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South Asia Regional Energy Partnership (SAREP) Presentation

on

Updates on the planned Interventions of the SAREP Task Force-2 on “Advancement of Transmission System Interconnections for Cross Border Electricity Trade (CBET) ”

Session 3: Updates on the planned Interventions of the SAREP Task Force-2 on “Advancement of
Transmission System Interconnections for Cross Border Electricity Trade (CBET) ”

11th Meeting of SAREP Task Force-2 on “Advancement of Transmission System Interconnections for Cross Border Electricity Trade”
14.15 -15.15 Hrs.16th February 2023, Karnali Hall, Kathmandu Marriott Hotel, Kathmandu, Nepal

Presented by
Rajiv Ratna Panda and Ajit Kumar



Content

- 01** Recap of the TOR of the SAREP Task Force -2 and key activities
- 02** Study on determining Regional Supply-Demand Scenario and Cross Border Electricity Trade potential in next 20 years.
- 03** Study on assessing the technical and economic aspects, in the form of prefeasibility study/analysis of cross border transmission for a few priority interconnections, to prioritize investments.
- 04** Regional Master plan study on developing the BBINS Long term perspective South Asia Regional Electricity Generation and Transmission Plan in next 20 years.
- 05** Creating/enhancing the operational procedures for nondiscriminatory access to the transmission network for all kinds of trade, including for collective transactions from the perspective of CBET.
- 06** Creating/enhancing framework/rules for coordinated grid operation for a safe, secure, stable, and reliable regional grid, in the context of CBET.
- 07** Supporting the creation of regional institutions for transmission planning and system operation, i.e., South Asia Forum of Transmission Utilities and the South Asia Forum of System Operator, activities under the forum.
- 08** Conducting knowledge exchanges, international study tours -Europe/ASEAN/USA, executive exchanges, and capacity-building activities
- 09** Update on South Asia Energy Database (SAED)



SAREP'S CROSS BORDER ELECTRICITY TRADE TASK FORCES

1. Task Forces are envisaged to be the Heart of SAREP's Cross Border Electricity Trade (CBET) interventions.
2. Will assist in generating evidence based informed recommendation through technical assessments/ studies* on CBET and building consensus.
3. Focused, structured, consultative and participative approach will be followed across three key areas.
4. Continuous engagement (preferably a meeting in a quarter).
5. Members will be owners of the Task Force and its outcomes.
6. Joint TF meetings will be conducted – enabling institutionalisation and synergies among Task Forces.

* If members want a particular study to be carried out for the Task force, they may request for the same. SAREP will provide the necessary technical assistance.

Terms of Reference of SAREP Task Force-2 on “Advancement of Transmission System Interconnections” for Cross Border Electricity Trade (CBET)

Objective :

The key objective of STF-2 is to *advance Transmission Systems Interconnection through identifying the import-export opportunities for technically and economically feasible cross border interconnections considering generation capacity additions, development of intercountry coordination procedures and standards required with respect to regional power system planning, design, and system operations, consistent with the evolving legal, policy and regulatory practices, and facilitate the implementation of the regional bilateral, trilateral transmission interconnections in South Asia for development of South Asian Regional Power Grid.*

Key Scopes:

1. Taking forward recommendations that emerged from the SARI/EI studies.
2. Regional Supply-Demand Scenario and CBET potential by 2040.
3. BBINS Long term perspective South Asia Regional Electricity Generation and Transmission Plan up to the year 2040 including identification of transmission capacity and cross border system interconnection options for regional cross border trading along with funding/investment models for cross border Transmission Infrastructure.
4. Assessing technical and economic aspects in the form of prefeasibility analysis of cross border transmission (for few priority interconnections) for prioritization of investments.
5. Operational procedures for nondiscriminatory access to transmission network for all kinds of trade, including for collective transaction from the perspective of CBET.
6. Suggest framework/rules for coordinated grid operation for a safe, secure, stable and reliable regional grid, in the context of CBET.
7. Support creation of regional institutions to support transmission planning and system operation i.e., South Asia Forum of Transmission Utilities (SAFTU), South Asia Forum of System Operator (SASFO) and implementation of various technical activities under SAFTU and SAFSO
8. Knowledge exchange, study tours, executive exchange and capacity building activities.

