



Tracking and modelling access to energy

Access results

- Introduction
 - Defining access to modern energy
 - Trends and projections
- Tracking: the importance of data and difficulties
- Access projections in the WEM model

- <https://www.iea.org/articles/defining-energy-access-2020-methodology>
- <https://sdgs.un.org/goals/goal7>

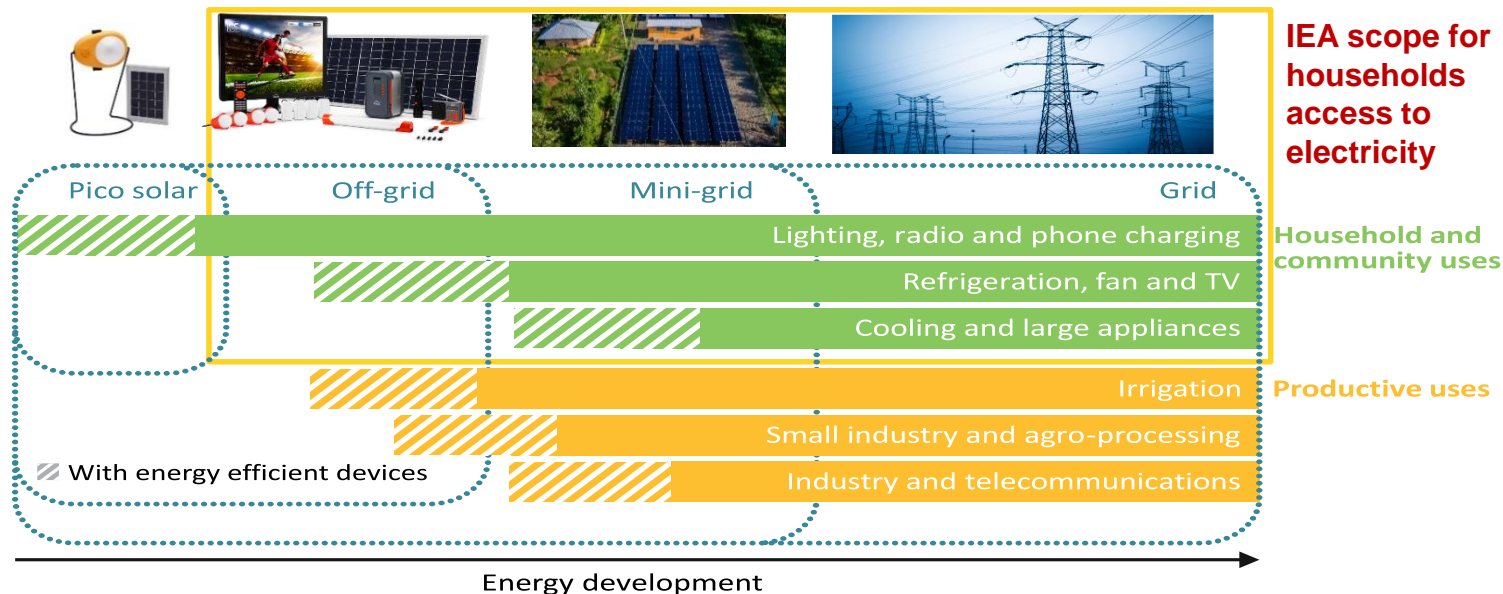
Goals

7

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

How to define access? No single internationally-adopted definition

- Different technological solutions and several uses



- IEA definition : Electricity access entails a **household** having **initial access to sufficient electricity to power a basic bundle of energy services** – at a minimum, several lightbulbs, phone charging, a radio and potentially a fan or television – with the **level of service capable of growing over time**.









Defining clean cooking access

- Solid biofuels in developing countries are mainly used for cooking, a topic covered under the SDGs

