Energy Data & Analytics

ESMAP Business Plan FY21-24

ESMAP
Energy Sector Management Assistance Program

THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP

Problem Statement and Context

Data and analytics are key to evidence-based decision-making on policies and investments necessary for achieving SDG 7.

Major challenges: lack of availability, accessibility, reliability, and analytics of data.

Availability:

Comprehensive, detailed data at the global and country levels for energy access (electricity and cooking solutions) is lacking. Geospatial information gaps are a barrier to electrification planning (transmission network-georeferenced layer). More efficient ways of data collection for energy access, including machine learning, and innovative survey approaches, are required in order to support scaled-up investment.

Accessibility:

Energy data are scattered throughout different organizations, which is a major constraint for policy-makers and practitioners. Furthermore, data are not sufficiently inter-operable, standardized, or harmonized to maximize the benefit of data usage.

Reliability:

Use of inaccurate and biased data could lead to critical policy failures.

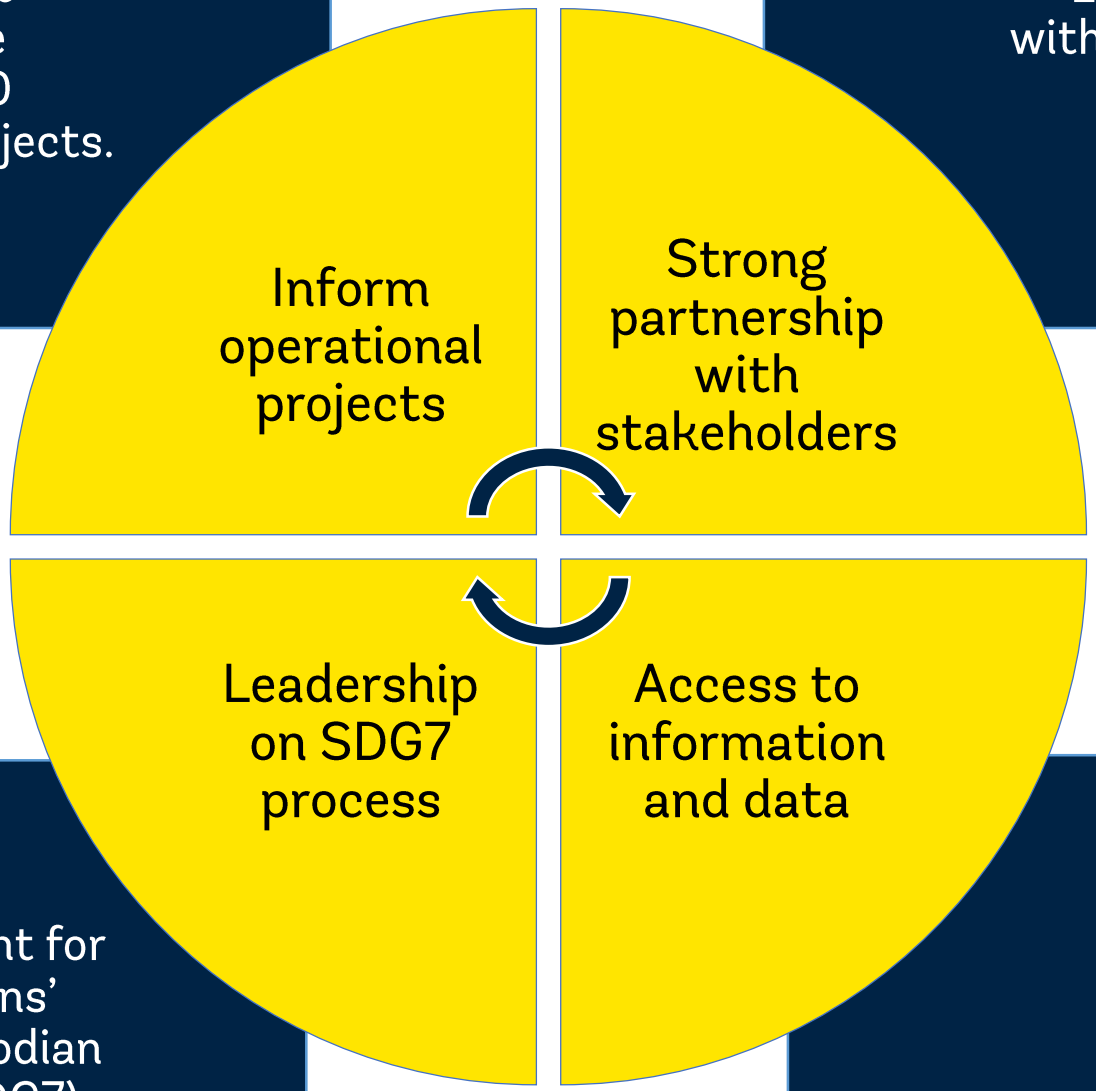
Analytics:

