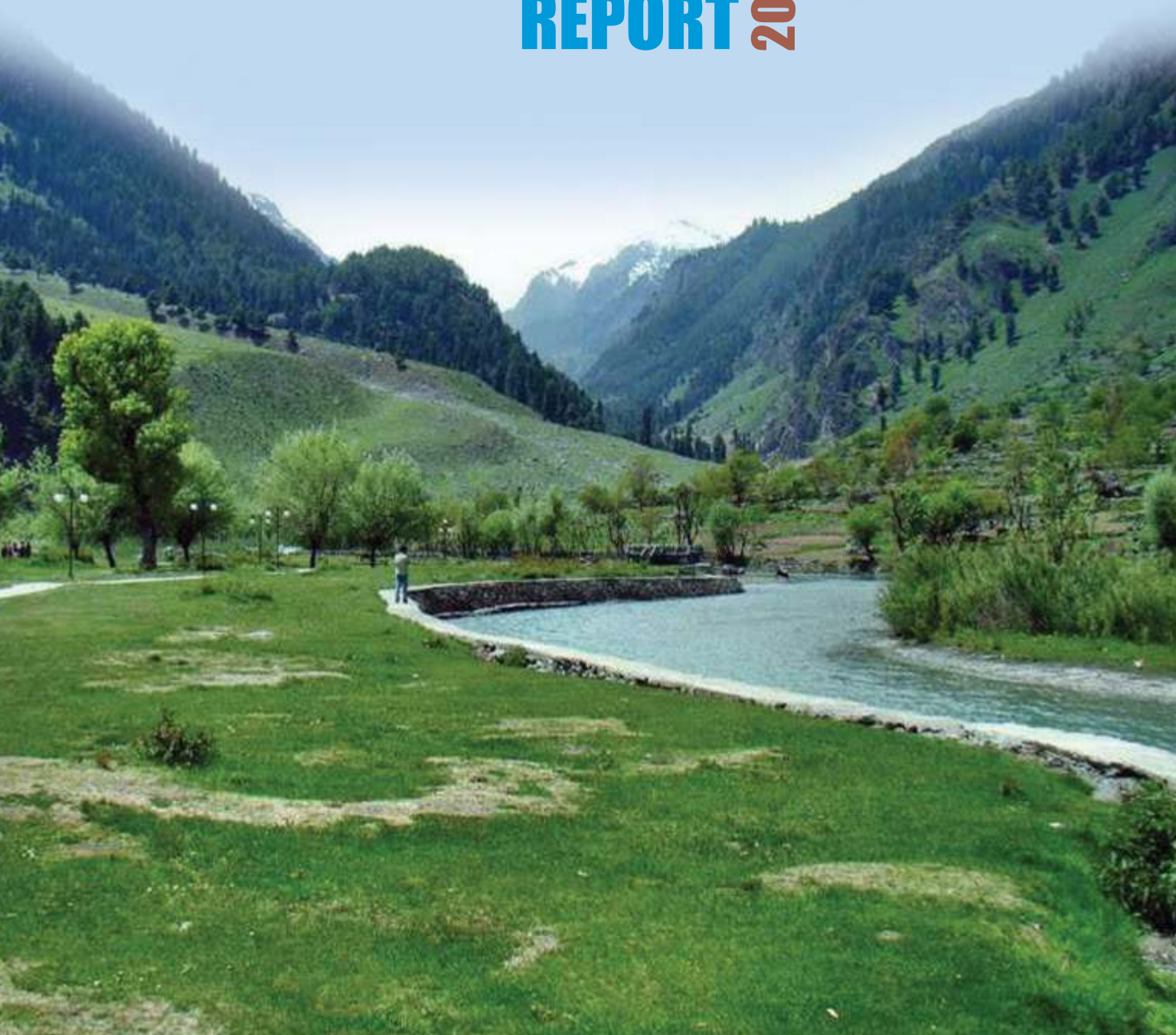


ANNUAL REPORT 2021-22



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Industrialist



Mr Keshub Mahindra
Industrialist



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Former Director General, CSIR



Mr Shirish Patel
Consulting Civil Engineer



Prof. Jyoti K. Parikh, PhD
Executive Director, IRADe

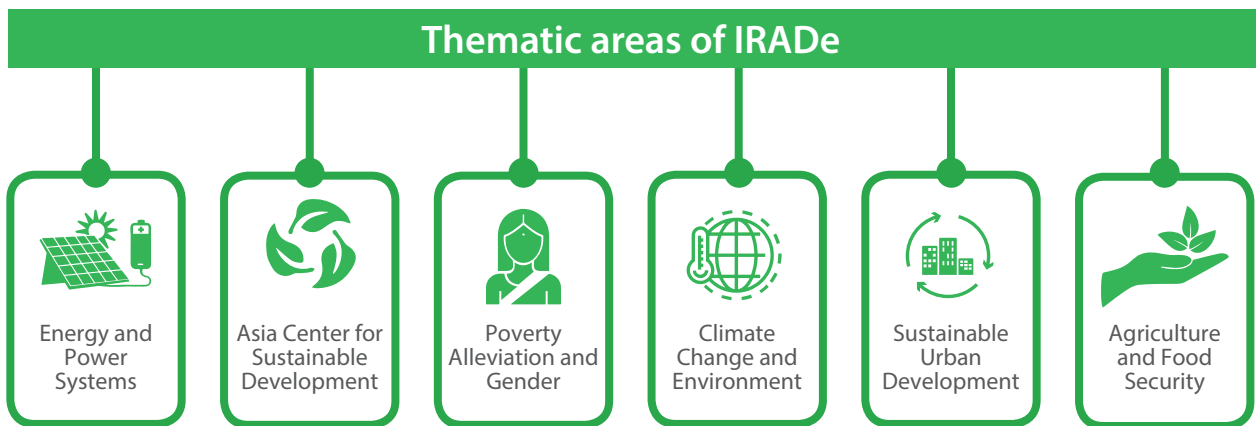
About IRADe



IRADe is an independent non-profit, advanced research institute that aims to conduct research and policy analysis to engage stakeholders such as government, non-governmental organizations, and 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. IRADe's research covers these issues and the policies that affect them. IRADe focuses on effective action through multi-disciplinary and multi-stakeholder research to arrive at implementable solutions for sustainable development policy research and effective governance that accounts for techno-economic and socio-cultural issues. It also

provides expertise to several ministries, national and international institutions, and partners with reputed organizations.

IRADe was established under the Society's Act in 2002 at New Delhi. It is certified as a Research & Development Organisation by the Department of Scientific and Industrial Research (DSIR), Ministry of Science and Technology (MoST), Government of India. It has also been selected as a Centre of Excellence by the Ministry of Housing and Urban Affairs (MoHUA), Government of India, for urban development and climate change.



Our Vision

To be a leading global independent policy research think tank that provides and enables implementable policy solutions for sustainable and inclusive development.

Our Mission

To carry out policy analysis from multi-stakeholder and multi-disciplinary perspectives for decision-makers and vulnerable groups in the thematic areas of climate change and environment; energy and power systems; sustainable urban development; agriculture and food security; poverty alleviation, and gender. This is accomplished using policy research and analysis, consensus and dialogues, capacity building, monitoring, and evaluation.

Our Objectives



IRADe's 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 of Projects

Preface

We are happy to present this year's Annual Report where we have taken major strides despite the continuation of the pandemic by carrying out a record of 17 projects at different stages during 21-22. We completed 8 projects among with two were major projects: Viz in the areas of interconnecting South Asia region, especially Bangladesh, Bhutan, India and Nepal (BBIN) funded by the UKAID and adapting to heat stress funded for 4 years by IDRC Canada. Modelling low carbon economy was also completed for GIZ and another for MoEFCC. In addition, our EV report for Delhi on the impact on distribution companies was released by Shri Rajiv Kumar, Vice Chairman, Niti Aayog ; funded by the Shakti Foundation. Our collaborative work with Loughborough University UK, MECS support on electric pressure cooking in Nepal and by Shakti foundation on the impact of electricity access on schools and health centers in Jharkhand and Bihar got completed as well. A few more activities in green buildings etc and updating GHG modelling got completed bringing a sense of achievement to all of us.



Among the ongoing projects, we are in the final stages of the two major projects completing this year in 22-23. Therefore, this year was a time for completing as many as six reports and seven events for the SARI project funded by the USAID for 10 years at a stretch, for which we are grateful. A study on the state-level analysis of NDC funded by the MacArthur Foundation is in advance stage of closure with most reports completed. Other ongoing projects include net zero CO2 emissions modelling for the power sector, solarization of schools, both funded by the New Venture Fund also make us hopeful for interesting results. For air pollution in Delhi the analysis and mitigation policy landscape for the transport sector are close to completion for the MoES.

In addition to the above, we are excited by the new opportunities that came this year e.g. from the three projects received from the Asian Development Bank (ADB) on regional cooperation in the South Asia region in electricity and gas for the clean energy transition. These three and another project from APN on heat adaptation will be carried out within our Asia Centre for Sustainable Development established three years ago to better coordinate and organize IRADe's work. Due to many projects in the Asia, IRADe is emerging as a think tank in the Asian region. Thematically, integrating all our work across projects, we find that IRADe is actively working on promoting Clean Energy Transition in Asia.

As you can see from our new logo for this year, we are celebrating 20 years of completion in September 2022. Thus, as we close 20-21, we have much to thank to IRADe staff for their enthusiasm and hard work and also our sponsors. Encouragement from our council members and our well wishers keep us going.

We would be grateful for your feedback on our work and this report. I thank Ashutosh Sharma, Saumya Vaish, Mohit Gupta and all IRADe group heads for their contributions in bringing out this Annual Report. I convey my best wishes to the readers.

Jyoti Parikh

On behalf of Team IRADe

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1.1. South Asia Regional Initiative for Energy Integration (SARI/EI)

The USAID funded South Asia Regional Initiative on Energy (SARI/E) program started in the year 2000 has been working on three main areas: Cross Border Energy Trade (CBET); Energy Market Formation; and Regional Clean Energy development. The fourth and the current phase of the Program, named South Asia Regional Initiative on Energy Integration (SARI/EI), for which IRADe is the implementation partner, extended in 2018 till the year 2022, is designed to build upon SARI/E successful initiatives of the past, to move South Asian countries towards implementation of the proposals and activities that have emerged over time, leading to greater cross border energy trade and increased regional energy security. The extended program works towards implementation through institutionalization by harmonizing policies and regulations related to energy in the region, advancing transmission interconnections and establishing a regional market for trading in electricity.

1.1.1. Studies Completed

Strategy paper on Creating Regional Technical Institutional Mechanism in South Asia Region for Promoting Cross Border Electricity Trade

Our team is conducting a study to form the South Asia Forum for Transmission Utilities (SAFTU) in the SAR (South Asian Region) to coordinate field level transmission related matters. The proposed SAFTU will be an association of transmission utilities of the South Asian Countries. This institution will support coordinated, reliable, and secure operation of the interconnected transmission network; coordinated system planning, integrated system/network development for integrated grid operation, and facilitating harmonization of technical standards for a

Regional Power Grid. The major outcome is a proposed charter of SAFTU.

Building consensus and developing a strategy paper for creating the South Asia Forum for Electricity Market (SAFEM) for promoting cross-border electricity trade (CBET)

The Task Force 3 on power markets recommended creation of South Asia Forum for Electricity Market (SAFEM). This forum will support market-based electricity trade in South Asian Region including bilateral, multilateral and collective electricity trade. The proposed SAFEM will be a forum of market players of the South Asian Countries. It is envisioned to be an important forum for the success of Cross-Border Electricity Trade (CBET). The Forum would work towards building consensus on various facets of electricity market, including market structure and products, market design and rules, payment mechanism of trade, etc.

White Paper on Creating Regional Technical Institutional Mechanism - South Asian Forum of System Operators (SAFSO) In South Asia Region

The proposed South Asia Forum of System Operators (SAFSO) aims to facilitate the development and implementation of common guidelines and framework for system operation in the regional grid. SAFSO aims to be a neutral entity in the form of an institution to enhance cooperation and collaboration, amongst the power system operators of different countries in South Asia and to maintain the security of the integrated grid and operate it in a safe, secure and reliable manner.

