

# Asia Centre for **SUSTAINABLE DEVELOPMENT**



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# OVERVIEW: ASIA CENTRE FOR SUSTAINABLE DEVELOPMENT

IRADe is working on sustainable development issues in South Asian Countries. Asia needs connectivity, common infrastructures and cooperative mechanisms to achieve Sustainable Development Goals. Regional common perspectives require collaboration in several development areas like energy, infrastructure connectivity, climate change, agriculture, urban development, food security and disaster management. With this encouraging experience, IRADe has set the Asia Centre for Sustainable Development to extend our work in Asian countries and beyond to work on achieving Sustainable Development Goals.

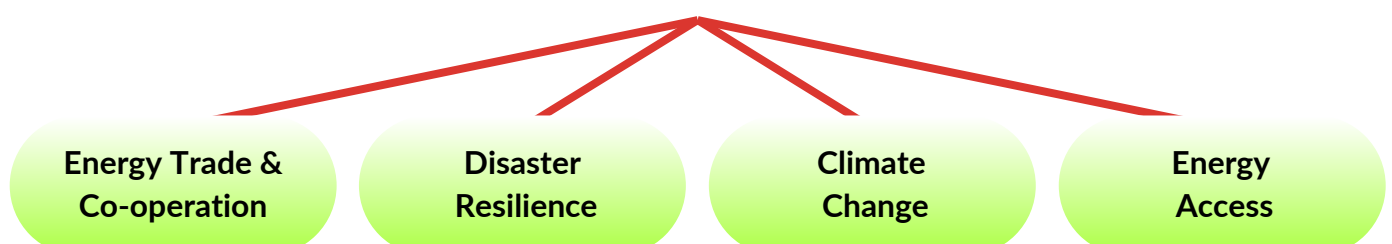


Regional energy cooperation results in optimal utilization of the power resources of the region, faster universal energy access, reduction of cost of supply and more efficient integration of intermittent renewable sources to the grid. IRADe in partnership with USAID has successfully demonstrated implementation of South Asia Regional Initiative for Energy Integration to push energy trade in the South Asian region. Our EEG/ UKAID project provided inputs on the impact of declining prices of Solar Energy on South Asia power trade. We also engaged stakeholders on various options for RE integration and grid balancing and role of pump hydro energy storage for India's renewable transition. We are currently doing several studies related to regional energy cooperation among BIMSTEC nations from the Asian Development Bank (ADB). With the four new earlier projects from the ADB and earlier a 10-year-long USAID project, IRADe has established itself as a leader in Regional Energy connectivity in the power sector of the countries in the Asian region.



IRADe is supporting the cities and national level policy makers in Bangladesh and Sri Lanka in integrating gender sensitive heat resilience in the climate policies. It has been working with the Urban Local Bodies of Rajshahi (Bangladesh) and Colombo (Sri Lanka) to develop vulnerable community focused heat action plans. We have been very successful in leveraging the collaboration with several regional forums like SAARC, BIMSTEC, SAFIR, ACCCRN, ASEAN in Asia on the sustainable development issues.

