

Foundations for Energy Transition:

Creating Enabling Environment for Lasting Results

CONTENTS

2023

I. Context

- Objectives of the Foundations Program
- Innovation and adaptation amid crises
- The Foundations Program at a glance

II. Current Engagements

- Own-managed activities
- Regional/country grants

III. Looking Forward

- Key challenges and opportunities beyond FY23
- The Foundations Program's focus areas

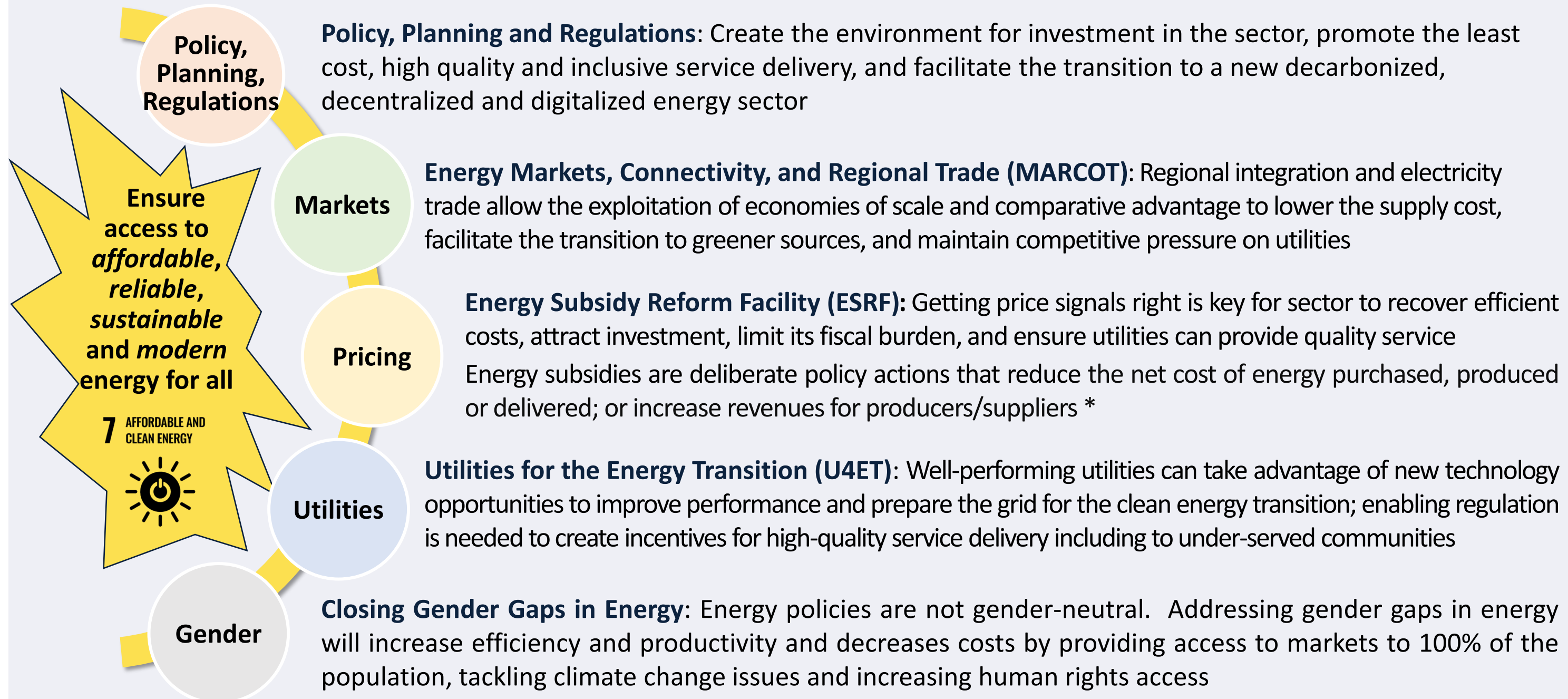


I. Context



Foundations for Energy Transition Program strengthens economic fundamentals for sustainable transition

2023



Foundations Program fosters innovative and adaptive approaches to address impacts from global crisis.....

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Climate change-induced natural disruptions, the Covid-19 pandemic, and the war in Ukraine have been both disruptive and transformative for countries' agenda of increased access and transition to clean energy



These crises have:

- created obstacles for policymakers to push for increased access and clean energy; led to reversing of past reforms, but also
- provoked a rethinking of traditional policy approaches and showed the advantages of innovative solutions.

ESMAP's Foundations Program continues to support governments and utilities in this evolving environment by providing comprehensive policy frameworks and implementation plans ***with innovative solutions, adapted to the changing conditions*** on the ground.

Crises create opportunities for fundamental changes if addressed properly

2023



1

Urgent need to accelerate integration of VRE and improve resilience in the context of exacerbated commercial losses for distribution companies.

The crisis is fertile ground for disrupting business-as-usual inertia

Implementing smart utility frameworks can provide win-win opportunities to sustainably improve utility performance, resilience, affordability and manage greater share of RE.

2

Electricity supply is more unstable due to spikes in electricity prices, as small, segmented markets are ill-equipped for responding to external shocks.

The worse the crisis, the higher the potential benefits of changes and reforms

This triggered a long-pending discussion on adjustments needed to the market design to facilitate faster integration of renewables, using more financial instruments in energy markets



3

Energy subsidies coming back rapidly and at much higher levels as governments try to shield consumers from rising and volatile energy prices

Short-term measures have shown to be effective tools for protecting consumers

Properly targeted transfers are more effective (and often lower cost) instruments than broad-based price subsidies, to meet the needs of the poorest and more vulnerable.

Foundations Program supports countries to adapt policies and innovate in times of change

2023

Nigeria | Power Sector Reforms for Clean Energy Transition

Planning – system impact of current PPAs -
Markets – review of vesting contract & PPA structures under market transition; **Pricing** – financial stabilization assessment for DISCOS, communication strategy, and debt analysis;
Utilities –utility-enabled rooftop solar potential assessment

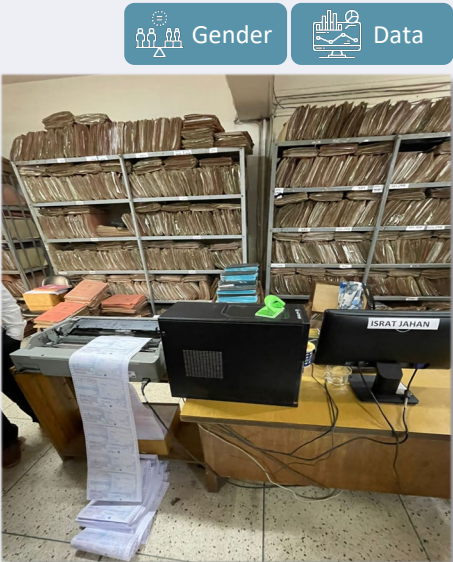
- Evidence on subsidy reduction and tariff reform
- Basis for more integrated system planning-based market reforms
- Basis for a target of solar energy



Bangladesh | Electricity Distribution Network Transformation

Utilities – Preparing the rural distribution system for modernized, digitized, efficient, and resilient operations, including deployment of SCADA, ADMS, smart meters, and solar rooftops.

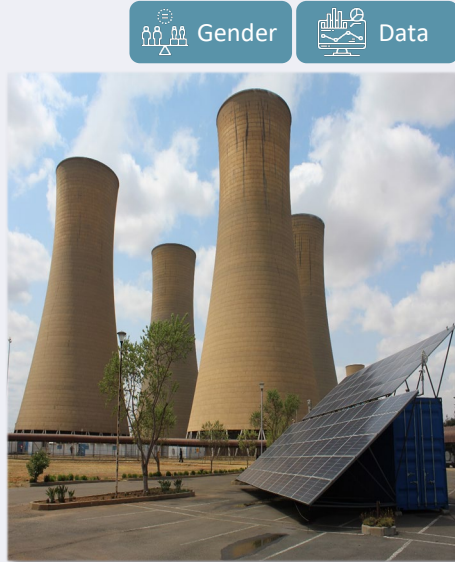
- Digitalization roadmap and masterplan for BREB
- Improved reliability and minimized losses
- Increased integration of distributed RE



South Africa | Introducing Market for Scaling Up Renewables

Markets – new legal & institutional framework for competitive & transparent electricity markets and improved sector financial viability through private investments in transmission & RE generation

- Legislation for wholesale electricity market enacted, RE generation & transmission capacity expanded by private investments
- GHG emissions reduced

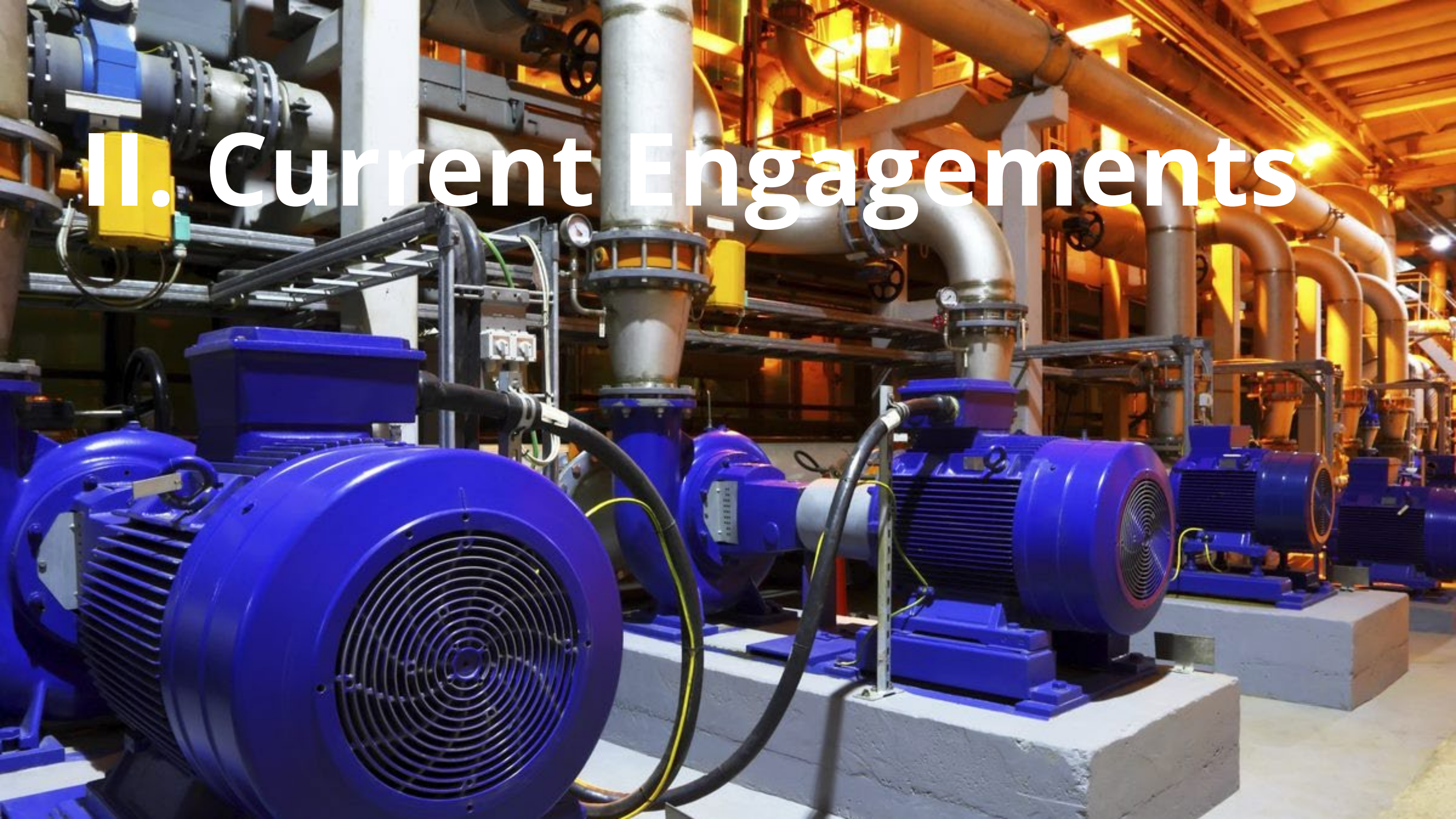


Kazakhstan | In-depth Subsidy Reform Initiative

Pricing – supports design and implementation of comprehensive subsidy reform program, including social mitigation measures to protect vulnerable customers & communication campaign to keep citizens informed

- Contribute to Gov's energy sector reform efforts via reduced subsidies , stronger institutional setup, improved sector financials, and better utility performance.





II. Current Engagements

Foundations Program established strong partnerships with development partners

2023

Why do we do it?

Supporting policy and regulatory frameworks: we work with partners to assist governments in designing and implementing effective policy and regulatory frameworks to promote sustainable energy development and attract private-sector investment

Building capacity: partnerships often involve capacity-building initiatives that help governments, utilities, and other stakeholders develop the necessary skills and knowledge to plan, implement, and manage sustainable energy projects and programs

Facilitating knowledge exchange: partnerships help foster knowledge exchange and learning among countries and stakeholders, enabling them to share experiences, best practices, and lessons learned in sustainable energy development

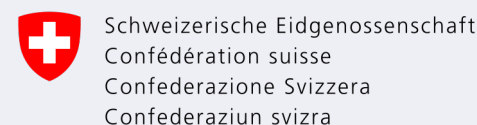
How does it help?