Impact of COVID-19 pandemic on South Asian Power System Operation

The study examines the impact of COVID-19 on the power sector in South Asian countries and provides policy recommendations to the respective

governments for mitigation of the associated risks. The study examined the impact of the pandemic on the sector, particularly due to the reduction in electricity consumption and the peak demand in each country of South Asia. The daily drop-in power demand and electrical energy consumption has been tracked from 15th March to 30th May, 2020, whereas the impact on the monthly demand and electrical energy consumption has been tracked from January to December 2020, vis-à-vis the corresponding months in the previous year. The Report also traces the impact on the Supply chain of fuel, equipment for maintenance, construction/erection of new power plants, grid operational problems, (if any), manpower safety, and financial impact on the utilities. It also records the steps taken by South Asian countries to mitigate the impacts of COVID 19 on the power sector and recommends the possible solutions, including fair sharing of risks and other policy recommendations.

Regulatory Interventions for Grid Discipline and Grid Reliability in the South Asian Region (SAR)

The objective of the study, which was done on behalf of the South Asia Forum for Infrastructure Regulations (SAFIR), is to review and analyse all the existing relevant electricity regulations, mechanisms, and technical frameworks with respect to grid discipline and grid reliability of each of the South Asian Countries, both from the perspective of integration of domestic grids within a country, as well as cross-border power grid interconnections, and come up with suggested regulatory measures/interventions needed for ensuring grid discipline and grid reliability in the SAR.

Developing white paper on Regional Parliamentary Forum on Energy Cooperation and Energy Trade in South Asia

The objective of the white paper is to create a **Regional Parliamentary Forum (RPF) on Energy cooperation and Energy Trade in South Asia. The RPF is a high policy level forum of Parliamentarians of South Asian Countries** (focusing on Bangladesh, Bhutan, India, Nepal, Sri Lanka (BBINS)) to discuss, de-liberate, share knowledge for advancing Energy cooperation and Energy Trade in South Asia, for a better and prosperous South Asian region.

The final report would be launched at South Asian Parliamentary Roundtable in April 2022.

1.1.2. Ongoing Studies

a. Operationalization of South Asia Regional Power Exchange (SARPEX)

The Task Force-3 on power markets is looking forward to achieve operationalization of South Asia Regional Power Exchange (SARPEX), a power exchange where all countries of South Asia, which are connected electrically, can take part beneficially. This study will look into areas of promoting cross-border electricity trade (CBET) through the Power Exchange in India, by all South Asian nations and build consensus among stakeholders to promote trading in the Indian power exchange.

b. Compendium of Electricity Regulations for South Asian Countries

The Compendium of Electricity Regulations of South Asia Countries is intended to act as a ready reference for all the member states to study and comprehend the regulatory frameworks in the region, so as to be able to engage meaningfully in cross border trade in electricity, as well as learn from each other in the region. The Compendium is updated on a six monthly basis.

The Compendium, updated till December 2021, was released virtually by the Chairpersons of the Regulators of the South Asian countries in the virtual Conference organized by SARI/EI jointly with SAFIR on **“Power Markets to Facilitate Enhancement and Integration of Renewable Energy”** on 15-16 February 2022.

c. Development of Knowledge Resource Database– “South Asia Energy Database (SAED)” for South Asian Countries

The development of South Asian Knowledge Resource Database aims to act as a critical enabler for policy makers and the research community in formulating and analysing energy policies. Presently, there are limited resources of the current data environment, particularly in getting substantial part of important data related to energy sector of different SA countries at one place and at times this hinders interpretation/analysis of the data required by the policy makers and

other stakeholders. Looking into such a requirement, it was decided to create an Energy data portal of the South Asian countries to collate the pre-decided energy sector data from various sites, as well as through manual feed and put that on this portal.

d. 2nd edition of BIMSTEC Energy Outlook 2035 (A Biennial Report)

The study provides an analysis, update, review of the energy sector (power, gas, oil) including the outlook of the seven countries which are part of BIMSTEC region till 2035. The draft report includes the reforms as well as the updates in each of the seven countries in BIMSTEC region along with the energy modelling of each of the countries.

e. Study on Transition of Bilateral Power Trade to Trilateral and Multilateral Power Trade in South Asia

Many regions across the globe have experience of transitioning from bilateral to trilateral and multilateral power trade. The proposed study aims to document and analyse the international best practices in Trilateral and Multilateral Power Trade across the Globe to identify learning and inferences for South Asia with the aim of developing a Regional Framework for South Asia. Based on these learning, as well as taking in to account the conditions prevailing in different countries in the South Asia, a Regional Framework for Trilateral and Multilateral Power Trade (RFTMPT) will be developed for the South Asia Region.

The draft model regional framework for trilateral and multilateral power trade in South Asia region has been developed. Virtual Stakeholders Consultations on the study – ‘Transition of bilateral to trilateral and multilateral power trade in South Asia’ was organized and the final report is under preparation.

f. South Asia Energy/Electricity Regulations to develop Regulatory Road Map for Electricity/Energy Exchange and Energy Cooperation (EC) among South Asian Countries

The study aims to develop Regulatory Roadmap for Electricity/Energy Exchange and Energy Cooperation (EC) each of the countries in South Asia, taking into account the development of specific Cross Border Electricity Trade Regulations and Guidelines introduced in the recent years such as GoI “Guidelines on Cross Border trade of Electricity – 2018, CERC Regulations 2019 and Procedure for approval of CBET

by the Designated Authority, 2021. The final report is under preparation.

g. Think – Tank Forum

Think tanks are an important channel for positioning CBET in the national priorities of respective countries. These think tanks are important agencies in leading advocacy for new initiatives by engaging politicians, institutions, and other influencers, for institutionalizing the roles of CBET in the realm of energy security and climate change agendas of these nations. As part of the program activities, South Asia Think Tank Forum (TTF) for regional energy cooperation was founded, as an outreach and dissemination forum, intending to engage policy makers, media, parliamentarians and bureaucrats, civil society and citizens to prioritize, fast track and pushes the agenda for CBET.

Think Tanks from 5 Asian countries (Bangladesh, Bhutan, India, Nepal and Sri Lanka) have been empanelled to the Think Tank Forum. Inception meetings with each of the Think-Tanks was individually organised and their respective work-plans, topic of their studies, plans for engaging with media in their respective countries were discussed in detail.

h. SAFIR Newsletter

The SAFIR Quarterly Regulatory newsletter aims to provide regulatory updates and experience sharing amongst the regulators in the South Asia region. This newsletter is envisaged to provide a platform for dissemination of news, updates and experience sharing, amongst the energy regulators of South Asia. It will, further, be a credible channel of information related to regulatory initiatives/reform processes and experiences in the region, during a particular quarter. It will lead to enhanced regulatory Cooperation, Knowledge sharing, facilitating a transparent regulatory framework in the South Asia Region.

The first edition of the Newsletter has been published and the second edition of the SAFIR Quarterly Regulatory newsletter is under preparation.

i. Assessment of the Cross Border Natural Gas Trading (CBNGT) Potential in the South Asian Countries

This Study critically reviews and analyses the existing literature and work done so far by SARI/EI in the area of Cross Border Natural Gas Trade (CBNGT) in the South Asian Region and develop a Regional Natural

Gas Trade Model (RNGTM) for the South Asian Region and undertake comprehensive modelling exercise to identify the CBNGT trading potential in the South Asian nations (Afghanistan, Bangladesh, Bhutan, India, Pakistan, Nepal, Sri Lanka & the Maldives) over a period of next 20 years.

j. India- Nepal Partnership paper for CBET

Background data preparation work commenced to prepare a framework for exchange of power between India and Nepal, considering daily and seasonal diversities of demand and availability of supply sources, so as to obtain a win-win situation for both the countries. A list of information required from NEA was prepared and shared with NEA.

k. Assessing the Potential Benefits of Cross Border Electricity Trade for Affordable Supply of Electricity, Facilitating Grid Balancing of Renewable Energy Integration, and Suggesting a Framework for Ancillary Service Market in the South Asia Region

This study aims at potential reduction in the average cost of supply of electricity in South Asian countries, year-wise, for the next 15 years, with increase in the cross border electricity trade for optimal utilization of generation assets in South Asia, analysis of various market mechanisms internationally for grid balancing and ancillary services and to propose a transparent market structure and a broad framework for ancillary services in the South Asian region.

l. South Asia Forum on Energy Investments (SAFEI)

This strategy paper is aimed towards creating a regional platform – “South Asia Forum on Energy Investments (SAFEI)”, which may ascertain the need and the prospects towards regional infrastructure projects and facilitate in creating an enabling and supporting environment to bring out such projects in an expeditious manner, with equitable benefits to the member countries and the investing partners. Such a move can help in bringing investment in the region, enhancing viability of the regional assets and therefore may help towards regional energy security and sustainability, by enhancement of cross-border exchanges amongst the different countries in South Asia. The contract has been awarded to a consultant to conduct this study.

1.2. EV Charging Patterns and Impact on Discom

IRADe has completed the study “Electric Vehicles - Charging Patterns & Impact on DISCOMs”. The study is based on a primary survey of users of electric-2W, 4W, EV-4W institutional, e-rickshaws, and prospective EV consumers in Delhi NCR. The survey responses were used to identify factors and policies for increasing EV penetration and assess the charging behaviour of EV users in Delhi. The study also estimated the impact of EV charging on the domestic grid of Delhi based on the assessed charging patterns and projected electric vehicle stock in Delhi in 2030. Based on the analysis in the project, IRADe has developed an excel based planning tool - ‘**IRADe EV load calculator**’ (IRADe-EVLC) to help distribution companies (DISCOMS) estimate the hourly electricity demand at distribution transformer (DT) level and thereby plan for the required capacity investment in distribution networks in Delhi. National workshop was held.

Duration: May 2019 – March 2022 (Completed)
Supported by: Shakti Sustainable Energy Foundation, India

1.3. Assessing potential carbon neutrality target years for India’s power sector

This project assesses various technology options and pathways to achieve NetZero emissions of the Indian Power Sector by 2050 or later. The project’s primary outcomes are to provide feasible technology options available to India’s Power Sector, consistent with its Geographical, Technological, Political, and Socio-Economic situations, and to provide a road map for reaching the Net-Zero pathway for development and implementation. Project outcomes on decarbonisation technologies, investments etc founded on quantitative and qualitative analysis also provide a credible basis for discussion with stakeholders on NetZero targets at a national and international forum. Main findings are:



Substantial additional investment is needed to achieve net-zero emissions



Solar PV, wind, battery storage are key technologies with support from nuclear, coal power plant with CCS



Early decarbonisation of the system let say in 2050 is more expensive than postponing it to 2060

Duration: May 2021 – December 2022 (Ongoing)
Supported by: New Venture Fund

2.1. Implications of Declining Costs of Solar, Wind and Storage Technologies on Regional Power Trade in South Asia (BBIN Countries)

This year IRADe completed an energy modelling study to assess the long-term implications of declining costs of solar, wind and storage technologies on the volume and direction of regional power trade among Bangladesh, Bhutan, India, and Nepal (BBIN) countries. The work involved the development of the Bhutan Electricity Model, updating IRADe's existing Bangladesh, India, and Nepal's Electricity Model, and running the regional integrated BBIN Electricity model. In the current financial year, we have integrated the four-country models of Bangladesh, Bhutan, India and Nepal into one integrated regional BBIN model. Further, we run multiple scenarios to assess the impact of RE and storage cost decline on the regional power trade in Answer TIMES. The scenarios assume testing outputs based on different cost decline levels (for RE and Storage technologies), politically motivated energy security scenarios, considering higher renewable potentials, and carbon emission reduction of 50% from the power sector.

The study has multiple key messages for the BBIN region as a whole and also for the individual country. At the regional level, with the cost decline in Renewable Energy and Storage (RE&S) technologies, the regional electricity trade can reach from 13 TWh in 2019 to as high as 986 TWh by 2050. To support this high trade number, the regional transmission capacity needs to increase from 3.8 GW in 2020 to as high as 174 GW by 2050 under the scenario of a higher cost decline for RE&S and higher RE potential for the region. Further, with higher RE capacities in the BBIN region, the time at which electricity trade is required will change. For instance, the hydro exporting nations such as Nepal

and Bhutan will supply more electricity to the region in non-solar hours than solar generation hours. In addition to this, higher RE will support full hydro potential utilisation in Bhutan and Nepal, wherein flexibility in hydropower generation will be a key element in deciding the utilisation of hydropower plants in the region.

From various stakeholder meetings undertaken for this study, we understand that the region's RE potentials are underestimated and need to be reassessed from time to time considering the technology development and cost declines as higher RE potential can bring more benefits to the region. With RE&S technology cost decline and higher RE potential, the share of RE capacities in the total installed capacities for the BBIN region can go as high as 75 percent by 2050, whereas it reaches only 55 percent in the base scenario (wherein trade is restricted to 2017 volumes). This increase in RE capacity will help reduce installed coal capacities in the region in the range of 33 to 45 percent compared to the base scenario. A combined effect of higher RE and reduced coal capacities will reduce CO₂ emissions from the power sector in the region.

