology was completed this year.

Sponsored by Ministry of Earth Sciences, Government of India

2.3 Policy engagement work in India to engage decision makers at national/state/city level for urban climate change resilience

This project aims to position the urban challenges in the larger policy framework provided by state and national institutions. As a part of the project IRADe reviewed the work done by ACCCRN partners on urban climate resilience. IRADe is engaged in building awareness among decision makers (at city, state and national level) about urban climate change resilience and integrating the concepts into wider planning discourse. To accomplish the needful the IRADe conducted meetings with high level dignitaries in 10 Indian cities viz. Shillong, Guwahati, Pune, Bhopal, Ahmedabad, Bhubaneswar, Vishakhapatnam, Hyderabad, Srinagar and Dehradun.

IRADe is focussing on organizing /participating in the events highlighting urban issues and has already organized four regional workshops covering several states of the country in which the ACCCRN partners shared the findings of ACCCRN work with the top level functionaries of states and cities. In these workshops high level dignitaries including State level Additional Secretary, City Municipal Commissioner, City Divisional Commissioners, and City Vice Chairman Development Authorities etc were also engaged in deliberations for building awareness and influence need for disaster and climate resilient urban planning.

As a part of the project IRADe will organize a session on “Climate and Disaster Resilient Smart Cities” for the 6thAnnual Conference of the International Society for Integrated Disaster Risk Management entitled “Disaster Risk Reduction: Challenges and opportunities for Sustainable Growth” in association with TIFAC and IIASA, in the session a paper “Mainstreaming of disaster resilience for sustainable development of Indian cities” will be presented. In addition to this a paper entitled “Indian Cities towards Smartness; a Case Study of Guwahati City” has been accepted in “Smart City Expo World Congress going to be held in Barcelona, Spain, in November 2015.

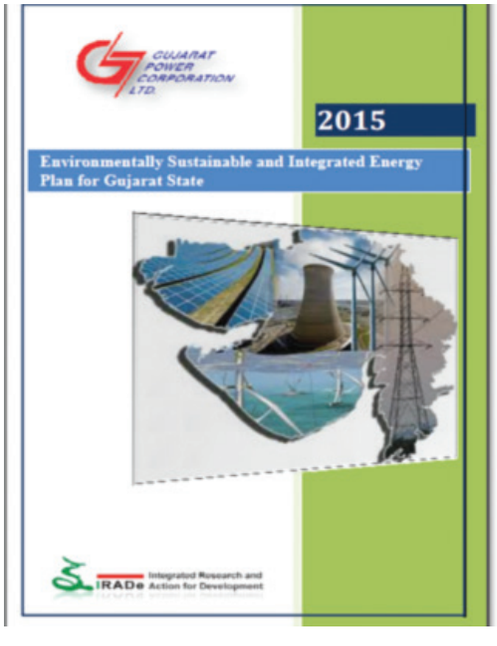
The initiative of developing 100 smart cities by Indian government is considered to be a big opportunity for IRADe to influence the government’s planning policies for furthering the ACCCRN cause of climate resilient cities, for accomplishing the needful IRADe has selected two Indian Cities viz. Guwahati and Ahmedabad for which it aims to prepare Climate resilient smart city framework and build consensus of the city authorities for implementing the same.

Sponsored by Rockefeller Foundation under ACCCRN Project

3 Energy and Power Systems

3.1 Sustainable and Integrated Energy Plan for Gujarat

IRADe was given the responsibility to prepare a strategy report on Environmentally Sustainable and Integrated Energy plan for Gujarat taking into account existing energy resources, energy demand, socio-economic status, government development plans, environmental constraints, hazard risk vulnerability of the state and its critical infrastructure with a perspective for the next two decades.



Under this project IRADe has conducted one stakeholder meeting at Gandhi Nagar, Gujarat in May, 2014 which was attended by around 30 participants from the entire energy and power sector of Gujarat. IRADe staff made detailed visits to key thermal and renewable power plants like the Gandhi Nagar Thermal Power Plant, its 1 MW solar power plant and ash pond, 1 MW canal top power plant at Mehsana, Narmada canal, Sabarmati river front, Ahmedabad BRT corridor, Vadodara vegetable market biogas power plant and nearby villages, etc to get the field level aspects for power and energy. Visits were also made to Thol bird sanctuary and Adalaj step well to guage into the environment aspects in the overall context for Gujarat.

IRADe staff visited all the major organizations in the energy and power sector in Gujarat to discuss critical issues like fuel costs, fuel supply (coal, gas, lignite), environmental issues, fuel imports and costs, issues of grid stability on account of renewable energy. Major findings and analysis of the project are presented here.

Gujarat has one of the highest growth rates of state GDP (SGDP) of around 10% since 10 years in the country. There is a marked shift in the economy of the state from an agrarian to industrial and services oriented economy.

Energy consumption in Gujarat is predominantly characterized by use of fossil fuels (Petrol, Diesel, Kerosene, LPG, Coal, Lignite, Natural Gas) and electricity, as the main commercial fuels. Rural areas also consume

cow dung, firewood and crop residues as fuel sources. Access to commercial fuels in rural areas is a matter of concern.