Leveraging resources: Partnerships enable ESMAP to leverage the resources, expertise, and networks of other organizations, which can help amplify the impact of its interventions

Enhancing credibility and Expanding outreach: Collaborating with well-established organizations and initiatives strengthens our position as a global leader in sustainable energy development.

Facilitating innovation: Collaborations with diverse stakeholders foster innovation by bringing together different perspectives, ideas, and approaches to address complex energy challenges.

Promoting synergies: Partnerships help create synergies and complementarities between different initiatives and organizations, leading to more effective and efficient use of resources and greater impact on the ground.



Energy Subsidy Reform Reference Group



Foundations Program delivers global knowledge products to inform countries and development partners (1/2)

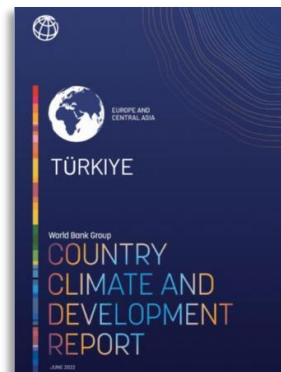
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Policy, Planning, Regulations

Foundations Program contribution to CCDR and decarbonization

Energy and power sector decarbonization analyses are a critical element of the Country Climate Development Reports. ESMAP's modelling work supports country dialogue, CCDR and innovation with the ambition to inform decision-makers on **the trade-offs created by the energy transition** and to **identify policies and strategies** that will **minimize transition costs** and **maximize its development impacts**. The modelling work informed:

- 21 CCDRs;
- 5 Knowledge products from market-led decarbonization to impact assessment of electric vehicles and green hydrogen production deployment on the Turkey grid.



Markets

Wholesale Electricity Market Design Options for Developing Countries

The guidance note explores and catalogs processes and policies used to **transition from vertically-integrated systems and single-buyer mechanisms to a fit-for-purpose electricity market design** in the context of developing countries to ensure the least-cost dispatch/capacity outcomes, liquidity, investor confidence, and system flexibility.

- It discusses the starting positions, mechanisms of transition, and sequencing of reforms, bringing specific consideration to the ways of handling legacy contracts with IPPs.
- It includes case studies, highlighting specific country/region examples of transition (SAPP, India, Nigeria, etc.)



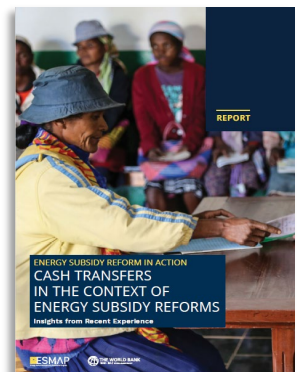
Pricing

Reforming Energy Subsidies in Developing Countries

The forthcoming flagship report focuses on **emerging approaches and lessons from ESMAP-funded energy subsidy reform engagements**. It reviews recent engagements to draw insights and fill knowledge gaps.

Multiple technical background papers, including:

- Use of **cash transfers** for energy subsidy reforms;
- Poverty and **distributional analysis** for reforms;
- Approaches for **macro-modeling** of subsidies
- Household energy subsidies – global review on **LPG**;
- Comparing **carbon pricing, energy taxes and subsidies**;
- Evolution of **price elasticity**.



Foundations Program delivers global knowledge products to inform countries and development partners (2/2)

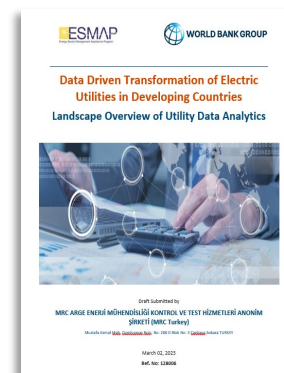
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Utilities

Data-driven Transformation of Electric Utilities in Developing Countries *(ongoing)*

Increasing digitalization has created an abundance of data in the power system, much of which remains “dormant”. The report provides:

- A landscape overview of data systems, use, impacts, and business models;
- Case studies of **best-in-class utilities that have deployed data and analytics to improve O&M and renewable integration**; and
- A roadmap and guidelines for utilities to systematically harness and deploy data analytics opportunities.



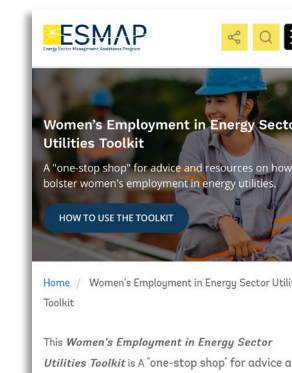
Gender

Women's Employment in Energy Sector Utilities Toolkit

Increasing women's participation in energy utilities result in better development outcomes including reduction of poverty and virtuous economic cycles. This toolkit is an online one-stop-shop for advice and resources on how to bolster women's employment in energy utilities.

The four modules are:

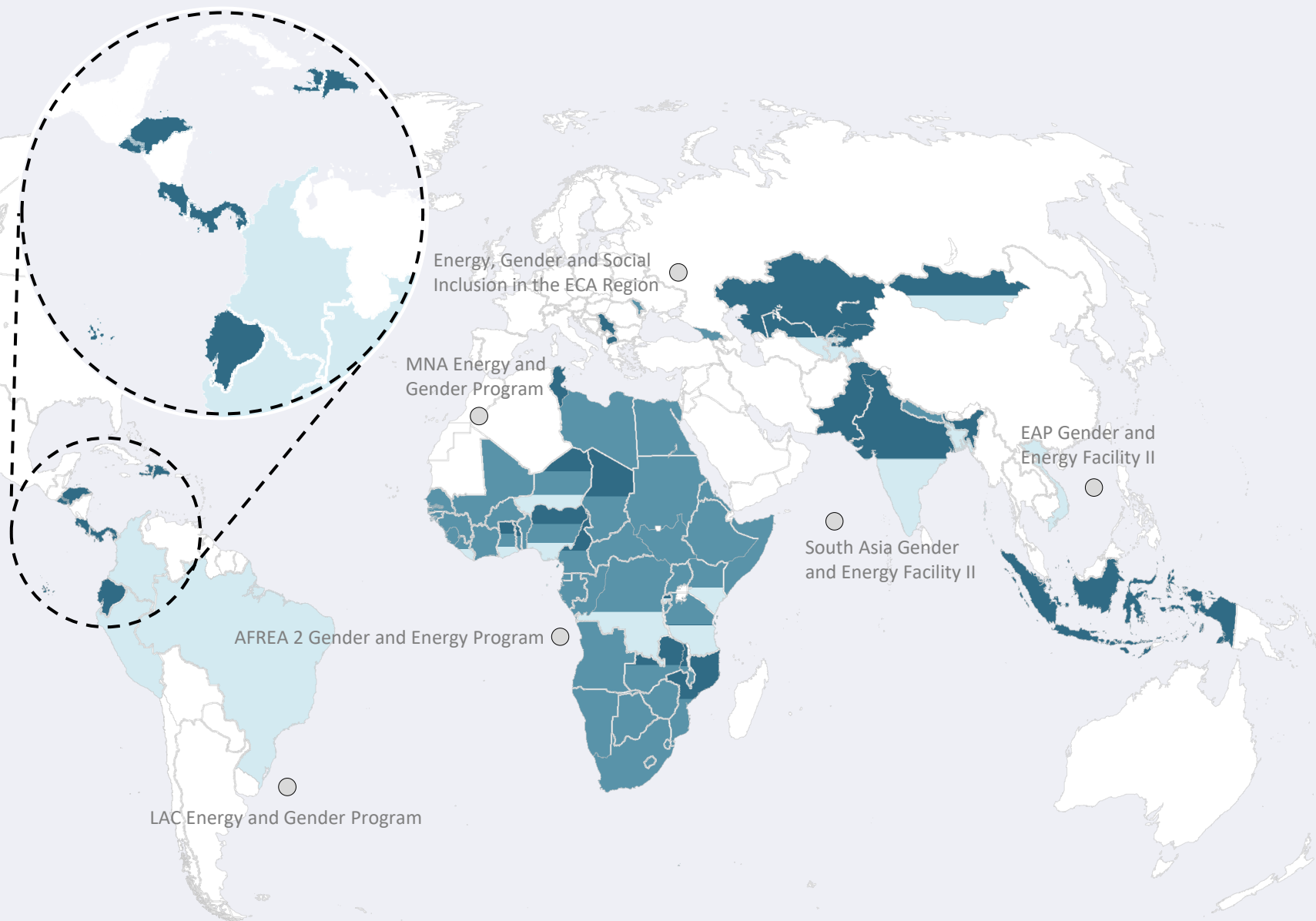
- Making the Commitment to Gender Equality
- Attracting and Recruiting Women
- Creating a Supportive Work Environment
- Advancing Women in the Company



Demand for regional and country grants has been growing

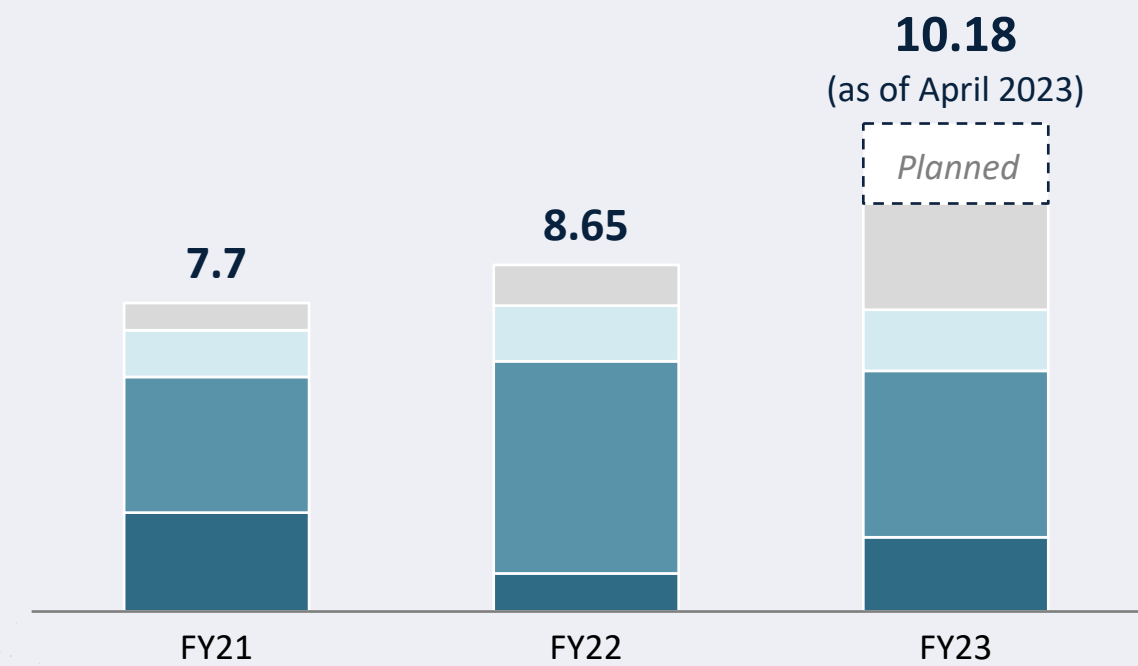
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Global Footprint (Countries where the Foundations Program has provided grants, FY21-23)



Note: global and regional activities are excluded (with the exception of AREP activities, i.e., African power pools) in the map

Annual Grant Allocation (million USD)



US\$ 26.5 million grants allocated in **70+ countries** directly/indirectly **over FY21-23**

The allocation for **FY23** amounts to **US\$ 10.2 million**, with an additional few million anticipated by June

- Legend:
- Closing Gender Gaps in Energy
 - Utilities for the Energy Transition
 - Energy Markets, Connectivity and Regional Trade (incl. AREP)
 - Energy Subsidy Reform Facility

Dominican Republic | Pricing Supporting Energy Subsidy Reforms



Gender



Data

2023

Tariff reforms to improve financial viability and efficiency while protecting the poor

Challenges

- High generation and system operating costs; high losses and widespread electricity theft
- Electricity tariff below cost-recovery levels, untargeted subsidies

Activities

Multi-year technical support, through WB Energy and Social Protection and Jobs GP collaboration, for:

- Development of electricity cost recovery tariff methodology
- Distributional analysis to identify poverty, social and gender impact of electricity tariff revisions.
- Reform of Bonoluz, assessment of distributional impacts. --> Policy actions captured in DPL series
- Integration of targeted electricity support (Bonoluz) into broader social protection program (Superate)
- Strengthening of social registries to better identify and target poor and vulnerable, incl. women.

Results

Achieved

- Informed Government Administrative Resolution on Bonoluz reform (DPL prior action)
- Contributed to government plan to address sector revenue shortfall
- Government announced its intention to resume gradual electricity tariff increases

Expected

- Mitigation of impact of planned electricity tariff increases through targeted cash transfers
- Increased number of beneficiaries and improved targeting through social protection system
- Reduced commercial losses from non-payment and theft



Image credit: Superate, Government of Dominican Republic

Southern African Power Pool (SAPP) | Planning & Markets

AFR RI-SAPP-Program for Accelerating Regional Energy/Transformational Projects



2023

Regional power integration strengthened to incorporate more renewables

Challenges

- Despite the abundance of energy resources in the region, including large hydro potential,
 - generation capacity remains inadequate to accommodate current, let alone future, demand
 - countries predominantly depend on high-cost and high-emission power plants
- The efficient option often relies on large generation and transmission investments of a scale that cannot be justified based on national demand alone

Activities

- Recipient-executed activities include: Complementing the IDA funds for the preparation of priority regional energy projects, Scaling up operations of the SAPP Project Advisory Unit (PAU), and Regional analytical support
- Has supported the development of 17 regional transmission and renewable generation projects
- Gender interventions to reduce gender gaps in the labor force.