Apart from the above technical gains, with RE&S cost decline, the region has the potential to save on the total system costs. The BBIN region could save around 227 Billion USD at 2015 prices in the higher RE&S cost decline scenario, and close to 312 Billion USD at 2015 prices in the combined higher RE&S cost decline and higher RE potential scenarios compared to the Base scenario on the total discounted system cost (2015 to 2050).

Duration: March 2019 – March 2022 (Completed)
Supported by: UK Aid from the UK government under the Applied Research Programme on Energy and Economic Growth (EEG), managed by Oxford Policy Management (OPM)

2.2. Testing Electric Pressure Cooker adoption in Socio-economic and Cultural Context of Nepal

IRADe implemented a community-scale pilot project in Nepal to monitor and understand an efficient electric pressure cooker (EPC) use pattern for accelerating uptake. The team carried out this pilot study to examine the socio-economic and cultural acceptability of EPC in the Nepal context. This study was supported by UK Aid and Loughborough University under Modern Energy Cooking Services (MECS) programme.

The pilot was carried out in Kavrepalanchok district of Nepal with two women communities (urban and rural). A screening survey was carried out with 240 cooperative members, 120 in Banepa and 120 in Timal. Analysis of the screening survey was utilised for selecting 40 members from each cooperative for distribution of EPC. Daily cooking records were collected using a modified MECS cooking diary in four phases: (i) Phase 1 (Baseline-3 weeks), (ii) Phase 2 (Transition-3 weeks), (iii) Phase 3 (Monitoring-6 weeks), and (iv) Phase 4 (Endline-3 weeks). After the baseline Phase, EPCs were distributed to the participants during the two days demonstration and training workshop in each municipality. Another hands-on training workshop was organised before the monitoring phase. At the end of the end line phase, an exit survey was conducted to record each participant's overall feedback about electric cooking.

IRADe team has submitted the draft report with the findings and recommendations from the analysis of the cooking diary data. In phase 1, the study recorded 13,191 heating events, 11,804 heating events were recorded in phase 2, phase 3 collected 7,085 heating records (only for EPC), and in phase 4, the study recorded 9,866 heating events. The analysis suggests that in phase 1, nearly 85% of heating events involved use of LPG stove and 9% of heating events used firewood stoves. After introducing EPC, the use of LPG stove declined in phase 2 and further in phase 4, while the share of EPC in total heating events became 35% in phase 4.

The exit interview highlighted that energy stacking becomes essential for households as simultaneous

cooking is not possible with a single EPC. The quality of the electricity supply needs to be improved as low voltage sometimes makes it challenging to cook in EPC. Using EPC costs nearly 50% cheaper than LPG stoves. Given that Nepal has huge potential for hydroelectricity generation, it would be beneficial to promote e-cooking in Nepal.

There is a need to develop an innovative financing solution, especially for poor households, to acquire e-cooking devices by solving the issue of high upfront costs. Expanding distribution and retailer store networks would build the vital ecosystem for adopting e-cooking. Targeted strategies for promoting e-cooking and campaigns for consumer awareness and adoption of e-cooking appliances will have positive implications.

Duration: July 2020 to March 2022 (Completed)
Supported by: Loughborough University, MECS Programme, UK









Training workshop conducted during the distribution of EPC in Banepa

2.3. Economic impacts of replacing natural gas with renewable energy in SASEC region

In this study, IRADe is assessing the economic and environmental implications (investment, energy supply cost, energy trade, and emissions etc) of replacing natural gas with renewable energy in SASEC countries- Bangladesh, Bhutan, India, Maldives, Myanmar, Nepal, and Sri Lanka, considering regional energy trade wherever possible. Based on current and projected future use of gas IRADe will develop scenario and roadmap to promote renewable to meet energy

needs and accelerate reduction in dependence on gas over time in SASEC countries. The study activities will include:

-  Review plans and projections of energy demand and use of gas in SASEC countries;
-  Review plans and policies as well as targets of SASEC countries in promoting renewable and meeting climate change targets;
-  Develop long term scenarios consistent with economic growth and energy resources;
-  Explore role of renewable in replacing natural gas as countries pursue their low carbon development;
-  Quantify impact on economy and emissions by indicating pathways of generation mix, cost of capacity expansion requirements, fuel requirements for power generation and emerging trade patterns and profile of emissions;
-  Organize stakeholder consultation meetings and lead the discussion on draft report (Economic benefits of replacement of natural gas with renewable energy sources/systems gradually in the SASEC region) and incorporate comments.

Duration: March 2022 to December 2022 (Ongoing)

Supported by: Asian Development Bank

2.4. Study on Economic Analysis derived for regional cooperation in electricity in SASEC region

South Asia Sub regional Economic Cooperation (SASEC) countries' energy trade is increasing and went up from 100 MW in 2012 to 4000 MW by 2020. It is moving to market exchange based power trade that will generate competitive price. The trade is mutually beneficial as exporters' economic growth can go up by revenue from export of power, making it viable to develop untapped hydro potential and facilitating accelerated investments. The importers can reduce cost of power, and develop more of their renewable power.

In this study funded by ADB, IRADe will estimate economic benefits of power trade among the SASEC countries. For this, IRADe is reviewing the existing studies and plans and develop long-term generation plans of each country keeping the current and future demand of power needed for economic growth suitable to all countries, the upper limits of potential of various energy resources and their current and expected costs, and their seasonal and daily load patterns. The study will involve consultation with governments, and other stakeholders during the preparation of the draft report.

Duration: March 2022 to December 2022 (Ongoing)

Supported by: Asian Development Bank

2.5. Transmission interconnection study of South and South East Asia

IRADe is working on a detailed technical transmission interconnection study and assessing economic benefits of interconnections between SASEC countries and South-East Asia.

This study involves the review of existing and planned studies and initiatives to promote power trade between South Asia and Southeast Asia. To assess economic benefits, technology selection models for each of the selected SEA countries and linked to the models of SASEC countries will be assessed. Various Scenarios of these models will provide hourly and seasonal trade levels for each country for number of years. Based on the scenario results, potential interconnection lines, keeping the maximum and minimum trade possibilities, a robust range of transfers will be identified together. The connections will be assessed for their economic viability. The various possibilities will be discussed with expert stakeholder consultations, to choose among optimal Transmission system models for each pair of countries. This model would consider the highest voltage power system in each country, existing interconnections, and proposed alternative interconnections, for optimization under the given hourly trade levels.

Duration: March 2022 to December 2022 (Ongoing)

Supported by: Asian Development Bank



3.1. Impact Assessment of Electricity Access on Health and Education

IRADe's study captured the impact of quality of electricity access on health and education delivery in Bihar and Jharkhand. Primary health centers (PHCs)/ community health centers (CHCs) and schools in rural and sub urban areas of Jharkhand and Bihar were assessed to capture the status of electricity supply by tracking metrics such as access, reliability, quality, convenience, and usage.

Based on the key understandings from the two studies through the group discussions and one-on-one interview it was understood that a list of interrelated barriers inhibits access to quality electricity to schools. These challenges can be classified into three categories: 1) lack of capital or finance available, 2) poor grid supply, 3) lack of awareness at various levels in decision making about the importance of electricity for quality education. A series of policy measures were recommended to overcome the challenges.

The findings indicate that investing in quality electricity supply to health facilities will generate great health benefits, particularly among vulnerable populations. For strengthening the electricity facility at the PHCs and CHCs some policy measures suggested were policy synergies between energy and health sectors, promoting clean energy, electricity access gap identification, develop market based service delivery models, energy efficiency for resource optimization, financial capacity-strengthening, and promotion of telemedicine.






Duration: September 2019 to June 2021 (Completed)
Supported by: SHAKTI Sustainable Energy Foundation

3.2. Role of DRE technology in promoting quality school education

IRADe's study focuses on identifying ways to scale up DRE uptake in government-run schools for promoting

quality education. There is a lack of data on power outages in rural and sub urban schools, which often suffer from severe electricity shortages during the daytime. With such inconsistent access to power, children often do not have the light required to study properly, and the school's goal of using ICT for enhanced learning opportunities gets compromised. The study proposes survey of schools and their staff to provide grass-root level evidence for electricity status to stakeholders.

IRADe intends to adopt a strong multi-stakeholder approach to achieve the following outcomes:

-  Evidence-based opportunities and measures for installation of DRE systems at schools to improve the teaching-learning outcome;
-  Enhanced awareness regarding DRE cost-benefits among the policymakers, education sector professionals, NGOs, and people at large;
-  Informed policy decision-making for incorporating DRE technology in energy planning at schools;
-  Reduced emissions through the promotion of renewable energy along with energy-efficient appliances;
-  Increased enrolment and greater interest levels across the student base due to availability of quality electricity supply;

This study is in its initial phases. The team has met with stakeholders from various departments to be on board and share their expertise. The research team has prepared a background report on the status of electricity access in schools of Jharkhand and Bihar.

Duration: December 2021 to March 2023 (Ongoing)
Supported by: New Venture Fund

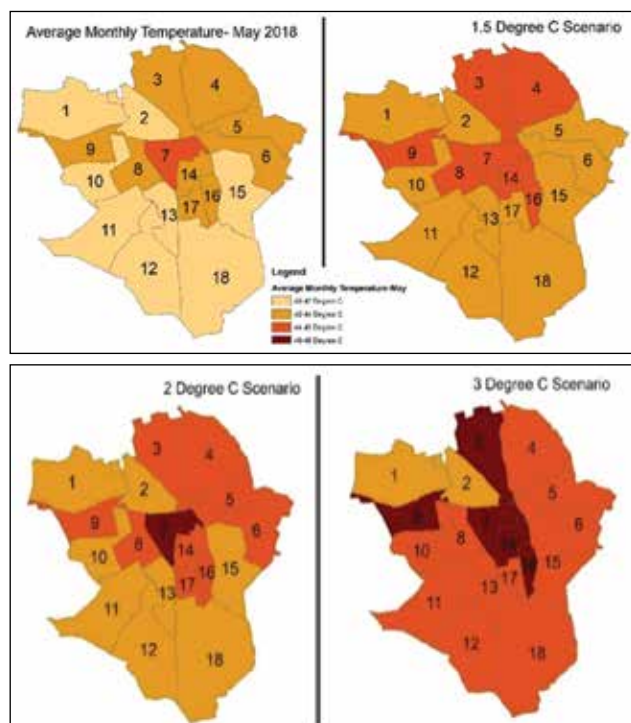


4.1. Climate Adaptive Action Plans to Manage Heat Stress in Indian Cities

IRADe, supported by IDRC (International Development Research Centre, Canada) and in collaboration with the Indian Institute of Public Health – Bhubaneswar & Gandhinagar and the respective municipal corporations in Delhi, Bhubaneswar, and Rajkot, has developed Heat Stress Action Plans (HSAPs) at ward level for the cities. Some of the key highlights of the project include:

Thermal Hot Spot Mapping Projections

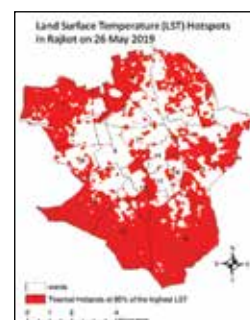
Predictions for the future thermal hot spots across Rajkot were mapped. Based on the temperature data of AWS stations across Rajkot (2018), IRADe calculated the future scenario temperature rise at 1.5°C, 2°C and 3°C for Summer Months.



The projections indicated that with each scenario, the number of wards in the higher temperature range would increase, with the wards recording lower temperatures earlier moving towards higher temperature ranges.

Percentage Spatial Distribution of Thermal Hotspots-Delhi & Rajkot

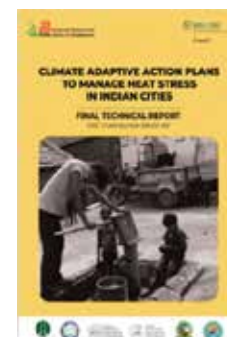
Analysis was carried out to identify the thermal hotspots/ Urban Heat Islands (UHIs) in Indian cities -Delhi and Rajkot, using Landsat-8 satellite data for the summer months of 2019 exhibiting the highest frequency of the heat waves mean maximum temperature.



To delineate the hotspots, the percentile method was followed, wherein initially, the areas experiencing temperatures above 95% of the highest Land Surface Temperature (LST) observed on a particular date were extracted. These areas represent the thermal hotspots at temperatures over 95% of the highest LST measured on the specific date. This method of hotspot extraction was repeated for 90%, 85%, and so on to delineate hotspots in every ward of the respective cities.