Lack of clear and understandable data undermines their usability. Lack of transparent analytic models, data interpretation, and user-friendly toolkits have been a constraint in energy data application for policy.

BUILDING ON THE SUCCESS OF THE KNOWLEDGE HUB

ESMAP Knowledge Hub products and database informed more than 30 lending or research projects. Focus included closing gender gaps in energy access

ESMAP collaborates with UN, governments, private sector, academia, NGOs, and CSOs



ESMAP is the focal point for international institutions' collaboration (UN custodian agencies to work on SDG7)

Obtain data and information from other World Bank Global Practices

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PROPOSED ESMAP RESPONSE

A comprehensive and innovative approach for data-driven and evidence-based policy and investment decisions

AVAILABILITY

- Strengthen primary data collection in the energy sector and improve data collection approaches, including household surveys methodologies, geospatial data collection, satellite data

ACCESSIBILITY

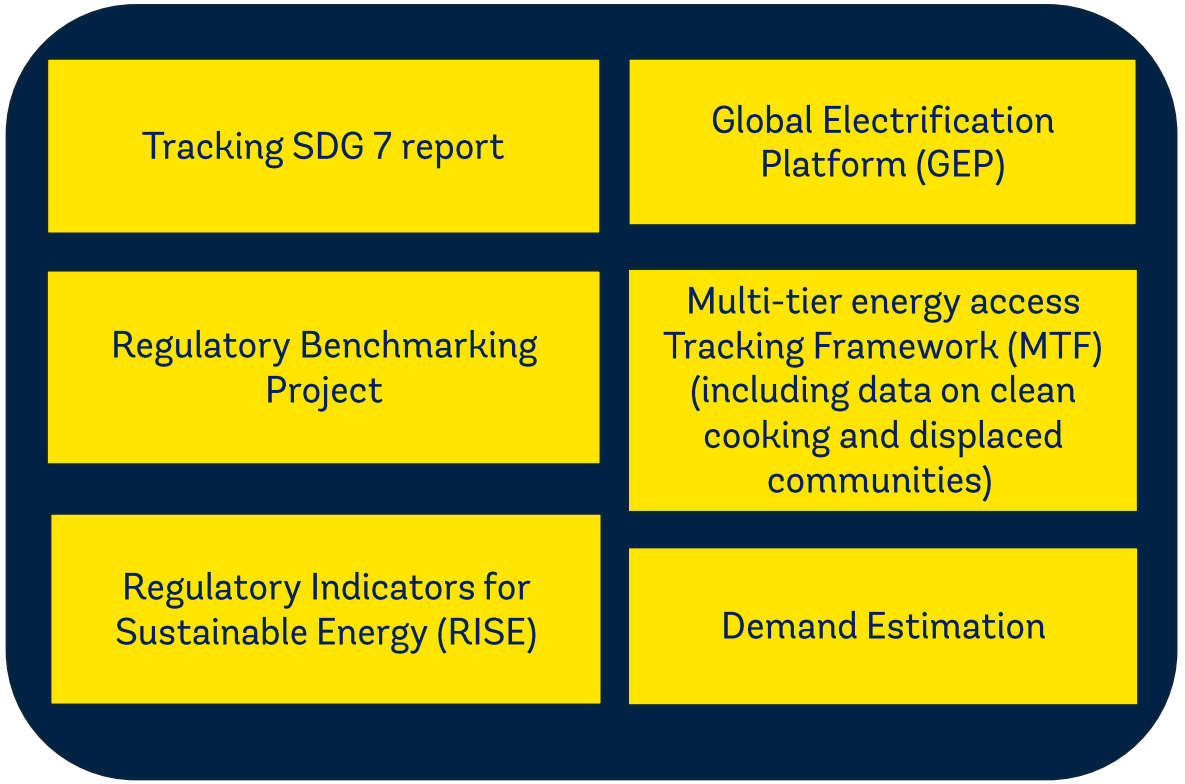
- Provide one-stop shop data and knowledge platform / data repository where all energy related information can be found and utilized. Standardize and harmonize various types of datasets to improve inter-operability