TF-2 Study on Regional Electricity Supply-Demand Scenario and Cross Border Electricity Trade (CBET) Potential by 2043

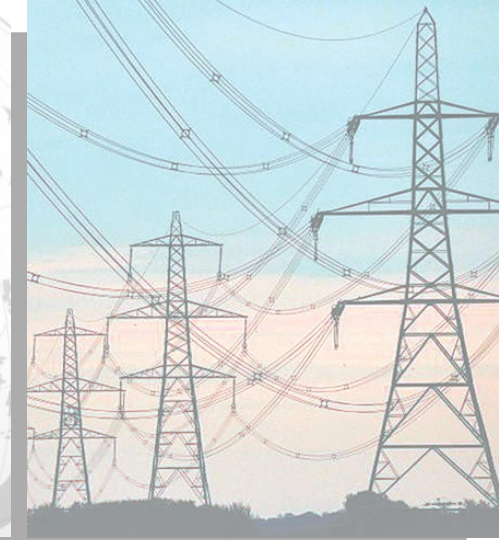
Objective :

- ❑ To identify the Cross Border Electricity Trading Potential in (MW, MWh.) of the South Asian (SA) nations over a period of next 20 years (2023-2043).
- ❑ The Detailed TOR is being presented in Session -4

TF-2 study on to “Assess Technical and Economic aspects, in the form of Prefeasibility Analysis of Cross Border Electricity Transmission for a few Priority Interconnections, so as to Prioritize Investments”

Objective :

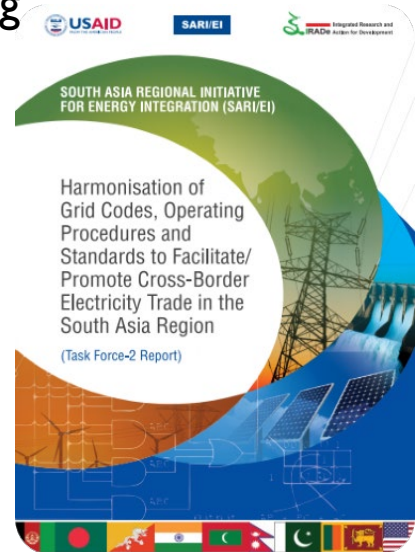
- ❑ To identify the priority cross border transmission interconnections and conduct prefeasibility studies on identified priority cross border transmission interconnections and inform investor community for mobilising the finance.
- ❑ The Detailed TOR is being presented in Session -5



Regional Master plan study on developing the BBINS Long term perspective South Asia Regional Electricity Generation and Transmission Plan

Regional Master Plan Study on Developing the BBINS Long Term Perspective South Asia Regional Electricity Generation and Transmission Plan

- ❑ TF-2 report suggested-The Master Plan shall form the basis for planning of the interconnected network among the member countries.
- ❑ A major collaborative planning effort will be needed to bring together the existing grids of the member countries and the planned regional super-grid.
- ❑ BIMSTEC Grid Transmission Master Plan is underway.
- ❑ SAREP will explore ways to support the work of BIMSTEC Grid Transmission Master Plan .











05

Creating/enhancing the operational procedures for nondiscriminatory access to the transmission network for all kinds of trade, including for collective transactions from the perspective of CBET.

Framework & Guidelines
for
Non-discriminatory Open Access in
Transmission for Facilitating Cross Border
Electricity Trade in South Asia



Current Power Market Reform and Integration in South Asia

Country	Power Trading and market Structure	Single Buyer	IPPs	Non-Discriminatory Open access Framework	Transmission System operation (as a part of Transmission Agency)	Independent transmission system operator	Competitive Power Market Power/Gas Exchange Platform	Cross Border Electricity Trade Through Power market
Afghanistan 	Single Buyer (SB)-DABS, VIU-DABS							
Bangladesh 	Single Buyer (SB)-BPDB, Multiple Seller ▲Partial Unbundling of Transmission							
Bhutan 	Single Buyer without Generation Assets (SBWGA)-BPC, ▲▲Un-bundled transmission							
India 	Multiple Buyer & Seller Competitive Power Market Platform. Power Exchange (PXs) Completely Un-bundled transmission							
Maldives 	Single Buyer (SB), VIU-FENAKA							
Nepal 	Single Buyer (SB)-NEA, Multiple Seller VIU-NEA							
Pakistan 	Single Buyer without Generation Assets-CPPA-G (Market Operator)▲▲, Multiple Seller						▲▲▲	
Sri Lanka 	Single Buyer (SB)-CEB, Multiple Seller							