IDRC Final Technical Report

The Final Technical Report (FTR) was submitted to IDRC. The project developed methodologies for thermal hot spot mapping using climatological data, identifying urban heat islands. The climatological analysis indicated an increase in heatwaves



over the years with an increase in the number of dry days and frequency of heatwaves. For example, hot days begin as early as March, resulting in an increased number of hot days and an expansion of hot months. This project created a new narrative for heat wave preparedness for vulnerable populations in India by establishing approaches and pathways required at the City, State, National, and International levels for adapting and mitigating the risks of heat stress on the well-being of the citizens and productivity of the cities. It will help the city/state/ national level institutions to have better capacities to deal with the extreme impacts of the heatwave.

Heat Action Plans

Heat Action Plans for Delhi, Bhubaneswar & Rajkot provided a framework for implementation, coordination, and evaluation of extreme heat response activities that reduce the negative impact of extreme heat. The cities institutionalised heatwave risk reduction heat stress adaptive capacities by bringing about policy changes, engaging stakeholders and supporting citizen participation. The Heat Wave Action Plans were revised and, finalized and submitted to the city & state agencies involved in the implementation of the Heat Action Plans. The plans intend upon being more spatially oriented and gender-sensitive while supporting the city's planning especially in prioritizing and integrating adaptive resilience within the agenda towards climate-resilient smart city. The Action Plans divide responsibilities into pre, during and post-event categories, detailing preparation for a heatwave (pre-event responsibilities), steps to be taken to reduce heat stress during a heatwave (during-event responsibilities) and measures to incorporate lessons learned and fill gaps found in the management of heat stress (post-event responsibilities).



South Asia Heat Health Information Network (SAHHIN)

The SAHHIN Secretariat hosted by IRADe organised a series of master classes on various topics ranging from developing heat action plans, heat thresholds, and early warning systems delivered by eminent experts. SAHHIN published two volumes and twenty-one fortnightly news mailer issues covering heat stress-related news in South Asia and the world. A Special Annual issue (Year That Was) providing heat-related top stories of the Year 2021 was published. Newsmailer has more than 2000 subscriptions globally.



Engagement with Climate Center for Cities (C-Cube) at NIUA

IRADe signed an MoU with Climate Centre for Cities (C-cube), within the National Institute of Urban Affairs (NIUA) to collaborate on various aspects of climate change in Indian cities through the Climate-Smart Cities Alliance. IRADe plans to develop a training module on Climate Adaptive Heat Action Plans and impart training to the city administrators to develop ward-level heat action plans in India.

Duration: November 2017- January 2022 (Completed)
Supported by: International Development Research Centre (IDRC), Canada

4.2. Enabling State Level Strategic Actions for Achieving NDC

The study suggests market-based solutions and business models for state-level implementation to reduce CO₂ emissions and increase renewable energy share in power, agriculture, and transport sectors. The outcome was disseminated through state-level webinars organised for Gujarat, Odisha, and Assam. A national-level conference is planned at the end of the study.

Power Sector: The project is in the final stage of research, analysis, stakeholder consultation, and output dissemination for Gujarat, Odisha, and Assam.

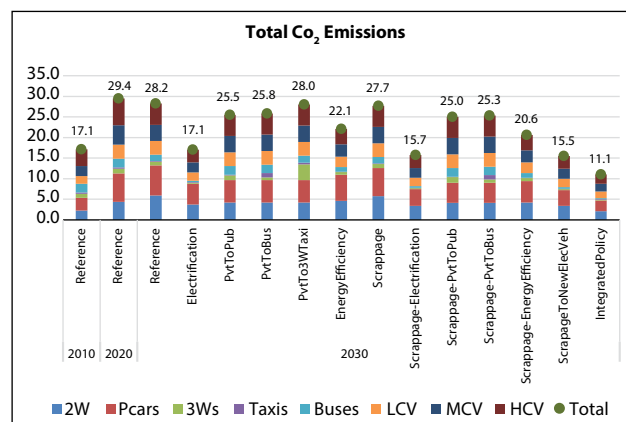
Discussion paper is finalized for Gujarat and Odisha, while the same for Assam is about to be completed. Major suggestion from Gujarat, a model-developed state, discusses the importance of balancing the infirm nature of renewable power injected into the grid. The developing state of Odisha needs to clean the comparatively polluting power generated in its captive power plants. The importance of these interventions for either state is discussed and the challenges are also researched in the discussion paper. For Odisha, various scenarios regarding the replacement of captive with super-critical thermal power plants or renewable are also analysed with government policies notified.

Agriculture Sector: Farmers in Gujarat use grid electricity whereas, in Odisha and Assam, most of them use diesel engines for irrigation. Solar irrigation is the cheapest option available to the farmers, but it faces certain constraints. The study proposes policy measures to increase the use of solar for irrigation.

Discussion paper for Assam is about to get completed. The discussion paper proposes market-based model for the shift from electric or diesel-based irrigation systems to grid integrated or community-based solar irrigation systems. It was found that a community based solar irrigation system is the cheapest irrigation energy source for farmers after heavily subsidized electricity. The financial implications for each stakeholder for the conversion are calculated. GHG emission savings due to the green energy transition of the irrigation system are also estimated at different conversion levels. Team is also working on a national-level policy brief for the agriculture sector based on the state-level study experiences.

Transport Sector: IRADe has finalised its study on Gujarat and is currently in advanced stages of research for Odisha and Assam. The study looked at the penetration of electric vehicles (EVs), the share of public transport, energy efficiency and scrappage policy, the accompanying cost of infrastructure, and investment requirements for low carbon pathways in the transport sector of these states. It also looked into incentives for lowering the cost of EVs and proposed market-based policy recommendations that may be implemented at the state level to benefit all

stakeholders. A gist of the impact of various policies on reducing emissions in Gujarat's road sector is shown below.



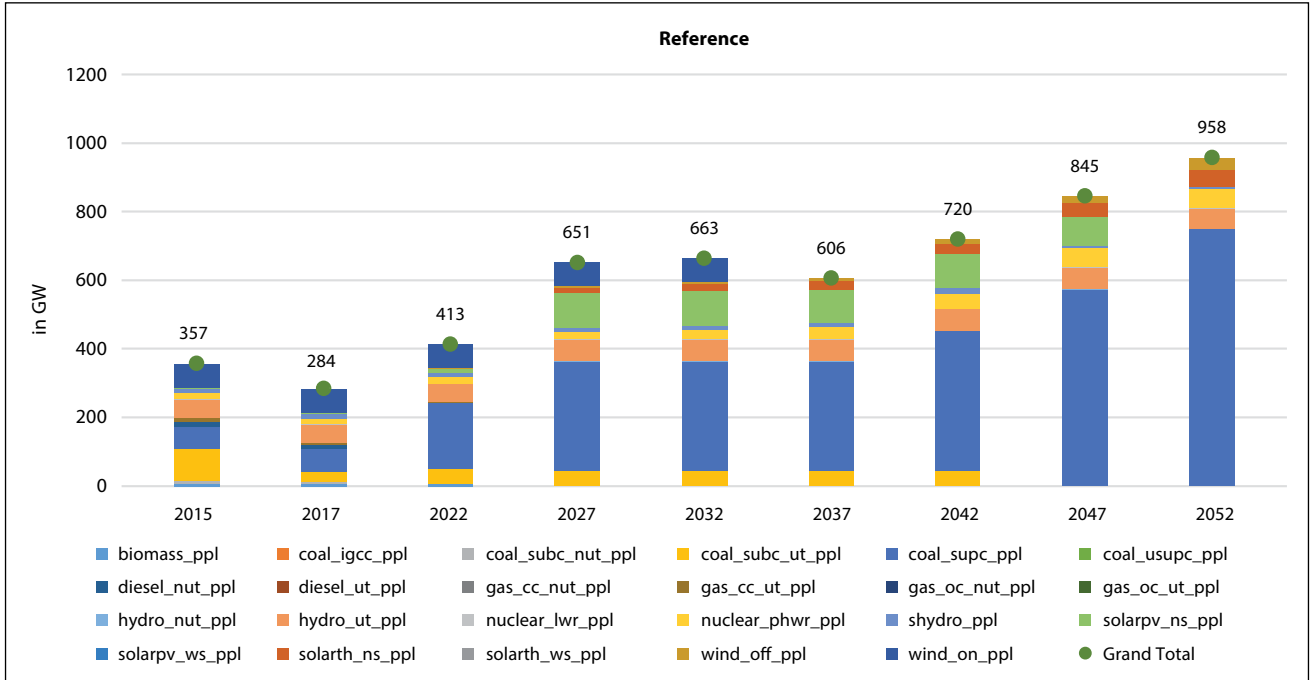
Duration: September 2018- September 2022 (Ongoing)
Supported by: MacArthur Foundation, USA

4.3. Low Carbon Economy Modelling Component of the -Strategic partnerships for the implementation of the Paris Agreement (SPIPA)

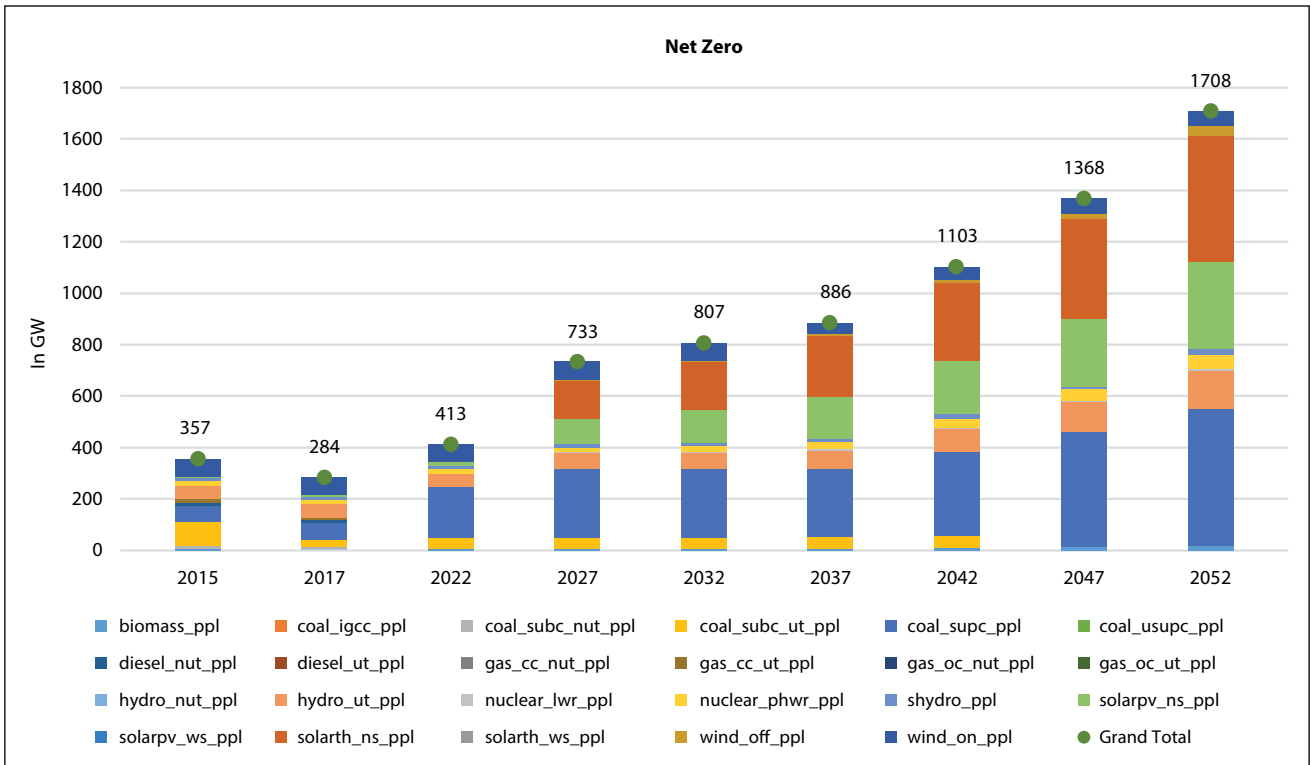
IRADe has completed the research under this project. The main objective of the SPIPA project was to build the capacity of the Indian research teams in modelling climate change and low carbon scenarios. Under SPIPA project, IRADe undertook capacity-building activities for 1) improving the energy sector representation in the Input-Output matrix 2015-16, 2) building a full energy model in MESSAGE-ix platform, 3) updating IRADe's activity analysis model to a CGE model.