QUALITY / RELIABILITY

- Provide reliable and good quality data through validation methodologies and inter-agency and inter-Global Practice collaboration processes

ANALYTICS

- Provide analytic toolkits (for example, country data profiles or RISE analytical platform) for easier data usage for practitioners and decision makers for planning and project design



Hosted by energydata.info:
600 datasets & 50+ Grid mapping, 16 applications

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TRACKING SDG7 REPORT

TRACKING SDG7
The Energy Progress Report

WHY:

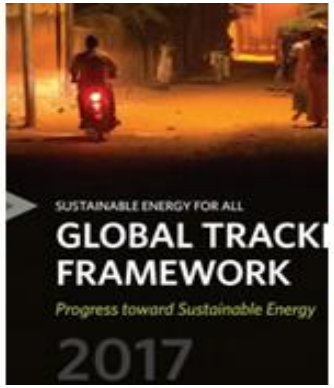
- Inform international community on progress toward SDG7 goals
- Provide data evidence for informed decision making
- Identify priorities for increased action

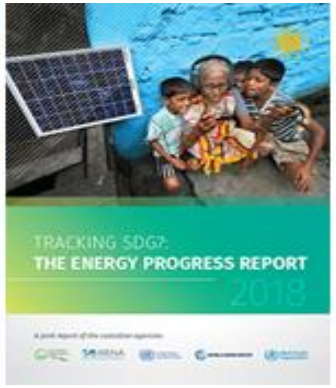
WHAT:

- 4 annual reports
- Focus on interlinkage between SDG7 and other SDGs
- At least one report in the business cycle to include regional focus

HOW:

- Collaboration of the 5 custodian agencies through joint production and dissemination efforts
- Continuous improvement of electricity access data collection methodology
- Improved validation practice to increase data transparency and credibility
- Closer collaboration with clients' statistical offices and other partners





International Energy Agency
Secure Sustainable Together

IRENA
International Renewable Energy Agency

United Nations Statistics Division

WORLD BANK GROUP

World Health Organization

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Multi-Tier Framework (MTF) for Energy Access

WHY:

- Lack of data available to track SDG 7.1 using new definition of "access" in its detailed dimensions (reliability, affordability) for electricity and cooking services.
- Accurate energy access data is critical for the formulation of feasible and effective national electrification plans and strategies.

WHAT:

- Publication of MTF dataset and country reports for 20 additional countries.
- Final survey instrument including MTF data analytics as well as digitalized data collection tool.
- MTF insight: in depth analysis using MTF datasets to investigate gender and impact evaluation.
- Regional workshops to develop the capacity of national statistical offices and to promote the adoption of short MTF survey modules into national household surveys.
- Data on Cooking exposure measurement: From a subset of MTF household survey samples, cooking exposure at the household and community level will be collected to develop the model to predict the cooking exposure.

HOW:

- Strong buy-in from World Bank energy teams, governments, and development partners in the MTF survey preparation, implementation and data analysis.
- Partnership with Poverty Global Practice Living Standard Measurement Study (LSMS) team in the World Bank: develop MTF data analytics and digitalized data collection platform. Critical in organizing regional workshops to build the capacity of national statistical offices.
- Concerted efforts with WHO to integrate a short module into national household surveys for SDG 7.1, including access to electricity and clean cooking solutions.
- Innovation in data collection: Cooking exposure level will be collected using air quality monitoring equipment at household (indoor air pollution and personal exposure) as well as community level (ambivalent air quality).
- Support researchers, NGOs, energy teams, and governments in designing energy surveys and carrying out data analysis.

