



La digitalización en las transiciones energéticas

24 de marzo 2021

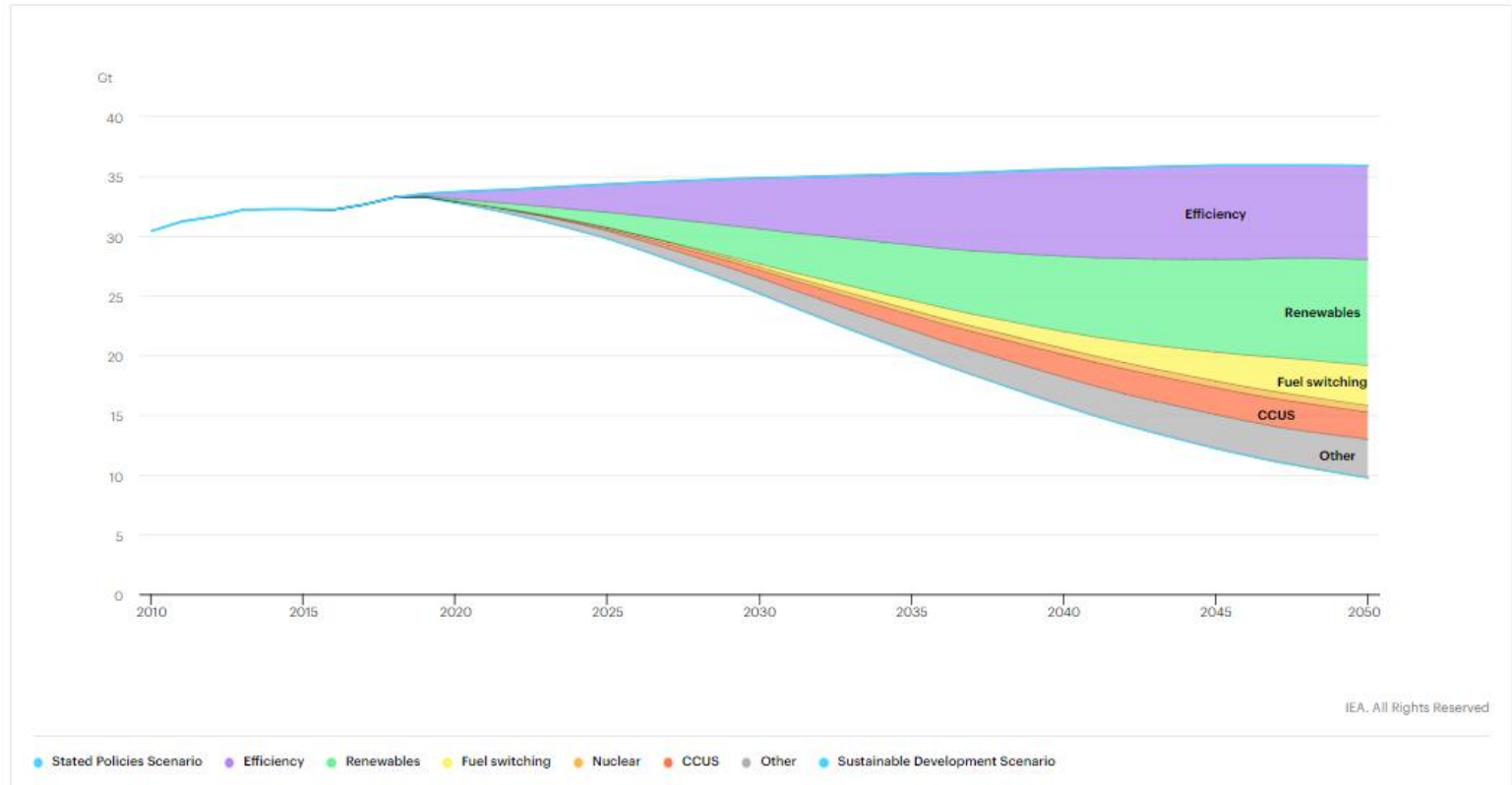
International
Energy Agency

1. **Global context**
2. **The flexibility challenge**
3. **Opportunities**
4. **Outlook**