IRADe team reviewed the Supply and Use table (SUT) for 2015-16 provided by Central Statistical Organisation, Ministry of statistics and program implementation, GOI. Issues with the representation of energy sectors – coal, crude oil, petroleum products, natural gas and electricity in the SUT for 2015-16 was identified and outlined. It was shown that energy input flows in many energy use sectors were inconsistent with the physical flow data. It was also shown that the production and import data of energy commodities were misrepresented. A modified SUT table for 2015-16 was obtained based on actual physical data on the

Scenarios wise Capacity requirement projected by the model



Scenarios wise Capacity requirement projected by the model



supply and use of these energy commodities from various published government reports. The modified SUT table was further used to estimate an Input-Output Matrix for 2015-16 consistent with the physical energy use data. The estimation and improvement of Supply

and Use table was a capacity building for IRADe team working for SPIPA to update its ANSWER TIMES- based power systems model to a MESSAGE ix based energy systems model simultaneously also updating the base year from 2011 to 2015. Through extensive discussions

and collaboration with IIASA, IRADe's power system model was set up on the MESSAGE platform using Python code for simulation up to 2052. The model has 23 power generating technologies, including 5 technologies for coal, 4 technologies for gas and solar, two technologies each for hydro, wind, nuclear, and biomass, and small hydro considered along with their cost parameters. A detailed load curve for 8760 hours is considered. Solar, wind, and hydro availability is considered. Energy demands from macroeconomic model are used as exogenous input into the MESSAGE model. To validate the working of the model, two scenarios are analysed for demonstration purposes- 1) reference scenario 2) net zero in power sector in 2050.

Simultaneously the team also worked on modifying its Macroeconomic model to a CGE model using Negeshi framework. In course of the project, IRADe collaborated with multiple international organisations like IIASA, JRC, European Union and GIZ and Indian universities, IIT Mumbai, Delhi and the Ministry of Environment, Forests and Climate Change. The results from these capacity-building exercises were presented to the MOEFCC through an online workshop organised by GIZ on 28th February 2022.

Duration: April 2020 – February 2022 (Completed)

Supported by: Project implementation by GIZ- India, and Delegation of the European Union to India







4.4. Updating the modelling studies on greenhouse gas emission and emission intensity of Indian economy carried out by TERI, IRADe and the IEG consortium (IEG-DU-NISTADS) in 2014-15

The objectives of the project were to update the previous GHG modelling studies of 2014-15 for all the relevant policy decisions and actions taken by the Government of India, States and Corporates since 2015 which impact the climate mitigation and adaptation actions in the country and analyse their impacts on the implementation of the NDC submitted by the Government of India in October 2015. Based on

the updated model, the study required to project the progress of implementation of NDC targets, impact on COVID-19 on growth and achievement of NDCs, suggest scope for enhancing NDCs and estimate the climate finance that would be required to achieve NDCs and suggested enhanced NDCs.

To address the objective of the study four scenarios were assessed. A baseline scenario (BAU) which assumed no low carbon policies was projected for comparison's sake. A scenario NDC was constructed which incorporated current policies and actual achievements including actual technology wise generation till 2016-17, energy efficiency trends, actual trends in renewable share, solar generation share and electrification of transport. A COVID-19 scenario that assumes over and above NDC scenario, the actual growth rates of GDP in the year 2020-21 and 2021- 22 imposed as a constraint. Finally, an Enhanced NDC scenario (ENDC) that assumes 450 GW RE deployment by 2030 over and above NDC scenario is also analysed.

The results showed that

-  Existing policies achieve NDC goals but with increased investment and lower GDP.
-  Current policies would help India achieve its target of 40% non-fossil fuel capacity and 47% reduction in emissions intensity reduction.
-  Enhanced NDC can be realized with lower private consumption.
-  Enhanced ambition of 450 GW would help achieve a 52% share of non-fossil fuel capacity and an emissions intensity reduction of 64%.
-  With additional climate finance (in addition to commercial foreign inflows), the same level of GDP as in BAU, can be attained with NDC or ENDC policies also.
-  COVID 19 shock spills over and persists till 2050 Non-Fossil capacity creation target of 40% not realized. Additional effort needed to regain the growth momentum.

Duration: 3 months

Supported by: MoEFCC

5

Sustainable Urban Development

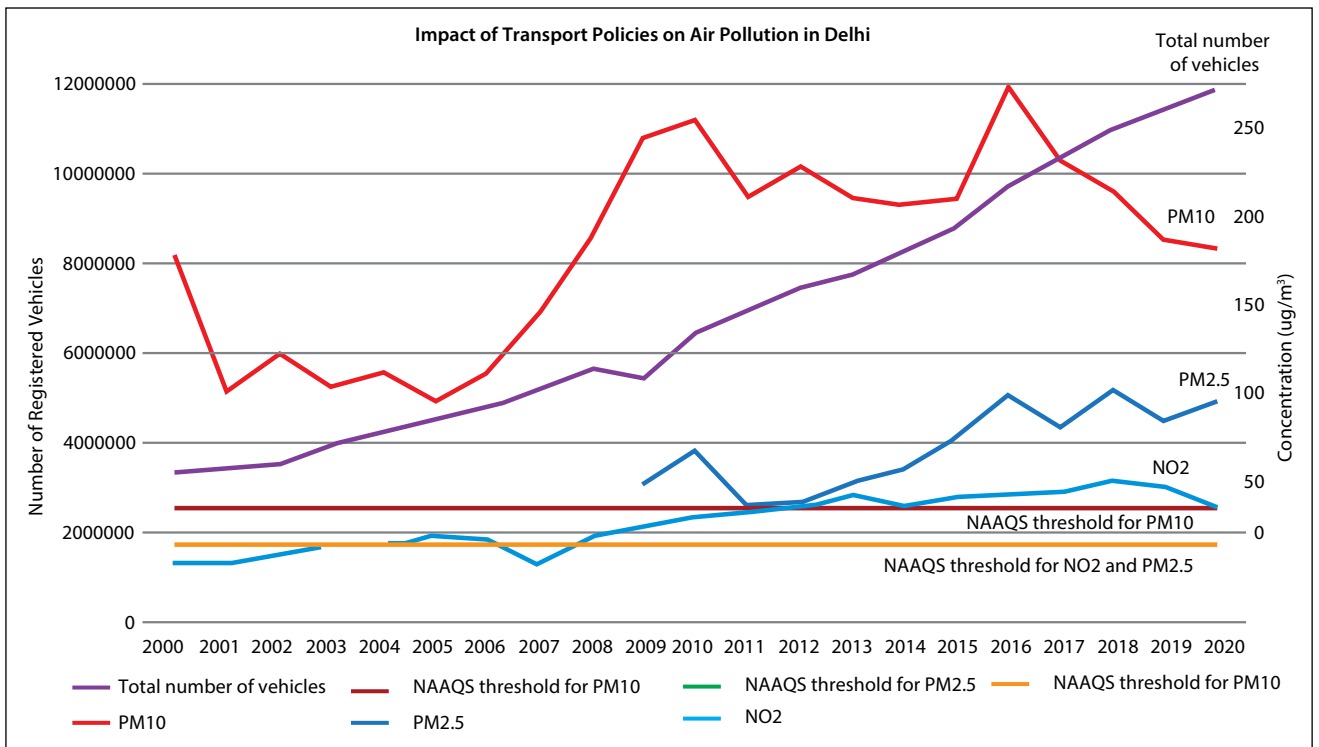


5.1. Process, Analysis, Observations and Modelling: Integrated Solutions for Cleaner Air for Delhi (PROMOTE)

Tracking Air Pollution Policies in Delhi and their impact

Delhi pollution increased and declined over 20 years (2000-2020) despite growth of vehicles by over 350% during this period? To understand this, we look at the mitigation policy landscape for transport sector. PM10 levels showed a decline during 2001-2005 by 64% before rising sharply during 2006-2010 by 127%. The year 2000 saw the implementation of stricter India Stage 2000 Emission Norms, through which the permissible limit of CO, HC, NOX was decreased by 60%, 54%, and 44% respectively for HDV (Heavy Diesel Vehicles). In addition, Delhi Metro was developed in

2000 which helped lower CO and NO₂ levels by 31% and 34% in areas closer to metro. Conversion of all commercial vehicles to CNG was achieved by 2002. In 2003, Auto Fuel Policy was approved by the Parliament at all-India level to roll-out a series of stricter norms. Bharat Stage II (BS II) norms were first implemented in metro cities like Delhi, before being implemented in the whole country in 2005. The BS II norms were followed by BS III and BS IV norms in 2010; and by BS VI norms in 2020. During 2011-2015, registration of diesel cars with engine capacity above 2000cc was banned. In addition, the entry of heavy vehicles (like trucks) in Delhi was restricted during day time, and these vehicles were allowed to pass through Delhi only during 10 PM- 7AM. These measures helped in reducing PM10 levels by 15% in 2011, 9% in 2012, 15% in 2013, 17% in 2014 and 16% in 2015. However, PM2.5 which was first measured in 2014, increased



Year	Policy	Impact
2000	India Stage 2000 Norms	<ul style="list-style-type: none"> The permissible limit of CO, HC, NOX decreased by 60%, 54%, and 44% respectively for HDV in 2000 relative to 1996 Norms. The quantity of lead and Sulphur in petrol was reduced by 91% and 50% respectively in 2000 relative to 1996.
	Delhi Metro	<ul style="list-style-type: none"> CO and NO₂ levels dropped by 31 and 34% in the areas which were closer to the metro.
2003	Auto Fuel Policy	<ul style="list-style-type: none"> A roadmap was prepared to introduce a series of stricter norms for cleaner fuels in the country during 2005-2020.
2005	BSII Norms	<ul style="list-style-type: none"> PM10 levels reduced by 40% but NO₂ levels rose by 45% in 2005 (compared to 2000) For HDV, the permissible limit for CO, NOX, and PM decreased by 11%, 12.5% and 58% respectively through BS II norms in 2005 compared to 2000 norms For 2/3 W (petrol), the emission standards for CO and HC+NOX got stricter by 20% and 25% respectively in 2005 compared to 2000 The quantity of Sulphur in Petrol was reduced by 50% in 2005 compared to that in 2000
2010	BS III and IV norms for vehicles in Delhi/NCR	<ul style="list-style-type: none"> Reduction in PM10 levels by 15% in 2011, 9% in 2012, 15% in 2013, 17% in 2014 and 16% in 2015 (relative to 2010) NO₂ levels increased by 2-10 µg/m³ during 2011-2015 (compared to 2010) PM2.5 increased by 20% in 2015 (relative to 2014)
2018	Eastern and Western Peripheral Expressway (EPE and WPE)	<ul style="list-style-type: none"> PM10 levels dropped by 11.55% in 2019 (relative to 2018) PM2.5 levels reduced by 13% in 2019 (relative to 2018)
2020	BS VI norms for vehicles in Delhi/ NCR	<ul style="list-style-type: none"> PM10 levels dropped by 2.5% in 2020 (compared to 2019) PM2.5 increased by 9% in 2020 (compared to 2019)

by 20% in 2015. NO₂ levels also showed an increase by 2-10 µg/m³ during 2011-2015. In 2018 Eastern Peripheral Expressway (EPE) and Western Peripheral Expressways (WPE) were developed around Delhi, which along with other policies helped bring down the PM10 and PM2.5 levels by 11.55% and 13% in 2019. By 2020, however, PM10 levels were again closer to the levels in 2000. The years 2017-2020 have seen above normal rainfall and there were also COVID-associated restrictions on various activities in the year 2020. Apart from transport sector, moving out bricks and other polluting industries, and power sector eased the pressure but on the other hand expansion of Delhi into NCR, stubble burning and Aravalli deforestation opened up Delhi to long range transport of pollutants.

Duration: October 2017- September 2022 (Ongoing)
Supported by: Ministry of Earth Sciences (MoES)

5.2 Gender-Sensitive Heat Action Plans in Cities of South Asia

Within the agenda of climate-resilient smart cities, IRADe's aims to support South Asia's medium-term development planning, especially in prioritizing and integrating adaptive resilience. The project will disseminate knowledge on heat stress management strategies, including the development of a spatially differentiated and gender-sensitive Heat Adaptation Plan (HAP) in South Asian countries of Sri Lanka (Colombo), India (Surat), and Bangladesh (Rajshahi).

This project is in collaboration with the International Centre for Climate Change and Development (ICCCAD), Bangladesh; SLYCAN Trust, Sri Lanka; and Urban Health and Climate Resilience Center of Excellence (UHCRCE), Surat India. The project has held several rounds of brainstorming sessions and interactions with its

collaborators. Inception meeting for the project was organised and the project methodology, project outputs, timelines, and key deliverables of the project were drafted. The project brochure was finalised and shared with project stakeholders.

