Addressing gaps in data for energy-related climate indicators: the IEA’s perspective

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UNECE Expert Forum for Producers and Users of Climate Change-related Statistics – September 2022
Overview

1) The importance of energy data for tracking climate objectives

2) Common and relevant data gaps for producing energy-related climate indicators

3) IEA’s capacity building activities supporting national data collection

4) New data sources: geospatial data for developing energy and climate indicators

5) New data sources: targeted surveys and estimation models

6) Conclusions
1. The importance of energy data for tracking climate objectives
The importance of energy transitions for achieving climate goals

Energy globally accounts for more than two-thirds of total greenhouse gas emissions

Source: IEA GHG Emissions from Energy data base – includes EDGAR modelled data
Energy includes IPCC categories ‘Fuel combustion activities’ and ‘Fugitive emissions from fuels’
Reminder: The importance of energy statistics
Climate indicators derived from energy statistics

Energy intensity of the economy (Total Energy Supply/GDP), World

CO₂ emissions from fuel combustion per population, European Union - 27
IEA’s data engagement: the road to global outreach

- IEA has a core data collection/dissemination role
- Cooperation with over 150 countries
  - Mandate to collect data from OECD countries
  - Data collection on voluntary basis for all non-OECD countries
- To develop and disseminate comprehensive global energy statistics to inform energy policy
- To guide international methodology harmonization

Mission
The IEA work with governments and industry to shape a secure and sustainable energy future for all

“… In addition to ensuring global energy security, the IEA has a new guiding principle: supporting countries in the global effort to attain net zero greenhouse gas emissions in the energy sector by mid-century.”

March 2022 IEA Ministerial Communiqué

2. Common and relevant data gaps for producing energy-related climate indicators
Energy balances are a compact source of information

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<th>COMPETITIVE ENERGY BALANCES 2019</th>
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<th>Crude oil</th>
<th>Oil products</th>
<th>Natural gas</th>
<th>Nuclear</th>
<th>Hydro</th>
<th>Geotherm., solar, wind, etc.</th>
<th>Biofuels and waste</th>
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Key indicators for tracking climate targets are derived from the energy balance

- **Estimating energy-related GHG emissions**

\[
\text{GHG emission from fuel combustion} = \sum_i EF_i \times Fuel_i
\]

*EF*: Emission Factor \[\frac{\text{kg} \text{ CO}_2}{\text{TJ} \text{ fuel}}\]  
*Fuel*: fuel consumed [TJ]  
*i*: fuel type (e.g. gasoline, natural gas, LPG)

- **SDG 7.3.1 (energy intensity measured in terms of primary energy and GDP)**

Total energy supply (TES) is required to compute SDG 7.3.1

- **SDG 7.2.1 (% renewables share in the total final energy consumption)**

Total final consumption (TFC) is required to compute SDG 7.2.1

*Note: TFEC which is defined as TFC minus non-energy use, for developing this indicator.*

- **Indicators to track Nationally Determined Contributions (NDCs)**
  - GHG-related NDCs (i.e. absolute emission targets, baseline emission targets)
  - Share of renewables/low-carbon energy sources in power generation/energy mix
  - Intensity targets (i.e. TES/GDP, GHG/POP)
Focusing on demand by sector and by end-use within each sector

IEA Energy Efficiency Indicators Data Explorer

Residential energy consumption by end use, United States

Detailed energy demand data essential for planning – statistically more complex than supply
Common obstacles in data collection and adoption of new sources

• Absence of energy data in statistical development plans and strategies of national statistical offices

• Lack of resources for rolling out targeted demand side surveys (e.g. transport, industry, households)

• General lack of data governance capacity (e.g. many administrative data sources are not centrally stored)

• General lack of digitalization:
  - Large amount of energy data may be collected using paper forms which impacts adopting novel data analysis approaches
  - Obsolete IT systems combined with lack of skilled staff hinder adoption of new technologies
3. IEA’s capacity building activities supporting national data collection
The IEA Energy Data Center global online training programme

• Key for reaching out to the energy statistics community (was initiated with a focus on in-person training in Paris)

• Objectives:
  1. Provide a service to members and non-members to help strengthen the skills of the international energy statistics community
  2. Provide guidance on how to complete the five annual questionnaires used to populate the IEA's core annual datasets
  3. Build a community of practitioners to share experience

• With the pandemic we have developed a structured on-line training substitute:
  1. In-person training weeks – implemented in a manner similar to before
  2. On-line “light” versions of the training weeks with a mix of live with pre-recorded videos/presentations, Quizzes, Q&A sessions, exercises sessions. The course is now divided in 6 modules of 1.5h each.

https://www.iea.org/events/21st-energy-statistics-course
Improving data on a regional basis

**EU4Energy programme (Phase 2)**

- EU-funded program focused on Eastern Europe, the Caucasus and Central Asia, for which the IEA is the main implementing partner (duration 2021-2025)

- **Objective**: to support the aspirations of focus countries to implement sustainable energy policies and foster co-operative energy sector development at the regional level.

- Working with the 11 beneficiary countries on improving energy data capabilities and enhancing data collection and monitoring, in addition to assisting country-level policy-makers in evidence based energy policy design that is pertinent to the country’s needs.