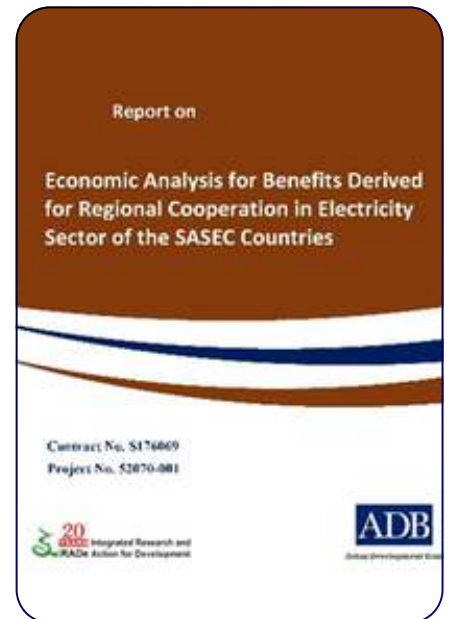
## RESOURCE CENTRES



# RENEWABLE ENERGY TRANSITIONS

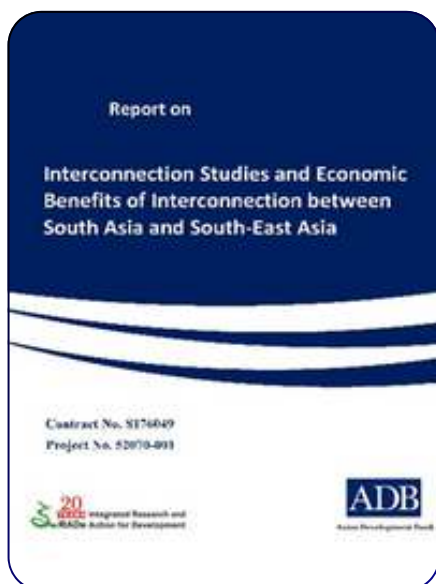
## Study on economic benefits of regional cooperation in electricity in the SASEC region

A study on Economic Analysis derived from regional cooperation in electricity in the SASEC region commissioned by Asian Development Bank (ADB) assessed the economic benefits of CBET in the SASEC region. For this study, IRADe has expanded its BBIN model developed under SARI/EI and updated under EEG to include Power system models for Sri Lanka and Myanmar. IRADe team also developed country economic models for Sri Lanka, Bhutan and Myanmar in addition to the India, Nepal and Bangladesh models used in the USAIDSARI project. IRADe team also developed a standalone power systems model for Sri Lanka and Myanmar and the process of integration with the BBIN model to create an integrated SASEC power systems model for modelling electricity trade in the SASEC region. The study showed the benefits extend far beyond the power sector and can help to achieve higher economic growth and achieve decarbonisation at the same time.



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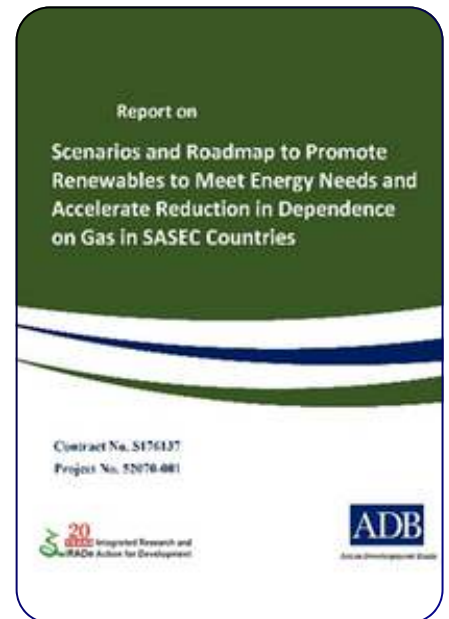
## Technical Transmission Interconnection Studies and Economic Benefits of Interconnection between South Asia and South East Asia

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# RENEWABLE ENERGY TRANSITIONS

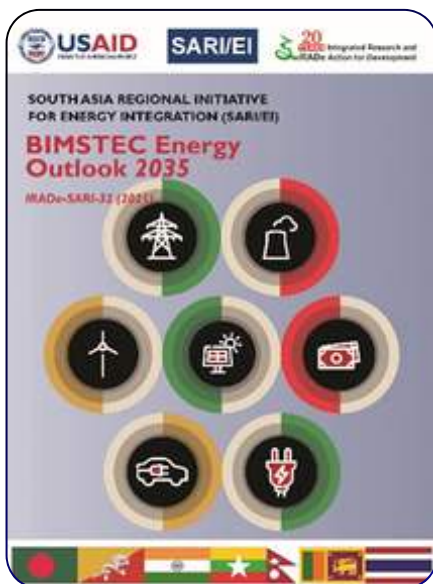
## Economic Impacts and Roadmap of Replacing Natural Gas with Renewable Energy in the SASEC Region

India, Bangladesh and Myanmar have an operational Natural gas infrastructure and import LNG. Prior to the economic crisis, Sri Lanka was at an advanced stage of introducing imported LNG in its energy supply mix. The excess hydro potentials of Nepal and Bhutan could be exploited to enhance their national revenue through energy exports while helping neighbouring countries like India and Bangladesh to replace their gas-based electricity generation. The Asian Development Bank (ADB) recognises the need for a well-sequenced plan for decarbonisation and financing in the region. Natural gas can provide flexible resources to allow more renewable energy to be integrated into the grid. However, concerns have also been raised about whether the continued use of natural gas is compatible with climate stabilisation goals. This study initiated by ADB and undertaken by IRADe focuses on the existing/potential natural gas use in the SASEC region. It aims to explore the economic, environmental and climate change benefits of replacing natural gas with renewable electricity sourced domestically or imported from the region and prepare a roadmap. Regional connectivity is a better solution than gas to support renewables.