The overall installed capacity of power generation has increased over five folds from 1990 to 2014 showing a CAGR of 5.15% during the last 2 decades. Private sector share in installed capacity has risen from 10% in 1990 to 41% in 2014. Electricity generation has increased four folds from 1990 to 2014. Private sector power generation has increased 19 fold during the corresponding period. It is one of the few states in the country to have surplus power and amongst the highest per capita electricity consumption of around 1800kWh/capita/yr as compared to 800kWh/capita/yr for India. In 2013-14 share of electricity consumption in various sectors for Gujarat was as follows. Industry had the highest share with 43%, followed by agriculture sector with 22%, domestic sector with 16%, other sector 13%, commercial sector 2.5%, while public water works, public lighting and railway traction constituted balance 4%.

Gujarat has fossil fuel reserves of crude oil, gas and lignite, but lacks coal (which is the major source of electricity generation). More recently lack of gas supplies have led to gas plants working at severely reduced capacities and over 4000MW capacity lies idle. Lignite potential is available but is constrained by its inherent bottleneck of not being able to use beyond 300-400 km hence in-situ power plants only suitable. Gujarat ports act as a major source of import of fossil fuels (coal, gas and crude) making it extremely important from the point of hazard and risk vulnerability. Coal is the main source of electricity generation in Gujarat, but the state has no resources and has to depend on local and imported coal for power generation. Coal plants are burdened with additional high cost of around Rs.1400/- per tonne due to transportation from mines in eastern India.

Gujarat has wind potential of around 35000MW, but only 10% is realized, wind power has inherent issues with grid stability, high variability in generation. One of the highest solar radiation in the country at 5.5-6.5 kWh/day/sq.m. Solar PV has high potential of around 35-60 GW, but is constrained by high capital cost and levellized tariff.

While analysing future requirement, electricity has been given significant importance as it constitutes around 50% of the overall energy requirement in the state. Energy requirement projections are done presenting multiple scenarios like Dynamics as Usual (DAU) with 8% growth rate of state GDP (SGDP), High growth 10% growth rate of SGDP, energy efficiency (falling elasticities), etc. Projections for next 20 years are based on suitable projection methods like regression frame-work that accounts for auto-correlation using IRADe's model using General Algebraic Modelling Software (GAMS). Constant elasticity and assumption of falling elasticity is undertaken with the idea of business as usual scenario and a plausible improvement in energy efficiency of the period.

The requirement for electricity is projected to increase by 2035 from 68 bkWh in 2013 to 274 bkWh with 8% growth rate of SGDP and to 378 bkWh with the higher growth rate of 10% in case of constant elasticity scenario. Correspondingly capacity will be 3.7 times to 4.5 times as large as the 23.8 GW of installed capacity i.e. 77GW and 106 GW under 8% and 10% scenarios, while the projections for falling elasticities are assumed to reflect increasing energy efficiency, show that in 2035 electricity requirement would be 12% and 14% lower with SGDP growth rates of 8% and 10% respectively and that the required installed capacity would be lower by 19 GW and 15 GW respectively as compared to constant elasticity scenario and is much more likely be consistent with improving energy efficiencies in all sectors. In this case the installed capacity required would be 68 and 91 GW respectively.

Projected requirement of petroleum products with 8% and 10% growth rate of SGDP show that petrol requirement in 2035 with 10% growth rate of SGDP is four times as large as the requirement of the same in 2013, whereas, this requirement becomes 3.18 times of the requirement of the same in 2013 under 8% growth rate of SGDP. LPG requirement in 2035 with 10% growth rate of SGDP would be more than tripled of the existing requirement of the same in 2013. With 10 % growth rate of SGDP, Gujarat will need around 21 Mtoe of these products in 2035 as compared to 8 Mtoe at present.

Based upon above calculations, additional scenario building exercise and supply options and policy

for the state are being prepared. The draft report of the plan has been submitted.

Supported by the Gujarat Energy and Petrochemicals Department and Gujarat Power Corporation Limited (GPCL)

3.2 South Asian Regional Initiative for Energy Integration (SARI/EI)

IRADe is the implementing partner for USAID's South Asia Regional Initiative for Energy Integration (SARI/EI) program for advancing regional energy integration and Cross Border Energy Trade (CBET) in eight South Asian countries (Afghanistan, Bangladesh, Bhutan, India, Pakistan, Nepal, Sri Lanka & the Maldives). The SARI/EI program addresses policy, legal, and regulatory issues related to energy in the region; promotes transmission interconnections; and works toward establishing a regional market exchange for electricity. The program acts as a catalyst for enabling systemic conditions for regional integration through three Task Forces. Task forces drive the program deliverables for identifying required policies and regulations for CBET, investments for transmission-intern connection systems and transparent trade practices. The task forces are guided by a Project Steering Committee (PSC). In consultation with the PSC and Task Forces, the SARI/EI Secretariat executes the program.