SUSTAINABLE DEVELOPMENT GOAL 7

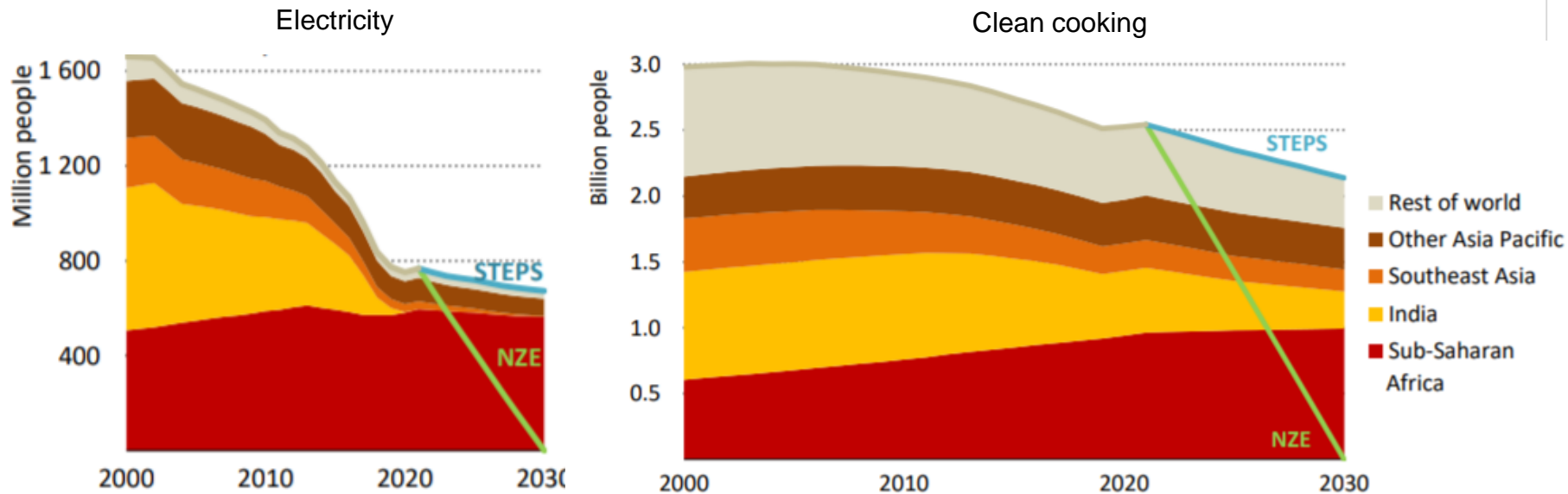
Ensure access to affordable, reliable, sustainable and modern energy for all

- Target 7.1: Ensure universal access to affordable, reliable and modern energy services
- Indicator 7.1.2: Proportion of population with primary reliance on **clean fuels and technology**

Biomass							
Natural gas	Electricity	LPG	Biogas	Improved cookstoves	Traditional use	Coal	Kerosene
							