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**Oct 2022- Sep 2023**



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**Duration:**  
**Nov 2022- Mar 2024**

## Electricity Grid Interconnection Masterplan for the BIMSTEC Region

IRADe has been commissioned by ADB for the preparation of an electricity grid interconnection masterplan for the BIMSTEC (Bangladesh, Bhutan, India, Myanmar, Nepal, Sri Lanka, and Thailand comprise the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation) region. The proposed work is to estimate the trading potential and, based on the same, to provide an optimal transmission plan for grid interconnections for the BIMSTEC region between and across the member states, in order to facilitate feasible trade. This will examine the policies and regulations for cross border electricity trade and for clean energy transition in each country. It will also examine the existing national and cross border transmission system and that is planned until 2040. It will set out a vision to add new interconnections and/or strengthen the regional grid interconnections, both between the countries and within each of the countries, to enhance the regional energy cooperation and attract investment to make it a reality.

# RENEWABLE ENERGY TRANSITIONS

## South Asia Regional Initiative for Energy Integration SARI-EI

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### SARI/EI Structure & Function (2012 – 2022)

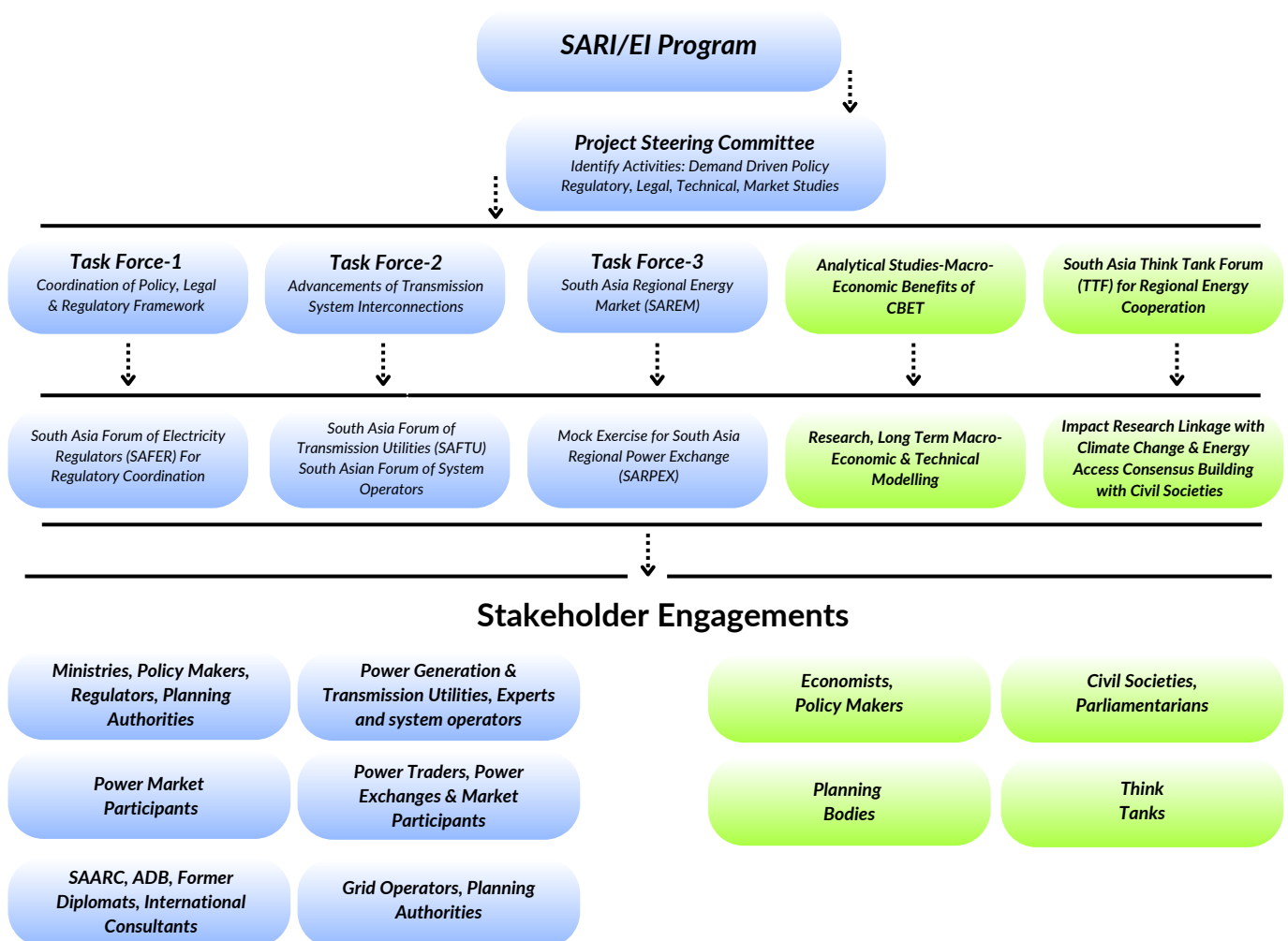


Figure 1: SARI/EI Program Structure

Project Steering Committee (PSC) is the apex body providing overall strategic directions to the SARI/EI program and has the following functions:



The three dedicated Task Forces (TF) address various issues related to CBET and provide practical and concrete recommendations for expanding CBET in the region during SARI/EI Phase IV (2012-2022). The brief details of each of the Task Forces are described below.