The primary objective of **Task Force-1** is to drive the Coordination of policies, legal and regulatory frame works for CBET. One of the key studies under this task force on "Review and analysis of Electricity Laws, Policies and Regulations of South Asian Countries" was completed recently. The final (draft) report provides Regional Regulatory Guidelines for decision making on CBET such that consistency in the transactions is ensured and delays on account of unclear and complicated regulatory regimes applicable to such transactions can be reduced. To this end the report recommends establishing a South Asian Forum of Electricity Regulators (SAFER). The report also proposed changes and amendments in Electricity Laws, Policies and Regulations of South Asian Countries for promoting CBET. **Task Force-2** focuses on **advancement of transmission system interconnections of power system in the South Asian region for enabling CBET**. The task force recognized the need for identifying country wise trading potential of electricity to other nations. To this end SARI/EI studies are now under progress on (i) Assessment of Electricity Trading Potential in the South Asia region and (ii) Harmonization of Grid Codes, Operating procedures and standards to facilitate/ promote CBET in South Asia. **Task Force-3** focuses on **electricity trading and regional power** markets towards and development of a Roadmap of South Asia Regional Electricity Market. A study to assess the preparedness of each South Asian Country for CBET by assessing commercial & operational aspects related to generation, transmission and power trading in each South Asian Country is underway. The study will also suggest suitable model of Power Exchange in South Asian region for cross border power trading.

Task Force- 1

a) Review of Electricity Laws, Regulations, Policies and Legal Structure for SA

b) Investor friendly Policies/guidelines for SA power sector (proposed)

SARI/EI/IRADe's Background Paper on CBET highlights the current status of and the overall benefits of CBET to South Asian economy, challenges and opportunities

The Concept paper on "CBET in South Asia examines the challenges and Investment opportunities and analyses the investment requirements for enabling CBET in South Asia.

The Working-Paper on Bhutan was prepared to assess the impact of CBET on the economy of Bhutan.

IRADe's India Activity Model provides India's projections with CBET and without CBET on key indicators such as energy mix, electricity generation mix, CO2 reduction, reduction in total investments and energy sector investment requirements, reduction in import dependence of coal and fossil fuels etc.

Task Force-2

a) Electricity Trading Potential Assessment in SA

b) Harmonization of Grid Codes, Operating procedures and standards for CBET

Task Force-3

a) Assessment of commercial terms and conditions for CBET & model of Power Exchange in SA

b) Market Rules and Pilot Market design (proposed)

3.3 Research and Analytical Studies

IRADe's in-house research work resulted in a background paper on CBET potentials and a concept paper on investment requirements for CBET. IRADe is working towards developing internationally acceptable energy models for econometric analysis of CBET benefits for participating South Asian countries.

CBET Opportunities: Nepal IRADe was part of the SARI/EI study missions in November 2014 and March 2015 to Nepal towards complimenting the Power Trade Agreement (PTA) signed between India and Nepal. The PTA driven by Prime Minister Modi has been critical in the emergence of donor and multi-stakeholder efforts across CBET between the countries. The SARI/EI mission is developing opportunities to advance Nepal-India electricity trade and define a time-bound program to assist the Government of Nepal and its power sector institutions in the public and private sector.

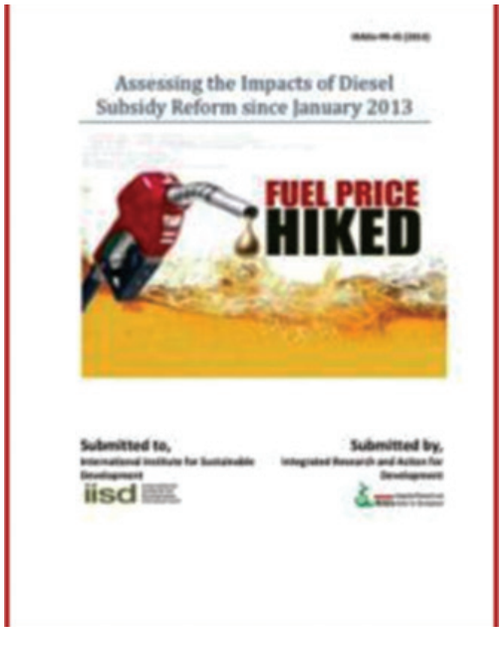
IRADe held stakeholder consultations in Nepal with USAID/Nepal, Nepal Electricity Authority, Investment Board Nepal, World Bank (Nepal), ADB (Nepal Resident Mission), Ministry of Energy (Nepal), Institute for Integrated Development Studies and SAARC Secretariat (Nepal).

Supported by the United States Agency for International Development (USAID)

3.4 Assessing the Impacts of Diesel Subsidy Reform Since January 2013

The objective of the report was to analyze the impact of diesel price deregulation on the Indian economy from September 2012 to June 2014. Diesel is an important petroleum product whose consumption and pricing has major macro economic implications. It was higly subsidized prior to 2012.

IRADe analyzed the data before and after the diesel price reforms and found that there were benefits to the economy and environment. The oil marketing companies under recoveries were reduced. The government's fiscal position improved on account of reduced subsidies. The trend of rising share of diesel vehicles was reversed. The analysis showed that the annual consumption of diesel was reduced partly because of slowing down of the economy and partly due to the increase in diesel prices. The question that the report seeks to answer is if the diesel price hike was responsible for the inflation and economic downturn. Methodology used regression equations for Wholesale Price Index (WPI) and Consumer Price Index (CPI) aggregates on their lagged and on the sectoral WPI and CPI prices of food, fuel, electricity and manufacturing. The results showed that there has been an overall increase in WPI inflation but it turned out to be temporary in nature.