Results

Achieved

- Financing secured and construction ongoing for Mozambique-Malawi and Tanzania-Zambia Interconnectors
- Regional balancing market trading instrument operationalized in April 2022
- Investment enabling regulations developed and adopted (transmission pricing, grid code) and private developers (and not only national utilities) are allowed to trade
- Competitive market share increased from 5% in 2015 to 25% in 2022 of total trade

Expected

- Connecting remaining countries to the regional grid and enabling private and climate financing for regional infrastructure
- Investment in large-scale renewable energy projects – following the RE roadmaps being developed in several countries – and boosted as regional power interconnection and market allow them to access larger markets



Automation and Digitalization of the Electricity Network in Mainland Tanzania and Zanzibar

2023

Electricity network modernization to improve reliability and efficiency

Challenges

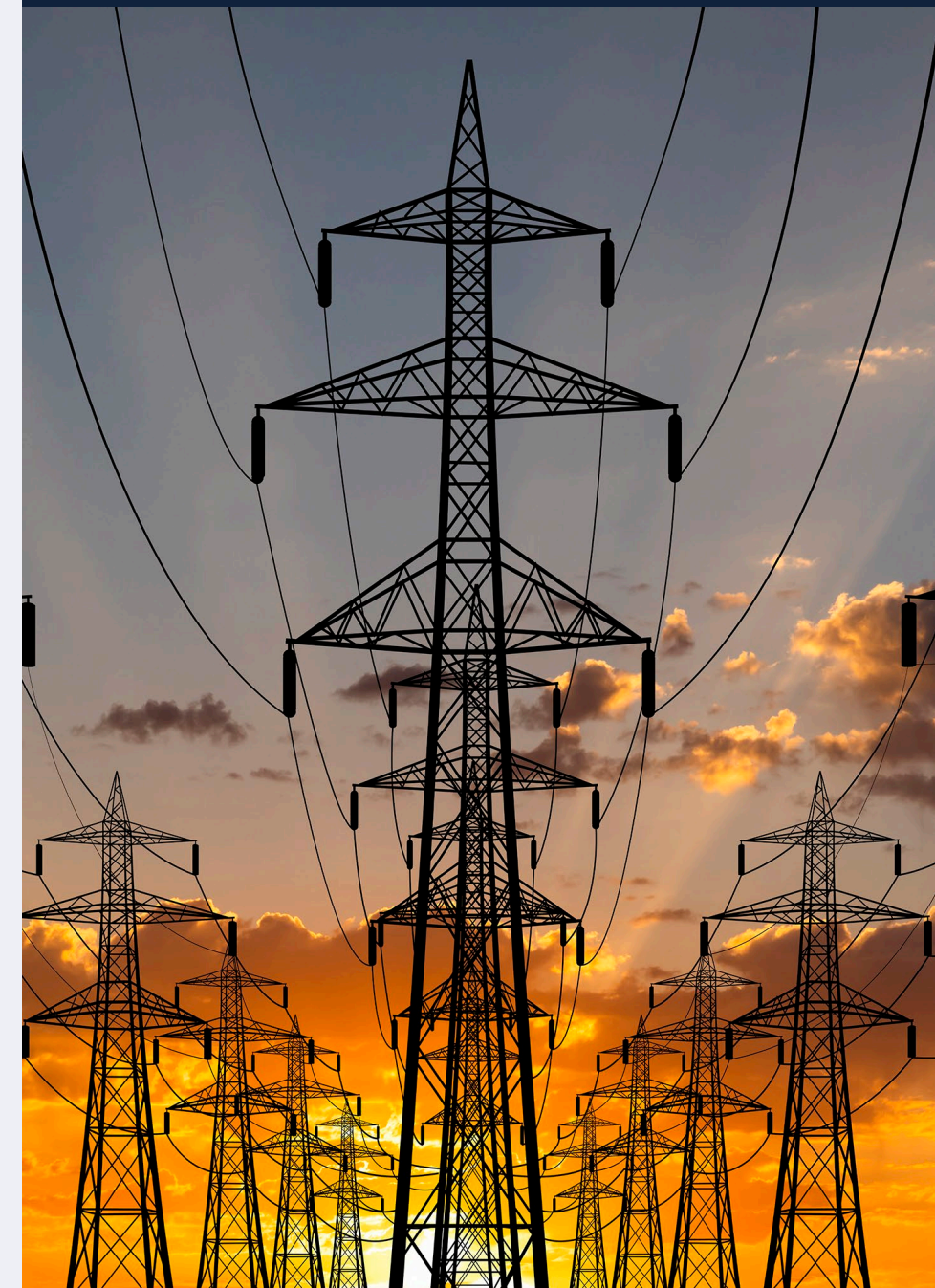
- Inefficient utility with outdated systems and processes
- High losses, especially in the distribution network
- Ambitious grid expansion for electrification and scale up of renewable energy resources
- Lack of grid control and visibility on the grid to manage planned VRE and BESS

Activities

- Diagnostic of current situation and development of performance improvement plan & digitalization roadmap
- Assessment and prioritization of IT/OT investments and institutional arrangements needed
- Design of demonstration Pilot (complementing ongoing AMI/AI pilot supported under AFD program)
- Related studies on VRE Grid integration, business models for distributed rooftop solar PV, regulatory framework tariff and design
- Gender assessment on women's employment to inform future operations

Expected Results

- Roadmap for automation and digitalization of Tanzania and Zanzibar's electricity networks
- Capacity building of utility in smart grid and digital technologies
- Modernization of the electricity network through the adoption of digital technologies
- Improving grid flexibility to facilitate VRE penetration and increased DERs
- Greater employment opportunities for women to close the gender gap



Assessing the Fiscal Risks Associated with the Wholesale Electricity Market Opening

2023

Informing the design of market mechanisms to support the energy transition

Challenges

- Georgia will open a Wholesale Electricity Market in the coming months with large uncertainties on the evolution of electricity prices, fiscal risks and impact on end-users' tariffs.
- Energy security and the energy transition are not yet considered in the market design

Activities

- Short term: Timely modeling analysis to assess potential impacts of the market opening on future power prices, financial viability of market operator and end-consumers tariffs.
- Long term: Identifying design options that would create a competitive market environment, improve resource adequacy, and boost the decarbonization process.
- Training and capacity building for women in technical roles.

Expected Results

- Quantitative analysis to support the decision-making process before and in the early stages of wholesale market operation.
- Knowledge and tool transfer to system operator, market operator, energy exchange and other counterparts.
- Regulatory recommendations on medium- and long-term market design options to support strategic goals related to decarbonization, reliability and security of supply.

Image credit: [Georgia Travel](#)

Global | Gender Regional Gender and Utilities Networks



Data

CG 2023

Regional Gender Networks that Promote Women's Participation in Energy Utilities

Challenges

- Women's participation in the energy sector remains low
- When women participate in energy sector they are segregated into non-technical or low professionalization jobs
- There is a lack of data and information regarding gender equality in the energy sector
- Utilities have limited capacity to design and implement activities that address gender gaps
- New challenges solutions are present

Activities

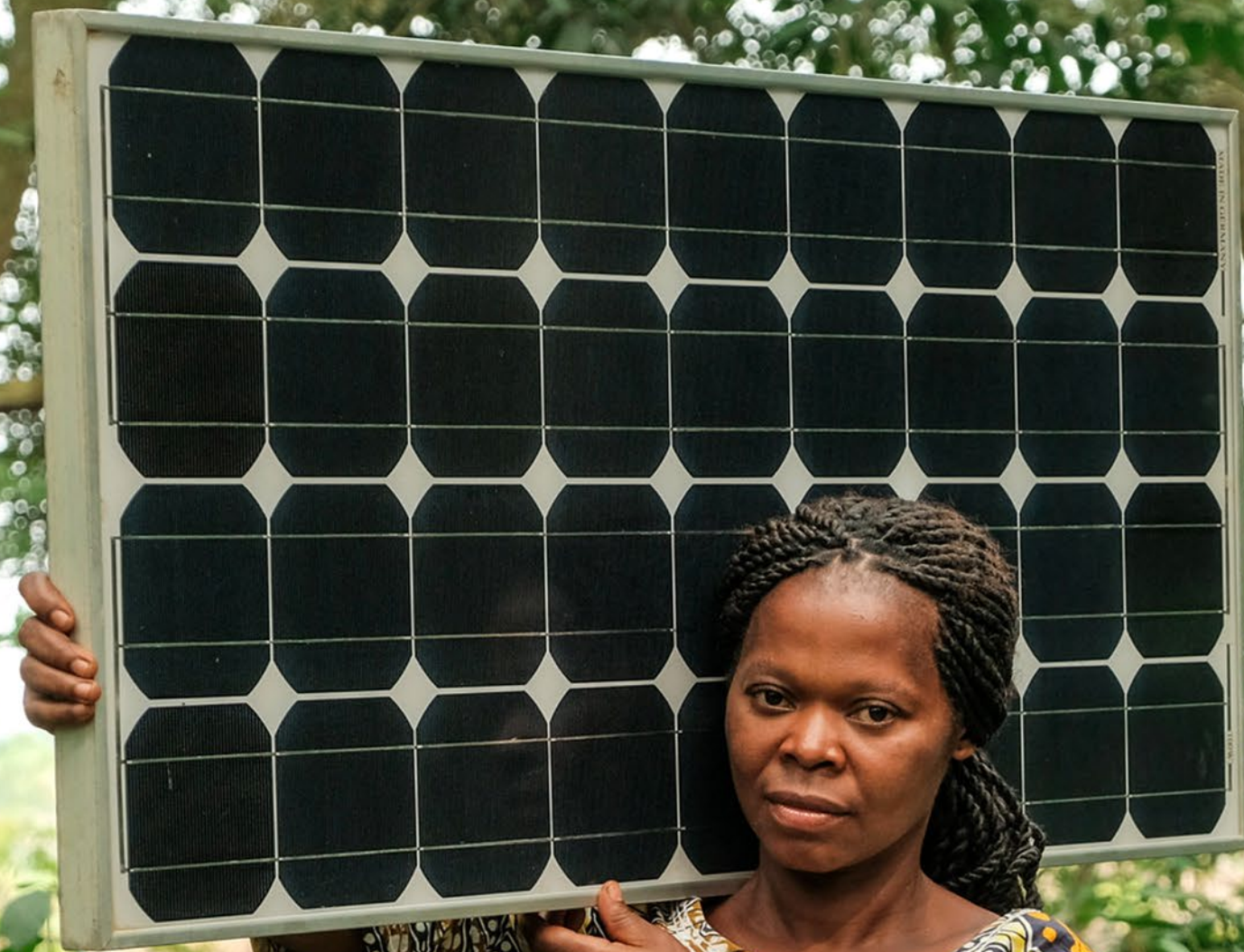
In close collaboration with client utilities from AFR, MNA, SAR and EAP:

- Setting voluntary agreements that aim to close and monitor gender gaps
- Identification of gender gaps for attracting, reattaining and promoting women in energy utilities
- Implementation of activities and monitoring indicators that aim to close specific gender gaps
- Holding knowledge sharing and capacity building activities for utilities staff

Expected Results

- Increase the number of women in technical roles at different levels within energy utilities
- Improve utilities facilities to ensure gender inclusion
- Build gender and technical capacity in utilities staff
- Decrease women's attrition in technical jobs
- Improve monitoring and evaluation of results





III. Looking Forward

Foundations Program is in line with the World Bank Evolution Roadmap Objectives

2023

Scaling up and optimizing for impact

ESMAP's Foundations support the efforts to maximize the development impact of having a well-performing energy sector through an increasing volume of grants supporting countries' efforts to strengthen the economic fundamentals in the five areas of Policy, planning and regulation, energy market, prices, utilities, and gender.

Stressing Sustainability & Resilience of Results

ESMAP's Foundations support systematically includes building capacity of local stakeholders and development of tools to monitoring results, two aspects of Foundation's work that allow our client countries to appropriate these activities and facilitate their capacity to achieve sustainability and resilience of Energy Transition reforms.

Supporting good country outcomes while addressing global challenges

ESMAP's Foundations works closely with regional institutions, and with bilateral and multilateral development partners in their support of Government Utilities and other stakeholders for designing and implementing effective policy and regulatory frameworks, developing regional energy markets, engaging in capacity-building activities of local institutions and individuals, and fostering knowledge exchange and peer-learning activities.