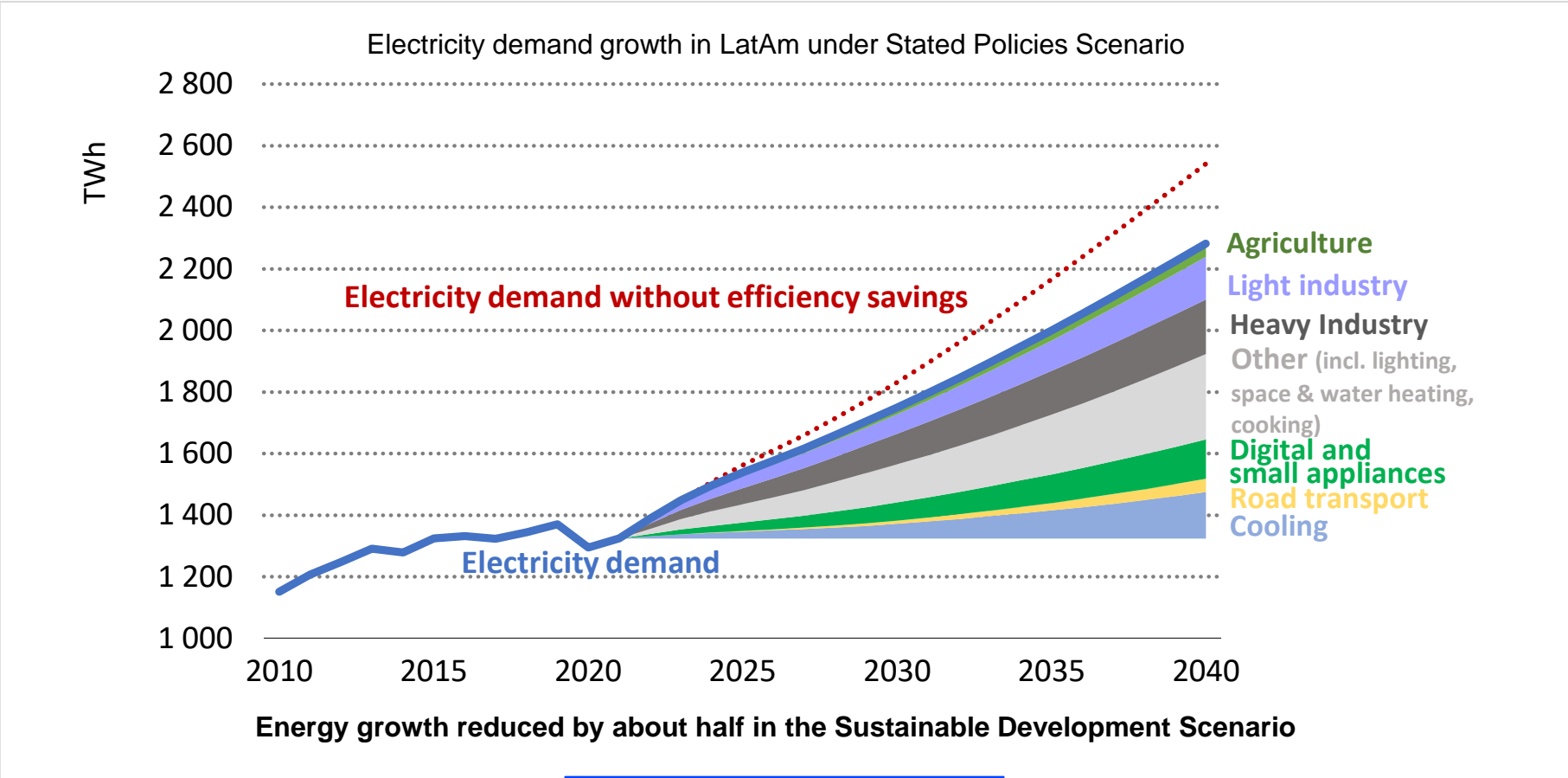
Global context

Energy efficiency and renewables key to decarbonisation

CO2 emissions reductions by measure in the Sustainable Development Scenario relative to the Stated Policies Scenario, 2010-2050