**Sub-Saharan Africa capacity reinforcement programme**

- Program for 10 sub-Saharan African countries, implemented by the IEA, funded by the European Union (duration 2020-2024)

- **Objective**: build capacity in energy data and statistics and the use of evidence-based analyses for long-term energy planning using integrated modelling tools

- **Methodology**: Phase 1 - 25h webinars, IEA Africa University series, bilateral work of data improvement (basic data, prices, energy efficiency indicators). Phase 2 – starting soon with in-country training activities
Development of roadmaps to support countries

• Aim is to go beyond traditional methodological training activities and support countries to enhance their national capacities by working with them directly on the energy information system.

• The concept draws on the quality frameworks developed for general statistics, best country practices around the world on strengthening energy statistics and on addressing identified gaps.

1. Currently working on developing a roadmap and tool to help countries strengthen their ability to produce sound energy statistics for climate reporting, and more broadly to track energy transitions. This will be ready by end 2022.

2. Developed a national road map for demand-side data collection.
IEA’s demand-side data collection roadmap

National roadmap for demand-side data collection and development of energy efficiency indicators

August 2022

Draft publication

Enhancing the capacity for collecting demand-side data is key for producing effective climate indicators.
Capacity building through global partnerships

- **UNFCCC**
  - Join IEA UNEP UNFCCC workshop on energy data for climate policy
  - Emphasis on the appropriate institutional arrangements to establish a coordinated approach to data collection and exchange

- **AFREC**
  - The IEA co-organised with AFREC the international workshop on bioenergy monitoring and reporting in Africa.
  - Collaboration on Africa analysis in IEA reports
  - Bilateral work on data to check for inconsistencies and to reduce gaps.

- **UN-FAO**
  - Collaboration on biofuels work where FAO presented their work on an IEA Africa University series.

- Continuous communication with other partner international and regional organisations such as the UNECA, IRENA, IAEA, AFD, IFDD, GiZ, DFID, USAID Power Africa, En.Dev, etc. in order to ensure synergies with other projects and explore possibilities of cooperation.
4. New data sources: geospatial data for developing energy and climate indicators
The Weather for Energy Tracker database

• Free platform providing high resolution weather indicators relevant to the energy sector. Extensively used by modellers.

• Reliable, consistent and easily accessible data on an expanded portfolio of weather variables, e.g. temperatures, degree days, solar radiation, precipitation, are becoming more and more important.

• Help statisticians, researchers, modellers and analysts around the world, as well as a broader audience interested in the energy sector.

• Developed by the IEA in collaboration with Fondazione Euro-Mediterraneo sui Cambiamenti Climatici (CMCC).

• Primary weather variables extracted from ECMWF Copernicus Climate Change Service information (2022).

• Updated every January, April, July and October

[Image of weather map with various data layers and indicators]
Weather indicators and solar generation correlation

• Granular weather data can be used as starting point to model solar electricity generation

Data sources: IEA Weather for Energy Tracker, IEA Monthly Electricity Statistics
5. New data sources: targeted surveys and estimation models
Importance of tracking residential consumption and common barriers

• Accurate households demand data is pivotal for tracking climate objectives:
  o SDG 7.2.1 (% renewables share in the total final energy consumption)
  o Greenhouse gas emission estimates
  o Energy efficiency indicators

• Collecting granular residential data requires targeted surveys with require resources and funding:
  o End-use energy consumption data: space heating/cooling, water heating, cooking, lighting, appliances
  o Granular activity data: population, number of occupied dwellings, floor area, appliances stock

• Biofuels correspond to large proportion of residential consumption, specially in Africa
  o Regional differences -> Regional wood resources are different – moisture content, NCV
  o Cultural difference -> Different ways of cooking, coffee making, …
  o Type of appliance -> Different cooking stoves require different amounts of fuel
Objective: improving the data collection and report of solid biofuels residential consumption in 10 selected countries.

IEA Africa programme – solid biofuel consumption estimation model

- Estimation and verification to improve energy balances within the selected countries.

- Make available a user friendly model for solid biofuels demand estimation.

- Share knowledge and foster discussion through various capacity building programmes.

Solid biofuels consumption estimation model - Data product - IEA
Improvements in demand data through new surveys

• Rwanda:

**Improvement**: New national survey on cooking fuel energy and technologies in residential and commercial and public services sectors

**Result**: Major revisions to solid biofuel supply and demand data

<table>
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<tr>
<th>Product/Flow</th>
<th>2019 OLD</th>
<th>2019 NEW</th>
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<tr>
<td>Firewood – residential consumption (TJ)</td>
<td>21153</td>
<td>91387</td>
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</table>

• Canada:

**Improvement**: New survey called the Monthly Renewable Fuels Survey which collects data on biofuel production plants – enhancing the quality/availability of supply side data

**Result**: Significant redesign of the Monthly Refined Petroleum Products Survey, which now includes data on blending terminals - enhancing quality/availability of demand side data

Data enhancements highly impact the quality of climate-related indicators (i.e. SDG 7.2.1)
6. Conclusions
Conclusions

• Accurate and timely energy data are pivotal for producing data and indicators required for tracking progress towards climate targets.

• Moving beyond supply… planning energy system transitions requires understanding and tracking energy demand. Improved data availability and quality on consumption across all demand sectors (transport, industry, residential and other sectors) through using specialized surveys and emerging technologies is key for developing climate statistics.

• Absence of funding for developing energy data in statistical strategic plans and lack of digitalization and data governance are major obstacles in data collection and adopting new data sources

• IEA strongly recommends support to primary data collection and development at national level (training + governance/resources) – happy to work with partners