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MTF: Displaced Communities and Refugees Data

WHY:

- The number of Forcibly Displaced Persons (FDPs) is 70.8 million (end 2018) – and growing.
- Developing countries are hosting 80 percent of the displaced people, and are facing substantial challenges in providing legal, safe, reliable, and affordable electricity services for host-communities and FDPs
- Energy access planning often overlooks this group of vulnerable populations due to data gaps.
- Availability of the data on host communities and refugees will improve the design and increase effectiveness of the World Bank's energy access lending operations in the relevant contexts

WHAT:

- Under MTF survey, there will be an additional focus on vulnerable populations
- The survey instrument will include a questionnaire on status of energy access for displaced communities and refugees
- Publication of 10 MTF datasets and energy assessment reports that include data on host communities and refugees

HOW:

- Strong buy-in from World Bank energy teams, governments, and development partners to include the focus on host communities and refugees in the MTF survey preparation, implementation and data analysis
- Collaboration with UNHCR to leverage ongoing field work in host communities and refugee settings for data collection
- Cross-support from the Energy Access team's displaced communities and refugees window to design questionnaire and liaise with the UN agencies, energy teams, and NGOs

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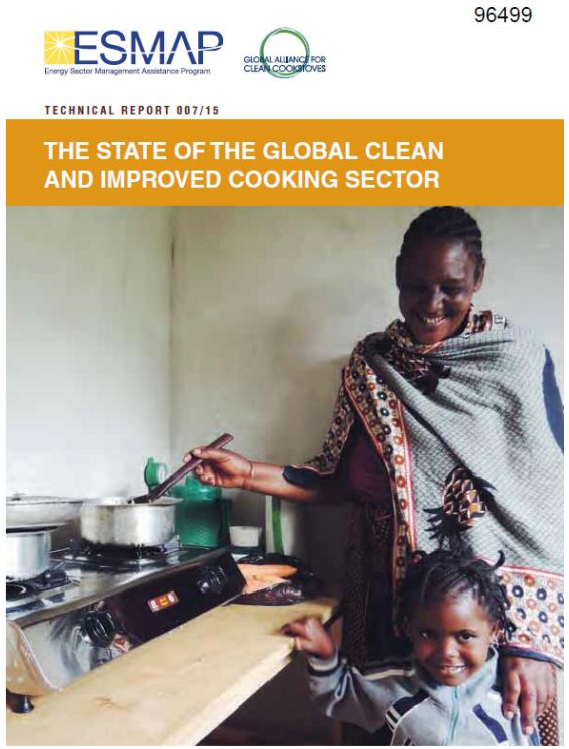
MTF: Clean Cooking data

- The World Bank has the largest portfolio of investments in clean cooking globally. The volume will increase significantly with the establishment of a Clean Cooking Fund (CCF) that seeks to leverage additional investments from MDBs and the private sector through a Results Based Financing (RBF) approach.
- Outcomes from past projects, and new ones to be catalyzed by CCF, will generate rich lessons that can support replication and scale-up in the sector.
- Project information and knowledge from key sector studies are currently in disparate formats, including internal project documents not accessible to practitioners.
- Collaborations with universities and research organizations will be initiated to make clean cooking data more accessible and usable to academia and practitioners.
- A global map of clean cooking projects will be produced that brings key project information to one platform.
- Market intelligence data (gender disaggregated) from the RBF facility will be consolidated, analyzed, and disseminated as a public good. This will include technology performance, business models, rates of cookstove uptake and pricing information.
- Different sources of information (e.g. project design documents, terms of reference, ESMAP global sector reports, evaluations, lessons learned analyses) will be made available.



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REGULATORY INDICATORS FOR SUSTAINABLE ENERGY (RISE)

WHY:

- To identify policy and regulatory gaps and priorities for effectively planning sustainable energy interventions in countries

WHAT:

- Comprehensive dataset of policies and regulations for sustainable energy in 140 countries
- Biennial RISE index updates assessing the policy and regulatory framework of each country

HOW:

- A broad survey on regulatory and policy framework for SDG7 pillars - access to electricity (decentralized and grid), access to clean cooking, energy efficiency, and renewable energy
- On-line platform for comparison- benchmarking, gap analysis, and good practice examples for clients' regulatory frameworks, including tracking policy commitments to address gender issues
- Regularly updating methodology and survey questionnaire to reflect changes in global best practices, increase transparency and validate credibility of data collection
- Edit focus on decentralized energy supply