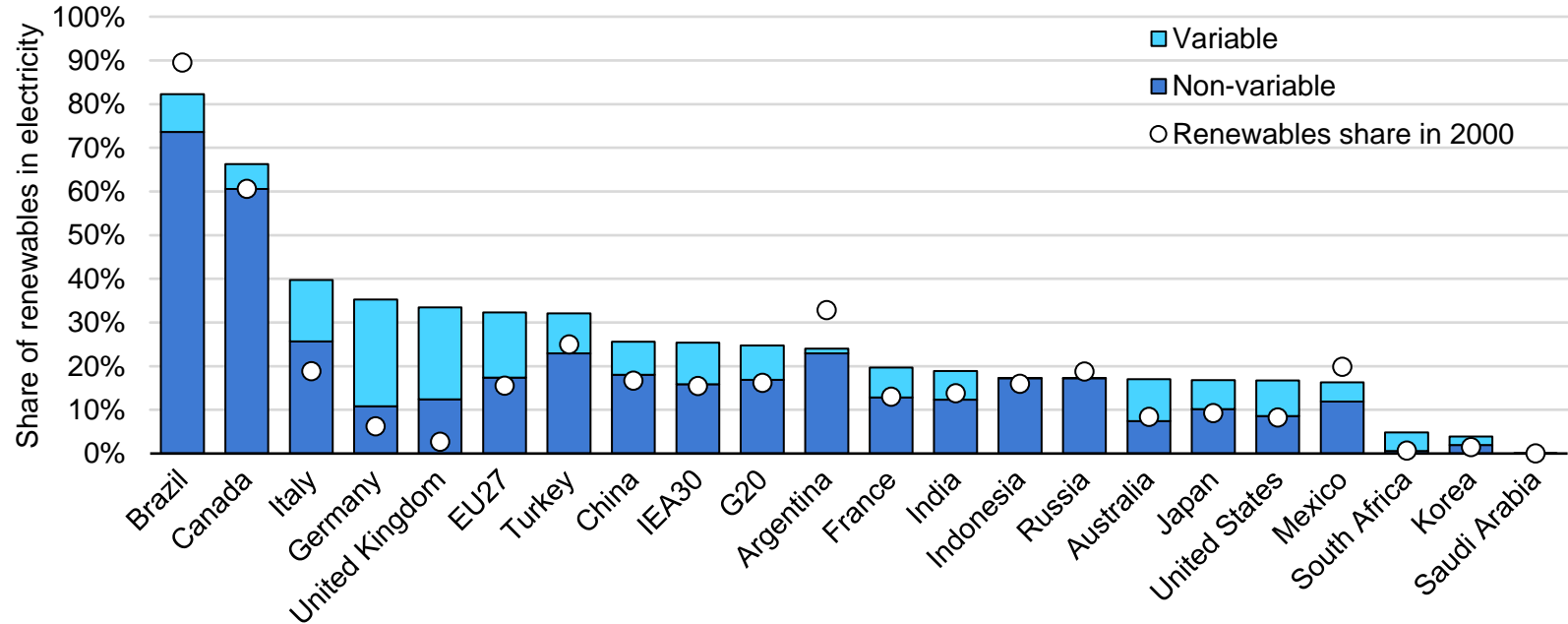


Demand for energy services can be met more efficiently



Power systems are changing

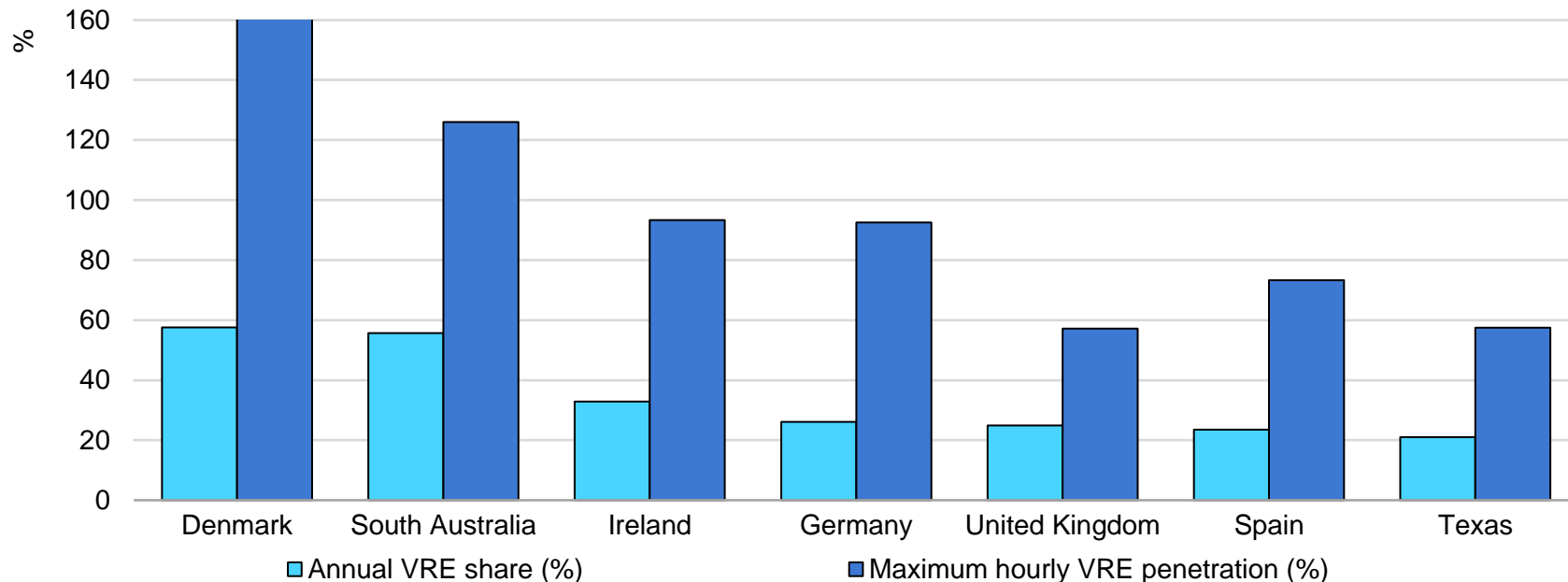
Share of variable and non-variable renewable electricity generation in G20 countries, 2018, and 2000 total share



Most G20 countries increased the share of renewables in electricity generation since 2000