The economic slowdown was more on account of the RBI not reducing interest rates as the RBI had shifted from WPI targeting to CPI targeting and though WPI inflation had reduced the CPI inflation was high on

account of high food prices. The wholesale price of food is largely influenced by rainfall, seasonal impacts and market forces and diesel price change had a very small impact on it. The report concluded that the persistent CPI inflation is because of hike in food prices and not because of diesel prices and if CPI inflation is controlled, the RBI is likely to respond by reducing the real interest rate, which will stimulate economic growth and reap the benefits of diesel reforms. The elasticity of overall wholesale price inflation with respect to diesel price change was found to be quite low.

A workshop was organized on 14th November 2014 where the results of the study was shared with an audience of wide background comprising of experts from different sectors of the economy and the government. The views of the experts were used to further update the report. The project report has been submitted to IISD in January 2015.

Sponsored by International Institute for Sustainable Development (IISD)

3.5 Global Technology Watch Group (GTWG) on Advanced Coal Technologies (ACT) for Power Generation

IRADe is a member of the Global Technology Watch Group, a consortia comprising of three IIT's (Madras, Bombay and Delhi) for the continuous monitoring of the status of coal technologies in India and abroad, their evaluation for use in India, and to facilitate the development of a road map of Advanced Coal Technologies for Sustainable Power Generation.

Coal will be the fuel of the country for several more decades. The present coal technologies are of low efficiency and highly polluting. Highly efficient, eco friendly, economically viable ACT need to be developed and deployed at the earliest. The existing non-technological barriers like isolated and fragmented research and development, lack of effective collaborative research and focused team work can be overcome by establishing a national ACT network which will bring together stakeholders from industry-academia-government-society to encourage, facilitate, catalyze and actuate purposeful sharing of knowledge and resources at national and international levels. This will help in creating a coal database, facilitate the development of a coal road map and culminate in the creation of a Global ACT Network, for the benefit of coal power generation in the country.

IRADe would critically examine the various technologies in power generation, beneficiation and mining and would develop a technology index based on multiple evaluation criteria such as capital cost, O&M cost, Co_2 & other emissions, socio-economic and water food print evaluation. Some technologies that are already in various stages of development but yet to be evaluated are ultra super critical power plants and Integrated Gasification Combined Cycle (IGCC). We have already begun the technology literature reviews for coal power generation, sustainability assessment and developed draft matrix for sustainability analysis.

Supported by Ministry of Science & Technology, Department of Science & Technology, Government of India

4 Agriculture and Food Security

4.1 Analysis of Factors Affecting Productivity of Northern Flood Plains of eastern Uttar Pradesh

IRADe carried out an in-depth research to understand the drivers of growth and livelihoods and obstacles in the selected districts and clusters where Sir Dorabjee Tata Trust (SDTT) supported projects are undertaken by its partner NGOs. IRADe assessed the production and resource potential and devised strategies in consultations with stakeholders and participating NGOs to overcome various challenges encountered by the region,strengthen the clusters and generate synergy using data and analysis for Bahraiach,Kushinagar and Shravasti districts, some of the poorest districts in UP.

In these districts electricity supply is poor,extension services are inadequate and certified seeds are not available in time. The irrigation potential of canals in Bahraich and Kushinagar is not fully realized due to siltation and poor management of canals. Private diesel operated tube wells are expensive. Credit to small and marginal farmers are inadequate. There exist large gaps between actual and potential productivity for major crops. Lack of proper marketing channel both for purchasing farm inputs and selling produce hampers diversification.

IRADe suggested strengthening of extension services with agri-clinics and agri- business as partners, improving canal management and diversification of agriculture to cash rich crops and measures to fully exploit the value chain of crops by utilizing by products in productive activities.

Under the project IRADe prepared detailed PRA reports of the surveyed clusters and 4 detailed reports: Vision plan for SDTT and three district level plans for Bahraich, Shravasti and Kushinagar.

Key recommendations: Some of the major recommendations and interventions suggested for the area are to Improve livelihood opportunities to the area with promoting, fisheries, poultry, medicinal plants, mushroom farming, promoting horticultural activities. Other recommendations comprise of Improving access to electricity through distributed solutions like gasifier, biogas. Improve access to water and sanitation through low cost solutions like sand filters, toilet linked septic tanks, flood proof hand pumps and toilet structures, low cost bamboo based toilet enclosures.