Engaging at regional and global level to complement country engagement

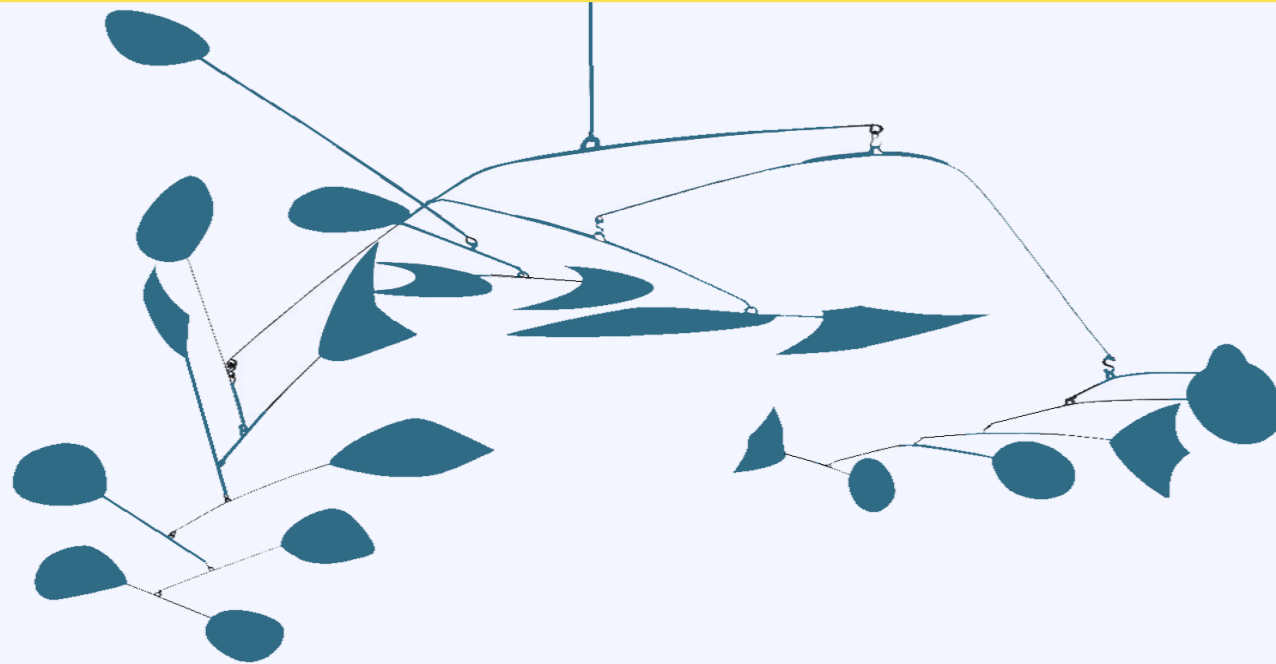
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Facilitating private capital participation

ESMAP's Foundations helps create an enabling environment for attracting private investment and know-how, by supporting Governments to strengthen the economic fundamentals of the energy sector and assisting Utilities to improve their financial situation and operational performance and become more credible off-takers.

Ambitious policies and sound regulations informed by integrated planning are critical for the energy transition

2023



*Planning processes and scope are changing and becoming **more complex*** with the inclusion of DERs, long term decarbonization ambitions, resilience and affordability considerations, and regional integration

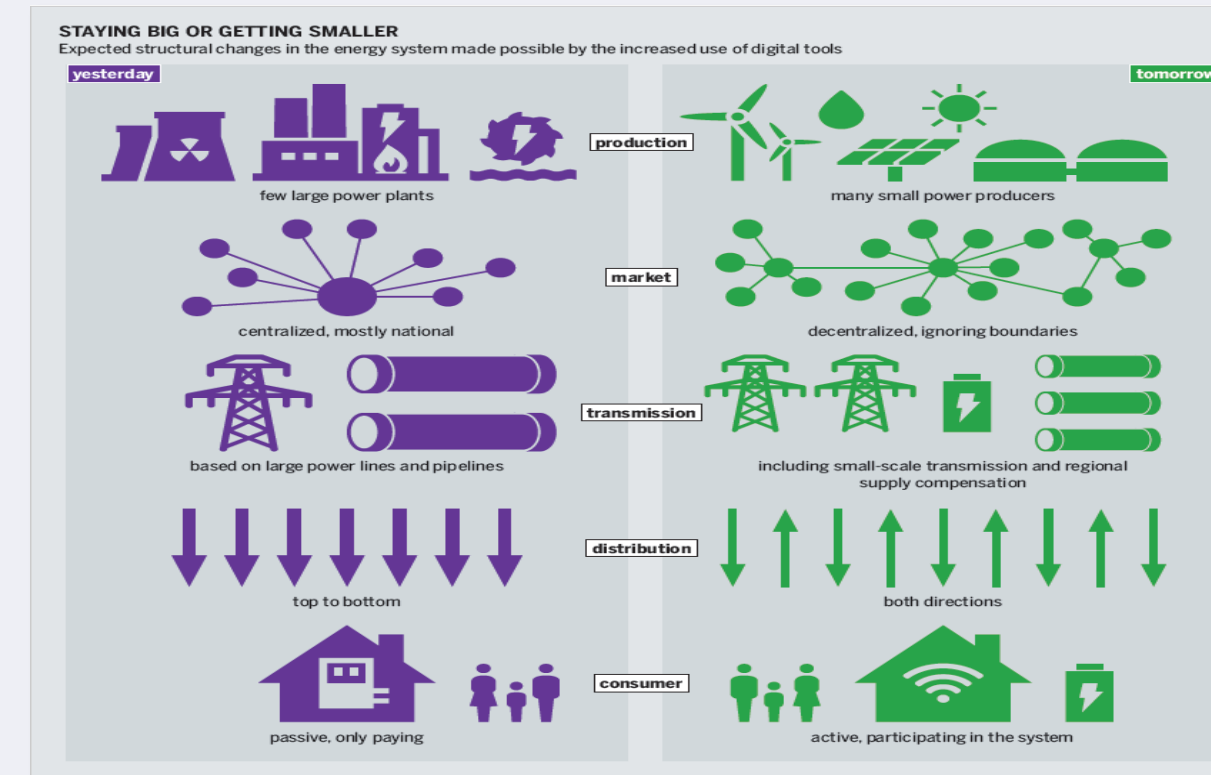
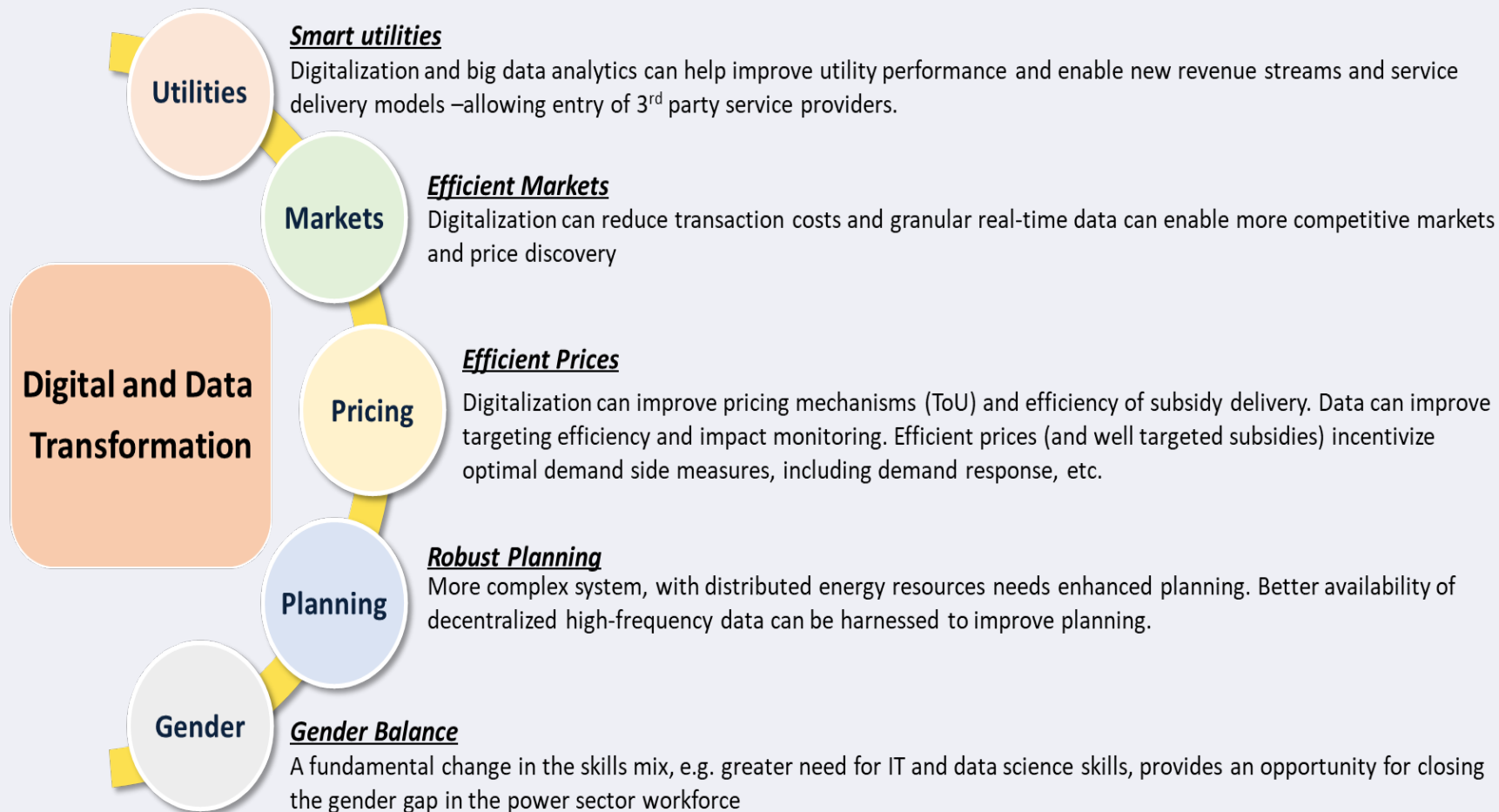
Planning is critical to balance competing needs and ambitions



Deep decarbonization of the power system requires new operational paradigm

2023

- Driven by policy and technology; impacting utility, grid operation, and planning:
 - Shift from a centralized to a “two-way” distributed system
 - New market participants
 - Greater customer engagement
- Digital technologies and data enables a more flexible and reliable system
- Developing countries are beginning to harness opportunities



Graphic: Bartz/Stockmar, [CC BY 4.0](#)

- **Systematic approach** to deploying technology and harnessing data and analytics
- Mainstream into **sector dialogue** on performance improvement and decarbonization
- Support **demonstration pilots** and **knowledge sharing**
- Catalyze investments at **scale**

Ensuring security of supply is a major challenge for energy transition

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Security of supply = “Keeping the lights on”

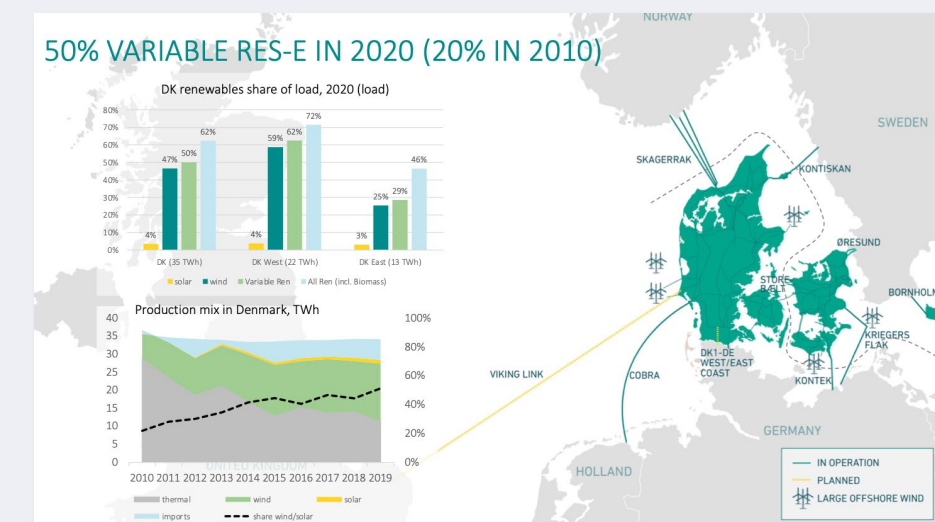
Regional energy integration (REI) proves to be one of the key solutions that provide:

- **Redundancies and flexibility:** larger balancing areas and flexibility options
- **Diversity:** access to more diverse supply resources and demand

REI is particularly relevant today, as Security of Supply faces mounting challenges:

- Natural disasters have long been causing major disruptions to power supplies
- Lately, **climate change** adverse impacts started putting more pressure on power systems
- **Pandemics** and **conflicts** have exacerbated it further
- **Larger shares of variable renewables** require the electricity systems to adapt

Examples range from high RE systems like Denmark ...



... to the war-torn Ukraine



.....and
sub-regional
power pools
in Africa



Existing interconnections



Legend: — existing lines — under construction/ funding secured - - without funding

Physical integration by 2024



Further new interconnections



Addressing energy subsidies is essential for accelerating the energy transition

2023

Reforming broad-based energy subsidies can accelerate just energy transition, by:

- **Preventing excessive consumption** of fossil fuels, reducing local air pollution and GHG emissions
- **Incentivizing clean energy investment** by enhancing financial viability of RE and EE
- **Improving utility financial performance** so they can become credible off-takers of clean energy
- **Channeling support directly to poor and vulnerable**, rather than those who consume more energy
- **Reducing fiscal burden, freeing up resources** for infrastructure, human development, just transition
- **Tackling secondary impacts** (e.g. agri-water pumping amid groundwater stress, smuggling, shortage)

Support is critical, 2022 energy crisis led **many governments to introduce new subsidies, reverse reforms, and halt planned reforms**, widening the gap between climate ambition and action.