Factsheets for the project cities are being drafted covering the current status of heat adaptation gaps and strategies, and capacity building needs. Stakeholder maps have been developed for the project cities, identifying the key agencies and organizations for designing and implementing the heat action plan.

Duration: October 2021- September 2022 (Ongoing)

Supported by: Asia-Pacific Network for Global Change Research

5.3 Market Research on Green Buildings and Storage

IRADe conducted market research for Climate Tech VC fund focused on Green Buildings and Storage and within these on Alternative Materials and the 2-3 Wheeler Electronic Vehicle market respectively. In this study, IRADe prepared an overview of the regulatory drivers in Green Buildings and Storage markets and conducted interviews with experts in India and a peer review of the growth forecasts for the two sub-segments.

Duration: October 2021 to December 2021 (Completed)

Supported by: Tractebel Impact Belgium SA

6

Conferences, Workshops and Meetings

Energy and Power Systems Events

SARI/EI- IRADe Events

1. Report Release Event - Analytical Study to Assess the Potential of Gas/LNG for Regional Energy Cooperation in BBINS Region

IRADe, for the SARI/EI project, undertook a detailed analysis to analyse the gas demand/supply position globally and in the Bangladesh, Bhutan, India, Nepal, Sri Lanka (BBINS) countries, including the trends in demand for the next 20 years. The Report was disseminated through a webinar on 27th July, 2021. It was attended by policymakers, heads of public sector undertakings in the Petroleum sector, and officials from the Petroleum and Natural Gas sectors from the BBINS countries. The Report was released by Mr. Tarun Kapur, then Secretary, Ministry of Petroleum and Natural Gas, India, along with Dr. Jyoti Parikh, Executive Director, IRADe.



2. Webinar on "Cross Border Energy Trade and Energy Security for South Asia"

The inaugural event in the four-part SARI/EI and Power line webinar series was held on 1st September, 2021. The series of four webinars focuses on the broad theme of "Accelerating Cross Border Energy Trade to Transition towards an Energy Secure South Asia".



The webinar had policymakers and experts from BBINS countries discuss the various benefits of CBET; the key drivers and enabling factors towards trilateral and multilateral power trade; the need for creating regional forums for increasing CBET; key issues and challenges to CBET, and how these can be addressed. The webinar was attended by over 200 energy sector enthusiasts from across the globe.

3. Stakeholder Consultations on South Asia Forum for Electricity Markets (SAFEM)

A key recommendation of SARI/EI Task Force-3 was creation of a South Asia Forum for Electricity Market (SAFEM) to facilitate consensus on market-based electricity trade in the region including bilateral, multilateral and collective electricity trade. Towards this, a detailed strategy paper was developed to analyse international practices, similar forums, proposed structure of SAFEM, its role and function, potential members, institutional structure, and various facets of the electricity market. Virtual meetings with stakeholders from Bangladesh, Bhutan, India, Nepal, and Sri Lanka were held to discuss the SAFEM Study on 9th, 10th, and 11th August, respectively.

4. *Virtual Stakeholder Consultation on the subject “Creating Regional Technical Institutional Mechanism/ Platform in the field of Power System Operation in South Asia Region”*

As a part of the SARI/EI program, the Task Force 2 members and other South Asian stakeholders recommended an institutional mechanism in the region for system operation coordination. A detailed draft report “Creating Regional Technical Institutional Mechanism/ Platform for sharing operational best practices and promoting excellence in the field of Power System Operation in South Asia Region” was developed. The paper deliberates on the need for such an institution, its role, members, structure, functions, and overall sustainability. Country-level stakeholder consultations were held with stakeholders from Bangladesh, Bhutan, India and Nepal, on 17 - 19 August, 2021, to present the key findings of the report and deliberate on the institutional mechanism.

5. *Stakeholder Consultation on the subject “Creating Regional Technical Institution/Body for promoting Regional Transmission Network in South Asia”*

SARI/EI Task Force-2 members and other stakeholders recommended creation of regional technical institution mechanism for power system operation and promoting integrated regional transmission network in South Asia. The proposed institution/body aims to facilitate and support harmonized network development and operations, incidental to cross border interconnections in South Asia. A detailed draft report **“Creating Regional Technical Institution/Body for cross cutting deliberations and promoting excellence towards the development and operation of the regional transmission network in South Asia”** was developed to deliberate on the need for such institution, its role, members, structure, functions, and overall sustainability. Stakeholder consultations with the concerned stakeholders from South Asian countries were held from 14 – 16 August, 2021.



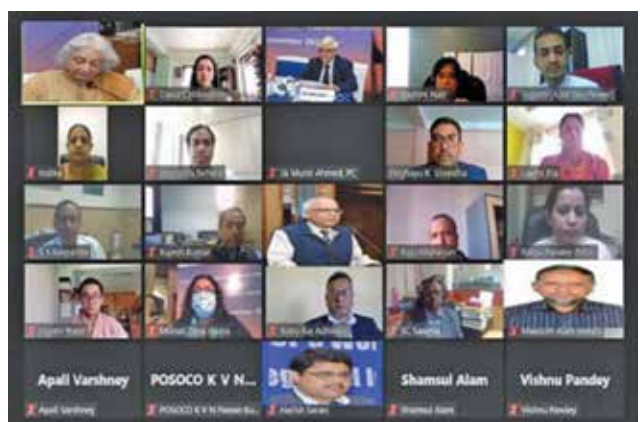
6. *SAFIR Infrastructure Conference*

The SAFIR Infrastructure Conference titled “Power Markets to Facilitate Enhancement and Integration of Renewable Energy” was jointly organised by South Asia Forum of Infrastructure Regulation (SAFIR) and IRADe for the SARI/EI program, virtually on 15 – 16 February 2022. Many important aspects of South Asian power sector were discussed during the inaugural session and four working sessions of the event - “Renewable Energy Resources potential in the South Asia Region and its optimum utilization”; “Status of Power Markets in the South Asia”; “Panel Discussion on Power Markets to Facilitate Enhancement and Integration of Renewable Energy”.



7. *Combined Meeting of SARI/EI Task Forces (hybrid mode)*

The combined meeting of the three SARI/EI Task Forces, held on 16th November 2021, was attended by esteemed members of the three task forces from Bangladesh, Bhutan, India, Nepal and Sri Lanka, along



with representatives from USAID and SARI/EI secretariat from IRADe. The SARI/EI team presented a brief overview of the studies completed and in the pipeline, as well as the activities undertaken in the past year. The team sought views of the Task Force members on any new areas for conducting studies or capacity-building programs, as well as on the current activities. A significant achievement highlighted was the South Asia Energy Portal, which consists of a wealth of demographic and energy sector data of the eight South Asian countries. This portal would be available to all the countries.

8. 9th SARI/EI Project Steering Committee Meeting (hybrid)

The ninth SARI/EI Project Steering Committee meeting was held on 17th November 2021 in a hybrid manner for esteemed members of the Project Steering Committee (PSC), comprising key representatives from Bangladesh, Bhutan, India, Nepal and Sri Lanka, along with representatives from USAID and SARI/EI secretariat at IRADe.



The SARI/EI team presented an overview of the completed and in-progress studies, as well as of the activities of the last year. It also presented brief recommendations of the studies completed and other events held during 2020-21. It presented the recommendations of the Task Forces, received during the combined Task Force meeting held the previous day, and asked for views of the members. The South Asia Energy Portal, was also presented before the Project Steering Committee.

Mr. Mohammad Hossain was nominated and unanimously elected as the Chairperson for the year 2021-22. Earlier, Mr. Tanmay Kumar Joint Secretary, Ministry of Power, Govt. of India and later Mr. Mriyunjay Kumar Narayan, Joint Secretary, Ministry of Power from India, had held the post for the last one year.

9. Webinar on "Establishing a Regional Power Market in South Asia"

The second webinar of the four-part SARI/EI - Powerline series sought to emphasise the importance of creating a vibrant regional power market for the mutual benefit of all the South Asian nations, as has been proved in many other parts of the world. Esteemed panellists from across South Asian countries discussed some of the most pertinent matters related to establishment of a regional power market, such as - the role of regional power market in enhancing energy security in South Asia; steps needed to facilitate the formation of a regional power market in South Asia; the key challenges and issues, and how these could be addressed.

10. Creating Regional-level Institutions for Efficient and Sustainable CBET in South Asia

This third webinar of the SARI/EI - Powerline series emphasised on creating regional-level institutions for efficient and sustainable CBET in South Asia. During the course of the discussion, the panellists addressed various questions related to this issue, such as- the role of regional-level institutions play in promoting efficient and sustainable CBET in South Asia; their key objective and responsibilities; the experience so far; the key issues and challenges, and how these could be addressed and the most effective financing mechanisms for the regional institutions.



11. Inception Workshop – Think Tank Forum

The Inception Workshop was organised in Virtual mode on 18th January, 2022 under the second phase of IRADe’s South Asia Think Tank Forum. The selected Think Tanks from the South Asian countries - Bangladesh, Bhutan, India, Nepal and Sri Lanka - along with representatives from USAID, SARI/EI secretariat from IRADe and SAREP attended the hybrid meeting.

12. Webinar on “Accelerating Clean Energy Transition in South Asia

The concluding webinar of the SARI/EI – Powerline series deliberated on the clean energy transition plans and targets of South Asian countries. The experience in clean energy adoption, issues and challenges, and the steps being taken to manage intermittent RE generation, were discussed in detail by the panellists. The webinar also talked about the role played by CBET in clean energy transition in South Asia, and the role of development agencies in accelerating clean energy transition.



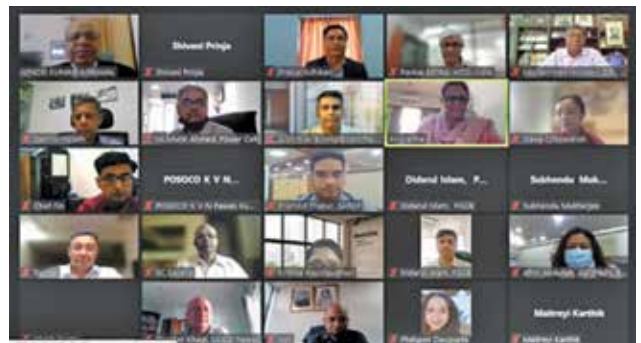
13. COVID Report Release

SARI/EI and the Indian Chamber Commerce jointly organized a webinar on 23rd February 2022, to disseminate and deliberate on the findings of the SARI/EI Paper on “Risk Mapping and Impact Assessment of COVID-19 on South Asian Power Sector (SAPS): Policy Measures for Business Continuity and Risk Mitigation”. Many important stakeholders from the BBINS countries attended the webinar, which had Mr. Anil Razdan, former Power Secretary, Government of India, chairing the inaugural session.



14. Stakeholders Consultations (virtual) on the study – ‘Transition of bilateral to trilateral and multilateral power trade in South Asia’

The key findings of the study on “Transition of bilateral power trade to trilateral and multilateral power trade in South Asia” and the “Model Regional Framework for Trilateral and Multilateral Power Trade” was presented before the stakeholders (Transmission Utilities, Regulators, and System Operators) from BBINS countries. The objective behind the proposed framework was to bring all the countries to a common understanding on the way in which trilateral and multilateral power trade may be undertaken, while also giving individual countries adequate freedom to customize the framework.



EV Charging Patterns and Impact on Discom

A Workshop was organised on 1st March 2022 in hybrid mode to release the report titled **“EVs Impact on DISCOMs”** at Le Meridien. The report was released in the inaugural session by Dr. Rajiv Kumar (VC, NITI Aayog) along with Dr. Kirit Parikh, Dr. Jyoti Parikh, Mr. Pankaj Batra, and Mr. Tarun Kapur. Shri. Rajiv Kumar in his address said that EV demand is rising exponentially. Around 3,33,000 EVs were sold during 2021, approximately a rise of 168% from the previous year. Further, he added that NITI Aayog and Gol have allocated 55 thousand crores for FAME-I, FAME-II, and Production Linked Incentive Scheme to boost EV penetration. The session was followed by a presentation by Dr. Probal Ghosh, Assistant Director, IRADe. He presented the results of the study.