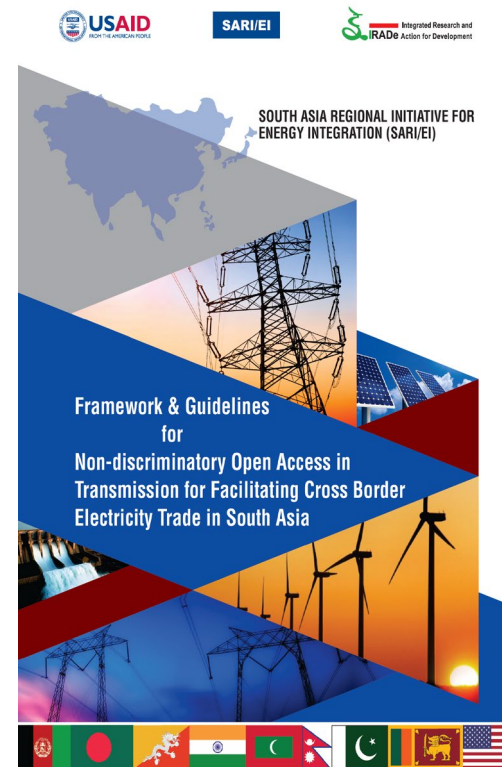
▲ Bangladesh- PGCB owns and operates the transmission grid, PGCB is a subsidiary of BPDB which undertakes generation and distribution ▲▲ Distribution Part of transmission

▲▲▲ Pakistan –Pakistan is working on the power market transition from the current single buyer to competitive market- Competitive Trading Bilateral Contracts Market (CTBCM) is designed and It is at advanced stage of launch/implementation. In May 2022, the Authority has granted market operator licence and approved market commercial code (MCC). As per the approved MCC; (a) the single buyer regime will end and DISCOs will be procuring power through centrally organized auctions run through the Independent Auction Administrator (IAA), (b) bulk power consumers (more than 1 MW load) will be given choice to procure power either from distribution company (DISCO) or it's competitive supplier and (c) market sales on merchant basis will also be allowed to interested generation plants including those retiring from legacy generation fleet or connected with the national grid as captive generating plants.

Creating/Enhancing The Operational Procedures for Non-discriminatory Access to the Transmission Network for all kinds of trade, including for Collective Transactions from the Perspective of CBET

Summary of Model guidelines for open access regime in South Asia

No.	Guideline	Components
1	Introduce enabling provisions for open access	<ul style="list-style-type: none"> • Introduction of open access in the legislative framework for electricity • Treatment of open access for cross border trade • Introducing changes in the power market structure to aid and enable open access • Enable system operators to co-ordinate cross border power flows
2	Define features and eligibility criteria for connectivity and open access	<ul style="list-style-type: none"> • Types of open access • Tenure and priority of various types of open access • Eligibility criteria for connectivity and open access
3	Fixation of open access charges	<ul style="list-style-type: none"> • Segregation and fixation of transmission and system operation charges • Application fees • Relinquishment charges for open access
4	Terms and conditions, and information system for open access	<ul style="list-style-type: none"> • Terms and conditions for open access • Open access register and other information systems
5	Procedure for grant of connectivity and open access	<ul style="list-style-type: none"> • Procedure for connectivity • Procedure for STOA, MTOA and LTOA • Nodal agencies, processing time lines, required documents etc.
6	Establishing the operational and commercial mechanisms	<ul style="list-style-type: none"> • Approval of detailed procedures for open access • Committee to prepare monthly energy accounts • Standard agreements
7	Encouraging regional mechanisms for co-ordination in CBET	<ul style="list-style-type: none"> • Ensuring co-operation and support in the operationalization of regional forums for collaboration in CBET



Advocacy and Dissemination of Report Findings with updating with the recent changes

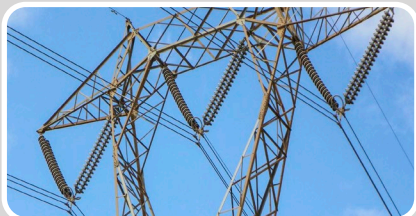


06 → **Creating/enhancing framework/rules for coordinated grid operation for a safe, secure, stable, and reliable regional grid, in the context of CBET**



Creating/Enhancing Framework/Rules For Coordinated Grid Operation for a Safe, Secure, Stable and Reliable Regional Grid in the Context of CBET