### TASK FORCE 1 (TF1)

#### “Harmonizing Policy, Legal and Regulatory Issues”

to create the enabling systemic conditions for a sustainable market for investment, institutionalisation and implementation of sustainable CBET.

### TASK FORCE 2 (TF2)

#### “Advancing Transmission Systems Interconnections”

to create enabling, systemic conditions for a sustainable market for investment and implementation of sub-regional transmission interconnections in the eastern sub-region of South Asia.

### TASK FORCE 3 (TF3)

#### “Establishment of South Asia Regional Electricity Markets”

by creation of enabling and systemic conditions for a sustainable energy trading and exchange market in the eastern sub-region of South Asia.

## Peek into the Past: History and Prior Phases (2000-2012)

### PHASE 1 (2001 - 2004)

The initial phase gave high emphasis on capacity building and information exchange.

Offered opportunities for exchanging information and building skills in analysis/negotiation with a view to enhance the understanding of the energy sector and create a pool of aware stakeholders.

Focused on the socio-economic aspects of regional energy cooperation, reaching stakeholders who can act as change agents—the media, public leaders, scholars, industrial energy consumers and trade unions.

### PHASE 2 (2004 - 2007)

In Phase II, SARVEI laid the foundation for increased clean energy access and improved market structures to facilitate regional investment in energy trade.

It focused on improving policy, legal, and regulatory framework for cross-border energy trade.

It identified, assessed, and promoted four cross-border energy trade and investment projects between India and its neighbouring countries. The program supported bilateral energy projects in and the long-term transit of energy to South Asia.