The Technical-Session 1: **“EV for Private & Public Transport”** was chaired by Shri Tarun Kapoor, former Secretary, MoPNG and co-chaired by Ms. Mahuya Acharya, MD, CESL. Shri Tarun Kapoor. In his address, Shri Tarun Kapoor said that oil prices are very sensitive to international affairs and can affect India for its energy security. We have no choice but to move really fast towards EV adoption. In this regard, Ms. Mahua Acharya manifested her concerns about the financing of the EVs and the need to create a proper buyback market for consumers to retire their conventional vehicles. After this session Mr. Vinay Saini, Area Convener, IRADe presented the hourly charging impact of EVs on DISCOMs.

Technical-Session II: “EVs Impact on DISCOMs”, was chaired by Shri Reji Kumar, President, ISGF and co-chaired by Mr. Pankaj Batra, Project Director, SARI-EI, IRADe. Shri Reji Kumar Pillai said India has made the availability of both CCS and Chademo chargers in one charging stations to comply with all EVs available in India. Concessional EV tariffs were made available in the initial days to promote EV which is nearly half the price of commercial tariff. The cost of underground cable connections is very high in metropolitan cities to install the charging infrastructure in a desired space. Further, Mr. Pankaj Batra added that now we have the policy for time of use charging and most of the smart meters now have time segregated reading which can now facilitate EV charging.

Webinars: Net ZERO Webinar

Climate goals of reaching net-zero emissions are being discussed worldwide. In the forthcoming COP 26, it is likely to be the main concern. Policies are to be framed and strengthened to overcome the obstacles, to adopt new technologies, retire old ones, change behaviour, and it has significant economic implications. For India to consider potential target years for reaching the net-zero, these implications need to be understood and required policies are to be widely discussed. In this context, IRADe has undertaken a study to assess the alternative possibilities, technologies required and costs of reaching net-zero emissions in the power sector which is the single largest



contributor, accounting for 50% of the national CO₂ emissions (2016). In order to understand the perspective of various stakeholders towards net-zero strategies for India's power sector, and to receive feedback on the findings of the study, IRADe organised a webinar on "Net Zero Strategies for India's Power Sector" on Thursday, October 21st 2021. https://www.youtube.com/watch?v=MofhtLAF_Jk&t=488s

Asia Centre for Sustainable Development

IRADe at ISUW 2022

On 2nd March 2022, IRADe participated in session 1 "Action Plan for Feasibility Study of Identified Interconnections and Market Design for Interconnected Power Markets" of Roundtable 1 "Interconnection of Regional Grids in Asia" at the Indian Smart Utility Week 2022. In session 1, Dr. Jyoti Parikh, along with Mr. Vinay Kumar Saini, presented the key findings from our project "Implications of declining costs of Solar, Wind and Storage Technologies on regional power trade in South Asia (BBIN Countries)" to the stakeholders in India and the participants from around the world. The panelist for the session included eminent personalities from India, South Asia Region, the GCC region, and many more. The project is funded by UK Aid from the UK government under the Applied Research Programme on Energy and Economic Growth (EEG), managed by Oxford Policy Management (OPM).

Testing Electric Pressure Cooker in socio-cultural context of Nepal

1. Distribution and training workshop of Electric Pressure Cookers in Banepa and Timal

IRADe conducted distribution and training workshop for the batches of 20 households on 17th and 18th September 2021, in Banepa, urban field site. On 19th and 20th September 2021, the electric pressure cookers were distributed and a training workshop involving 20 households was conducted in Temal, the rural site. A detailed device demonstration was given in the local language with the help of local consultants.

2. Follow up training sessions of Electric Pressure Cookers in Banepa and Timal

From 18th-21st November 2021, IRADe organised a cooking activity in both urban and rural sites of the study. The participants were divided in groups of 5, and each group was given the task to prepare a local dish on EPC to understand their familiarity with the device. At the end of the programme, the participant's queries regarding the device were addressed followed by an orientation for the next phase of the pilot programme.



Climate Change and Environment

Webinars

1. Heat Waves in South Asia, 6 June 2021

A webinar was organized on Heat Waves in South Asia by the South Asian Meteorological Association (SAMA), India Meteorological Society (IMS)- Jaipur Chapter and South Asia Heat Health Network (SAHHIN) on the occasion of World Environment Day. The webinar covered various



country presentations and discussions on Heat waves in South Asia. The webinar was attended by more than 90 participants from India, Bangladesh, Afghanistan, Pakistan, Sri Lanka, Myanmar, Bhutan, Maldives. The webinar was also a part of a worldwide registered event for World Environment Day on the United Nations Environment Programme.

2. SAHHIN 1st Master Class on 'Heat Threshold for Indian cities', 12 August 2021

SAHHIN 1st Master Class by Dr. SC. Bhan, Scientist F, IMD provided an overview of HST and methodology to assess HST of Indian cities and was attended by over 90 participants across the globe.

3. SAHHIN 2nd Master Class on "Climate Adaptive Heat Action Plans", 25 August 2021

SAHHIN 2nd Master Class by expert Mr. Rohit Magotra, Deputy Director, provided an understanding of Heat Action Plan features, along with identification and mapping of heat hot spots and developing heat adaptation strategies for managing heat stress for cities. The Master class was attended around 70 participants across the globe, including Bangladesh, Sri Lanka, South Africa, Nepal, Maldives, Japan, India, Bhutan, Germany, Greece, and Australia.

4. SAHHIN 3rd Master Class on "Early Warning systems for Heat Stress Management", 2nd September 2021

SAHHIN 3rd Master Class by expert Dr. Ajit Tyagi, Senior Advisor, IRADe discussed components of Early warning systems for heat stress management. The session was attended by over 70 participants across the globe.

5. SAHHIN 4th Master Class on "Heat Early Warning Systems-Scientific Approaches for Estimating Thresholds", 28 October 2021

SAHHIN 4th Master Class by Mr Abhiyant Tiwari deliberated on the importance of temperature thresholds in heat early warning systems, various options and best-in-use scientific analytical methods available for deriving such temperature thresholds, the issues and constraints in policy decision-making in setting threshold temperature for heat early warning systems. The session was attended by around 50 participants.

6. SAHHIN 5th Master Class on "Heat Wave Management Initiatives in India and their Impacts", 24th February, 2022

SAHHIN 5th Master Class by Mr Paras Nath Rai deliberated on the importance of a heatwave management framework to prevent, respond, and contain heat-associated risks. It elaborated on the initiatives and actions taken by the National Disaster Management Authority (NDMA), Govt. of India for heat wave management. It was attended by around 40 Participants.

7. "Climate Change and assessment of Dengue geography in India", 12th August 2021

IRADe organized a National workshop inaugurated by Shri Somnath Bharti, MLA, Delhi., The workshop deliberated and shared research on the health geography of dengue, degree of association of Dengue with local climatic factors and demographic parameters, early warning systems, and Dengue management action plan to build preparedness of public health response for effective prevention and management of Dengue in India. The Workshop was attended by more than 50 Participants.

8. Session on "Impacts of Heat Stress and its Management" at Adaptation Futures 2020, 4th October 2021

IRADe in association with TERI, organised a session on "Impacts of Heat Stress Management" in the Adaptation Futures Conference on 4th October. The session emphasised that climate adaptive heat stress plans for South Asian cities will prevent mortality as well as reduce economic and non-economic impacts of heat stress. The

session was chaired by Prof. Jyoti Parikh and co-chaired by Dr Judith (WENR), lead presentation was given by Mr Rohit Magotra, Deputy Director, IRADe; prominent panelists included - Dr. S.C. Bhan, Scientist F, IMD; Ramiz Khan, Red Cross Red Crescent Climate Centre; Christian Siderius, WENR; and Neha Bharti, TERI.

9. INTROMET-C4, 23-26 November 2021

Rohit Magotra, Deputy Director, IRADe, presented a paper on “CHANGING CLIMATE: CONSEQUENCES & CHALLENGES (C4-'21)” and Mohit Kumar, Research Analyst, IRADe submitted a poster on “Correlating Urban Climatological Variations and Heat Stress in Indian Cities” in the International Symposium on Tropical Meteorology (INTROMET (21) organised by Indian Meteorological Society, Cochin Chapter and hosted by Cochin University of Science & Technology - School of Engineering (SOE) during the period November 23-26, 2021. The National and international community of Atmospheric Scientists discussed various issues of the changing climate and their consequences and challenges.

10. APN Project Inception Meeting, 18th, January 2022

The project held its inception meeting with the project collaborators viz; International Centre for Climate Change and Development (ICCCAD), SLYCAN Trust, and Urban Health and Climate Resilience Center of Excellence (UHCRCE).

An overview of the project, including its key objective project milestones with deliverables, was discussed at length in the meeting. The meeting also discussed the need for a communications framework, project publication and branding and the next steps in the project.



Journal Article

Parikh, J; Pandemic, Climate Change and Long Term Socio-Economic Changes, preprint to appear in Econprism, 2022

Parikh, J; Liverman, D; et al, "Survey of gender bias within the IPCC", 602, 30–32 (March 2022), Nature

Magotra, R; Shaw, M; Bhatia, A (2021)Trend in Dengue Incidences in Rajkot- Jun 25, 2021- Economic and Political Weekly.

Magotra, R; Shaw, M; Parikh, J; Tyagi, A; Sharma, Y (2021), 'Disaster Vulnerability Assessment, Shillong Meghalaya' Urban India, Vol 1: January - June 2021.

Parikh Jyoti and Parikh Kirit (2021), "Linking climate science and climate action: An Equitable Way to Raise Climate Finance", Energy for Sustainable Development, Volume 65, December 2021, Pages 185-188.

Tyagi, A; Kumar. M; Bhan, S.C. , Magotra,R; Sharma, Y (2022), "Review of Urban Heat Islands: Monitoring, Forecast and Impacts", Vayu Mandal: Bulletin of Indian Meteorological Society, 47, 2, pp 1-28.

Policy Brief

Prioritize and Strengthen Disaster Resilience Action Plans for Shillong city, Meghalaya

Prioritize and Strengthen Disaster Resilience Action Plans for Gangtok city, Sikkim

Electricity and Education- Enabling Quality Access

Improving quality of health service delivery through access to sufficient and reliable electricity supply

Modules

Training Module for Medical Stakeholders for Management of Heat Related Illness.

Book Chapters

"Climate adaptive heat action plans to manage heat stress in Rajkot city"- *Compendium of Case-Studies on*

"Health Adaptation & Resilience to Climate Change & Related Disasters", under the HER-CAP (WHO sponsored) project, by NIDM

"Post Disaster Waste Management During the 2014 Srinagar flood"- Compendium of Case-Studies on "Health Adaptation & Resilience to Climate Change & Related Disasters", under the HER-CAP (WHO sponsored) project, by NIDM

News-paper Article

Parikh, J; Electricity for peace and development: South Asian grid connectivity is an idea whose time has come, The Times of India

Parikh, J; Weighing our net zero challenge: It's not just about energy. India has to assess technological, economic and societal transitions, The Times of India, April 2021

Parikh, J; "Right questions for stubble burning: Why Paddy? Which law supersedes?"