High shares of variable renewables are becoming the norm

2019 Annual VRE share and maximum hourly penetration

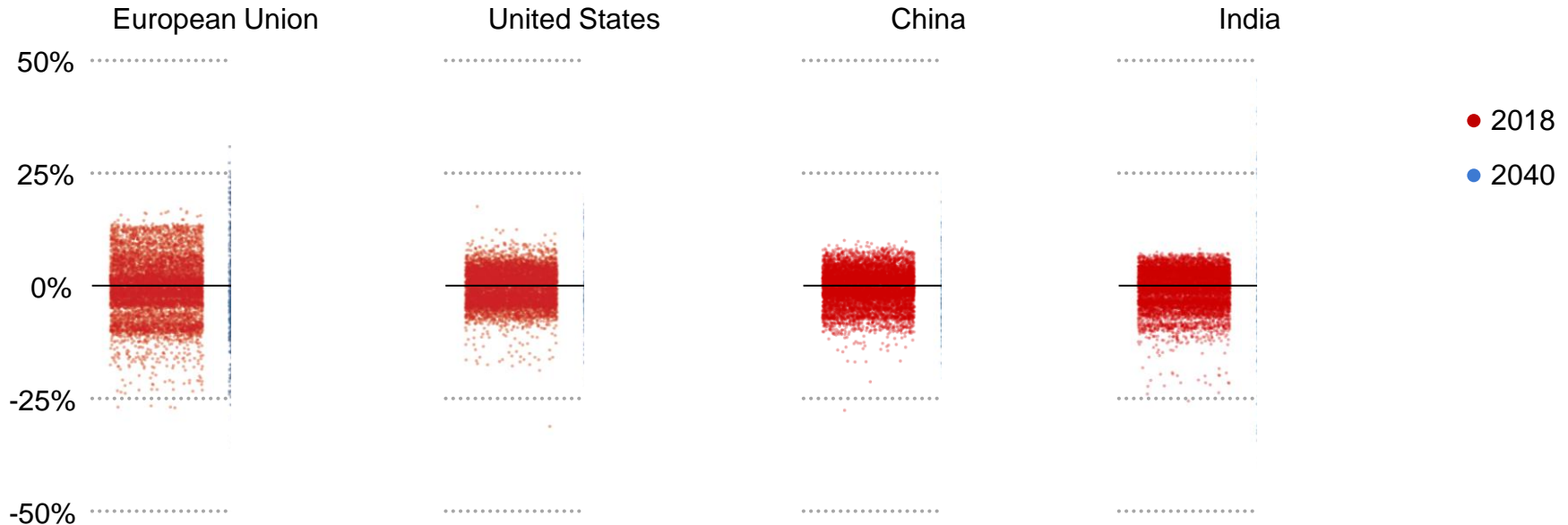


As countries and regions are attaining higher shares of VRE generation, they are also experiencing much higher instantaneous VRE infeed levels in certain periods of the year

The flexibility challenge

Electricity and flexibility move to the heart of modern energy security

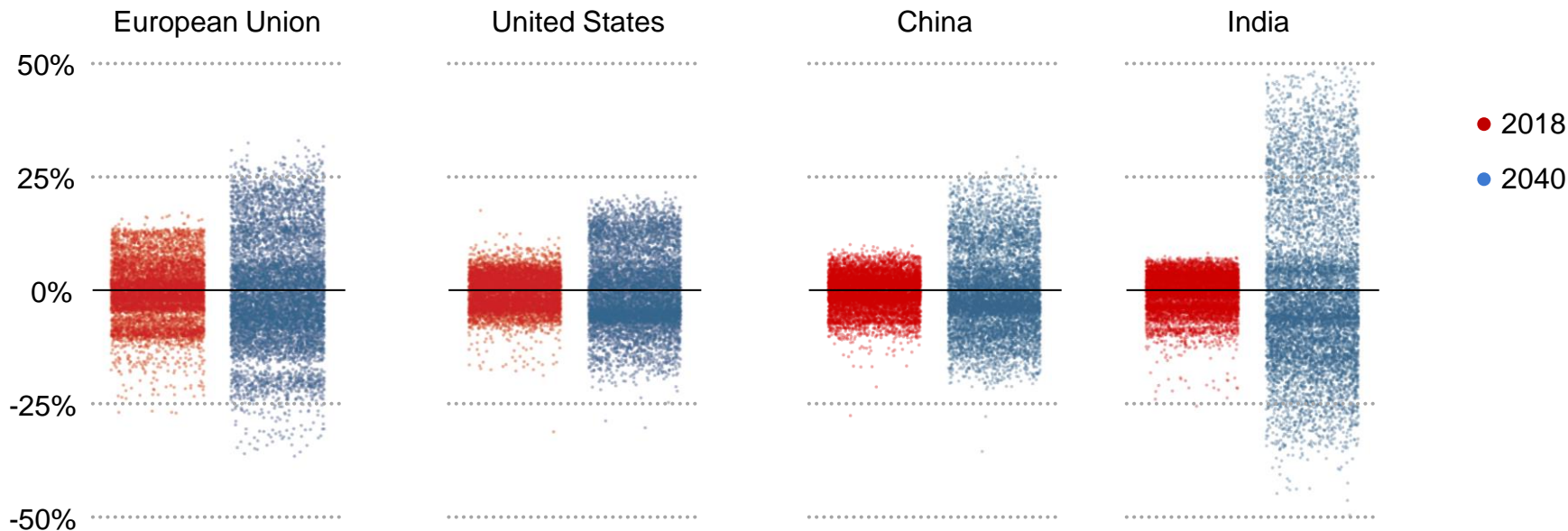
Hour-to-hour adjustments required in power systems due to variability in demand, wind and solar PV, in the Stated Policies Scenario



Global flexibility requirements double by 2040. A wide set of distributed flexibility sources, including storage and demand-response will be needed to ensure electricity security.