Drafting of Common Minimum Grid Code for Facilitating CBET



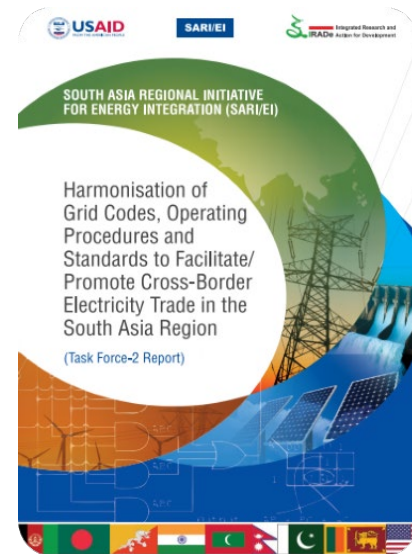
Facilitation of cross border trading of power, while ensuring secure, reliable, economic and efficient operation of the grid.



*Facilitation of the **coordinated optimal operation** of the South Asian Grid.*



Facilitation of coordinated and optimal maintenance planning of generation and transmission facilities in the South Asian grid.



Common Minimum Grid Code is under Advanced stage of development under SAFIR

Creating/Enhancing Framework/Rules For Coordinated Grid Operation for a Safe, Secure, Stable and Reliable Regional Grid in the Context of CBET

Draft Common Minimum Grid Code for Facilitating CBET

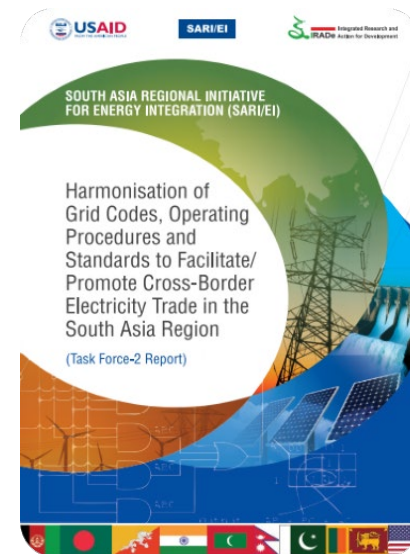
Connection Code

Operating Code

Scheduling & Despatch Code

Planning Code

Administration of the Grid Code



Common Minimum Grid Code is under Advanced stage of development under SAFIR

Creating/Enhancing Framework/Rules For Coordinated Grid Operation for a Safe, Secure, Stable and Reliable Regional Grid in the Context of CBET

Draft Common Minimum Grid Code for Facilitating CBET



Connection Code

- Procedure for Inter Country connection
- Important Technical Requirements for Connectivity to the Grid
- Connection Agreement



Operating Code

- Frequency Band 49.9 – 50.05 Hz
- Voltage Band for 400 kV at inter. Point 380-420 kV
- System Security-Protection Coordination & periodic Protection testing
- Operation liaison.
- Restoration Plans including Black Start.
- Periodic Reports – Daily, Monthly Reports.
- Outage Planning



Scheduling and Dispatch Code

- Scheduling and Despatch Procedure.
- Maintaining actual drawal from SA Asia grid close to schedule
- Deviation Settlement mechanism.
- Reactive power drawals to be controlled at inter-country connection points.



Administration of the Grid Code

- Committee for Review of the Grid Code.
- Ultimately, the Forum of South Asia Regulators would do that.

Common Minimum Grid Code is under Advanced stage of development under SAFIR



SA REGIONAL INITIATIVE
ENERGY INTEGRATION (SARI/EI)

...ing consensus and developing a strategy
...er on “Creating Regional Technical
...stitution/Body for cross-cutting
...liberations and promoting excellence
...owards the development and operation of the
...regional transmission network in South Asia”

07 → South Asia Forum/Network of Transmission Utilities



Mission

To act as a regional technical institution to facilitate and render support towards harmonised transmission system development and operation, incidental to cross border interconnections, leading to the development of South Asia Power Grid and also to venture towards energy integration of South Asia region with nearby regions such as South East Asia, Central Asia and Middle East.