To this end, the Energy Subsidy Reform Facility (ESRF) is:

- **Monitoring** global developments, **advising** WB regional teams
- Ramping up **engagement and advocacy** to highlight risks and insights from experience
- Observing **increased short-term demand for technical support** on managing impacts from crisis
- Expecting **higher demand for TA financing** – as subsidies impact sector, fiscal balance, public debt.

Going forward, ESRF will ramp up support to WB teams and clients to develop sustainable solutions while protecting the poor and the vulnerable.



Creating an energy inclusive sector with actions aimed to close the gender gap

2023

Currently three topics are dominating the gender agenda: care economy, gender digital divide and working with men to reduce the gender gaps.



- **Shifting gender norms** is needed to increase gender equality.
- **Holistic approaches that considers women lives' stages** (education, work, promotions, leadership) are the most efficient solution.
- **Change behaviors** by working with men (and women) to ensure the energy sector is closing gender gaps and empowering women at all levels: as beneficiaries and agents of change within communities; in technical and leadership positions; and overcome new challenges of the 4th industrial revolution with cutting-edge solutions.

Foundations for Energy Transition continues to support clients and partners to strengthen economic fundamentals in times of change

2023

The following conclusions are key to guiding ESMAP 's Foundations work program:

- Well-articulated policies, integrated sector planning and sound regulations remain core requirements for any successful Energy Transition reforms.
- Deep decarbonization requires modern utilities, with a new operational paradigm that impacts utilities' operational & financial efficiency, grid operation & systems' planning.
- Expanding Regional energy integration (REI) is key to strengthening the security of supply by creating redundancies, adding flexibility in the systems, & increasing the diversity of supply
- Reforming broad-based energy subsidies and developing well-targeted instruments that protect the poor and most vulnerable is essential for achieving a just Energy Transition.
- Creating an energy-inclusive sector to close the gender gap requires a focus on shifting gender norms, changing behaviors and implementing programs with a holistic approach.

Ensure access to **affordable, reliable, sustainable and modern energy for all**

7 AFFORDABLE AND CLEAN ENERGY



Clean energy deployment accelerated



Reliability of electricity supply enhanced



Energy access increased



Affordability of service effectively increased



Sector's financial performance improved



Capacity and sector knowledge stakeholders strengthened



Gender gaps in energy narrowed



THANK YOU

Annexes



Institutions and Capacity Strengthening for Regional Power Trade

Institutional capacity developed to foster trade of renewable energy

Challenges

- Unutilized renewable energy despite its immense potential technically and economically
- Insufficient access to electricity most notable in the northern part
- Incomplete process of the energy sector reforms, including unbundling and privatization
- Poor institutional structure and regulatory and technical capacity of the transmission utility

Activities

- Advisory and technical assistance to SONATREL – a national transmission utility – to improve its corporate governance structure and management and operational capacity so as to enable the utility to meet the demands of a growing portfolio and investments and serve as operator of the regionally integrated transmission network
- Support to the Government to establish the institutional architecture for power trade, including appointing signatories for and defining the nature of the needed commercial contracts
- HR strategies realignment/strengthening will include recommendations to guarantee equal employment/training/career/mobility opportunities to women.

Results

Expected

- Suitable institutional structure for power trade and select robust contract arrangements are set up and the Cameroon-Chad Power Interconnection Project is implemented
- Hydropower supply in the south of the country to reach the northern regions, improving the electricity access in the latter



Enhancing the Performance and Financial Viability of the Tunisian Energy Sector

2023

Energy subsidy reforms to enable sector financial viability and energy transition

Challenges

- Heavy dependence on imported gas for electricity production
- Energy subsidies significant share of budget, deteriorating utility (STEG) financial viability

Activities

- Analytical work to help the government design a holistic reform roadmap for gradual subsidy elimination;
- Support for development of a strategy to mitigate volatility on oil import prices;
- Performance diagnostic and improvement action plan for STEG
- Gender-sensitive analyses that informed reform design while addressing equity concerns and political economy

Results

Achieved

- A series of tariff increases for fuels, electricity and gas (2018-19); expansion of social safety net beneficiary database; and decrees to facilitate firms' self-generation to help them cope with increased tariffs
- Strategy to manage oil price fluctuation adopted by the government in January 2020 to manage the energy cost
- Collection rates among private customers increased to 97% in FY2020, as part of STEG performance improvement plan
- The government has concluded negotiations on the 500 MW solar photovoltaic project with the private sector

Expected

- Further reforms under development, expected to be completed by 2025
- Automatic indexation mechanisms to periodically reflect commodity price changes
- Reform of LPG product pricing
- Potential macro-fiscal benefits, energy sector performance improvements, and RE and EE incentives

Image credit: [Habib M'henni/ Wikimedia Commons](#)

Accelerating the Clean Energy Transition in Vietnam

Low-carbon pathways for power infra materialized and implemented

Challenges

- Informing clean energy implementation plans at the national and EVN level
- Spurring innovative power system developments through digitization and cybersecurity resilience

Activities

- EVN network digitization and cybersecurity assessment to support successful VRE integration
- The assessment will inform EVN's Climate Action Plan
- Decarbonization analysis
- Gender-specific actions at the policy, regulatory, and corporate levels to close gender gaps and to ensure a just transition for women

Results

Expected

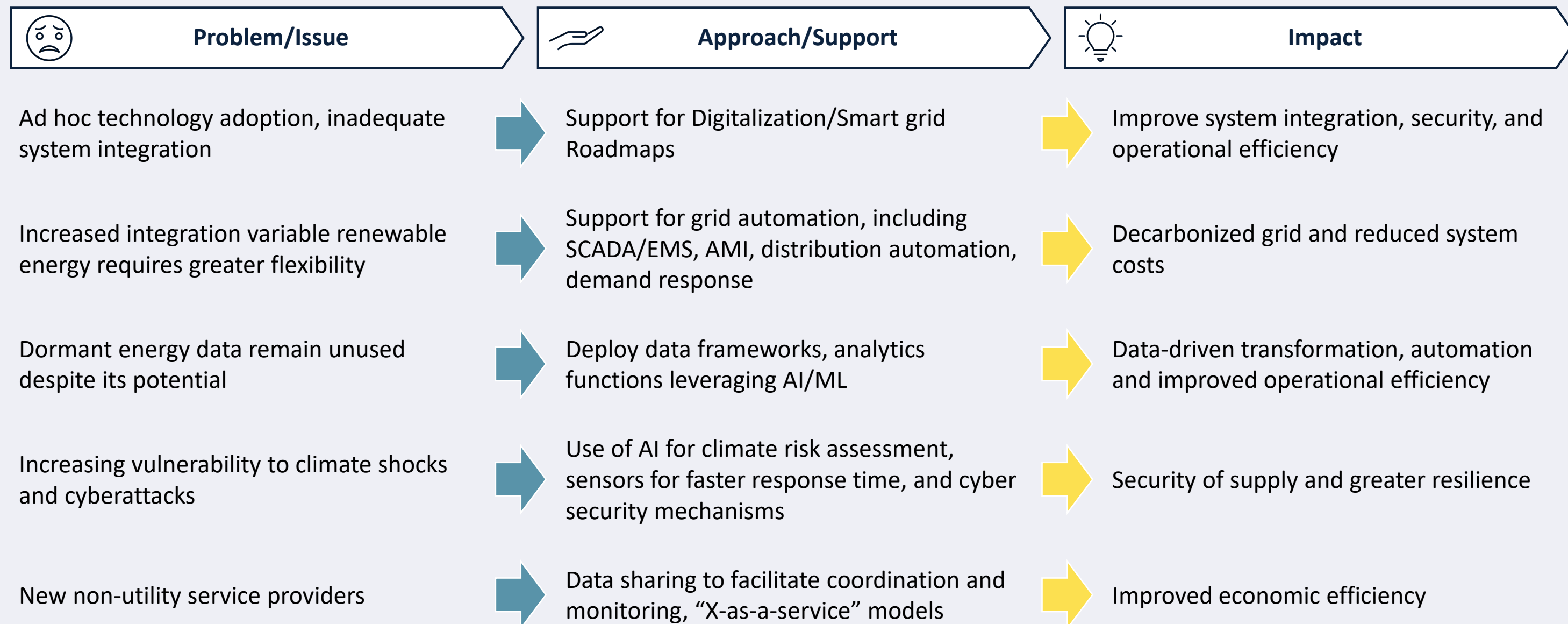
- Knowledge transfer to EVN and sector stakeholders of opportunities offered by grid digitization, cybersecurity measures and investment requirements
- Clean energy transition roadmap plans informed at the national and utility levels
- Vietnam CCDR was published in July 2022



Image credit: [Energy Monitor](#)

Digitalization and data are foundational for improved system performance and grid decarbonization

2023



PLANNING PREPARING THE ENERGY TRANSITION



Planning: Evidence based analysis

2023



➤ Key strategic areas for policy and investment development support:

- **Decarbonization** strategies
- Investments in **new technologies**
- Regional **integration** and **wholesale** market development
- Enhancement of system **operation**

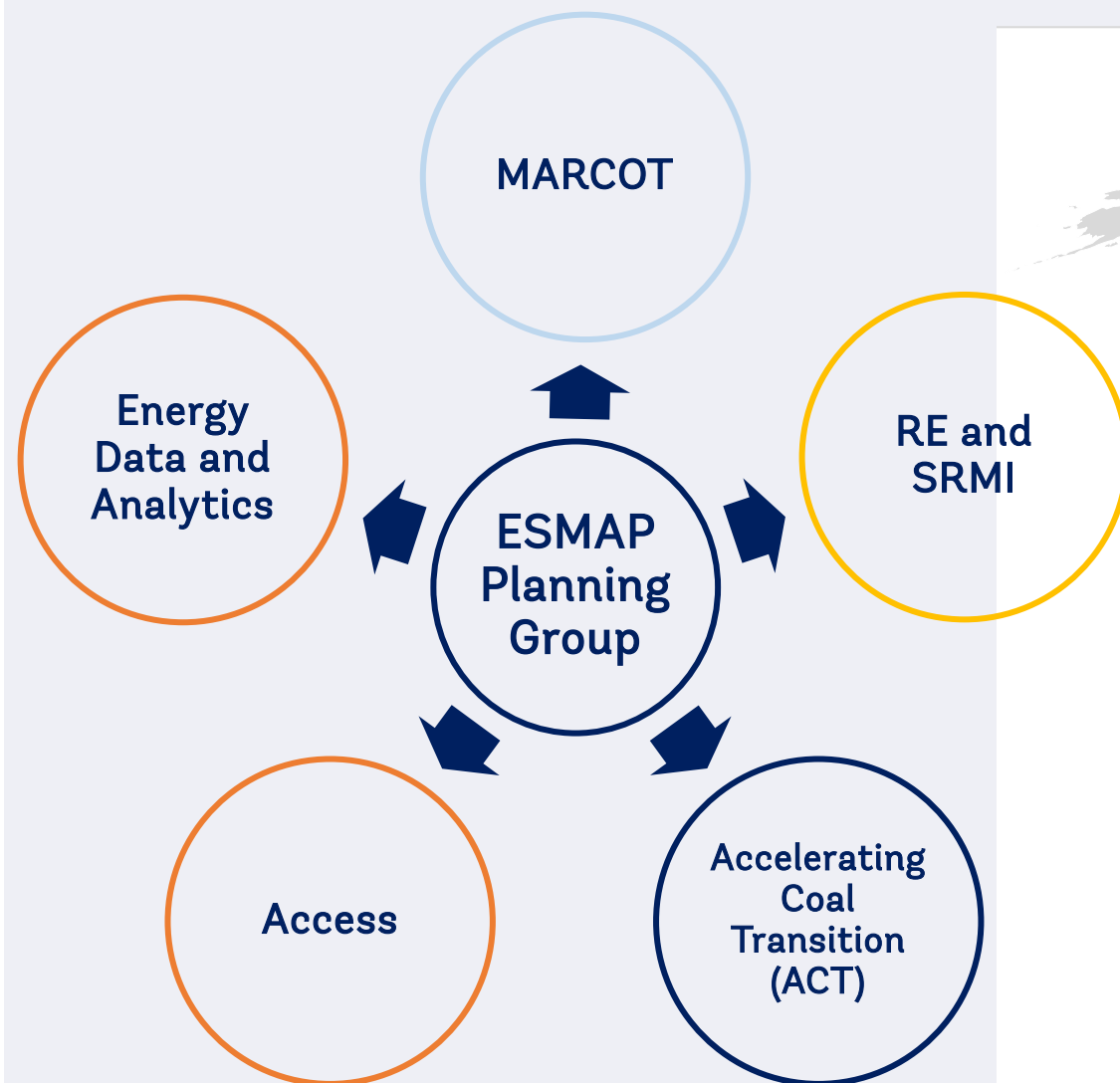
➤ Planning support tools at scale:

- Least-cost planning using World Bank Electricity Planning Model (EPM) implemented for nearly 100 countries
- Development of open-source tools and database to support this initiative at scale
- Collaborative efforts with ministerial and utility planning bodies including training
- Collaboration with IRENA, KTH, UCL, NREL on planning questions