Parikh, J; "For a digital stimulus: Budget for growth and empowerment through digital access and connectivity" Times of India, 2021

Media Coverage

"MoEF: Ahmedabad 2nd most local weather weak metropolis amongst seven studied"- The LIVE Ahmedabad, 27 December 2021

"Cooperation and Collaboration –Ushering in an energy-secure South Asia through regional Power Market" Powerline South Asia, Annual Edition 2021

"Budget for growth and Empowerment through Digital Access and connectivity" June 2021, Times of India

"Power Distribution Reforms- Govt Focus on Mitigating Cash Flow Stress and Reducing Theft"- Infrastructure Today, April – June 2021

"In Conversation- Exclusive interview with Pankaj Batra"-| Energy Storage Pro, May 2021



Dr. Jyoti Parikh

- ⇒ **May 13, 2021:** Speaker at EEG Energy Modelling webinar organized by Oxford Policy Management Ltd, Oxford UK, virtually
- ⇒ **June 5, 2021:** Closing speaker closing session at Cambridge Climate and Sustainability Forum 2021 on World Environment Day organized by University of Cambridge, UK, virtually
- ⇒ **June 6, 2021:** Speaker at inaugural session at Scientific Program (tentative) of the Webinar on Heat Waves over South Asia organized by Indian Meteorological Society, Jaipur Chapter and SAHHIN, New Delhi, virtually
- ⇒ **June 14, 2021:** Speaker at Plenary session for policy recommendation for Research on Gender Equity in Energy Access in the Global South organized by Design Combine, Kerala, virtually
- ⇒ **June 18, 2021:** Speaker at special address at Disaster Resilient Waste Management for Sustainable Spaces organized by the National Institute of Disaster Management, Ministry of Home Affairs, and IMPRI Impact and Policy Research Institute, New Delhi
- ⇒ **August 18, 2021:** Speaker at the Second annual conference on "Hydro Power Asia" on Cross Border Interconnections session organized by India Infrastructure Publishing Pvt Ltd, New Delhi
- ⇒ **October 5, 2021:** Chaired the session on Adaptation Futures Asia Pacific - 2020 organized by TERI & IRADe, virtually
- ⇒ **October 6, 2021:** Participated in the Consultation meeting with the minister MOEFCC, New Delhi



- ⇒ **October 12, 2021:** Attended Hybrid Energy Editorial board meeting or at SDEWES conference: Sarajevo journal editorial meeting organized by ELSEVIER, virtually
- ⇒ **October 18, 2021:** Participated as discussant in a closed-door roundtable on the 'Future of electric cooking in India' organized by CEEW, New Delhi
- ⇒ **November 3, 2021:** Speaker at EEG : COP 26 at Strathclyde University, Glasgow, virtually
- ⇒ **November 10, 2021:** Special invitee to the Friends of COP26 briefing, chaired by the President COP, UK, virtually
- ⇒ **November 16, 2021:** Chaired and delivered a plenary address in the Inaugural Ceremony of the World Waste-to-Wealth Summit & Expo-2021 by World Waste to Wealth, New Delhi virtually
- ⇒ **February 21, 2022:** Speaker at an Evaluation workshop at All India Women's Conference, New Delhi
- ⇒ **March 2, 2022:** Speaker in the roundtable, Interconnection at Regional grids, ISUW 2022, New Delhi
- ⇒ **March 8, 2022:** Keynote address at IIT Dhanbad on International women's day on "Eliminating Gender Bias"

Mr Pankaj Batra

- ⇒ **15th April 2021:** Keynote speaker at the inaugural Session Power Conclave 2021- organised by Resonance Energy
- ⇒ **22nd April 2021:** Led the Indian delegation in the IEC SC21A WG 5, to present a new proposal for making an



international standard on Battery Management System (BMS).

- ⇒ **6th May 2021:** Chaired the Eighteenth meeting of Power System Control and Associated Communications Sectional Committee of the Bureau of Indian Standards
- ⇒ **13th May 2021:** Spoke on the Webinar (Debate) on Draft National Electricity Policy, organized by India Energy Forum.
- ⇒ **16th June 2021:** Participated in the virtual Round table discussion on CERC's Draft Ancillary Services Framework, organized by the India Energy Storage Alliance
- ⇒ **18th June 2021:** Chaired the 8th Meeting of Electrical Energy Storage Systems Sectional Committee, ETD 52
- ⇒ **25th June 2021:** Speaker at the virtual EV Battery Management Systems Forum 2021, organized by EMobility+
- ⇒ **29th June 2021:** Speaker at the Independent Power Producers Association of India is webinar on "Cyber Security in the Power Sector"
- ⇒ **7th July 2021:** Spoke at the Workshop on NIAS Transition Plan for an Integrated Approach to Development and Environment in the Power Sector, chaired by Member, Niti Aayog
- ⇒ **13th July 2021:** Moderated the webinar on the topic of "Modeling Variable Renewables and Energy Storage in Long-Term Planning Studies" under the "Peer2Peer: India Power Series", by NREL, USA
- ⇒ **27th July 2021:** Speaker at the Session on Battery Swapping: An Alternative Feasible Solution For EV charging in the EV Charge India 2021, organized by EMobility+
- ⇒ **29th July 2021:** Moderated the Webinar on BIS Standard on Open automated demand response by Bureau of Indian Standards
- ⇒ **30th July 2021:** Panelist at the session on 'The Need for Pumped-Hydro Storage in the Indian Grid' organized by C-STEP
- ⇒ **12th August 2021:** Convened the 4th meeting (online) of working group to develop

draft document on Strategic Roadmap for Electrotechnical Division Council of BIS

- ⇒ **23rd August 2021:** Attended the meeting of the jury to finalize the 9th edition of the "Innovation with Impact Awards for Discoms 2021" by ICC
- ⇒ **31st August 2021:** Attended the first meeting as Member of the CII National Committee on Power 2021-22
- ⇒ **22nd Sept 2021:** Panellist at the Discussion on Financially Solvent Discoms in the Global South, organized by CSTEP, along with Southern Voice

Mr Rohit Magotra

- ⇒ **29th July 2021:** Panelist for University of Oxford- Public Health Foundation of India (PHFI seminar series on 'Social Policy and Environmental Health.
- ⇒ **3rd August 2021:** Speaker at 'SAMA Foundation Day' 8th ICSD (International Conference on Sustainable Development) 2020 on Regional Cooperation in the field of Heat Stress and Health (Awareness and Mitigation) among South Asia countries.
- ⇒ **5th October 2021:** Panelist in session "Climate-change adaptation as a critical approach to minimizing disaster risk: Insights from the field", Adaptation Futures, 2021.
- ⇒ **23-26 November 2021:** Presented paper on "Changing Climate: Consequences & Challenges (C4-'21)" in the International Symposium on Tropical Meteorology (INTROMET (21) organised by Indian Meteorological Society, Cochin Chapter and hosted by Cochin University of Science & Technology - School of Engineering (SOE).
- ⇒ **21st February 2022:** Panelist for dissemination and evaluation workshop on "Gender into urban climate change initiatives" All India Women's Conference.
- ⇒ **15th March 2022:** Panelist in the "National Webina on Heat Wave Risk Reduction" National Disaster Management Authority.



Dr. Probal Pratap Ghosh

- ⇒ Moderated the 'Technical Session I: Indian Modelling Tools and Policy Analysis' and presented on development of low carbon modelling tools at IRADe in the 'Technical Session II: Energy Sector Modelling Tools and linkages with Land-Use Modelling Tools' in the online workshop on 'India - EU Knowledge and Technical Exchange on Low Carbon Modelling Tools' organised by GIZ India and the Delegation of the European Union to India from 1st – 2nd July 2021.
- ⇒ Presented the estimation of modified SUT & Input-Output table for 2015-16 and the results of the scenarios from MESSAGE based full energy model for India developed under the SPIPA project in the online final workshop titled 'India-EU Technical Exchange Workshop on Low Carbon Modelling under SPIPA Project' organised on 28th February 2022.



Dr. Chandrashekhar Singh

- ⇒ Delivered a presentation on the theme of clean cooking solutions during the four day workshop "Mini-grids and Clean Cooking - Electricity Access for All" organised by Centre for Science and Environment (CSE) from 14-17 December 2021



Vinay Kumar Saini

- ⇒ Presented the project "Implications of declining costs of Solar, Wind and Storage Technologies on regional power trade in South Asia (BBIN Countries)" key findings in session 1 "Action Plan for Feasibility Study of Identified Interconnections and Market Design for Interconnected Power Markets" of Roundtable 1 "Interconnection of Regional Grids in Asia" at the Indian Smart Utility Week 2022.



Ms. Moumita Shaw

- ⇒ **22nd September 2021:** Speaker at 3-days Online Training Programme on "Climate Change, Urbanisation and Multi-hazard Management", NIDM & MGSIPA, Punjab.
- ⇒ **20th October 2021:** Speaker at 3 day Online Training Programme on "Disaster resilience and Coping Capabilities of Cities amidst COVID 19 Pandemic" organized by School of Architecture and Interior Design, SRM University, Chennai. in collaboration with NIDM.



9

Project Reports



S. No.	Project Report No. and Year	Title of Project	Funding Agency
1.	IRADe-PR-95(2022)	Impact of Quality of Electricity Access on Health and Education Delivery - Bihar	Shakti Sustainable Energy Foundation (SSEL)
2.	IRADe-PR-94(2022)	Climate Adaptive Action Plans to Manage Heat Stress in Indian Cities Final Technical Report 2017 – 2021	International Development Research Centre (IDRC)
3.	IRADe-PR-93(2022)	Heat Wave Action Plan – Bhubaneswar City	International Development Research Centre (IDRC)
4.	IRADe-PR-92(2022)	Heat Wave Action Plan – Delhi City	International Development Research Centre (IDRC)
5.	IRADe-PR-91(2022)	Vulnerability Assessment of Households in Bhubaneswar to Heat Stress	International Development Research Centre (IDRC)
6.	IRADe-PR-90(2022)	Vulnerability Assessment of Households in Rajkot to Heat Stress	International Development Research Centre (IDRC)
7.	IRADe-PR-89(2022)	Vulnerability Assessment of Households in Delhi to Heat Stress	International Development Research Centre (IDRC)
8.	IRADe-PR-88(2022)	Testing Electricity Pressure Cooker adoption in Socio-economic and cultural context of Nepal	Loughborough University, MECS, UK
9.	IRADe-PR-87(2022)	Discussion Paper, Assam Power Sector –Enabling State Level Strategic Actions for Achieving NDC	MacArthur Foundation
10.	IRADe-PR-86(2022)	Discussion Paper, Assam Agriculture Sector – Enabling State Level Strategic Actions for Achieving NDC	MacArthur Foundation
11.	IRADe-PR-85(2022)	Discussion Paper, Odisha Transport Sector – Enabling State Level Strategic Actions for Achieving NDC	MacArthur Foundation
12.	IRADe-PR-84(2022)	Strategic Partnerships for the implementation of the Paris Agreement. (SPIPA)	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)
13.	IRADe-PR-83(2022)	EV charging patterns and impact on Discom	Shakti Sustainable Energy Foundation (SSEL)



S. No.	Project Title	Funding Agency	Status
Energy and Power Systems			
01	South Asian Regional Initiative for Energy Integration (SARI/EI)	United States Agency for International Development (USAID)	Ongoing
02	EV Charging Patterns and Impact on Discom	Shakti Sustainable Energy Foundation (SSEL)	Completed
03	Assessing potential carbon neutrality target years for India's power sector.	New Venture Fund	Ongoing
Asia Centre for Sustainable Development			
4	Implications of Declining Costs of Solar, Wind and Storage Technologies on Regional Power Trade in South Asia (BBIN Countries)	Energy and Economic Growth (EEG)	Completed
5	Testing Electricity Pressure Cooker adoption in Socio-economic and cultural context of Nepal	Loughborough University, MECS, UK	Completed
6	Economic impacts of replacing natural gas with renewable energy in SASEC region	Asian Development Bank (ADB)	Ongoing
7	Study on Economic Analysis derived for regional cooperation in electricity in SASEC region	Asian Development Bank (ADB)	Ongoing
8	Detailed technical transmission interconnection study (SASEC-REC)	Asian Development Bank (ADB)	Ongoing
Poverty Alleviation and Gender			
9	Impact Assessment of Electricity Access on Health and Education	Shakti Sustainable Energy Foundation	Completed
10	Role of DRE Technology in Promoting Quality School Education	New Venture Fund	Ongoing

S. No.	Project Title	Funding Agency	Status
Climate Change and Environment			
11	Climate Adaptive Action Plans to Manage Heat Stress in Indian Cities	International Development Research Centre (IDRC)	Completed
12	Enabling State Level Strategic Actions for Achieving NDC	MacArthur Foundation	Ongoing
13	Low Carbon Economy Modelling Component of the -Strategic partnerships for the implementation of the Paris Agreement (SPIPA)	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)	Completed
14	Updation of the GHG Modelling Study	Ministry of Environment, Forest and Climate Change (MoEFCC)	Completed
Sustainable Urban Development			
15	Process Analysis, observations and modelling – Integrated solutions for cleaner air for Delhi (PROMOTE)	Ministry of Earth Sciences (MoES), Natural Environment Research Council	Ongoing
16	Gender-Sensitive Heat Action Plans in Cities of South Asia	Asia Pacific Network (APN)	Ongoing
17	Market Research on Green Buildings and Storage for NFC Ventures	Tractebel Impact Belgium SA	Completed

List of IRADe Newsletters

<https://irade.org/website/irade-news-letter/>



1. IRADe Newsletter (IRN)
<https://irade.org/website/irade-news-letter>
2. South Asia Heat Health Information Network (SAHHIN) Newsletter
<https://climateandcities.org/about-us/south-asia-heat-health-information-network/>
3. IRADe South Asia Regional Initiative for Energy (SARI/E) Newsletter
<https://sari-energy.org/>

SPONSORS



Integrated Research and Action for Development (IRADe)

C-80 Shivalik, Malviya Nagar, New Delhi - 110017

Tel.: 91 (11) 2667 6180, 2667 6181, 2668 2226

Our Websites and Social Media Handles:

Web: www.irade.org

SARI website: www.sari-energy.org

@IRADe_Delhi

IradeDelhiIndia

irade-new-delhi-280019169