The key objectives for SAFTU can be as follows:

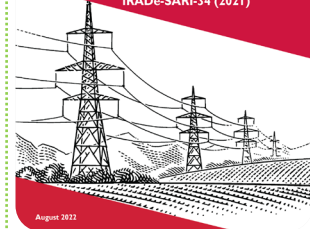
- Act as a platform for crosscutting deliberations and exchange of ideas on the subjects related to network development and operation in South Asian Grid;
- Dissemination of knowledge towards deployment of advanced and efficient networks in the region, particularly keeping in view the need towards renewable energy integration and grid balancing and integrating diverse sources of energy available in the South Asia region;
- Provide a platform for enabling harmonisation of guidelines and operating codes through discussions and try to build consensus through discussions on the issues of common interest;
- Undertake research, technical studies, and come up with white paper and discussion briefs in relevant areas of integrated system planning and network development;
- Conducting workshops and conferences at regular intervals, involving the concerned stakeholders from different countries in South Asia, towards promoting excellence and greening the regional grid;
- Promote and render assistance towards knowledge sharing, capacity building & training in system planning, network development, RE integration, etc.



SOUTH ASIA REGIONAL INITIATIVE FOR ENERGY INTEGRATION (SAR/IEI)

Building consensus and developing a strategy paper on "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"

IRADe-SARI-34 (2021)



August 2022



TF-2 Members support in creating South Asia Forum/Network of Transmission Utilities will be key



07 South Asia Forum/Network of System Operator



South Asia Forum/Network of System Operator

Mission

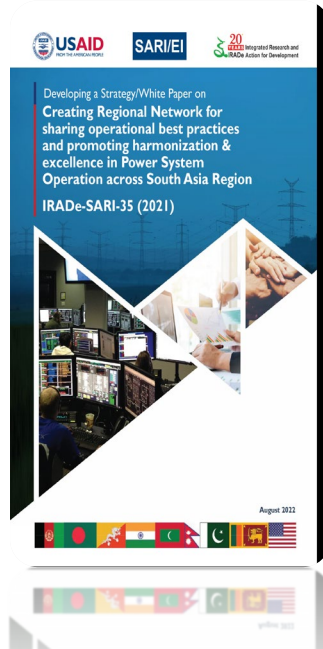
To be a regional network for **cross cutting deliberations, exchange of ideas, sharing of operational best practices and capacity building in the matters related to safety, security, reliability, sustainability and economy of the Power System Operation** in South Asia Region, as well as endeavour to collaborate with the neighbouring regions on the issues of common interest.

The key objectives for SAFSO can be as follows:

i. Exchange of Ideas: Act as a platform for crosscutting deliberations and exchange of ideas towards promoting safe, secure, reliable and efficient power system operation in South Asia. This shall include documentation and sharing of experiences related to system operation, discussions on standard operating procedures/guidelines and harmonization of practices including international benchmarking in the matters related to system operation;

ii. Knowledge Dissemination: Sharing of know-how on advanced/sustainable energy systems, their impact (economic, social, environmental etc.), particularly in the areas of renewable energy integration and grid balancing, taking into view the diverse sources of energy available in South Asia region;

iii. Technical Support/Expert Advice: Carry out technical studies/assessment in the area of power system operation for the purpose of knowledge creation and creating evidence to support CBET. This shall include leveraging expert advice and know-how including global experiences in power system operation;



TF-2 Members support in creating South Asia Forum/Network of System Operator will be key

South Asia Forum/Network of System Operator

The key objectives for SAFSO can be as follows:

iv. Skill Development:

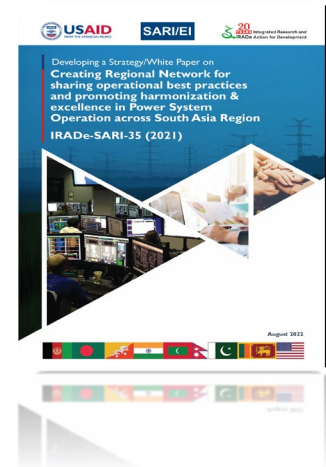
Facilitate and render assistance towards skill development and capability enhancement of human resource employed at the Load Despatch Centres. This shall be done with the intent to use the latest technologies and tools, in order to further enhance the level of system operation;

v. Workshops/Conferences:

Conduct workshops for different stakeholders in SAC on matters related to system operation. These shall include the different aspects related to sharing operational practices, promoting harmonization & excellence in system operation and matters related to greening the regional grid;

vi. Deliberation on Best Practices/Issues:

Discuss the best practices and technical issues related to system operation in the different parts of the region and across the globe and try to build consensus through discussions on the issues of common interest and goal.