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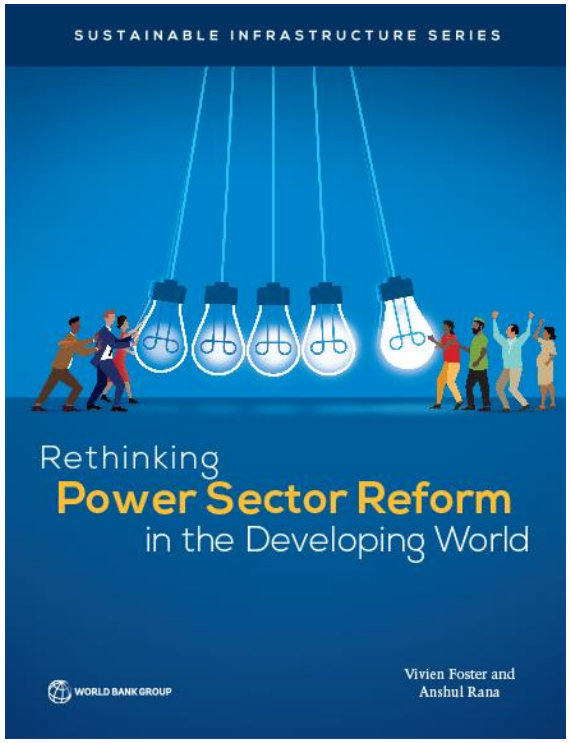
REGULATORY BENCHMARKING PROJECT

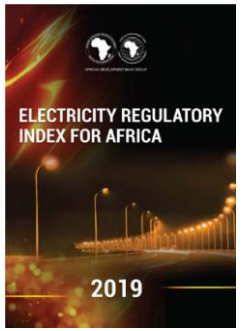
WHY:

- Better understand the gap between regulation on paper (de jure) AND in practice (de facto), which will complement the well-established RISE methodology of assessing de jure sustainable energy regulations

WHAT:

- Continue regulatory benchmarking process from the Rethinking Power Sector Reform project as part of the World Bank Infrastructure Vice Presidency's regulatory benchmarking project
- Complement RISE database with de jure and de facto data on the structure and functioning of regulatory agencies
- Focus on governance practices (autonomy, accountability) for regulators, tariff setting methodologies,, quality of supply and market entry
- Collect data for over 100 developing countries





HOW:

- Cooperation amongst, the World Bank, AfDB and OECD to cover the entire globe and create a comprehensive regulatory benchmarking index for the sector
- Pilot project to cover 18 countries across World Bank regions before global scale up
- AfDB to cover Sub Saharan Africa through its Electricity Regulatory Index
- Index to be used as critical component of infrastructure diagnostics tools (InfraSAP) to maximize finance for development.

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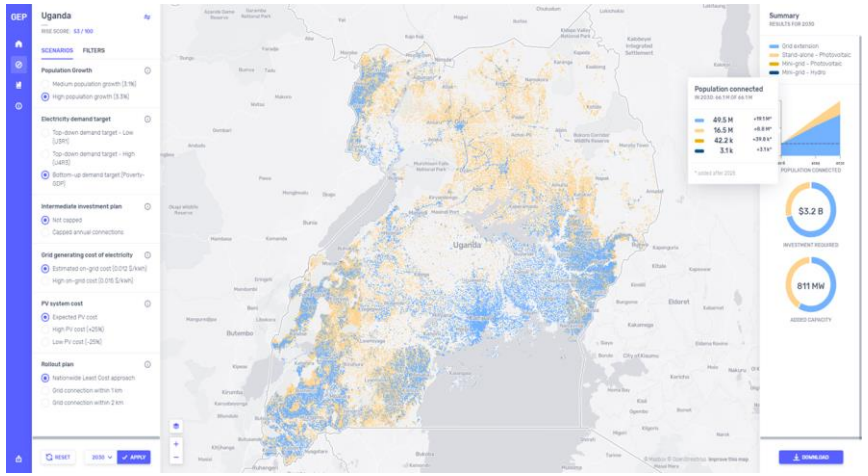
GLOBAL ELECTRIFICATION PLATFORM (GEP)

WHY:

- Governments, practitioners and private sector lack the understanding of how to achieve SDG7: what technology mix, where, and how much investment (including for added capacity)
- Sizing, locating, and visualizing the access challenge is a condition sine qua non for establishing a programmatic approach to access, including: an enabling ecosystem for grid and off-grid developments, roles and responsibilities of relevant institutions, and syndication of financing.