Sponsored bySir Dorabji Tata Trust (SDTT)

5 Poverty Alleviation and Gender

5.1 Energy Sector Reform

This project is a part of the ENERGIA 4 year research initiative funded by the Department for International Development (DFID) reviewing the evidence of the relationships between gender, energy and poverty. IRADe is working in a consortium led by Global Subsidies Initiative (GSI) of the International Institute for Sustainable Development (IISD) and supported by Bangladesh Institute of Development Studies (BIDS), Bangladesh and Spaces for Change, Nigeria which focus on energy empowerment, energy sector reform and impacts for gender in the 3 countries. Research will be undertaken globally to identify examples of best practice of implementation of positive energy sector reform policies that have worked well for women, as well as those that have not worked well. The work will cover those research methods deployed to understand the impacts of energy sector reform on different sections of society and on the impacts of policy change on gender drawing from other sectors such as health and education. From this understanding detailed national household level research will be undertaken in three countries undergoing or planning to undergo reforms (Bangladesh, India and Nigeria).

Supported by ENERGIA

5.2 Analysis of Kerosene Free Delhi Scheme

This study was funded to IRADe by International Institute for Sustainable Development (IISD), the objective of the study was to evaluate the scheme in Delhi state to provide LPG connection to the poor households (especially poor household having Jhuggi Ration Card (JRC), Below Poverty Line (BPL) and Antodaya Ann Yojana (AAY) ration card) who are still dependent on kerosene for cooking and make Delhi India's first kerosene free state and study the feasibility of similar scheme in other states.

"Kerosene Free Delhi" scheme was launched by Delhi Government in 2012. The scheme gave a free LPG cylinder, two-burner gas stove, regulator and gas pipe to the ration card holders who were using kerosene. IRADe found the scheme to be a success as it reduced indoor air pollution but it failed to include poor as it focused only on beneficiaries with ration card holders which often exclude extremely poor. Eg: homeless with no identity card or address.

It was also found that some kerosene use continued to bridge days between the delivery and order for a gas cylinder. IRADe recommended to provide tie-up bottled (second small size bottled may be 5 KG, which will save additional cost on the second bottle for the government) connection to the beneficiaries. A sufficient awareness and orientation program to expand the beneficiaries' knowledge on using LPG and its benefits for their cooking needs is also recommended.

Sponsored by International Institute for Sustainable Development

6 Events, Meetings and Workshops

6.1 SDTT stakeholder workshop on agriculture and livelihood, Lucknow

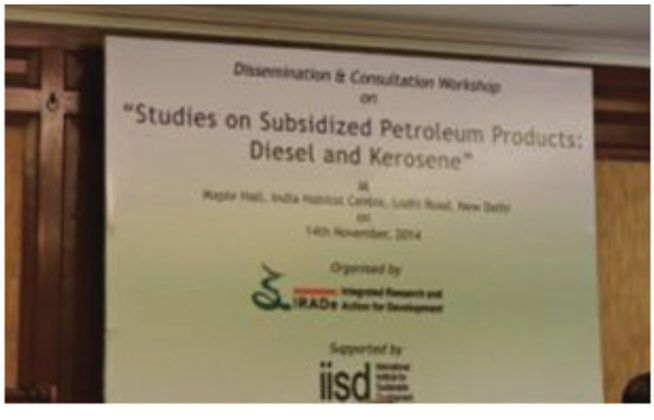
A two day State level Workshop on Improving Agriculture Productivity and Livelihood in Eastern Uttar Pradesh was organised on 27th-28thFebruary, 2015 at Lucknow. The workshop was attended by about 50 delegates from the Central and State Government functionaries, donor organization, Indian Council of Agricultural Research (ICAR), Private Entrepreneurs, SDTT NGO partners, and IRADe project team. Mr. V.N.Garg, IAS, Agriculture Production Commissioner, Government of Uttar Pradesh was the Chief Guest.

The objective of the workshop was to present the vision and district plans and to design an integrated and participatory action plan for the development of the area in general with specific reference to agriculture, non-agriculture and allied areas for improving the livelihoods of the stakeholders.

The workshop also helped to make policy level recommendations for different sectors relating to agriculture and allied activities in the State and suggested new deviations.

6.2 Workshop on studies on subsidized petroleum products: diesel and kerosene

IRADe organized a final dissemination & deliberation workshop on "Evaluation of Scheme for Kerosene Free Delhi (KFD)", wherein the final outcome



of this study (KFD) was presented on 14th November 2014 at India Habitat Center, New Delhi. The workshop was attended by delegates from Ministry of Petroleum, Government of India, Department of Food Supplies & Consumer Affairs, Delhi government, Oil marketing companies and non government research organizations.

6.3 South Asia Investors Workshop on "Cross-Border Electricity Trade"

24th-25th September, 2014, New Delhi, India

The South Asia Investor workshop was organized by IRADe in association with Confederation of Indian Industry (CII) was an important platform for investors, developers, financial institutions, Multilateral Development Banks and high-level officials from the region to explore challenges and investment opportunities to enhance CBET among the South Asian nations. The workshop emphasized that promoting regional cooperation in CBET needs enhanced political consensus and formalization of ensuing processes. Harmonizing legal, regulatory and policy frameworks will be critical and this will call for regional regulators.

6.4 Study Tour to European Regional Power Markets July 13- 19, 2014, Amsterdam and Paris

IRADe in association with the Indian Energy Exchange Limited (IEX) organized a visit to Amsterdam and Paris for facilitating knowledge transfer and building the capacity of the task force members, PSC members and other representatives from SA countries on legal and regulatory issues, institutional governance, operational and other aspects of the European Regional Power Market.

