Energy
Transitions
Commission

Protecting Paris: accelerating clean electrification for a “well below 2°C” world

ETC Representatives Meeting

14 May 2026

Plan for the day

Agenda item	Presentation time	Discussion time
Key opportunities to accelerate clean electrification	10’	
China: finally decreasing coal dependency?	5’	
India: unparallel potential for solar	15’	35’
Indonesia: spotlight on ETC’s work with IESR	10’	
Solarizing Africa: opportunities to leapfrog to clean electrification	10’	
Europe: decreasing reliance on gas	5’	40’

Agenda

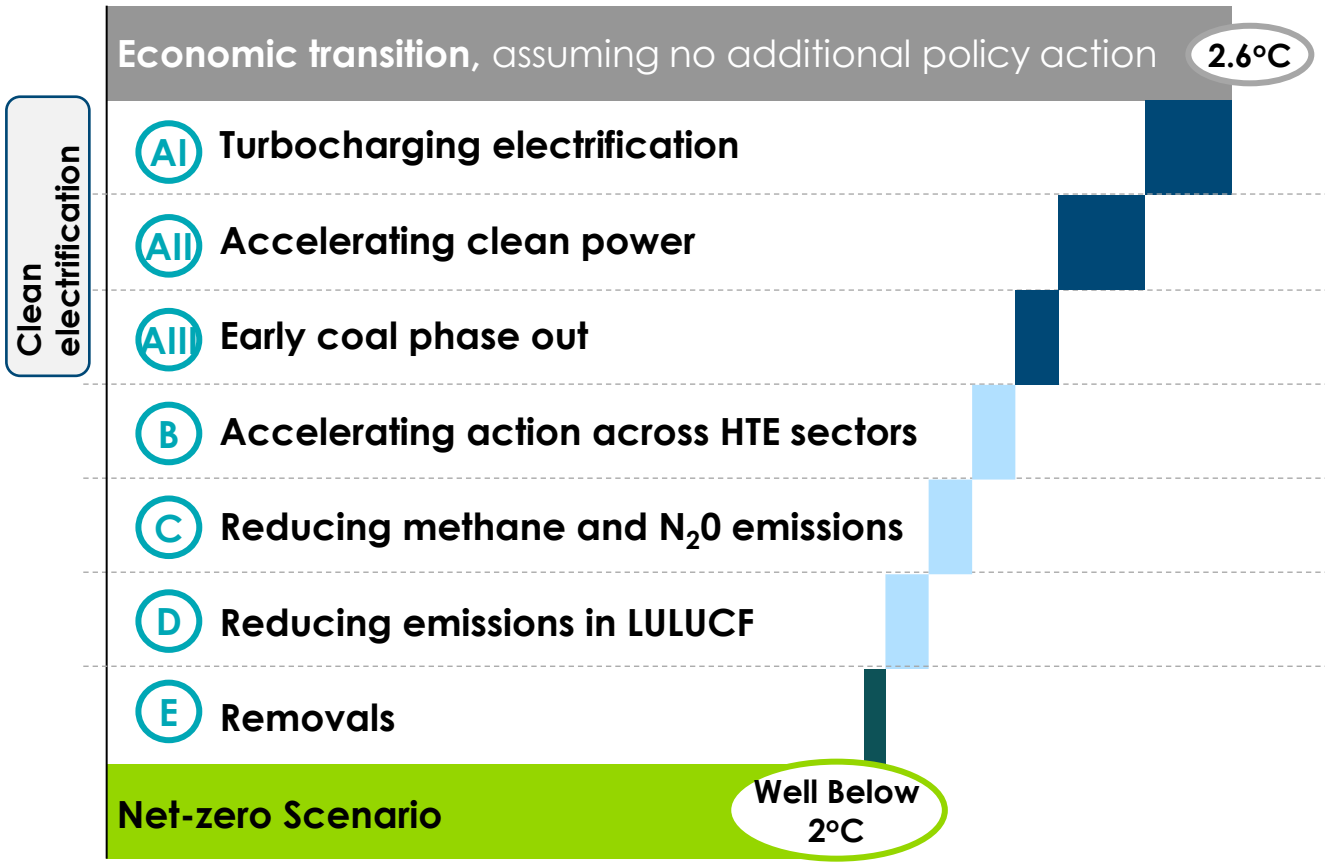
- **Key opportunities to accelerate clean electrification**
- China: finally decreasing coal dependency?
- India: unparallel potential for solar
- Indonesia: spotlight on ETC's work with IESR
- Solarizing Africa: opportunities to leapfrog to clean electrification
- Europe: decreasing reliance on gas
- Next steps