Clean cooking					Not clean cooking		

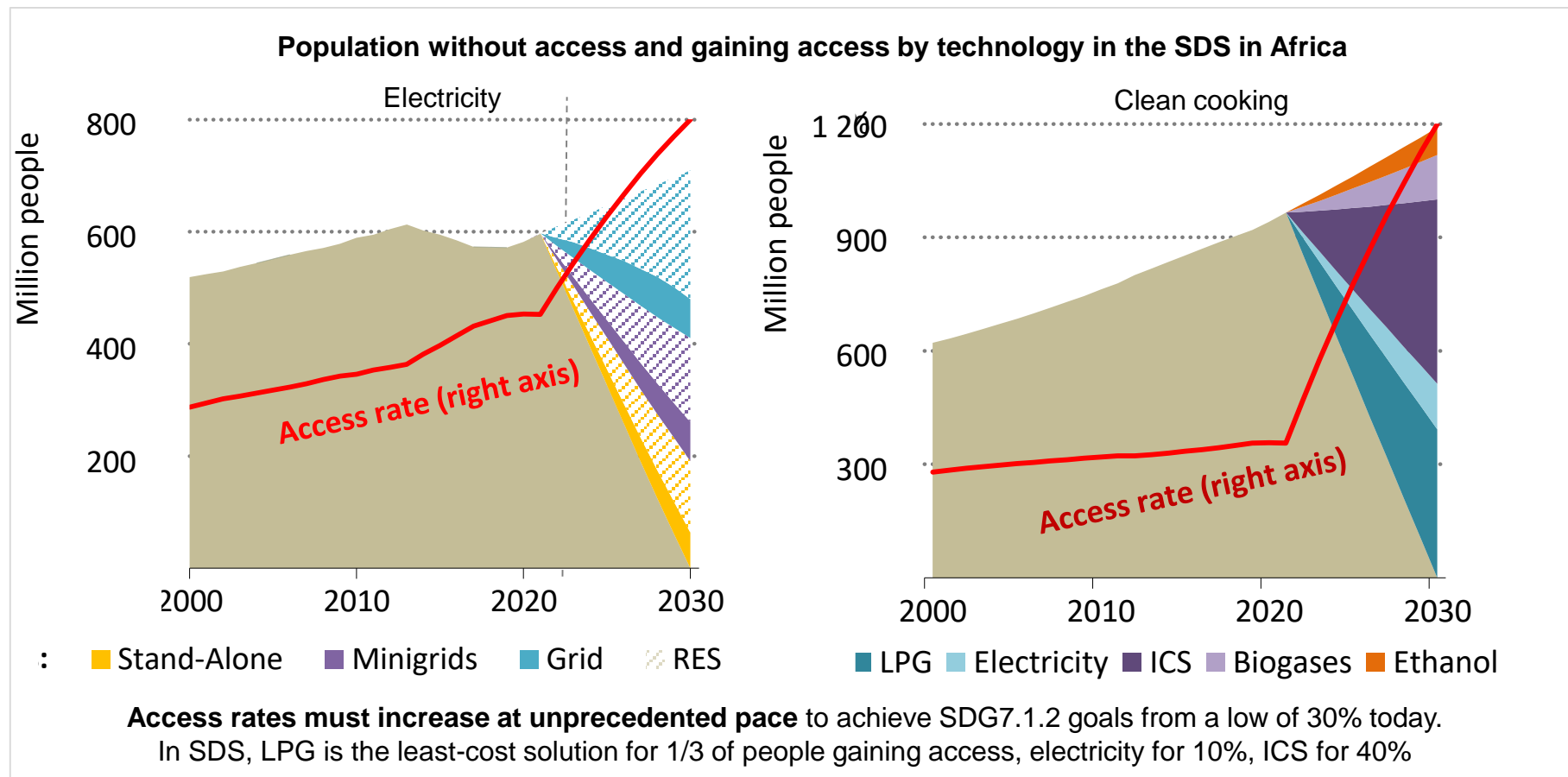
- Definition: access to clean cooking facilities means access to (and primary use of) modern fuels and technologies

Population without access in STEPS and SDS/NZE



If no additional efforts in policies and investments are deployed by **2030** more than **2 billion** people will be **cooking** with traditional and **harmful** stoves and more than **650 million** will still be **lacking basic electricity** access.

Africa is far from achieving universal clean cooking access

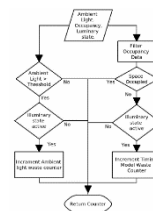


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How to track energy access? - Tools

What are the most frequently used options for data collection in households:

- Use of administrative data (e.g. utilities connections, REA programmes, sales...)
- Business surveys
- Household surveys (very high potential but high cost)
- Estimation/Modelling
- In-situ measurements for grids and mini grids ...



The IEA is working on a methodological guidelines to track access using administrative sources

There is no uniform methodological recommendations but a **combination of the different methods** considering local/national specificities is the best solution