TF-2 Members support in creating South Asia Forum/Network of System Operator will be key



08 Conducting knowledge exchanges, international study tours - Europe/ASEAN/USA, executive exchanges, and capacity-building activities



International Study Tour to Western Energy Imbalance Market (WEIM)- What is unique about it ?

The concept behind the **EIM is nothing new**. All Independent System Operator (ISOs) and Regional Transmission Organizations (RTOs) run **integrated day-ahead markets and real-time markets**, which include 15-minute and five-minute markets.

But what is different about WEIM is that **CAISO** has made its markets available to entities outside of its ISO territory.

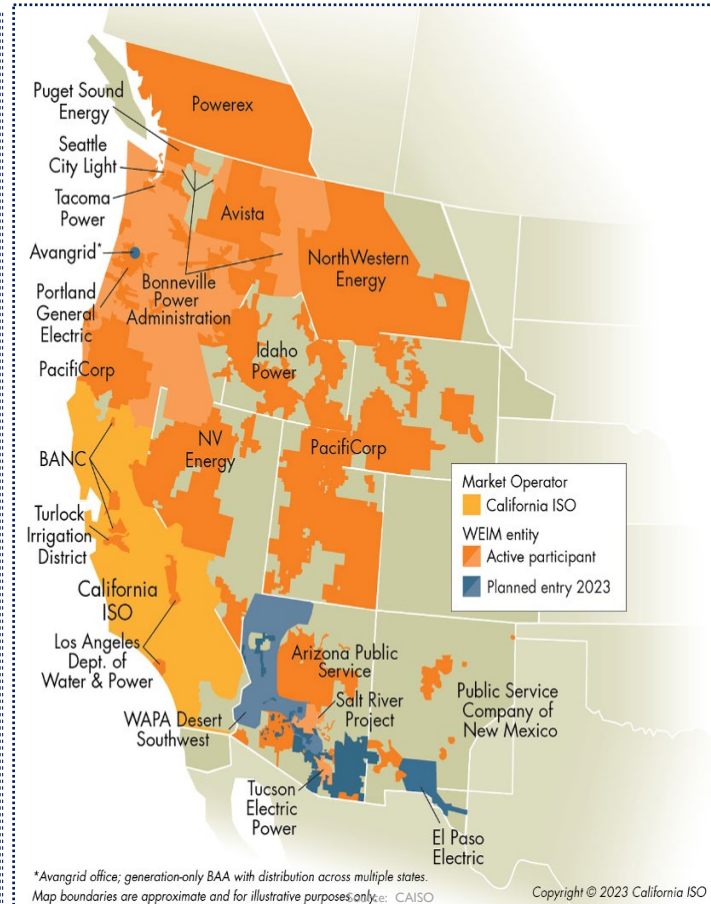
The WEIM serves parts of **Arizona, Oregon, Nevada, State of Washington, California, Utah, Wyoming and Idaho**.

Powerex Corp, based in Vancouver, British Columbia, Canada also participates in the WEIM.

The result has been enhanced grid reliability and cost savings for participants in the hundreds of millions of dollars.

Besides its economic advantages, the EIM improves the **integration of renewable energy, which leads to a cleaner, greener grid**.