WHAT:

- GEP is an open source, open data platform providing a high-level overview of least cost solutions – grid, off-grid, mini grids – and associated investment requirements based on the location and demand of beneficiaries.
- The different scenarios are developed with a cross-sectoral approach for the 64 countries with the highest access deficits (below 90% and highest deficit in population count)
- The user-friendly interface allows for customization of scenarios to local country context by adjusting levers and toggling filters, while deeper analysis may be carried out on the underlying model and input data



Global Electrification Platform User interface

HOW:

GEP ensures the sustainability of planning and electrification efforts by:

- Building on existing efforts and aggregating publicly available energy datasets on energdata.info
- Training governments in national electrification least-cost planning
- Establishing data standards in close collaboration with sector stakeholders
- Collaborating with integrated planning partners for improving the platform

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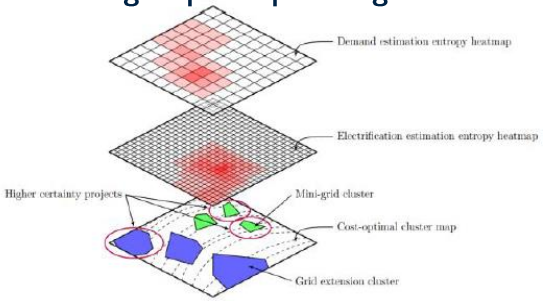
Demand Estimation

WHY:

- Without having accurate demand estimation including residential and non-residential customers, national geospatial electrification planning can lead to over or under investment in energy infrastructure. Often energy demand from non-residential customers is not fully captured.
- Consumption prediction (estimation) is a key element of minigrid system design. Recent research indicates that prediction errors can be considerable. (Louie, 2016)
- Private sector's risk premium could be reduced through more accurate demand estimation

Integration of Agricultural demand estimatio into the existing geospatial planning tool



WHAT:

- High-level geospatial layer for residential and agriculture demand for GEP in 60+ countries: Final results will be integrated into the GEP and provide the foundation to revise the demand assumption for residential and agriculture customers.
- In-depth analysis for residential and agriculture demand assessment in 20 countries: More spatially disaggregated demand assessment layer will be developed by using statistical techniques and a machine learning algorithm. In addition, a more up-to-date data layer will be explored and identified while validating the results through ground truthing.
- Demand assessment toolkit: Survey instrument and algorithm to analyze the data collected will be developed for mini-grid development and potential market assessment

HOW:

- Collaboration with multiple sectors including Poverty and Agriculture GPs: Identify and validate the existing dataset and harmonize the dataset across countries.
- Development of demand estimation algorithm (statistical techniques including machine learning)
- Dissemination of final output and analytic toolkit with the end-users

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ENERGYDATA PLATFORM

Open data and analytics for informed decision making

WHY:

- There is a need for an open data platform for publishing energy data from multiple providers to tackle the issue of limited and scattered high-quality machine-readable open data
- High demand for increased data availability and accessibility
- Limited amount of open analytics and applications

WHAT:

- A one-stop-shop for energy related datasets and applications that is free and easy to use
- The World Bank's open data platform that provides decision makers and researchers access to data and analytics relevant to the energy sector
- Offered as a public good for governments, development organizations, the private sector, academia etc.