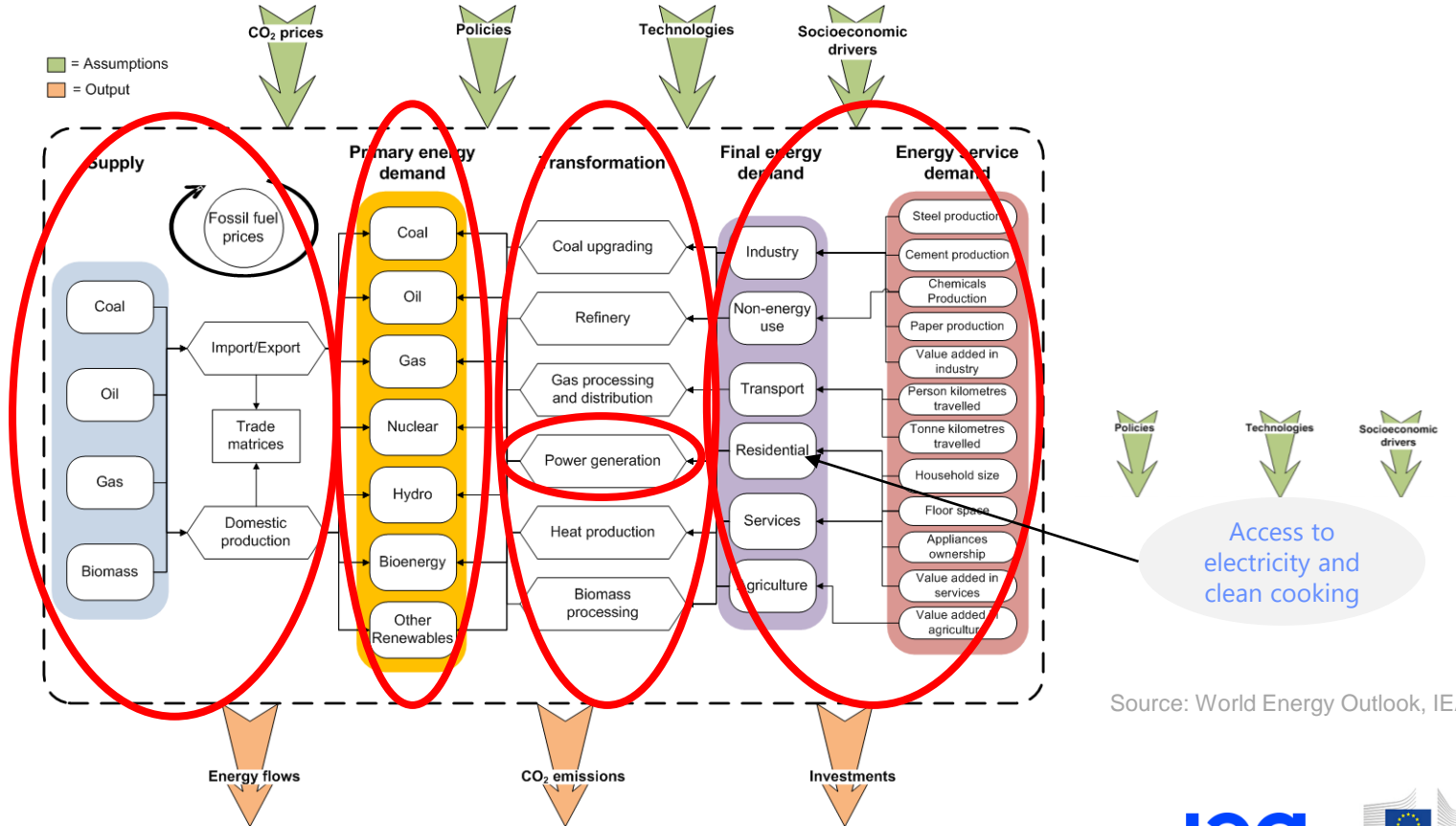
How to track access and off-grid electricity? - Common barriers

- Correctly **sampling** urban & rural areas and regions (**regional differences**)
 - Access rate and consumption patterns are different -> **No access areas vs full access**
 - Different hh sizes and energy needs -> **often no geographical differentiation**
 - Remote areas vs. areas closer to the grid -> **grid expansion vs. minigrids**
- **Off-Grid** electricity is challenging to track
 - Off-grid data is often **not metered** -> **Decentralised/unregulated power and Stand alone systems - lack of sources**
 - How to report mini-grids and SHS electricity? -> **# of systems/connections, kW or KWh?**
 - Grid data are simpler but -> **Non-technical losses (thefts)** are high and difficult to track (is it considered access?)
 - Tracking off-grid systems in operation (**life-time**) -> **Mini-grids maintenance; SHS durability**
- Calculating **access to electricity**
 - **Defining Access level/quality** (or tier) -> **initial access vs. full access**
 - Unmetered connections and unused connections
 - What **type of access** -> **Grid vs. Mini Grids vs. Solar home system (SHS) vs. Solar lamps**
 - What power per capita to consider as first access -> **Capability to power certain appliances**



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IEA's World Energy Model (WEM) OVERVIEW