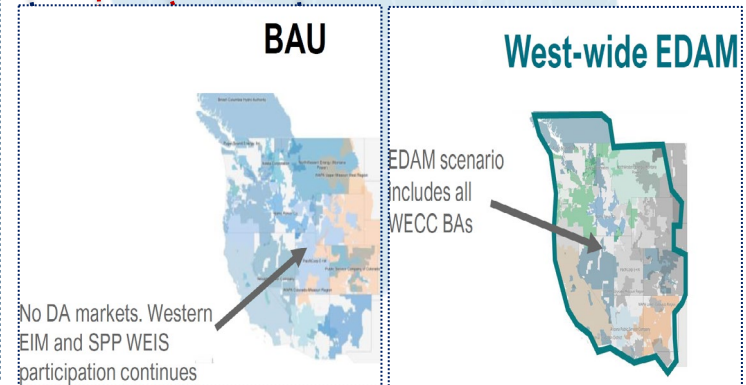
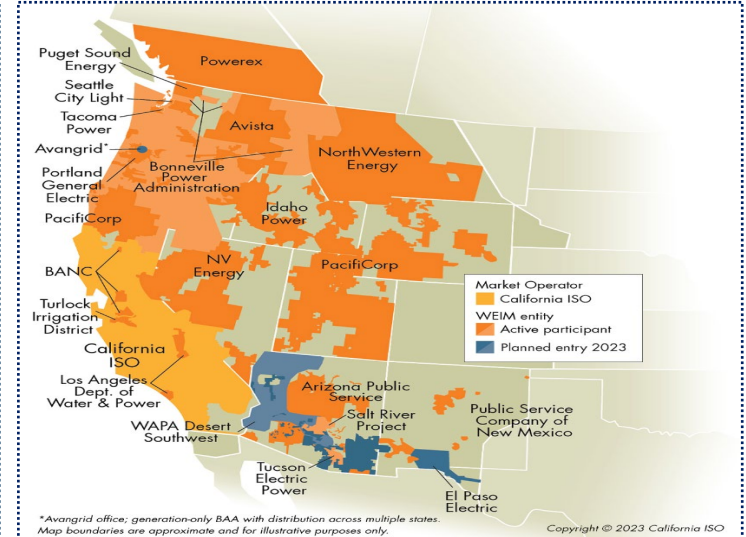
April 3, 2022, CAISO hits all-time peak of more than 97% renewables

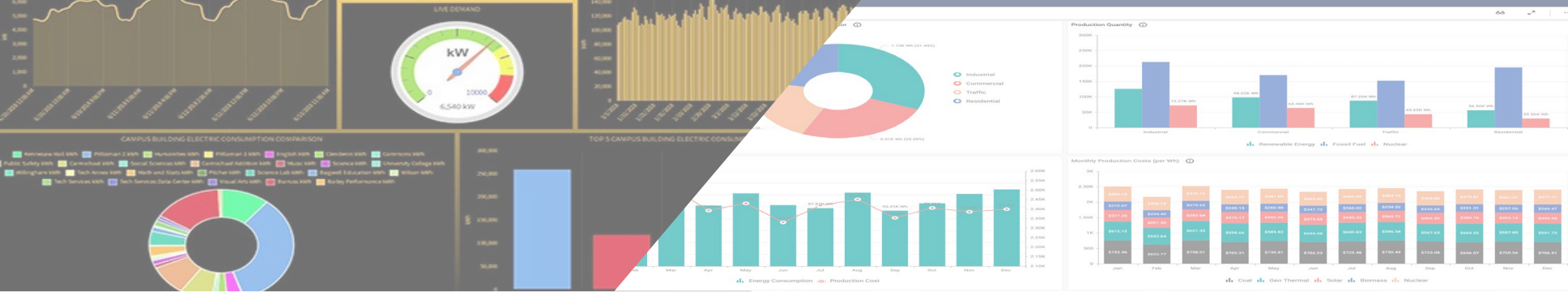


International Study Tour to Western Energy Imbalance Market (WEIM)- Learning from CAISO, WEIM

Through the Study Tour, It will be interesting to learn:

- How **CAISO** allowed other parties to participate outside of his territories ?
- What was the **motivation** ?
- What is the **process** followed for **Joining** the WEIM ?
- What **kind of agreement** were needed for WEIM ?.
- What is the **governance structure** ?
- What are the **minimum technical, legal, regulatory and commercial requirement** to Join the EIM.
- How **Powerex of Canada** joined WEIM ?
- What is the **overall regulatory framework** governing WEIM ?
- What is the **dispute settlement method** ?
- How the **Regional Conesus** built for WEIM ?
- How **WEIM Charter** drafted and adopted ?
- What is the **Extended day-ahead market (EDAM)** design, implementation action ahead.
- How is **consensus**-built on EDAM ?
- How were the **Political, regulatory and territorial issues** managed ?
- How the **competition among states** are managed/tapped ?





South Asia Energy DATABASE

South Asia Energy DATABASE

Home | Dashboard | Regional Data | Analytics | Reports | Institutional | Login

USAID SARI/EI

South Asia Energy Database

About SAED

South Asia Energy Database is a single point platform to disseminate data and information related to Energy / Power Sector in South Asia region.

It acts as an information repository to reduce data asymmetry and helps towards high quality data research and analysis about the region.