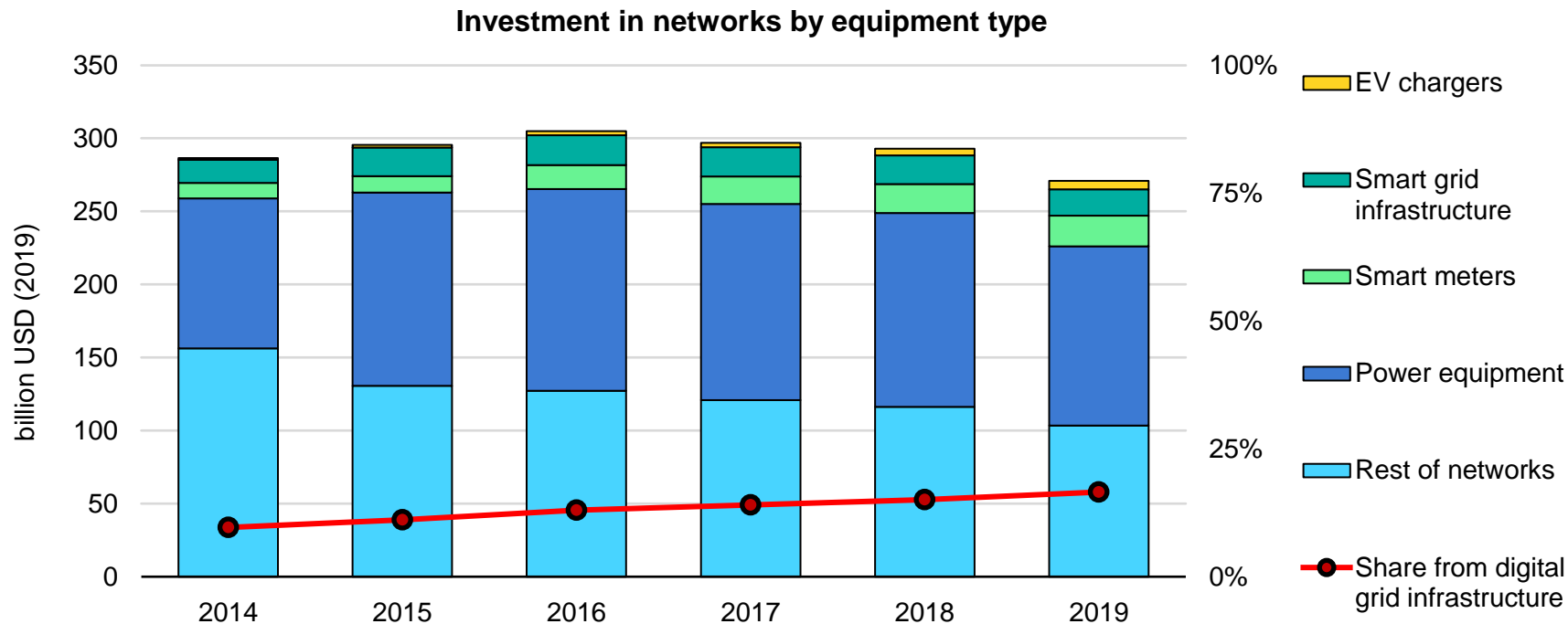
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Grids transform slowly – but digital is accelerating in many regions



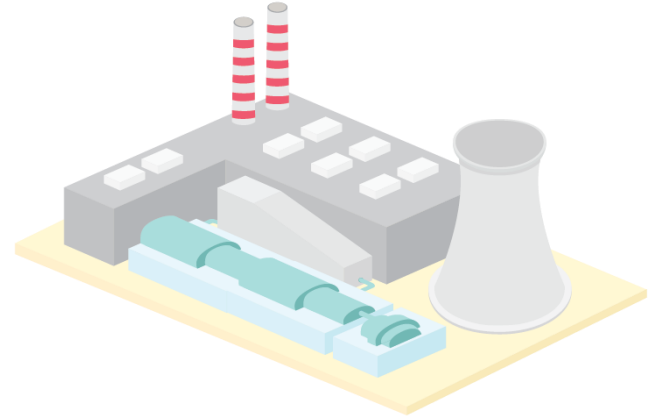
Investment in electricity grids is declining ... **but technology is becoming smarter** : Smart meters, utility automation and EV charging infrastructure now make up more than 15% of total spending.

Opportunities

The power sector landscape is changing dramatically



Consumption fluctuates

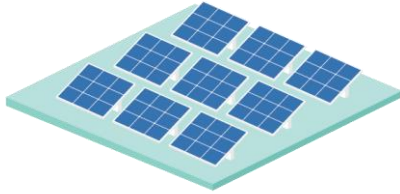


**Centralised power plants
adapt their output**

Power system management use to be centralised power plant adapting to consumption ...

The power sector landscape is changing dramatically

Solar Power Plant

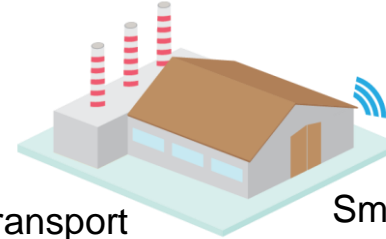


Wind Turbines

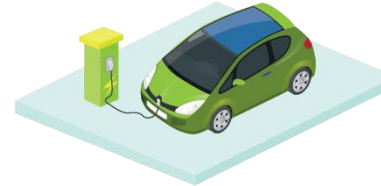


**Renewable energy output
fluctuates**

Industry



Transport



Smart Homes



**Smart consumers adapt
their output and demand**

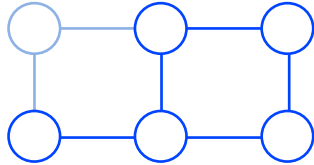
... in the future, consumption will be able to follow production patterns

Multiple flexibility sources provide opportunities and challenges

Digitalisation enables flexibility to be harnessed at affordable costs, and in enough quantity



+1 Billion
households participating



+11 Billion
connected devices



+150 Million
electric vehicles

... to which we can add 1350 TWh from industry and agriculture

Digitalisation enables flexibility to be harnessed at affordable costs, and in enough quantity.