6.5 SARI/EI Study Mission to Nepal 3rd – 7th November, 2014 and16th-19th March, 2015Kathmandu, Nepal

IRADe was part of the SARI/EI study mission to Kathmandu, Nepal towards complimenting the Power Trade Agreement (PTA) signed between India and Nepal. The PTA has been critical in the emergence of donor and multi-stakeholder efforts across CBET between the countries. The mission explored opportunities to advance Nepal-India electricity trade and define a time-bound program to assist the Government of Nepal and its power sector institutions in the public & private sector.

6.6 2nd Meeting of Task Force-1 on "Coordination of Policy, Legal and Regulatory framework", 19th-20th February, 2014, Colombo, Sri Lanka

Key Findings and Member Recommendations:

- Taxes and duties between South Asian nations can impede CBET.
- Need non-discriminatory opaccess for enhancing private sector participation and the relevant regulatory regime are required for granting access.
- For long term sustainability overall tariff must reflect true cost of generation and tariff must be fixed by independent regulators.
- Subsidies may be required in developing country context, viable, supported by adequate trading mechanism and power market rules, along with infrastructures is necessary to regulate trading of Power.
- UI mechanisms, on a regional basis, needs to be developed for the purpose of regional grid discipline.

6.7 3rd Power Steering Committee (PSC) meeting, and the 4th meeting of Task Force 1 on "Coordination of Policy, Legal & Regulatory Framework" 17th-18th December 2014, Dhaka, Bangladesh

The meeting was inaugurated by the Chief Guest Mr. A R Khan, Chairman, Bangladesh Electricity Regulatory Commission (BERC). Key Recommendations were to build consensus among different stakeholders for disseminating the task force recommendations/ findings results in forums that can have influence on the decision making bodies such as SAARC, Government forums, SARI/EI and SAARC energy center should complement each other's work as both are working for a common cause of electricity trade within the SAARC region and establishment of a regional electricity grid. A study on Investment Friendly Policies and Regional Investment Framework for CBET for SA was proposed, based on IRADe's efforts to undertake analytical study to assess the economic benefits of CBET between India-Nepal, studies of other bilateral opportunities was suggested

6.8 3rd Meeting of Task Force 2 on "Advancement of Transmission Systems Interconnection", 25th-26th February, 2015, Colombo, Sri Lanka

The main objective of the meeting was to review latest developments in Nepal power sector including the status of Dhalkebar (Nepal) - Muzaffarpur (India) 400 kV Transmission Line Cross-Border Interconnection, review latest updates on the planned and proposed Cross-Border Transmission lines between India- Bangladesh, to discuss the progress and preliminary draft findings of the study on the "Assessment of the Electricity Trading Potential in the South Asia region", discuss and seek suggestions/recommendations from the members on the draft findings of the study "Assessment of the Electricity Trading Potential in the South Asia region"

6.9 Sustainable Energy Plan for Gujarat project, Stakeholder meeting

A one day stakeholder meeting was organized on 23rd May 2014, at Gandhi Nagar, Gujarat. The meeting was attended by all the major energy and power sector organizations of Gujarat from both Government, Public and Private sector. Around 30 senior level delegates of power and energy sector participated in the meeting.

The objective of the meeting was to discuss the existing energy scenario of the state, issues in power generation, fuel and electricity supply, fuel resources, grid parity with renewable and other related issues.

Dr. Kirit Parikh Chaired the meeting and Dr. Jyoti Parikh made a detailed presentation on the project.

6.10 Regional Workshops for Disaster- Resilient and Sustainable cities

In the year 2014, IRADe, a Centre of Excellence of the Ministry of Urban Development (MoUD), worked extensively in the area of disaster resilience from the point of view of preparing cities and mainstreaming disaster resilience in urban planning. Four regional workshops on 'Sustainable and Disaster-Resilient Urban Development' in different cities including Shillong, Guwahati and Bhubaneswar (Eastern India), Pune, Ahmedabad and Bhopal (Western India), Vishakhapatnam, Hyderabad (South India) and Dehradun, Srinagar (Northern India) were conducted with active participation of the urban local bodies, parastatal bodies, researchers and urban planners of the respective cities. The workshops were mainly sponsored by the MoUD.

East India workshop: The workshop was held on 17th October, 2014 at Hotel Brahmaputra Ashok in Guwahati, Assam. The workshop was inaugurated by Mr. Daya Ram Rajbangshi, Addl. Commissioner, Guwahati Municipal Corporation, Govt. of Assam. The workshop was attended by 45 participants which included representatives from Ministry of Environment & Forests, PHED, Guwahati Municipal Corporation, Shillong Municipal Corporation, Royal Institute of Architecture, Tezpur University, CRDF, Environ, TPO, NEHU, CEPT, GMDA, Arayanak, Agency for Sustainable Development etc.

The main purpose of the East India Regional workshop was to present the findings of IRADe's research work on Guwahati and Shillong cities to finalize strategies for Sustainable and disaster resilient cities.