[Know More](#)



09 South Asia Energy Database (SAED)

Objectives:

- ❑ To create a **single point, user-friendly data** source;
- ❑ To promote **data transparency** and help **high quality data research and analysis**;
- ❑ To **disseminate data/information** on the key indicators of power/energy sector for all the **South Asian countries**;
- ❑ To Act as **information repository** for the power/energy sector of **South Asian countries**;
- ❑ **Launch of database at Delhi (India) on 22nd June 22, High Level Demonstration and Training- Nepal(18th July 2022), Bangladesh(31st July 2022), Bhutan (12th August 2022)**

South Asia Energy Database

Home | Dashboard | Regional Data | Analytics | Reports | Institutional | Login

USAID SARI/EI USAID Program Research and Innovation Center for South Asia

South Asia Energy Database

About SAED

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[Know More](#)

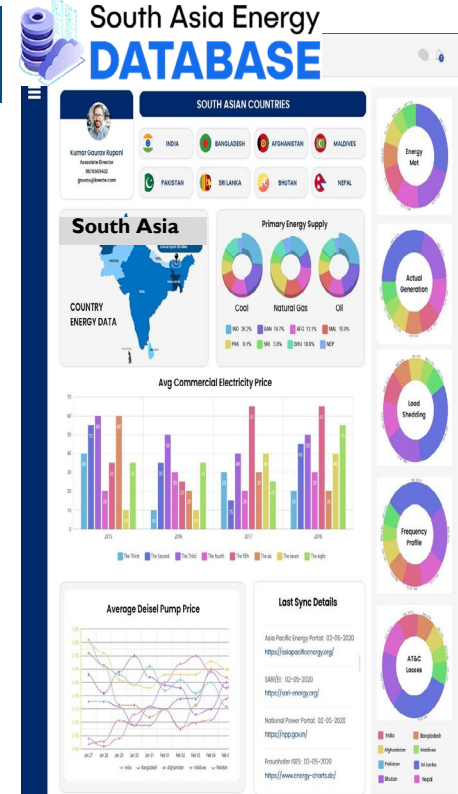
<https://www.southasiaenergydatabase.org/home>

A First of its Kind in South Asia, web portal along with Mobile application provides easy data access and portability

09 South Asia Energy Database (SAED)

A Comprehensive Energy/Electricity Sector Data Base

{Online, user friendly, data Analytic, Indicative Graphs, pie charts and Figures, Info graphics, Annual Data Book }



Power Related Time Series Data

Energy Met, Actual Generation ,
Energy & peak deficits, Rate &
volume transaction of PXs

Cross Border (MU & MW),
Frequency Profile, Diversity
Factor, T & D losses

Electricity Generation Capacity
and Transmission Network

Installed capacity & Fuel Mix,
Transmission sector

Regional Power Transfer
Capacity, Basic Power Plant
details

Key Energy Statistics (Both Year
wise and Past Trends &
Forecasts, Country Wise)

Per capita energy consumption,
Energy resource potential &
reserves, Primary Energy Supply
& Demand

Total energy consumption &
sector wise consumption, Energy
Balance, Energy access

Key Policy and Regulations

Key Energy & Power Sector
Related Laws, Policy &
Regulations

National Power & Energy Sector
Master Plans/Projection etc.

Attractive Dash board, Analytics, Automatic Report Generation, Country Comparative , Projections , Analytics

Strengthening of load dispatch centre/system operator's Real Time Data Acquisition System (RTDAS), Management Information System (MIS), data dissemination system and facilitating integration with SAED:

- ❑ Develop **comprehensive formats/templates** for detailed power supply position report of power system as needed.
- ❑ Detailed review of the **existing hardware and software/Information technology infrastructure** associated with RTDS, MIS, information management and data dissemination system and conduct detailed Gap analysis.
- ❑ **Comprehensive Strengthening Action Plan** for load dispatch centre/system operator's (SAPNL) covering all aspects such as :-
 - ❑ Including suggested **formats/templates for automatic and real-time data management** and dissemination for 15 minute wise, daily, monthly, quarterly and annual reports on a real time basis
 - ❑ The **infrastructure upgradation details** (such as hardware and software/Information technology infrastructure upgradation such as deployment/augmentation of Remote terminal units (RTUs), transducers and or any other technology for enhanced data acquisition etc.) and
 - ❑ The details required for **augmentation of the communication system.**
- ❑ **Project investment plan** and suggest procurement mechanism in consultation with load dispatch centre/system operator.
- ❑ **Support** in procurement, supply erection and commission of equipment.

Thank You



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Disclaimer

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