Demand Response Capacity

4000 TWh

Theoretical potential in 2020

15%

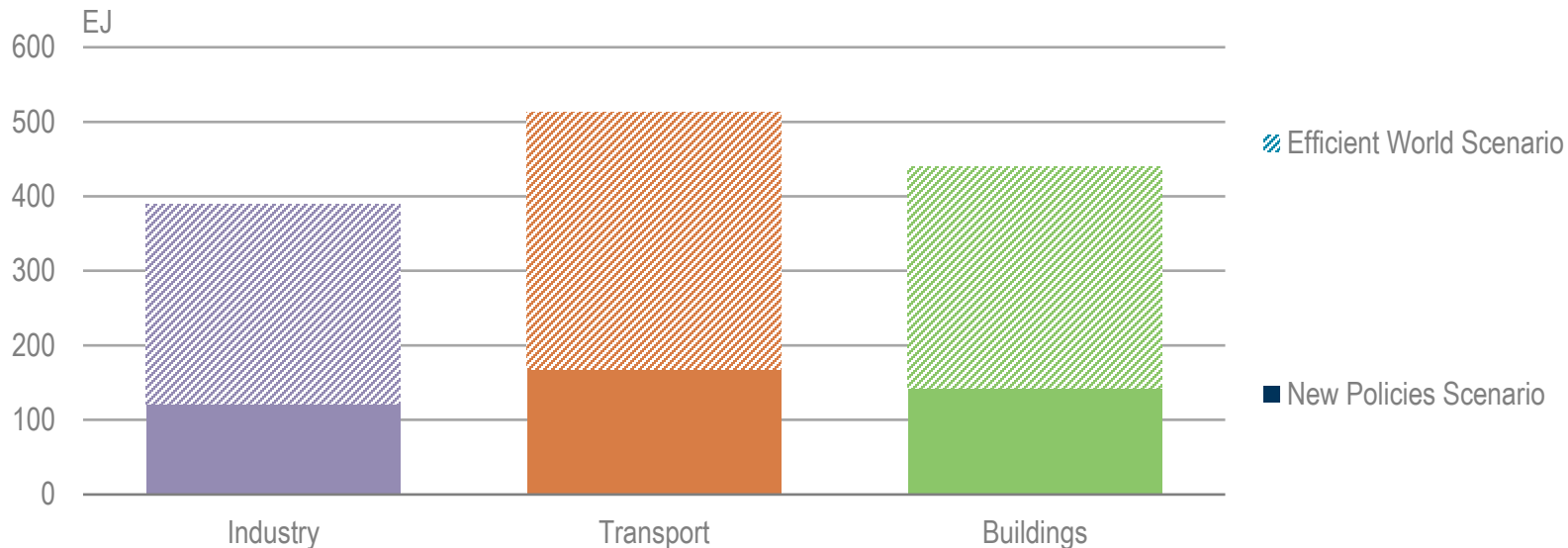
of today's potential
is tapped

7400 TWh

Theoretical potential in 2040

There is significant cost-effective savings potential in every sector

Cumulative energy savings in NPS and additional potential in the EWS to 2040



In 2040, potential savings are equivalent to the final energy use of China today. The largest opportunity is in transport, where recent progress has been slowest.

Cities have the potential to drive digitally enabled energy transition

High density of population and economic activities

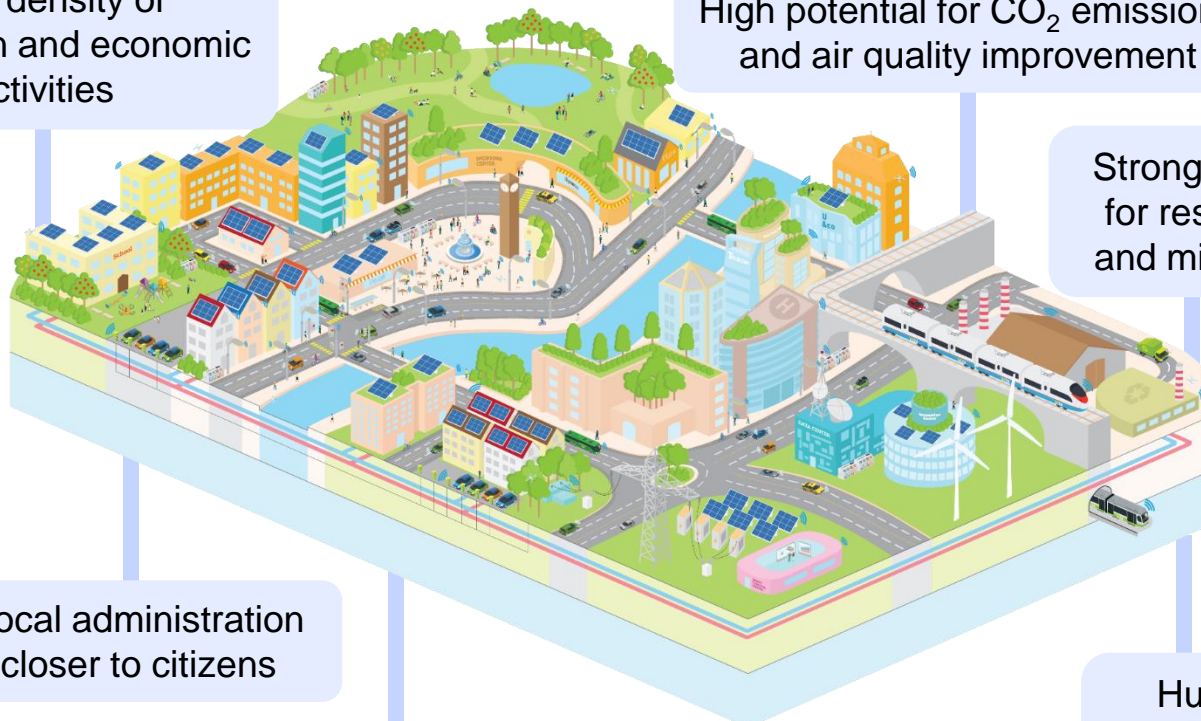
High potential for CO₂ emissions and air quality improvement