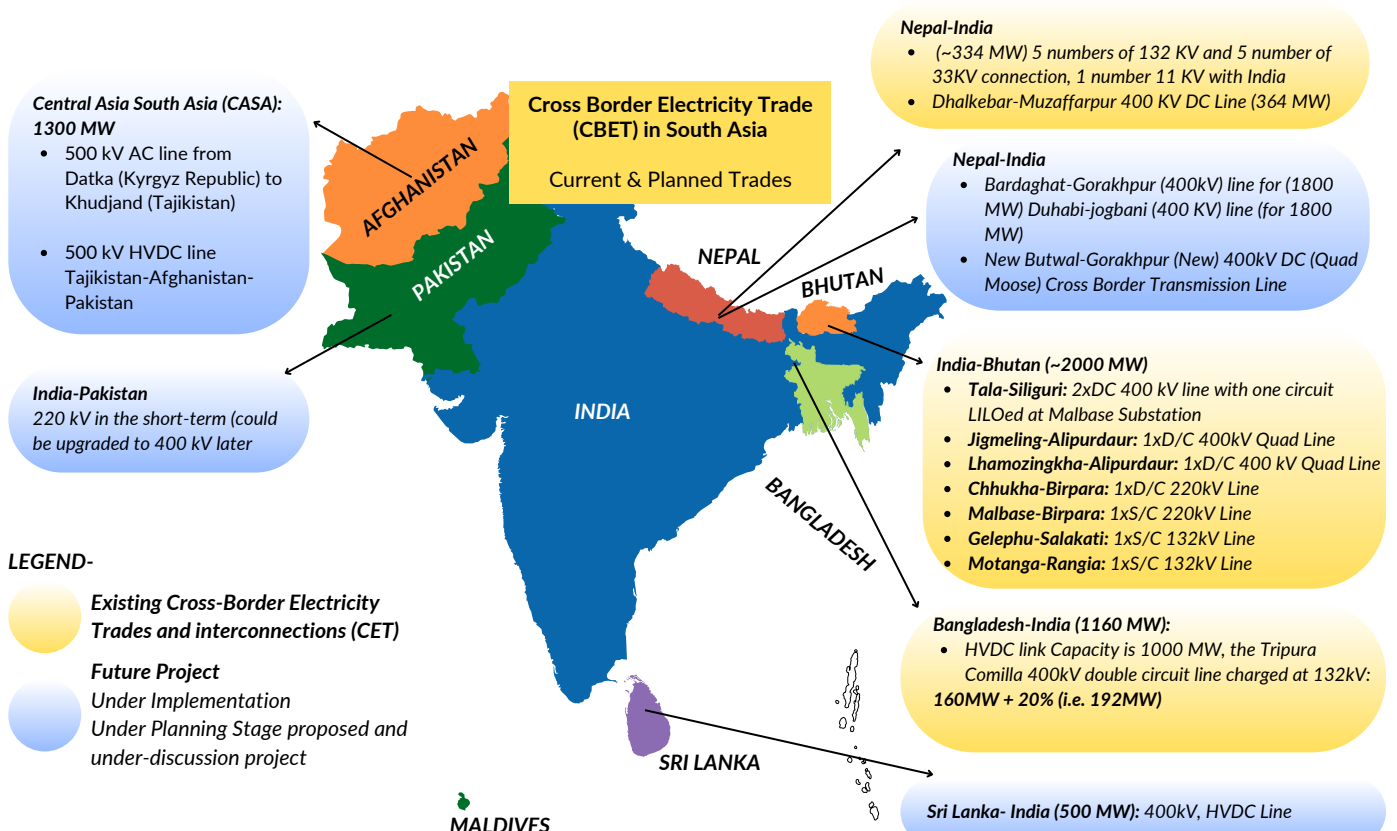
### PHASE 3 (2007 - 2012)

The third phase focused on enhancing regional energy security through mutual co-operation. Cross-border energy trade was significantly advanced by a series of technical assistance activities for the development of transmission infrastructure.

The regional energy market formation was supported through programs that helped energy planners and policymakers in understanding the key energy market trends, latest modelling techniques, and ways to hedge risk.

Figure 2: Phase-wise historic activities of SARI/EI

## Current Scenario of Cross-Border Electricity Trade (CBET)



## SARI/EI Phase IV and Extended phase (2012-2022)

SARI/EI works with government departments and ministries, energy utilities, regulators, energy experts, diplomats, think tanks, businesses, academicians, regional institutions, multilateral development Banks, financial institutions, industry bodies, and other agencies to promote enhanced energy integration and cross border energy trade (CBET) in South Asian countries and South East Asia (BIMSTEC region). In the extended phase (2018-2022), SARI/EI is focused on implementation of CBET through institutionalization by proposing creation of regional bodies, graduating from bilateral to trilateral and multilateral trades and creation of a regional energy market. The SARI/EI program established a Think Tank Forum (TTF) to engage bureaucrats, policy makers, media, civil society and citizens to fast-track the agenda of CBET and regional energy cooperation among South Asian countries. The Program has also envisioned the formation of a Parliamentary Forum, a high level policy level forum of Parliamentarians of South Asian Countries to discuss, deliberate, share knowledge for advancing energy cooperation and energy trade in South Asia.