WB Development Data Hub

World Bank data repository
Internal use only

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Partner organizations

Energy Data

643 Datasets

50+ Electricity Grid Maps

16 Applications

19 Partners

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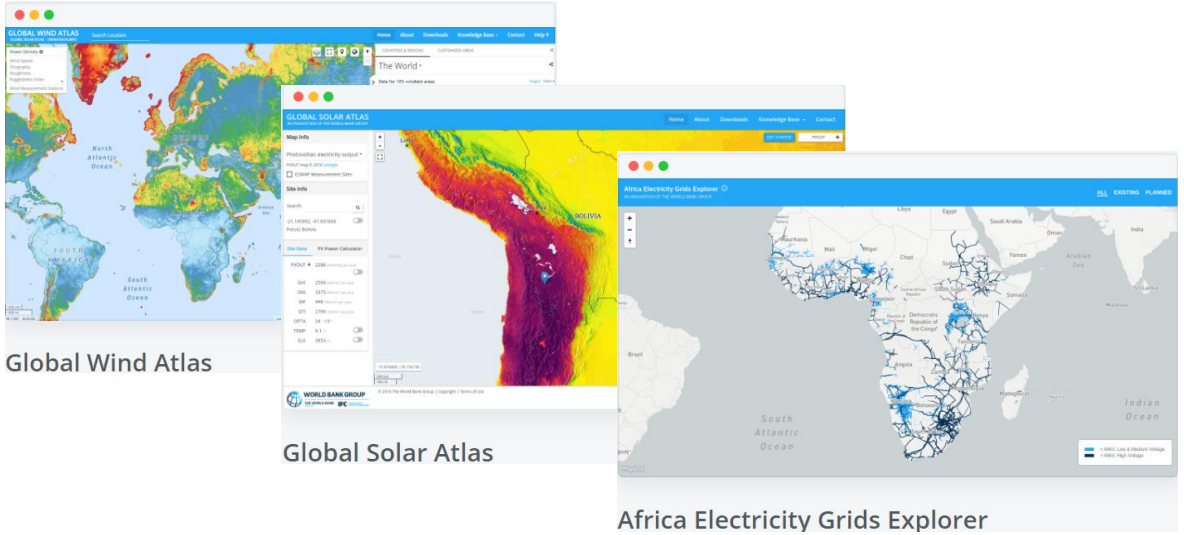
ENERGYDATA PLATFORM

HOW:

- Robust website powered by CKAN - the open-source data platform
- Public data from World Bank Development Data Hub
- Partnerships with 19 organizations – over 200 open datasets and 6 apps provided
- Global transmission grid mapping initiative – feeding the new data into all existing and future apps
- Country data profiles in development - consolidated downloadable data analysis and visualization for each country
- New and improved applications – improved user-friendliness, consistent design and standardization of technical approach
- Maintenance and promotion of existing applications – including the Global Solar Atlas and Global Wind Atlas

16 apps available and
7+ new apps in development



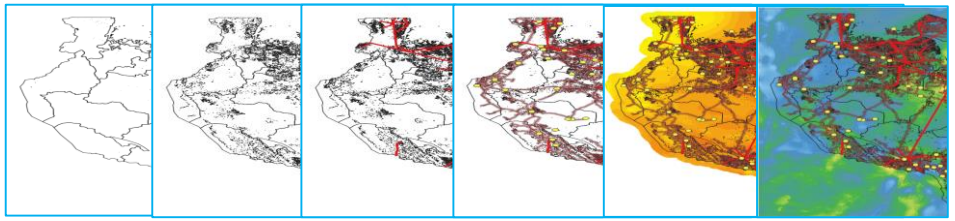
Global Wind Atlas

Global Solar Atlas

Africa Electricity Grids Explorer

... and more

Country data profile



RISE (policy)

SDG& Tracking (results)

MTF (access)

- ✓ Population, roads, transmission/distribution network, RE potential, mini- and off-grid location, etc.
- ✓ Country and Sector background
- ✓ Information on ongoing WB projects
- ✓ Active donors and projects, etc.

RESULTS FRAMEWORK

OUTCOME 1*: Government counterparts have used the generated evidence in policy decisions		Target (by the end of FY24)
Outcome indicator 1.1.	World Bank energy lending operations informed by using the Energy Data & Analytics datasets, applications and knowledge reports (including using energy data to close gender gap in energy services)	100%
Outcome indicator 1.2.	New World Bank advisory services and analytics projects supported by ESMAP confirm and illustrate the use of Energy Data & Analytics datasets, applications and knowledge reports	100%
Outcome indicator 1.3.	Evidence of uses of Energy Data & Analytics outputs in well-established global initiatives (publications, indexes, research series, white papers from global institution including World Economic Forum, UN, IRENA, IEA)	10
OUTPUTS:		Target FY24
Output 1	Publication of the Tracking SDG7 Report	4
Output 2	Publication of RISE analytical platform website	2
Output 3	Publication of MTF Country Report (focus on gender gaps in each report)	20
Output 4	Publication of MTF insight on gender and impact evaluation	2
Output 5	Refugees Data Report Publication	1
Output 6	Knowledge products (including RBF data platform) on clean cooking	10
Output 7	Regulatory benchmarking index portal	2
Output 8	Launching of Global Electrification Platform 2.0 (including 64 countries)	1
Output 9	Capacity building workshop for GEP	4
Output 10	Residential customer demand estimation report including algorithm and input data by country	20
Output 11	Agriculture energy demand estimation report including algorithm and input data by country	20
Output 12	Dissemination of demand assessment toolkit (survey instrument and open source algorithm)	1
Output 13	Adding new institutional partners on EnergyData platform that would publish at least 1 dataset each	12-15
Output 14	Publish analytical pieces on EnergyData platform	15-20
Output 15	Present Energy Data and Analytics Hub work at WBG/partner/international events and conferences	3-5
Output 16	Launch of updates to other existing applications (Global Solar Atlas, Global Wind Atlas, etc)	3