Stronger need for resilience and mitigation

Local administration closer to citizens

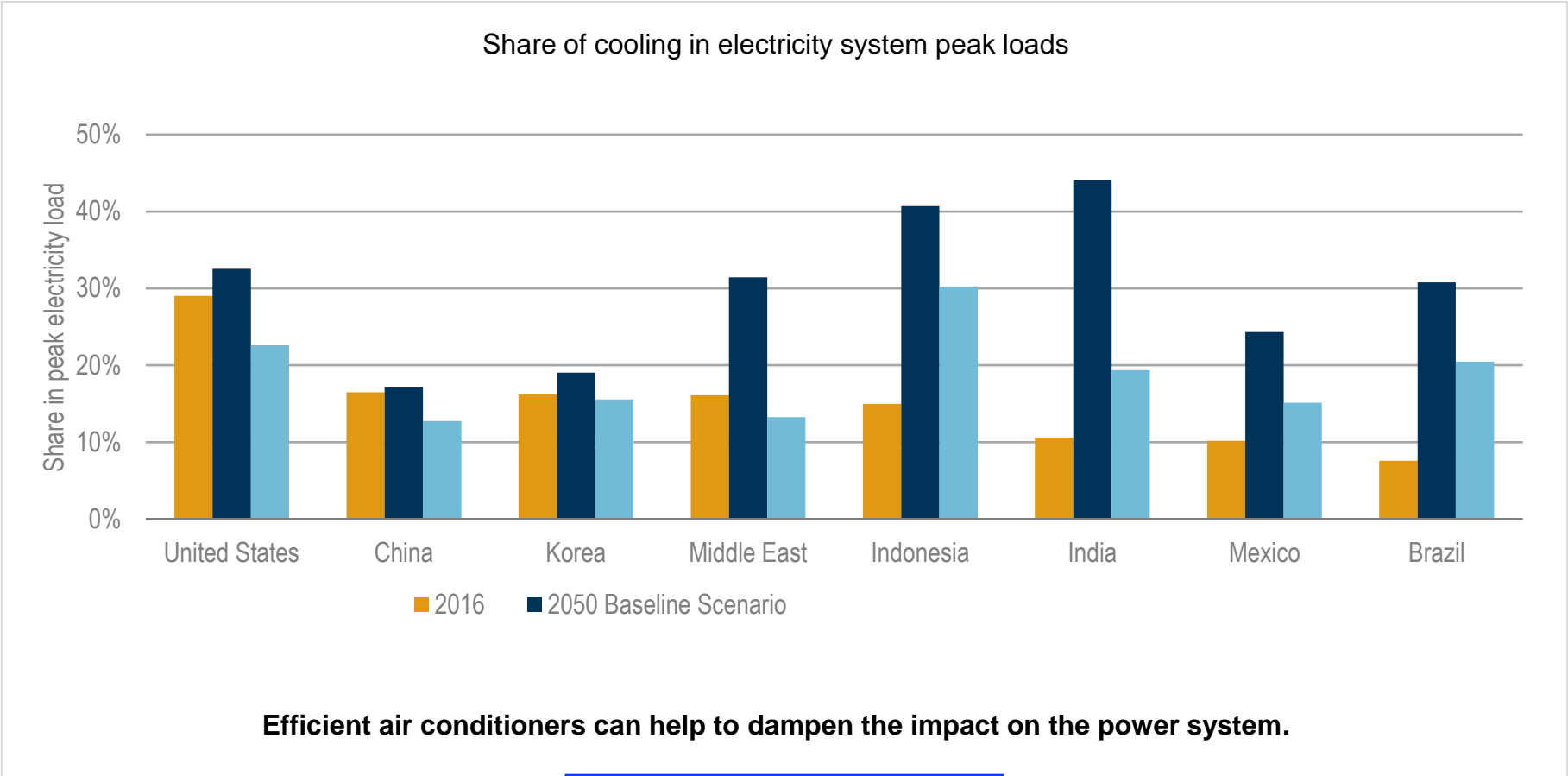
Diversity of energy demand enabling energy networks integration