West India workshop: The workshop was held on held on 9th September, 2014 at Hyatt Regency, Ahmedabad, and Gujarat. The main purpose of the West India Regional workshop was to present the findings of IRADe's research work on Ahmedabad, Pune and Bhopal cities to finalize strategies for Sustainable and Disaster resilient cities. The workshop was inaugurated by Mr. G S Aloria, Additional Chief Secretary, Urban Development and Urban Housing Department, Govt. of Gujarat.

It was attended by 40 participants which included representatives from HSMI, TCPO ,CEPT, CPWD,UNDP, Tata Centre for Disaster Management, TISS, Jamnagar Municipal Corporation , MP State Disaster Management Authority , TARU Leading Edge Pvt. Ltd.

South India Workshop: The workshop was held on 09th October, 2014 at Hotel The Park, Vishakhapatnam, Andhra Pradesh. The workshop was inaugurated by G C Kishore Kumar, Secretary Visakhapatnam Urban Development Authority (VUDA), Andhra Pradesh. The workshop was attended by 43 participants, which included representatives from Greater Vishakhapatnam Municipal Corporation, Ministry of Environment & Forests, VUDA, Andhra University, State Disaster Response and Fire Services A.P, UNDP, CPWD, GITAM University etc.

The main purpose of the South India Regional workshop was to present the findings of IRADe's research work on Vishakhapatnam, Hyderabad and Bhubaneswar cities to finalize strategies for Sustainable and disaster resilient cities.

North India workshop: The North India Regional workshop was held on 30th December, 2014 at India International Centre in New Delhi. The workshop was inaugurated by **Mr. Shankar Aggarwal, Secretary, Ministry of Urban Development, Government of India.**

The main purpose of the North India Regional workshop was to present the findings of IRADe's research work on Dehradun and Srinagar cities to finalize strategies for Sustainable and disaster resilient cities.

The purpose of the workshops was to build awareness on city disaster-resilience mechanism, dissemination of knowledge and to suggest strategies for disaster-resilient cities. The workshops aimed at building the capacity of city stakeholders (policy makers, urban planners, city administrators, experts, academicians and aid agencies from different regions of India) to strengthen the disaster resilience mechanism and help them deal with related issues and formulate adaptation strategies.

Considerable time was spent in preparing reports of the 10 cities containing hazard analysis, spatial planning as well as level of benchmarks of urban services.

We acknowledge the support of our Asian Cities Climate Change Resilience Network (ACCCRN) partners.

7 Professional Activities

Dr. Jyoti K Parikh, Executive Director, IRADe

- Panelist in New Climate Economy: The Global Commission on the Economy and Climate. Organised by ICRIER, Session 2: Critical Evaluation of 12th Plan from Climate point of view, 14th April, 2014, New Delhi.
- Round table on Climate Dialogue: A joint Indian Environment Law Offices & Globe India, 5th August,2014, New Delhi.
- Participated LEDs GP 2014, Global workshop, 27th-29th August 2014, Addis Ababa, Ethiopia
- Chaired & Panelist at Conference on Climate Change. Organised by PAIRVI, 6th September, 2014, Bhopal.
- Participated Summit on Global Agenda. Invitation from World Economic Forum, 8th November, 2014, Dubai
- Keynote speaker at IPCC AR-5, Working Group 3, Disseminations meeting, 21st November, 2014, Philippines
- Speaker at inaugural session at Conference on Energizing the Smart Cities in India, Organised by Infraline Energy, 12th December, 2014, New Delhi
- Attended PSC meeting of SARI/EI project, 16th December, 2014, Bangladesh
- Key Presentation on Resilent cities at Regional Policy Dialogue of Sustainable Urbanisation in South Asia. Invitation from UNESCAP, 18th December, 2014, New Delhi
- Attended 1st meeting of National Steering Committee for India-Tech Triple Expo 2015 comprising 16th CONSTRUTECH International Exhibition & Conference under chairmanship of Secy. MoUD, 7th January, 2015, New Delhi.

Mr. Sharad Verma

- Presented State Vision Plan at Lucknow for SDTT project on improving agricultural productivity and livelihood in flood prone areas of eastern UP in February, 2015.
- Participated in "Future of Electricity India Workshop" on 16th June 2015 at Taj Palace, New Delhi Organized by World Economic Forum (WEF) also attended by the Hon'ble Minister of Power and New and Renewable Energy, Mr. Piyush Goyal, GoI.
- Participated in 4th International Symposium on 'Biofuels and Bio-energy : Enablers for Sustainable and Scalable Solutions", on November 2014 at Hotel Le Meridien, Janpath, New Delhi, organized by Petrofed, Indian Oil Corporation Ltd (IOCL)
- Participated in "Economic Times-Flyash Summit", on October 2014, at Indian Habitat Center, New Delhi organized by Economic Times and C-Farm, supported by NTPC and SAIL,.
- Participated in "First National Solar City Conference" on June 2014 at Shiwalik Hotel, Chandigarh, organized by CREST, MNRE, GoI.

Mr. Chandrashekhar

- Attended the inception meeting of the ENERGIA Gender & Energy Research Programme at IISD Geneva, Switzerland on 9- 13 February 2015.
- Participated in the final dissemination & deliberation on "Analysing Rural Energy Transitions and Inequities at India Habitat Centre, New Delhi on 29 September 2014.