Source: World Energy Outlook, IEA

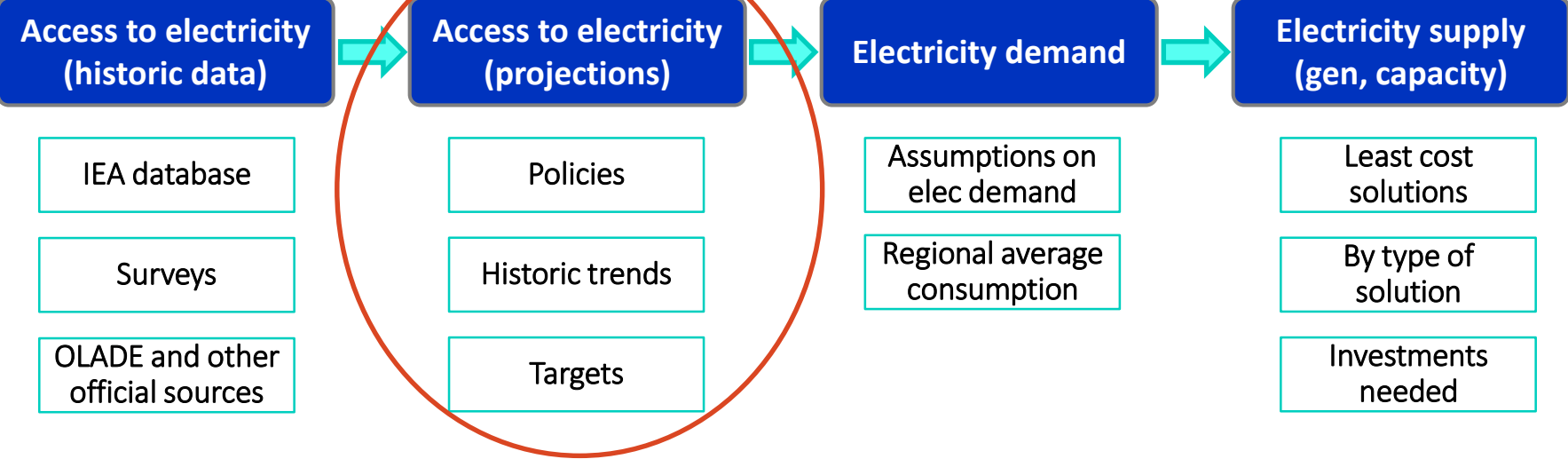
Scenarios and approach

- Develop sets of policies that describe different future pathways
 - Create a coherent storyline among policies, prices, development and deployment of energy sources and technologies
 - It is important that policies make sense together, reflecting broad evolutions in the world with specific policies and measures
- World Energy Outlook Scenarios
 - **Stated Policies Scenario** (STEPS) – hold up a mirror to the actions and intentions of today’s policy makers, and provide a candid assessment of their implications for energy markets, energy security and emissions
 - **Sustainable Development Scenario** (SDS) – provides a strategic pathway to meet global climate, air quality and energy access goals in full
- Additional Scenarios, and Cases and Sensitivities are developed:
 - **Net-Zero Emissions by 2050** (NZE2050 case) – developed for WEO 2020 to outline a pathway for the energy sector to 2030 to be on track for net-zero by 2050.

Questions to be answered by the energy access module

- Access to electricity
 - How many people have gained and will gain access to electricity?
 - How much electricity demand will come from them?
 - How will this demand be supplied? By which systems and with which fuels?
- Access to clean cooking
 - How many people have gained and will gain access to clean cooking solutions?
 - Through which technology and fuel will they gain access?
 - How will this affect the demand for clean cooking fuels?
- How much investment is needed to deploy the infrastructure?
- What are the energy access-related CO₂ emissions ?