One of the most important objectives of the program is to create an enabling energy market in South Asia, not only to ensure a fair mechanism for CBET, governed by universally accepted market rules, along with technical rules, but also to attract private investment in the sector, and investment from multilateral funding institutions. SARI/EI program enhances knowledge-sharing among regional stakeholders through quarterly SAFIR Regulatory newsletters, South Asia Energy Database, weekly Power Bulletin Compendium of Electricity Regulations of South Asian countries.

## Stakeholder Engagement

In the fourth and current extended phase, SARI/EI has been involved in more than 150 events and published 45 reports around themes related to CBET, as part of its stakeholder engagement and guidance mandate. These regular interventions during the last decade has resulted in successfully engaging more than 3000 stakeholders across various institutions, including government, energy utilities and energy sector related organizations, diplomats, international financial institutions, and think tanks/research institutions.



## Achievements and Outcomes

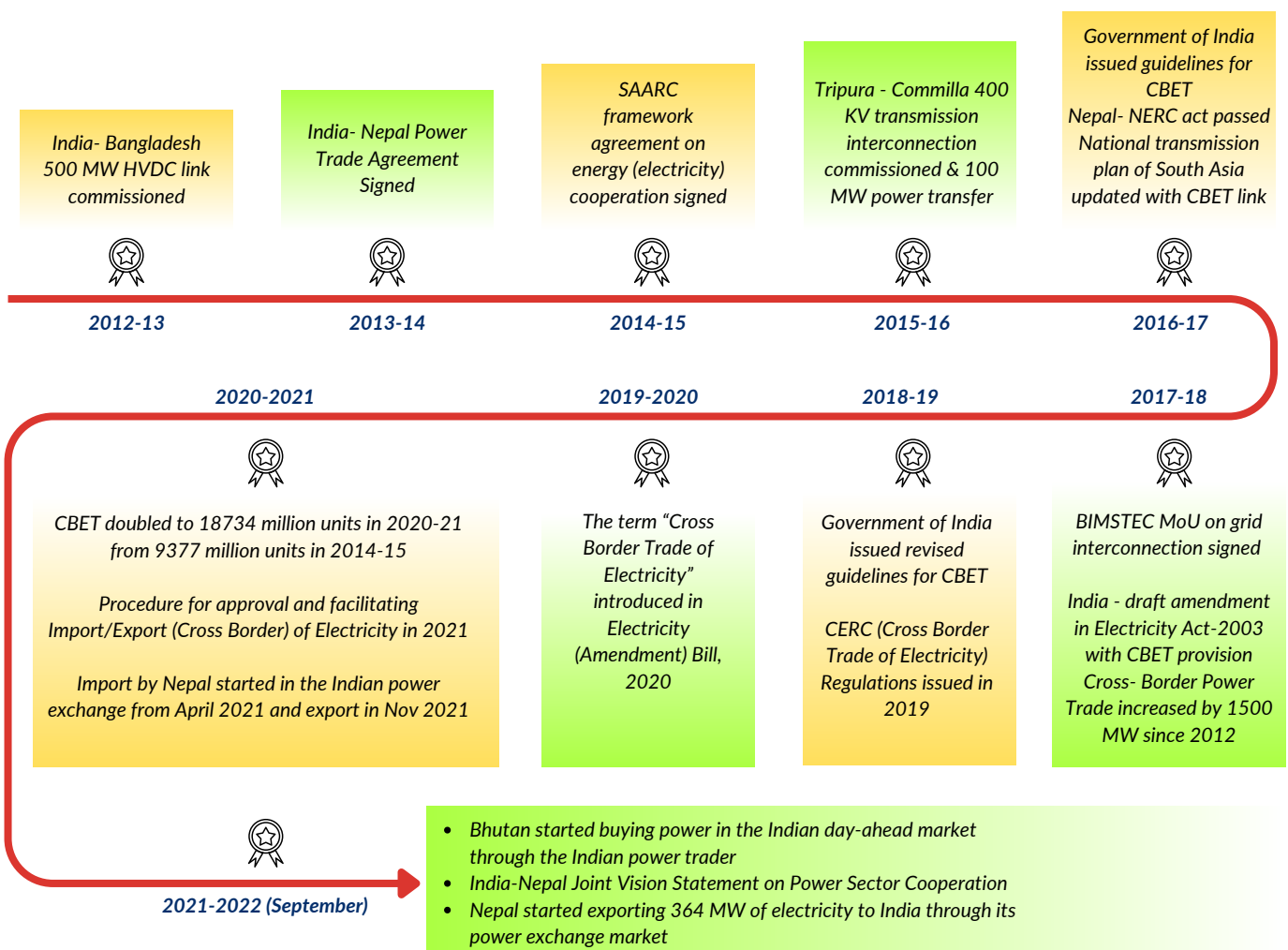
The three Task Forces took up demand-driven studies with tangible outcomes such as Regional Regulatory Guidelines (RRG) for Promoting CBET in South Asia, suggested changes/ amendments in Electricity Laws, Regulation and Policies, Grid Code provision required for CBET, Model Power Purchase Agreements and Transmission Service Agreements, Framework guidelines on Trading License and Market Design & Rules for South Asia Regional Power Exchange, Power Pricing Mechanism in South Asia, creating Regional Technical Institutional mechanism in South Asia Region for promoting CBET, Regulatory interventions for grid discipline and grid reliability in South Asia, creating South Asia Forum of System Operators for promoting CBET, Strategy paper for creating the South Asia Forum for Electricity Market for promoting CBET, Assessing the potential of gas for regional energy cooperation, Cross Border Natural Gas Trading potential in the South Asian countries, Transition of bilateral power trade to trilateral and multilateral power trade in South Asia.