List of Projects (2014-15)

S.No.	Title	Funding Agency	Status
1	Critical Evaluation of 12th Five Year Plan from a climate perspective	ICRIER "The New Climate Economy Project	Completed
2	Supporting National Study on The Economics of Ecosystems and Biodiversity (TEEB-India Initiative)	Deutsche Gesellschaft für Internationale Zusammenarbeit	Completed
3	First Biennial Update Report (BUR) to UNFCCC: Updation of Information on Mitigation Actions for National Circumstances	InsPIRE Network for Environment	Completed
4	Socio-economic Vulnerability of Himachal Pradesh to Climate Change	Department of Science and Technology (DST), GoI	Completed
5	Sustainable and Disaster Resilient Cities: Case Studies and Capacity Building of 10 JnNURM Cities	Ministry of Urban Development, Government of India	Completed
6	Vulnerability of Coastal Cities on Rivers to Climate Change: Case Study of Surat	Ministry of Earth Sciences, Government of India	Completed
7	Assessing the Impacts of Diesel Subsidy Reform Since January 2013	International Institute for Sustainable Development (IISD)	Completed
8	Analysis of Factors Affecting Productivity of Northern Flood Plains of eastern Uttar Pradesh	Sir Dorabji Tata Trust (SDTT)	Completed
9	Analysis of Kerosene Free Delhi Scheme	International Institute for Sustainable Development	Completed
10	Modelling Studies on Greenhouse Gas Emissions (GHG) and Emission Intensity of Indian Economy	Ministry of Environment Forest and Climate Change (MoEF &CC), GoI	Ongoing
11	Review of status of Marine National Park (MNP), Jamnagar and evolving vision statement for management of MNP	GIZ and the Ministry of Environment, Forests & Climate Change	Ongoing
12	Policy engagement work in India to educate decision makers at national/state/city level to urban climate change resilience and integrate the concepts into wider planning discourse	Rockefeller Foundation under ACCCRN Project	Ongoing
13	Sustainable Integrated Energy PLan for Gujarat	Gujarat Energy and Petrochemicals Department and Gujarat Power Corporation Limited (GPCL)	Ongoing
14	South Asian Regional Initiative For Energy Integration (SARI/EI)	United States Agency for International Development	Ongoing
15	Global Technology Watch Group (GTWG) on Advanced Coal Technologies (ACT) for Power Generation	Ministry of Science & Technology, Department of Science & Technology, Government of India	Ongoing
16	Energy Sector Reform	ENERGIA	Ongoing

IRADe's outreach and partners

IRADe networks with the government, ministries/ departments, international organizations, public and private sectors, academic experts, NGOs, and consultants to work on projects awarded by them. IRADe provides decision support to eleven ministries include Ministry of Environment and Forests and Climate Change, Ministry of New and Renewable Energy, Niti Aayog (formerly Planning Commission), Ministry of Power, Ministry of External Affairs, Ministry of Earth Sciences, Ministry of Urban Development, Department of Science and Technology, Central Statistical Organization under Ministry of Statistics and Programme Implementation, Technology Information, Forecasting and Assessment Council (TIFAC), etc. for many national level projects.

At the international level, IRADe has worked with bilateral and multilateral organization like the World Bank, Asian Development Bank (ADB), U.S. Agency for International Development (USAID); United Nations Development Programme (UNDP);, California and United States Environmental Protection Agency(USEPA), Wuppertal Institute for Climate, Environment and Energy, (WISION) Germany; Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Germany; Rockfeller Foundation; British High Commission; International Institute for Applied Systems Analysis (IIASA), Austria; British High Commission BHC), Centre for Clean Air Policy (CCAP), USA; International Institute for Sustainable Development (IISD), South South North Trust (SSNT) etc.

IRADe has partnered with academic, private sectors, multinational organizations, think tanks and NGOs. These include Shakti Foundation, Indian Council of Social Science Research (ICSSR), SEWA, Petroleum Federation of India, Pricewater House Coopers, ICF International, Rockefeller Foundation, Institute for Social and Environmental Transition (ISET), Center for Clean Air Policy (CCAP), Indian Council for Research on International Economic Relations (ICRIER), InsPIRE Network for Environment, Stanford University and Sir Dorabji Tata Trust (SDTT) among others.

IRADe has also developed strategic partnerships and is part of global networks like the USAID's Low Emissions Asian Development (LEAD) program - ASIA-LEDS, ENERGIA-International Network for Gender and Sustainable Energy, Netherlands; Global Clean Cook Stoves Forum, UN Foundation; Asian Cities Climate Change Resilience Network (ACCCRN), Global Technology Watch Group (GTWG-DST), Climate Action Network South Asia (CANSA).

IRADe has carried out some pioneering work in the field of state level energy planning, city level climate resilience planning, other climate change studies and livelihood studies in agriculturally vulnerable flood prone areas.

IRADe Integrated Research and Action for Development

C-80 Shivalik, Malviya Nagar, New Delhi - 110017, India
Tel: 91-11-2667 6180, 2667 6181, 2668 2226
E-mail : info@irade.org
Web: www.irade.org