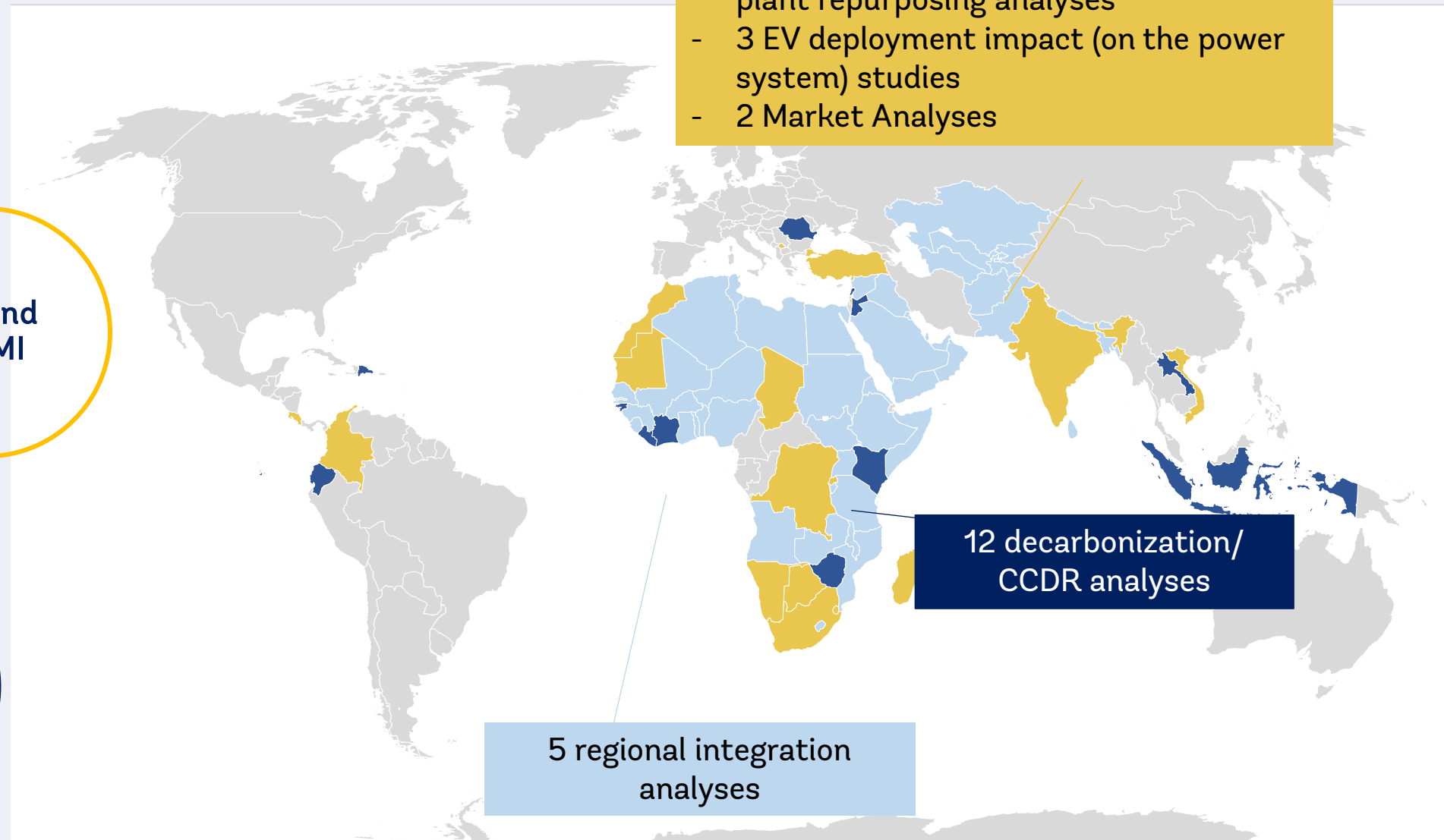
Planning: The Bedrock of ESMAP Programs

2023



Supporting operations:

- More than 10 investments through RE and BESS strategy analyses, coal plant repurposing analyses
- 3 EV deployment impact (on the power system) studies
- 2 Market Analyses

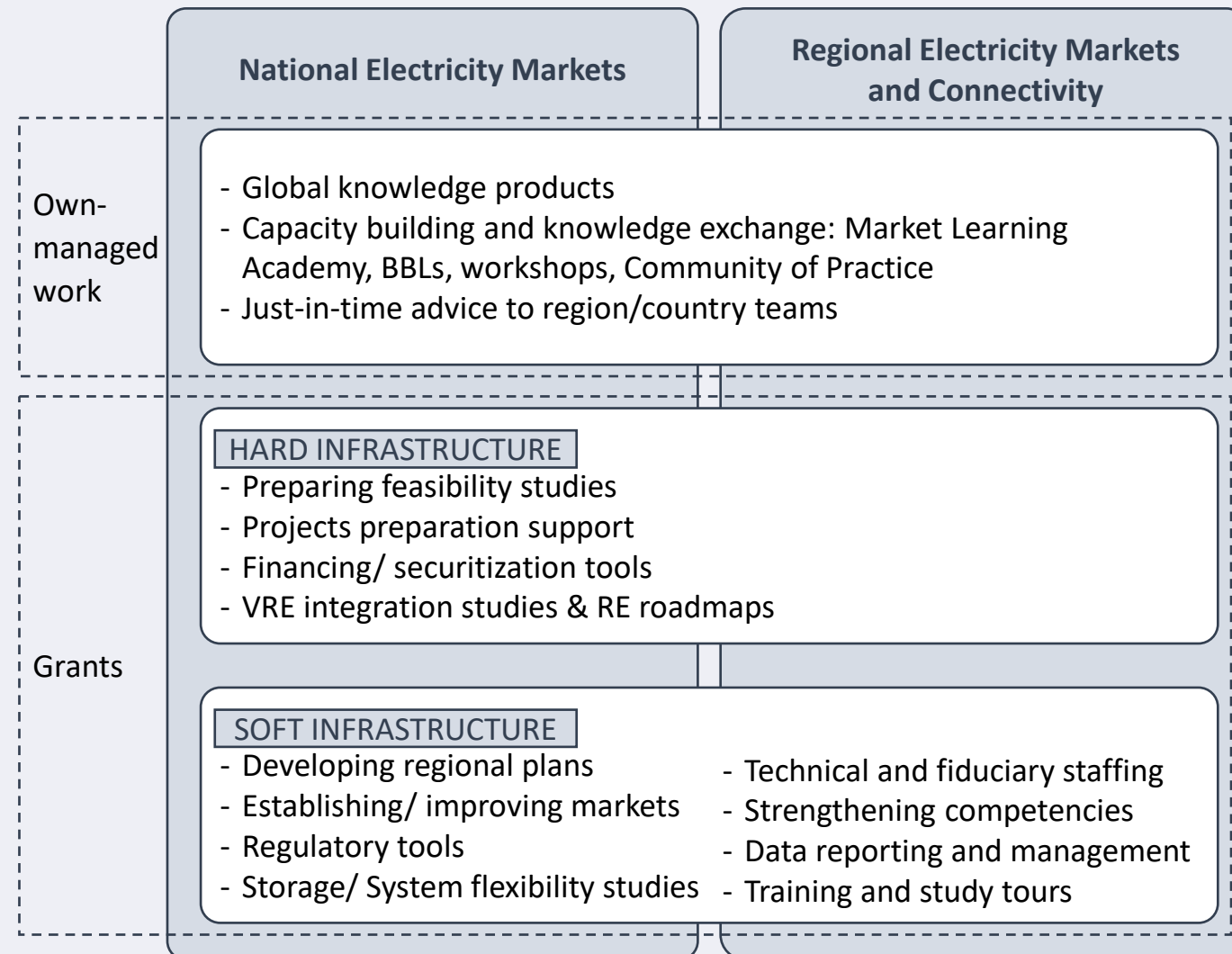


ENERGY MARKETS, CONNECTIVITY, AND REGIONAL TRADE FOUNDATIONS FOR ENERGY TRANSITION



MARCOT has two pillars – National Electricity Markets and Regional Electricity Markets and Connectivity

2023



Context



National Electricity Markets

- National systems are approx. equally divided into Vertically Integrated Monopolies, Single Buyer Models, and competitive markets, with at least Wholesale Electricity Markets
- Competitive markets are prevalent in OECD (ECA and LAC)
- There is a clear and strong correlation between the level of competition in a market and sector outcomes, while whether there is causality (directional effect) between these two variables is yet to be explored



Regional Electricity Markets and Connectivity

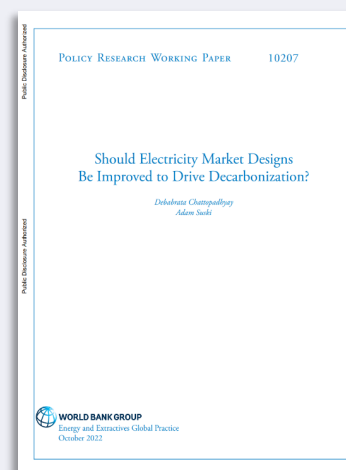
- Regional energy integration (REI) initiatives are on the rise
- Energy transition entails unprecedented expansion and transformation of power sector infrastructure
- REI is an effective solution to achieve the goal of ensuring universal access to affordable, reliable, sustainable, and modern energy by 2030 and the goals of the 2015 Paris Agreement on Climate Change

MARCOT's own-managed activities focus on the development and exchange of global knowledge for policymakers, sector counterparts, and WB

2023

Knowledge Products

- Report ***“Wholesale Electricity Market Design: Rationale and Choices”***, a brief guidance note discussing key market design elements and design choices for developing countries transitioning towards a wholesale electricity market
- ***“Global Market Observatory”***, a database that compiles and maintains data on key characteristics of electricity markets globally for analytical (e.g., benchmarking) and operational (e.g., development policy lending) support of the WBG dialogue in the area of electricity market reforms
- ***“Adapting Market Instruments and Trading Mechanisms for Decarbonized Systems of Future”***, a summary of the critical literature on the efficacy of the existing market designs to decarbonize power systems
- ***Electricity Market Simulation Model***, the computational modeling framework based on the Cournot-Nash equilibrium model to test various market designs from the perspective of decarbonization efficacy. The model is accompanied by documentation comprising a collection of papers and presentations written on the topic
- ***“Short-term Gains from Cross-Border Electricity Trading in Latin America”***, a report highlighting cross-border trading opportunities in the region and estimating the potential savings on electricity supply costs if 20 Latin American countries allowed unrestricted trade of electricity between the borders without expanding their current electricity generation capacity



Capacity Building and Knowledge Exchange

- **Learning Academy**, in collaboration with Energy Regulators Regional Association (ERRA), has delivered a series of webinars and formal training sessions since June 2021. The past sessions were on: the fundamentals of energy markets; the role of markets in decarbonized future power systems; regional markets and transmission regulation; wholesale electricity market design and challenges in developing economies; and electricity market design in times of energy crisis.
- **BBLs** have been held on VRE integration in the India spot market (with CERC India), the role of markets and competition in enabling VRE, storage, DER, and green hydrogen (with FERC), and lessons of transitioning to markets (with ASR).
- **Peer Learning and Knowledge Exchange** have been conducted between ENTSO-E – African power pools, SAPP – India, and SAPP – EAPP.
- **Community of Practice (CoP)** has been established with over 100 staff joined across the World Bank Group, with a Yammer page
- Collaboration and partnerships with external centers of expertise have been developed:
 - The Bank is a founding partner in the **Regulatory Energy Transition Accelerator (RETA)** - a global initiative bringing together energy regulators to discuss the challenges they face and to share best practices, which was launched at COP26
 - The Bank also is an implementing partner in the **Global Power System Transformation (G-PST) Consortium** launched in 2020

Webinar Series: **Electricity Market Design in the Times of Energy Crisis: The European Perspective**

Dates: February 15-16, 2023

Organized by:
Energy Regulators Regional
Association (ERRA)



MARCOT Learning Academy

MARCOT (incl. AREP MDTF) also provides TA grants and in-kind technical expertise to regional/country teams

2023

TA grants

Regional

- Supporting preparation and implementation of the West Africa Regional Energy Trade DPF
- Horn of Africa Initiative rapid support for regional integration
- Implications of Enhanced Regional Electricity Trade on Power Sector Reforms in LAC
- Accelerate South Asia Power Market (ASAP): Development of Regional Wholesale Market Design Options for Cross Border Electricity Trade among BBINS countries
- Utility Performance and Behavior in Africa Today (UPBEAT)
- Pan-Arab Regional Energy Trade Investment Support
- Supporting preparation and implementation of the West Africa Regional Energy Trade DPF 2
- CAPP Institutional and Capacity Strengthening
- Renewable Energy Scale-up in ECA - Challenges and Opportunities
- Support preparation of WAPP Ghana-Cote d'Ivoire Power Interconnection Project and regional power market readiness
- EAPP Regional Power Market Support Phase 2
- Moldova Regional Power Interconnection Option Study
- Scaling-up Regional Energy Interconnectivity in Central Asia