## Achievements and Outcomes (Cont.)

Study on South Asia Energy/ Electricity Regulations to develop Regulatory Road Map for Electricity/Energy Exchange and Energy Cooperation (EC) among South Asian Countries, Regional Parliamentary Forum on Energy Cooperation and Energy Trade in South Asia, and Promoting CBET through the Power Exchange in India, by all South Asian nations, South Asia Forum on Energy Investments (SAFEI), 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, Empanel Think Tanks for creation of an outreach and dissemination forum to fast-track the agenda of Cross-border Energy Trade (CBET) and regional energy cooperation among South Asian countries.

Key stakeholders from South Asian countries worked together in a highly consultative and participatory manner for almost a decade and have taken steps to advance CBET in the region. The SARI/EI Secretariat also worked closely with regional institutions such as South Asian Association for Regional Cooperation (SAARC), South Asia Forum for Infrastructure Regulation (SAFIR), and Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC).

## Key Cross-border Electricity Trade Developments during 2012-22



# Reports Published During 2012 - 2022



# RENEWABLE ENERGY TRANSITIONS

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

IRADe studied an energy modelling study that 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 CO<sub>2</sub> 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).

### Supported by:

**UK Aid from the UK government under the Applied Research Program on Energy and Economic Growth (EEG), managed by Oxford Policy Management (OPM)**

### Duration:

**Mar 2019 to Mar 2022**

# GENDER AND ENERGY ACCESS

## 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.

**Supported by:**

**Loughborough University, MECS Programme, UK**

**Duration:**

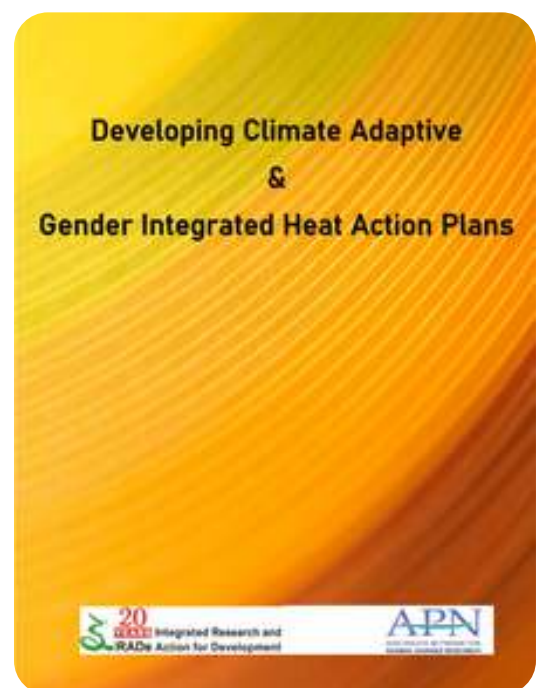
**Jul 2020 to Mar 2022**

# URBAN CLIMATE RESILIENCE

## Integrating heat action plans in climate policy & guidelines for evolving gender-sensitive heat adaptation plans in cities in South Asia