Hubs for creativity and innovation



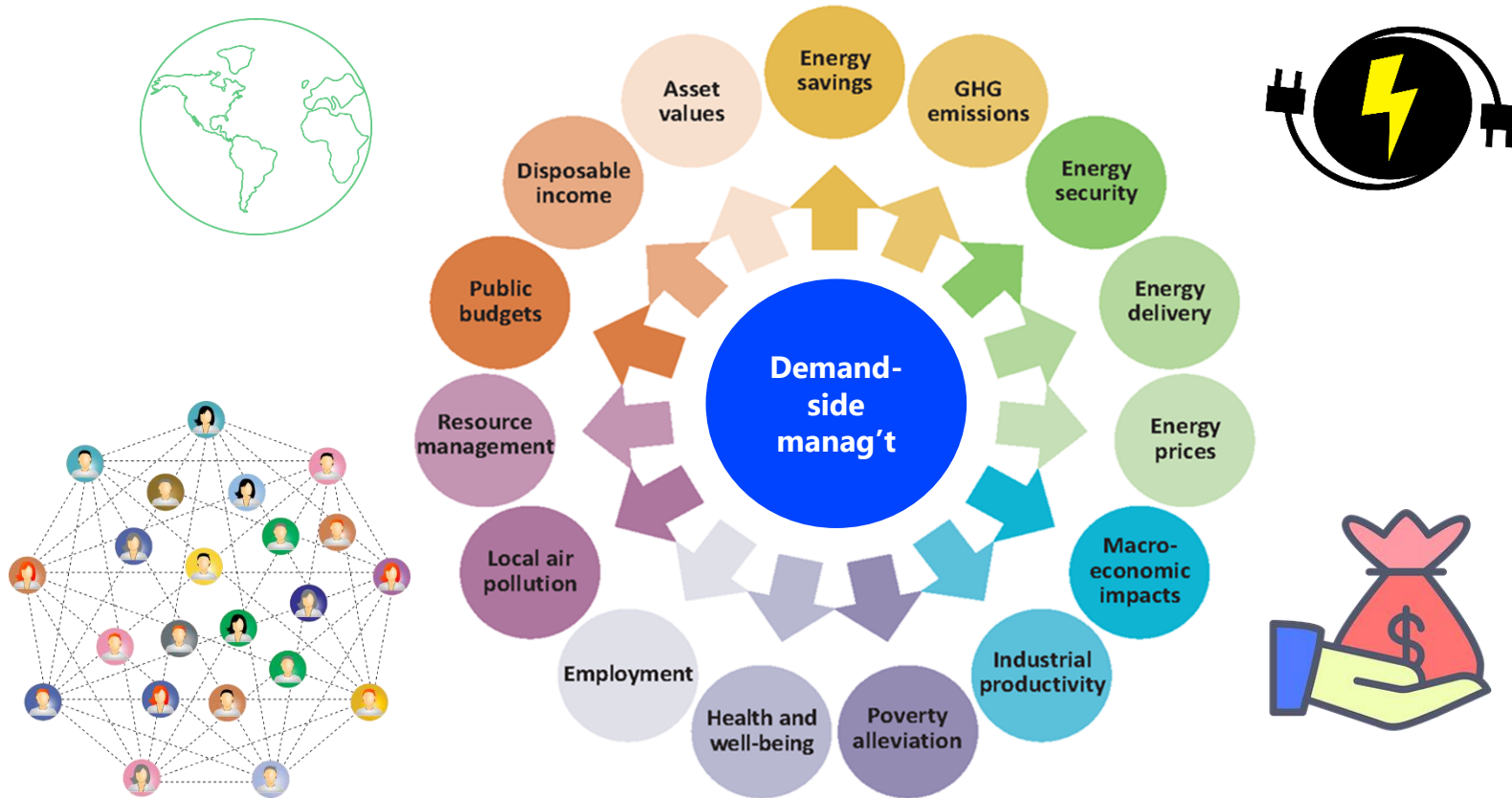


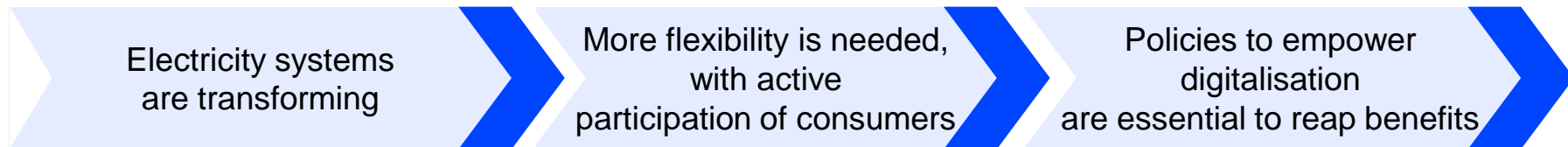
Cooling demand has serious implications for grids



Outlook

There are multiple benefits to full leveraging digital technologies





- **Digitalisation** can help leverage opportunities:
 - Create a more interconnected and responsive electricity system
 - Support carbon emissions reduction
 - Help to minimise system cost and need for new investment
 - Improve stability, resilience and security
 - Enhance quality of power supply
- IEA **3DEN Initiative**, supported by the Italian Government, is looking at how digital technologies, the right policy frameworks and incentives can help accelerate power system modernisation and a more active participation of customers.

Upcoming events and publications:

- 30 March IEA Global Energy Efficiency Conference
- 31 March IEA – COP-26 Net Zero Summit
- May IEA special report – The World's Roadmap to Net Zero by 2050
- 23 July IEA G20 Report on Empowering Cities Towards Net-zero Emissions (to be presented 23 March)

Engage with us: 3DEN@iea.org energy.efficiency@iea.org