* In the ESMAP Theory of Change this is a foundational result for other programs, therefore it is represented at the intermediate outcome level.

PROPOSED BUDGET

	FY21	FY22	FY23	FY24	Cumulative
Tracking SDG7*	$ 400,000	$ 400,000	$ 400,000	$ 400,000	$ 1,600,000
MTF + displaced communities	$ 4,100,000	$ 4,100,000	$ 4,100,000	$ 4,100,000	$ 16,400,000
RISE/ Benchmarking	$ 600,000	$ 1,400,000	$ 820,000	$ 1,400,000	$ 4,220,000
GEP	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 6,000,000
Demand Estimation	$ 2,000,000	$ 3,000,000	$ 3,000,000	$ 2,000,000	$ 10,000,000
EnergyData.info**	$ 750,000	$ 750,000	$ 750,000	$ 750,000	$ 3,000,000
Cumulative	$ 9,350,000	$ 10,400,000	$ 9,820,000	$ 9,400,000	$ 41,220,000

** Tracking SDG7 will transfer $270,000 per annum to the other 4 custodians (IEA, IRENA, UNSTAT, WHO)*

*** EnergyData Platform budget includes $300,000 per annum for Global transmission grid mapping initiative*

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Partnerships & Initiatives

Project	Partnership/ Description
Tracking SDG7	➢ Collaboration with the other custodian agencies (IEA, IRENA, WHO, UNSTAT) ➢ Collaboration with the SDG7 technical advisory group ➢ Collaboration with the UN Regional commissions
MTF	➢ Partnership with Survey Unit, LSMS in Poverty GP ➢ Partnership with WHO ➢ Displaced Communities and Refugees: Developing a partnership with UNHCR; coordinating with the member organizations of the Global Plan of Action; collaborating with WB's Fragility, Conflict & Violence Group ➢ Clean Cooking: WHO, UNDP, United Nations Department of Economic and Social Affairs (UNDESA), Clean Cooking Alliance (CCA), Hivos, Energia, EnDev, CCAC, SEforALL, GLPGP, Loughborough University
RISE	➢ Focus group with private sector, Civil Society Organizations (CSO) and law firms, which are providing energy investments consultancy services ➢ Collaboration with World Economic Forum on the Energy Transition Index ➢ Collaboration with IRENA and IEA
GEP	➢ Consortium: KTH, Development Seed, World Resources Institute, Google, University of Cambridge ➢ Collaborating partners: DFID, UNECA, UNDP, UNDESA, SDSN, SEforALL, Power for All, OpTIMUS, Facebook
Demand Estimation	➢ Collaboration with the data harmonization team in Poverty GP ➢ Collaboration with Agriculture GP
EnergyData Platform	➢ Collaboration with partner organizations, academic institutions, other WBG data initiatives

Risks

Risk description	Proposed Mitigation
COVID-19 related risks: hindered survey processes due health concerns and restrictions imposed on public, changed priorities in client countries to mitigation of virus consequences.	Increase the use of remote survey tools and using online platforms for data collection and verification. Collect accurate and comprehensive energy access and demand data, including for public institutions, health and education facilities, to help the Governments and CMUs to promote investments and revive the economy.
Low implementation/disbursement of the program funding	Adequate human resources and skills mobilized to ensure an appropriate pace of implementation
Working in Countries affected by fragility, conflict and violence (FCV): security risk for data collection, Unavailability of the respondents	Using alternative methodologies to collect data in FCV countries (for example nightlight satellite data, remote interviews)
No follow up by World Bank operations after the program support	Commitment to implement follow-on activities supported by the program are a key criterion for offering operational support
Institutional changes affecting collaboration with partners	Close dialogue (formal and informal) with partner institutions to ensure continuity of collaboration

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