IRADe has developed climate-adaptive and gender-integrated heat action plans Collaborating with municipal corporations in Colombo (Sri Lanka), Rajshahi (Bangladesh) and Surat (India). The project engaged with key decision-makers and stakeholders to evolve and disseminate knowledge, build stakeholder capacity, and support cities in developing administrative capacity and increasing awareness among policymakers. Key objectives included disseminating knowledge of a replicable, spatially differentiated, and gender-sensitive Heat Adaptation Plan, building local-level stakeholder capacity, and developing an effective communication strategy.

The Gender-Sensitive Heat Action Plan (HAP) aims to address heat stress through a gender-inclusive lens. The plan emphasises comprehensive data collection, stakeholder consultations, and the development of targeted strategies and implementation protocols, prioritising gender-specific considerations at every stage. Beginning with comprehensive data collection and stakeholder consultations, the plan designs targeted strategies by analysing past trends, policies, and frameworks. Development entails translating insights into actionable steps through stakeholder engagement and surveys, ensuring a gender-balanced approach. Implementation involves training modules, sectoral integration, and community collaboration, emphasising outreach to women through tailored strategies. Further, monitoring and evaluation phases establish protocols for gender-specific tracking and regular reviews, ensuring continuous improvement and responsiveness to stakeholder feedback for an effective and evolving Gender-Sensitive HAP.



The project established gender-specific impacts of heat stress, developed technical and institutional capacities for gender-sensitive heat adaptation plans, and implemented climate adaptive frameworks in South Asia, fostering international visibility and collaboration for heat mitigation and adaptation.

### **Supported by:**

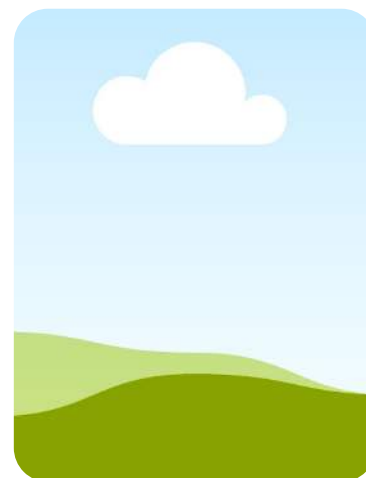
**Asia-Pacific Network for Global Change Research**

### **Duration:**

# URBAN CLIMATE RESILIENCE

## Regional Consultation on Strengthening Climate Resilient Low Carbon & Inclusive Growth in Asia Region

Climate Resilient Low Carbon Strategies combine strategies to deal with climate risks and action to reduce carbon emissions, focusing on improving social, economic, health, and livelihoods. There is a need for analysing and deliberating on the pathways required to achieve Net Zero commitments for the countries in the region and regional approaches to achieve climate commitments and sustainable, inclusive economic growth. IRADe worked on a landscaping report and convened a consultation with key regional stakeholders, policymakers, and researchers to deliberate on the pathways and priorities to achieve climate-resilient inclusive development in the background of Net Zero commitments.



Some of the key priorities which emerged from the project are:

- Building resilience to climate change depends on the preparedness to deal with the issues of the shock, including financial, technological, and societal resources. Multi-stakeholder, multi-sectoral arrangement is essential to manage the climate change and shape the development process in the region.
- Communities are central in addressing the climate resilience, low carbon and inclusive growth and there is a need to identify potential force multipliers in the region. Community based organisations like cooperatives have huge potential for inclusive and sustainable development.
- Regional connectivity, technology, and private sector involvement are critical to developing sustainable renewable energy. Regional cooperation on energy transition, regional grid system, and multi-lateral water arrangements will build capacity of the nations.
- Cleaner production, circular economy, renewable resolution, and sustainability can help mitigate risks of climate change, biodiversity loss and pollution.

**Supported by:**

**International Development Research Centre (IDRC), Asia**

**Duration:**

**May 2022 to Aug 2022**