National

- Cameroon – Institutions and capacity strengthening for regional power trade
- Chad – Supporting reform and investment to expand access to affordable and financially viable energy
- Nigeria – Programmatic ASA for Energy
- DRC – Programmatic support to the power sector in the DRC
- Project Preparation and Implementation Capacity Enhancement for Nepal Energy Sector Agencies and Support Policy and Regulatory Reform

Lending operations informed

- AFR RI-The Eastern Electricity Highway Project under the First Phase of the Eastern Africa Power Integration Program
- AFR RI-SAPP-Program for Accelerating Regional Energy/Transformational Projects
- Tanzania-Zambia Transmission Interconnector
- Mozambique-Malawi Regional Interconnector Project
- Tunisia-Italy Power Interconnector - Project Preparation TA
- Temane Regional Electricity Project
- Uganda-Tanzania Interconnector Project
- Africa: DRC Electricity & Water Access and Governance Project
- Second Djibouti-Ethiopia Power System Interconnection Project
- Regional Energy Transmission, Trade and Decarbonization Project
- Iraq: Southern Region Electricity Network Strengthening Project
- Namibia: Transmission Expansion and Energy Storage
- Horn of Africa Regional Power System Transformation Project

ENERGY SUBSIDY REFORM FACILITY FOUNDATIONS FOR ENERGY TRANSITION



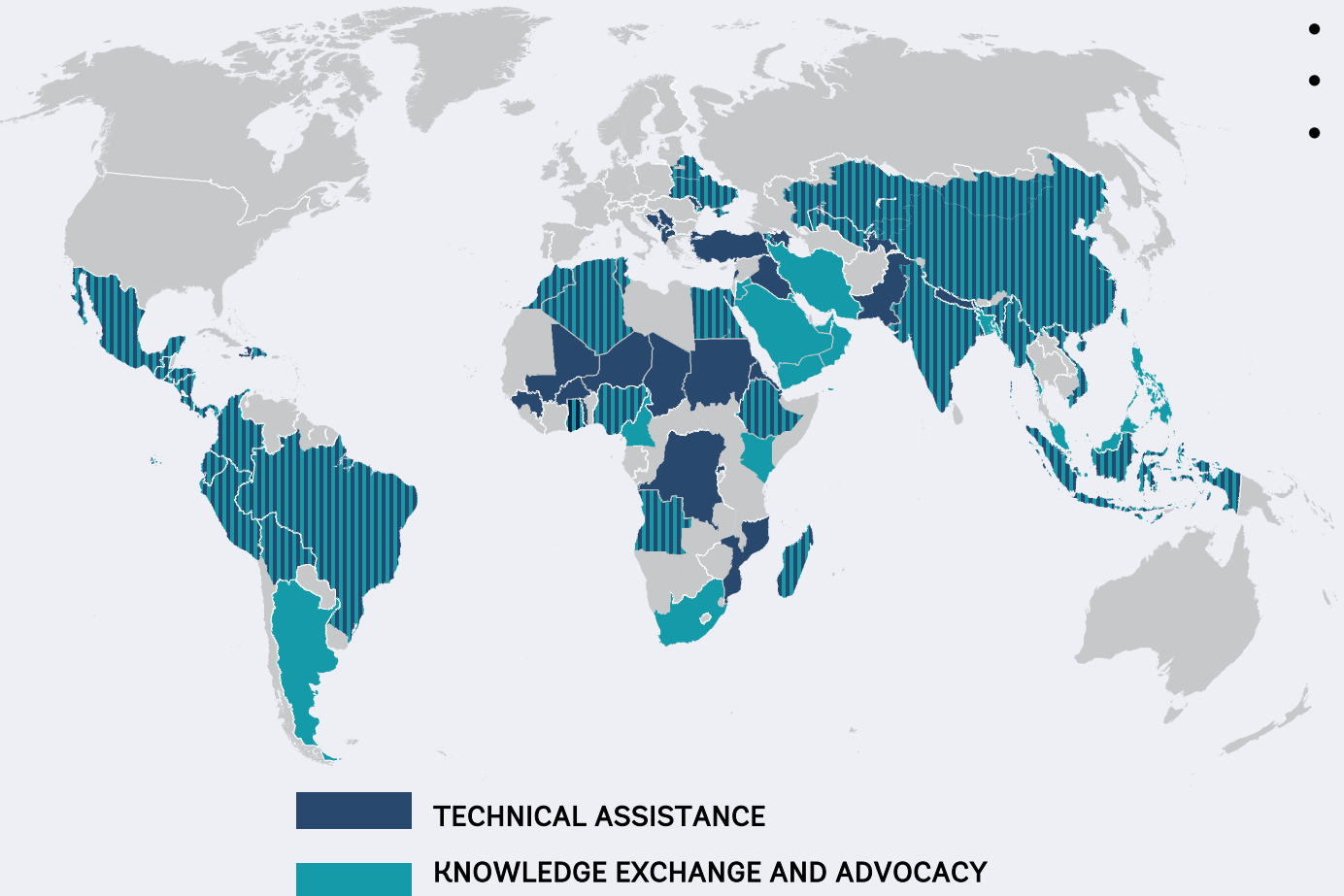
ENERGY SUBSIDY REFORM FACILITY

– An overview

2023

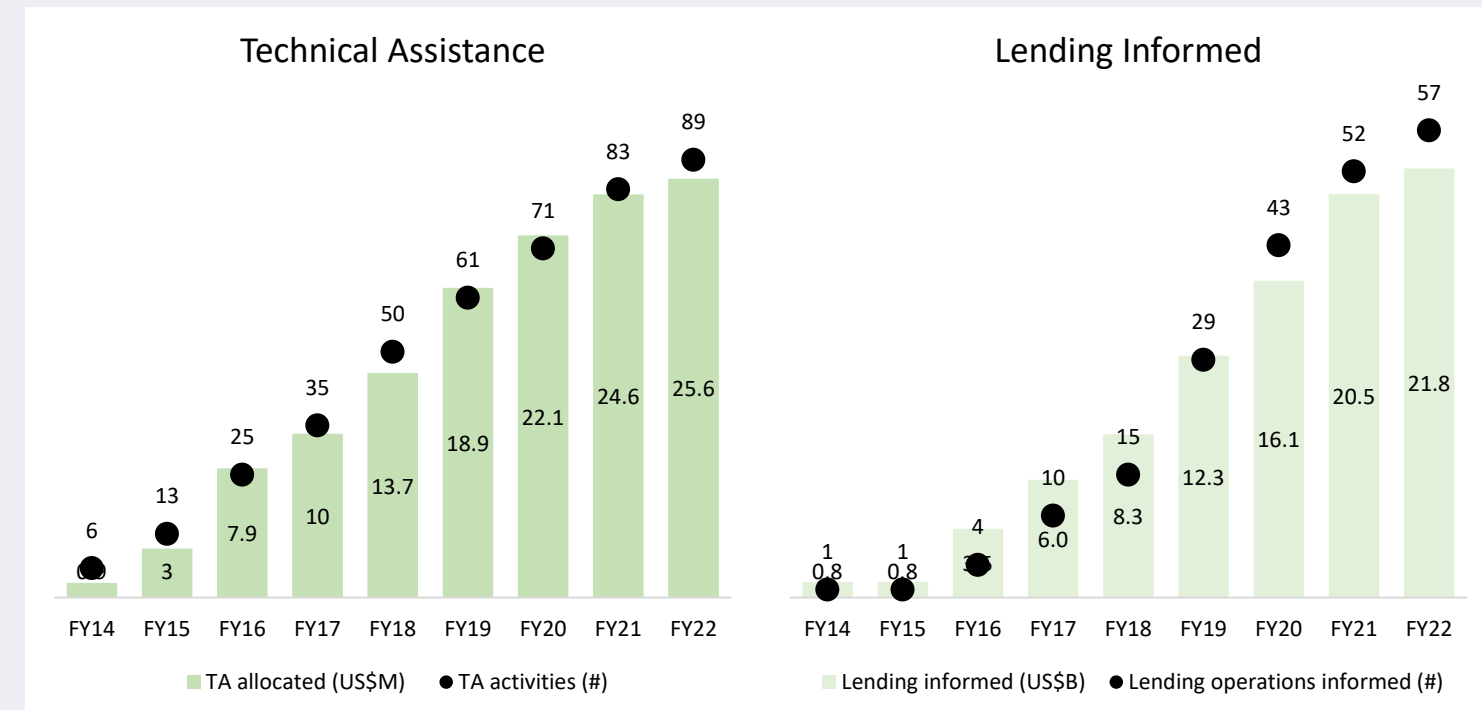
Objective

Established in 2013, ESRF supports governments in designing and implementing sustainable energy subsidy reforms while safeguarding the welfare of the poor and vulnerable.



Strong results to date

- **US\$26.5 million in Bank-executed TA** grants in 65 countries
- Informed over **US\$21.8 billion in WB lending**, through 60+ operations
- 22 countries undertook policy, regulatory and pricing reforms
- Energy Subsidy Reform Assessment Framework (**ESRAF**) launched
- Cross-support to operational work in AFR, ECA, EAP, LAC, MNA, SAR
- Engagement with **multi-GP** WB internal community of practice (~400 members)
- Growing external engagement and advocacy



Main pillars of ESRF Support

Technical Assistance Grants

Support for **multisectoral reform engagements**, through WB operational teams.

Knowledge creation and sharing

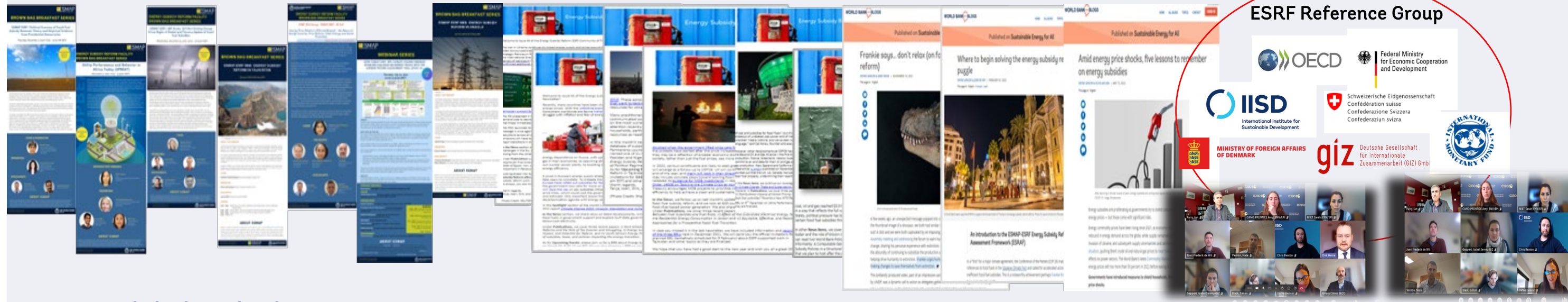
Facilitates **knowledge creation and exchange**, sharing recent experiences and emerging approaches.

Produces **knowledge products** (global, regional country specific reports, iCOP, and ESRF)

Global outreach and advocacy

Contributes to **global energy subsidy reform agenda**, by disseminating knowledge and engaging with key stakeholders.

Performs **global advocacy and communication** on priority energy subsidy reform topics



Current global outlook:

- Per latest OECD and IEA data **global energy subsidies exceeded US\$1 trillion**, up from US\$700B in 2021, and US\$362 B in 2020.
- In 2022, fuel and electricity prices reached record highs, with strong demand amid supply constraints.
- Russian invasion of Ukraine exacerbated the situation.
- **Governments rushed to shield households and firms**; measures varied based on trade exposure to Russia and consumer vulnerability.
- Many government actions meant: (i) reversal of past reforms; (ii) delay of planned reforms; (iii) increased cost of existing subsidies; and (iv) introduction of subsidies in countries that never had them.
- **Sectoral, fiscal sustainability and public debt risks are growing.**

ESRF FY23-24 Pipeline

2023

TYPE	REGION	#	COUNTRY	Potential grant activity	FY23-24 US\$000
BETF	AFR	1	Mali	Cost of service study update	75
		2	Mauritania	Mauritania Energy Transition Acceleration	250
		3	Republic of Congo	Supporting Energy Sector Reform Activities in the Republic of Congo	190
		4	Sierra Leone	Sierra Leone Energy Sector Subsidy Reform Program	50
		5	Togo	Electricity subsidy reforms	290
		6	West Africa	Regional Subsidy Stocktaking Exercise	200
	ECA	7	Kyrgyz Republic	Support to implementation of new tariff methodology, tariff design and distributional impact assessment	100
		8	Moldova	Subsidy assessment	100
		9	Tajikistan	Additional financing for the ongoing support on envisaged tariff reforms	250
		10	Ukraine	Energy Subsidy Reform - Rapid Response	500
		11	Uzbekistan	Electricity subsidy reform TA	200
		12	Western Balkans	Subsidy reform and tariff policies for energy sector financial sustainability and affordability	300
	Global	13	World	Global UPBEAT	50
	MNA	14	Algeria	Support on Energy Subsidy Reforms	100
		15	Egypt	Electricity Sector Viability and Energy Subsidy Reform	200
		16	Morocco	Market Reform TA including Tariff Analysis	150
		17	Tunisia	TA to on utility for performance improvement, tariff mechanism update and subsidy reform	100
	SAR	18	Bangladesh	Subsidy Reform Assessment	100
		19	Sri Lanka	Sector and Subsidy Reform Dialogue	300
RETF	SAR	20	India	RETF TA for Program for Electricity Distribution Reforms in India	700
TOTAL (US\$000):					4,205