Electricity access model



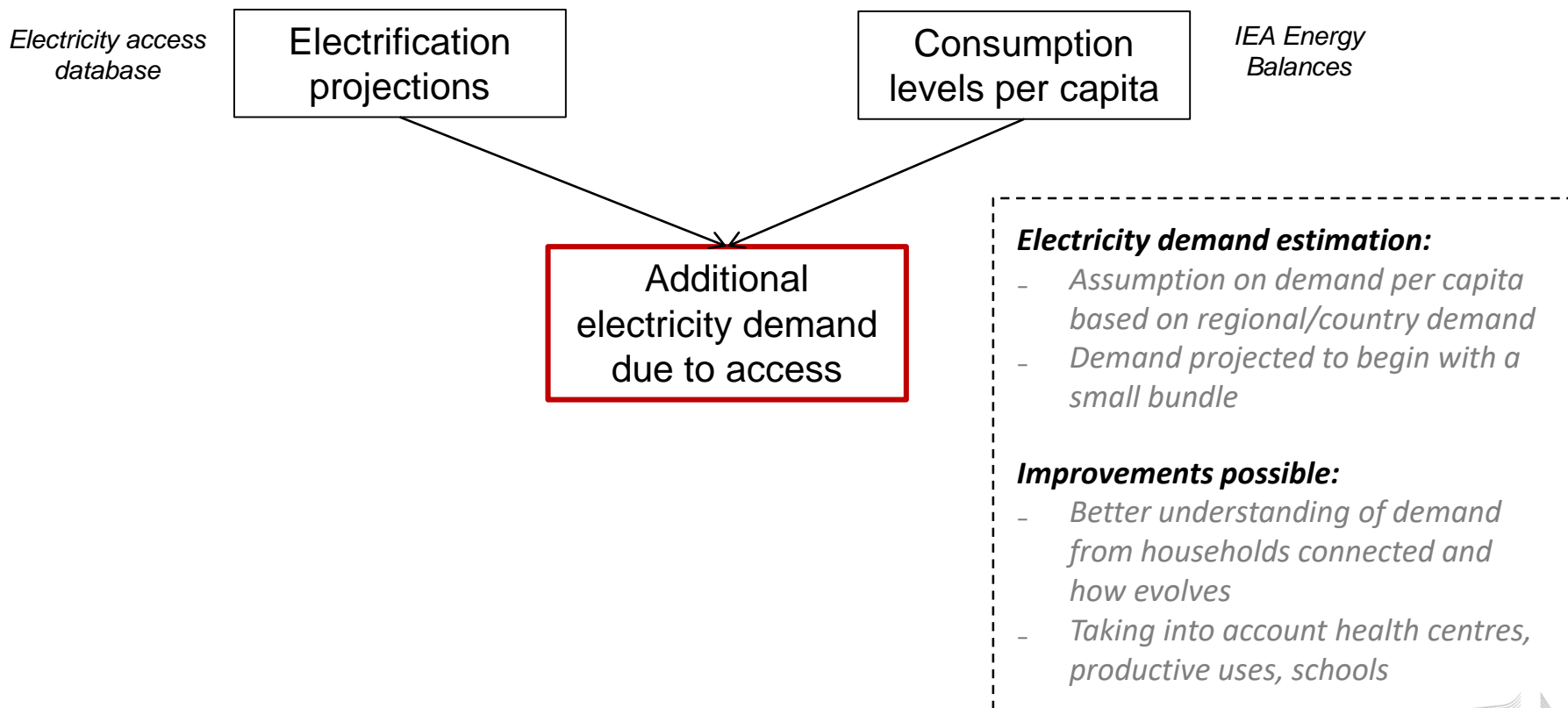
By country and region

By region

Historic

Historic and projections by scenario

Electricity access model – Demand estimation



Electricity access model – Demand estimation

Electricity access database

Electrification projections

Consumption levels per capita

IEA Energy Balances

Additional electricity demand due to access

Allocation of electricity access demand to Residential electricity demand

Lighting

Cooking

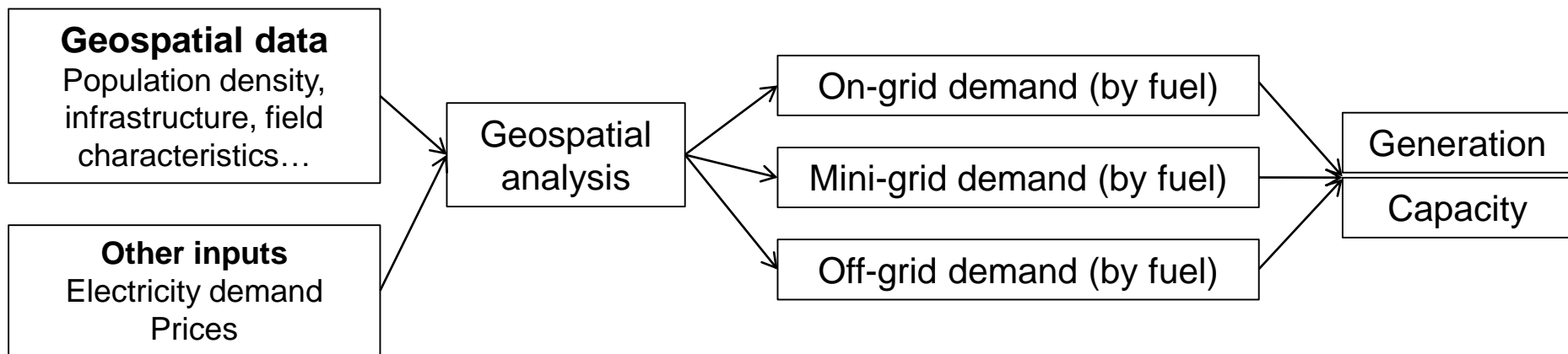
Cooling

Appliances

Water heating

Space heating

Electricity access model – Power generation



$$\text{Electricity Final Demand (used for Main PG module)} = \text{Electricity TFC (including total access demand)} + \text{Electricity OES} - \text{Mini- and Off-grid access demand}$$