ESRF FY23-24 Pipeline

2023

TYPE	REGION	#	COUNTRY	Potential grant activity	FY23-24 US\$000
BETF	AFR	1	Burkina Faso	Comprehensive energy subsidy reform advisory by EEX and MTI	100
		2	Cameroon	Affordability assessment and options study to reduce power generation impact on sector's financial sustainability	100
		3	West Africa	Gambia, Guinea Bissau, Senegal, Financial Recovery Plans	200
		4	Zimbabwe	Power sector recovery	100
	Global	5	SPJ GP	Social Protection – Global stocktaking	150
		6	Collaboration w/ FCI	Impact of energy subsidy reform on firms and competitiveness	100
		7	World	Energy crisis response TA	600
	LAC	8	Argentina	Comprehensive analysis of subsidy reform in context of IMF program	100
		9	Belize, Suriname	Tariff and cost of service analysis to identify subsidy reform road map	100
		10	Costa Rica and El Salvador	Follow-up TA on tariff reform and utility cost recovery	100
	MNA	11	West Bank and Gaza	Reform options to improve electricity services to refugee camps	100
	SAR	12	Maldives	MTI led Policy dialogue	100
TOTAL (US\$000):					1,850

UTILITIES FOR THE ENERGY TRANSITION

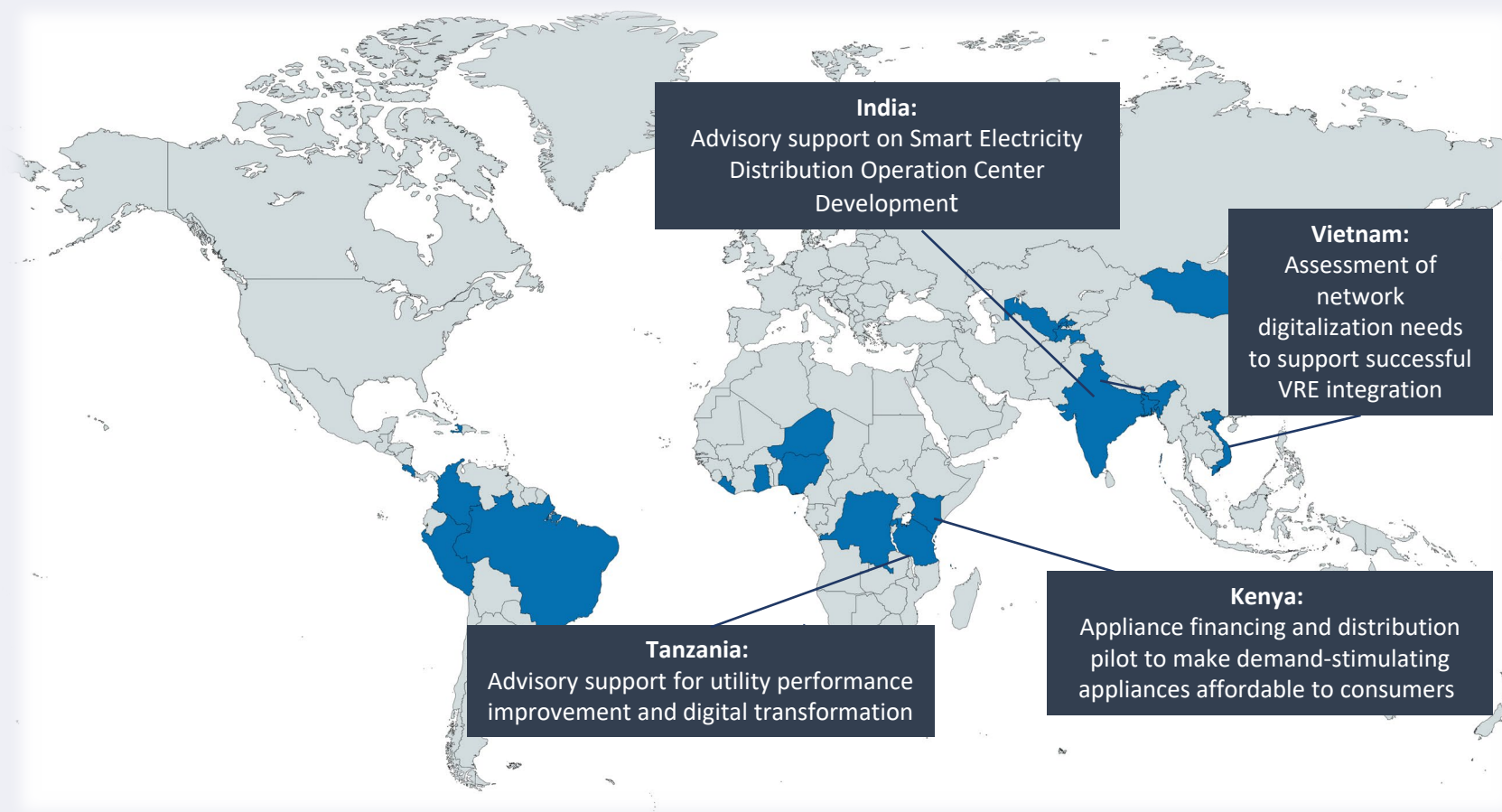


Utilities for Energy Transition – portfolio

2023

The Program was established in 2021, to support utilities to harness digital technologies, data and innovative business models to accelerate the energy transition.

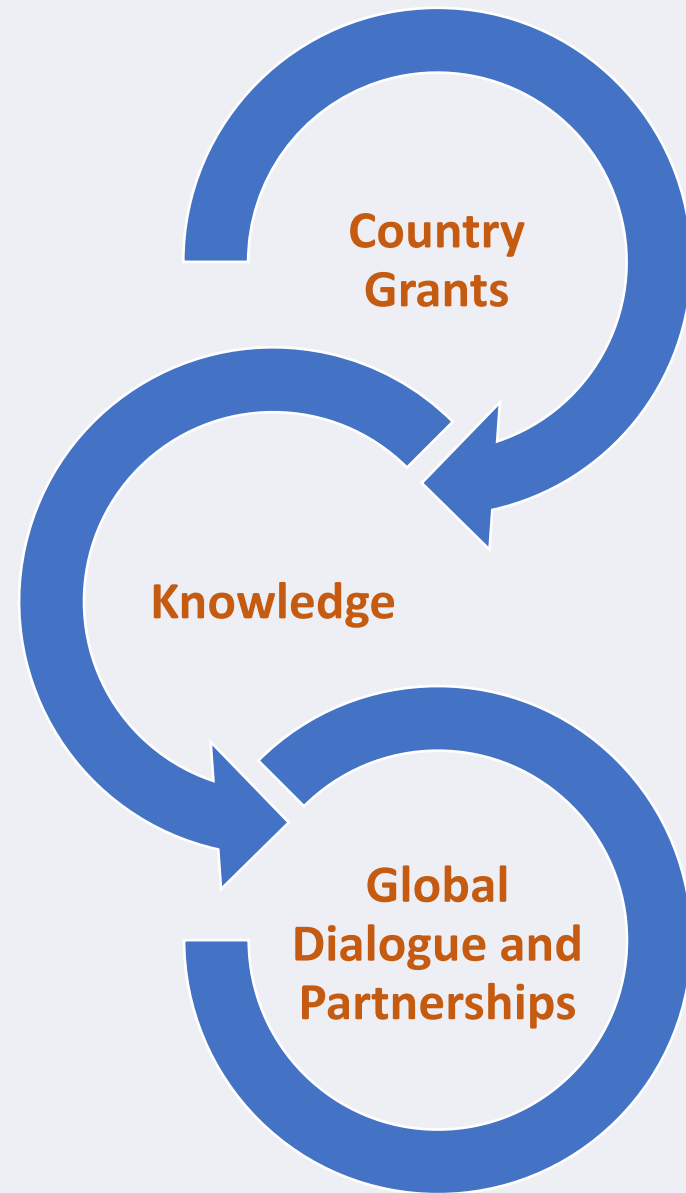
- Growing grant portfolio. Currently \$3.5 million in BETF grant funding supported across 24 regional and country grants.
- \$3 billion in WB lending informed
- Support areas include utility digitalization, smart grid rollout, distributed energy resources, innovative business models
- First request for RETF from program (\$1.5M) to Support Electricity Distribution Reforms in India P4R (\$500M) to support modernization, digitalization of distribution utilities
- Possible RETF demand from other countries in the pipeline, especially MICs



- Emerging experience in emerging middle-income markets from early phases of modernization – South Asia, LAC, EAP, ECA. Africa still at nascent stage, with need to establish strong use cases, and help leapfrog based on experience of more advanced countries.

Utilities for Energy Transition – Pillars of support

2023



- Support for operational engagements on utility performance improvement and modernization.
 - Areas of support ranging from digitalization, smart grids, enabling innovative business models, and enabling regulatory frameworks.
-
- Create and collate emerging knowledge to support sector dialogue on utility modernization
 - Design innovative solutions, capture lessons learned, and provide expertise and training.
 - Leveraging opportunities for data-driven transformation, improved implementing of advanced metering infrastructure, case studies.
-
- Stimulate a global dialogue on the role of utilities for the energy transition in developing countries
 - Study tours, BBLs, Utility Knowledge Exchange Platform (UKEP), partnerships



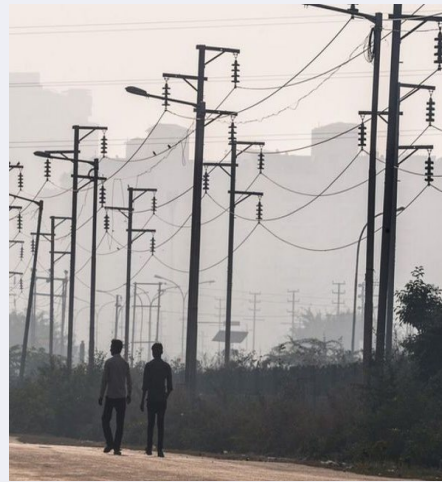
Utilities for Energy Transition – sample grants

2023

India | Distribution Utility Modernization

Targeting service quality improvements, rapid increase in RE penetration, and encouraging rooftop solar and DERs connecting to the distribution grid

- Support the national program in three states - West Bengal, Madhya Pradesh and Rajasthan – focusing on state-owned utilities
- Technology enabled service quality improvements: ICT roadmaps, ensuring integration of various system
- Informing WB-supported distribution smart-grids programs



Vietnam | Smart grid Roadmap

EVN network digitization and cybersecurity assessment to support successful VRE integration.

- Knowledge transfer to EVN and sector stakeholders of opportunities offered by grid digitization, cybersecurity measures and investment requirements
- Clean energy transition roadmap plans informed at the national and utility



Niger | Appliance financing and utility digitalization

Assessment of **new innovative digital technologies** for improved electricity services delivery.

- Maintaining financial viability and service reliability while expanding access to new customers
- Assessment of utility-enabled appliance financing options to improve electrification outcomes
- Pilot for digital systems deployment to improve grid operations, commercial performance



Colombia | Service Quality Improvement

Supporting the EPM group to develop an integrated approach to service quality improvements through smart-grid investment

- Study undertaken for 6 utilities under EPM group, which correspond to around 30% of the distribution service in Colombia;
- Maturity assessment, international best practices references and roadmap to improve service quality
- New proposal for phase-2 of work being drafted



Utilities for Energy Transition – Pipeline (near term)

2023

Country	Lending Project Name	Estimated BETF (US\$)	Estimated RETF (US\$)
India	Electricity Distribution Reforms in India	50,000	1,500,000
Dominican Republic	Distribution Efficiency Improvement and Utility Strengthening	200,000	
Indonesia	Indonesia Electricity Network Transformation Program (I-ENET)	300,000	5,000,000
Lebanon	Lebanon Distributed Renewable Energy	250,000	
Angola	TBC	500,000	
South Africa	TBC	450,000	
Mauritania	Mauritania Energy Transition and Access	300,000	
PNG	PNG National Energy Access Project	150,000	
Colombia	TBC	400,000	
Cabo Verde	TBC	200,000	
Global	Global Utility Sustainable Tracking Framework	50,000	

Indicative scope

- Dominican republic: AMI, smart grids, pipeline project
- South Africa: Eskom smart grid and Cape Town municipal distribution modernization
- Indonesia: Large P4R with DISCO modernization, AMI, smart grids, etc.
- Papua New Guinea: Grid modernization, control and automation for RE integration

CLOSING GENDER GAPS IN ENERGY FOUNDATIONS FOR ENERGY TRANSITION



Gender and Energy Program

2023

CONTEXT



Due to COVID 19, women lost more than 64M jobs globally.

Covid-19 crisis cost women around the world at least \$800 billion in earnings (OXFAM, 2021)



Women represent only 32% of the RE labor force (IRENA; 2019). Women are about 25% in hydropower**) (ESMAP, 2023**)



Women suffer from time poverty more frequently than men as they are responsible for fuel collection and unpaid work.



FHH, and women and girls have less access to electricity.

Program’s objectives:

Aligned with the WB Gender Strategy (and its 4 pillars), and SGD 7 and SGD 5

- 1. Increasing women’s employment and leadership in the energy sector
- 2. Improve women’s productivity and livelihoods
- 3. Increase women’s access

Main outcomes

WB projects**