Illustration of modelling population gaining access

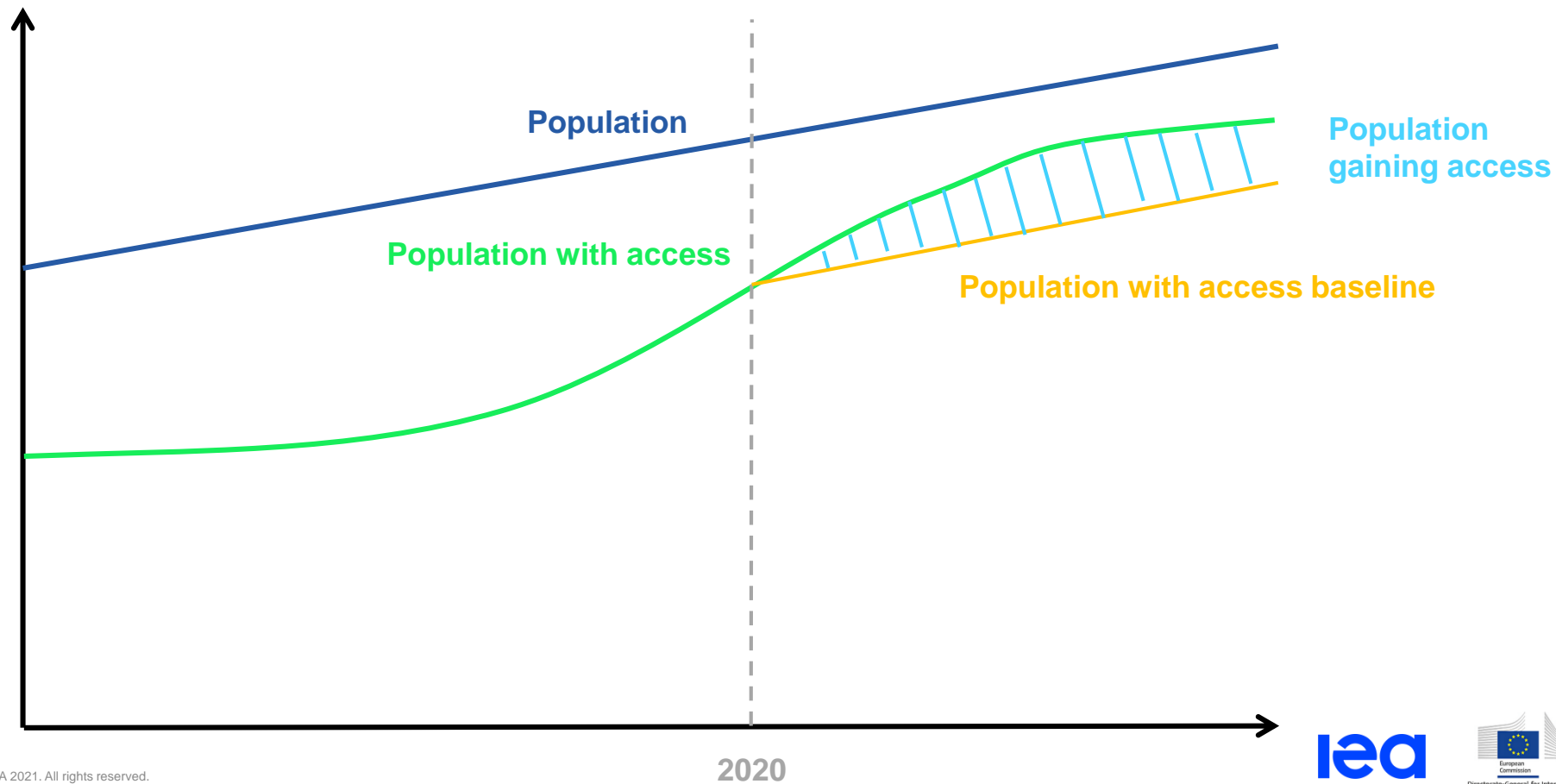
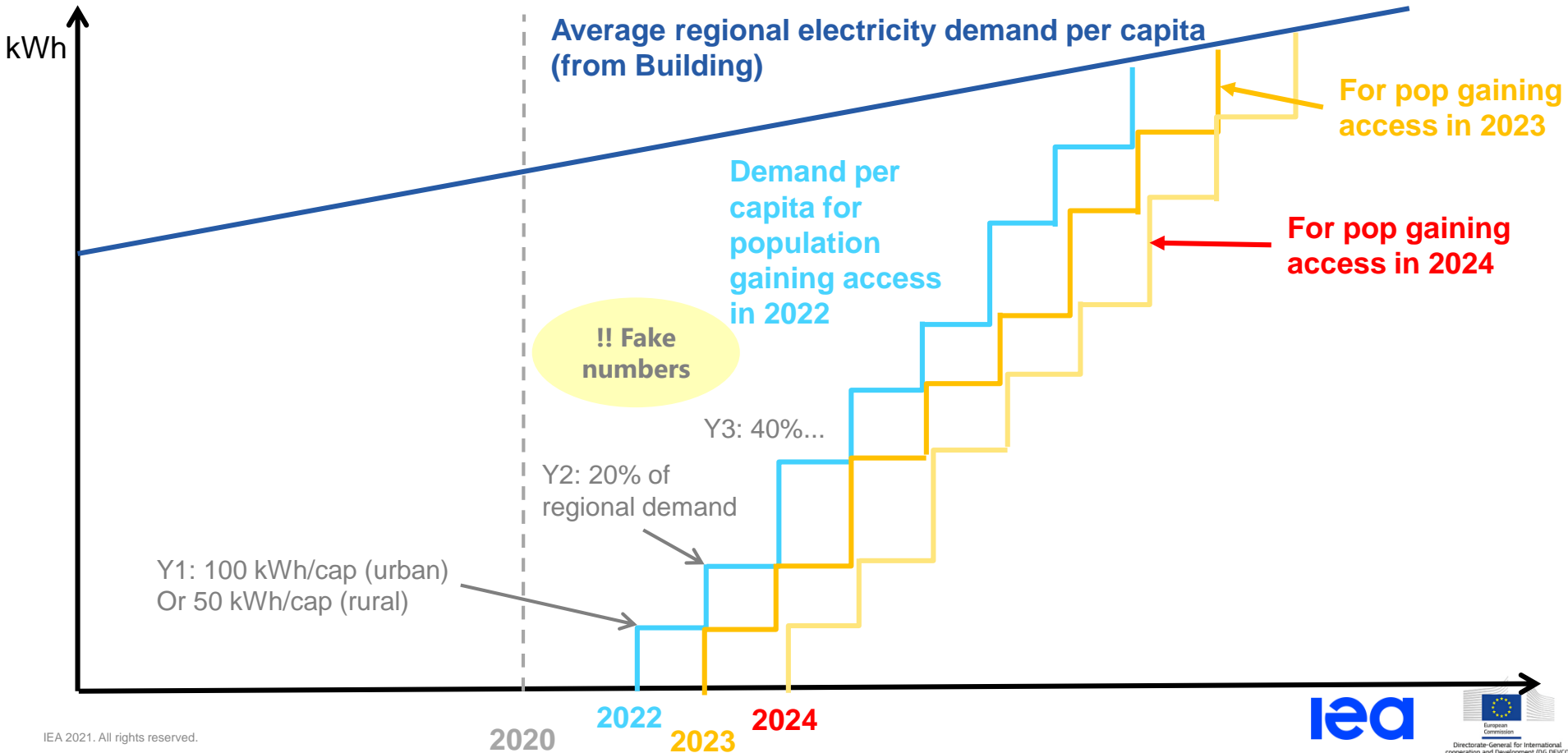


Illustration of modelling demand from pop gaining access





Thanks

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