Protecting Paris work identifies the core 'blocks' of emissions reductions that are needed to deliver temperatures closer to Paris objectives

Illustrative

Peak warming in the 21st century and key mitigation areas

°C



Key levers of change

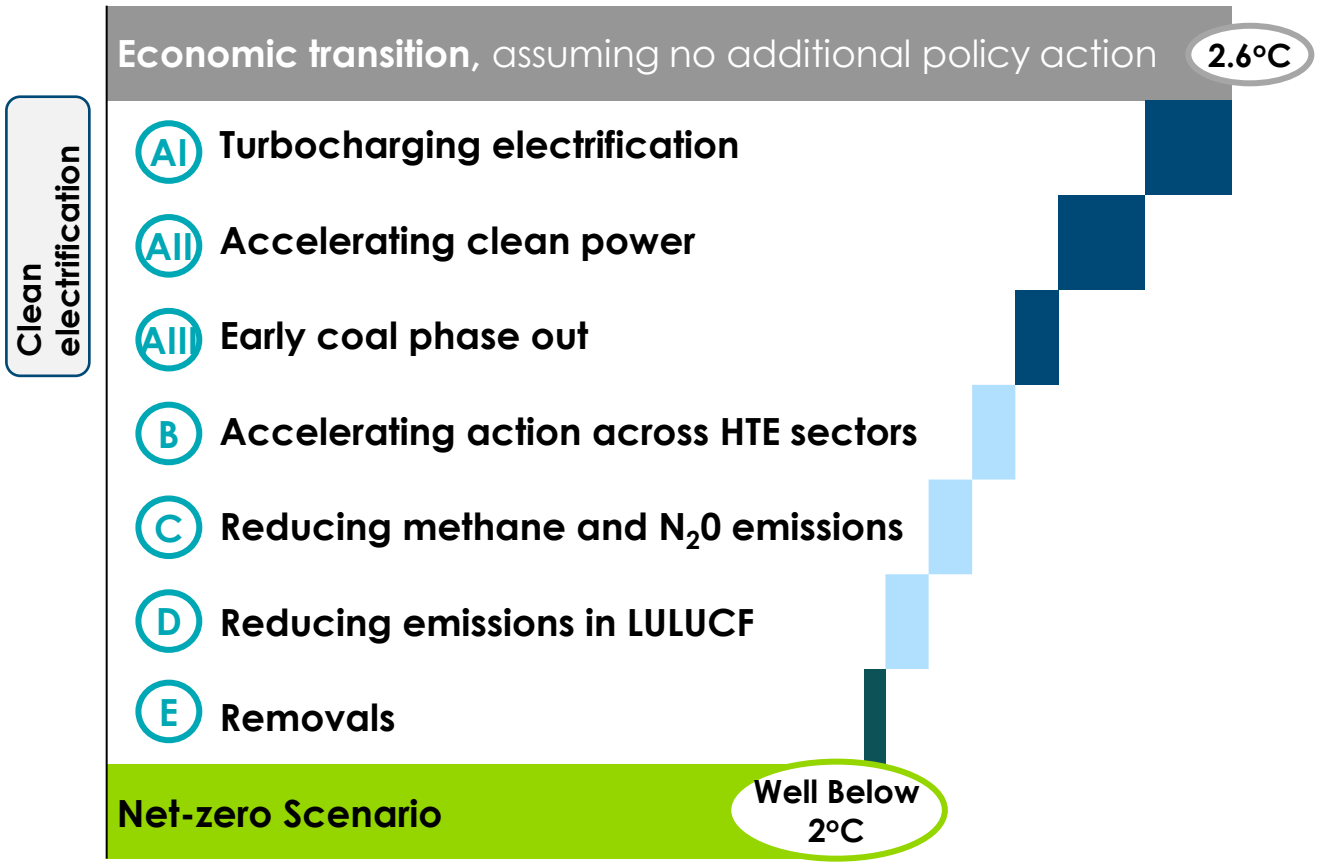
- Accelerating electric vehicles, heat pumps and industrial electrification, doubling energy efficiency
- Tripling renewables, extending grids and deploying storage
- Decreasing coal generation by decommissioning of old plants or displacing baseload demand
- Low-carbon steel, cement, aluminium and chemicals + sustainable aviation/shipping
- Cutting non-CO_2 emissions from O&G production and distribution as well as waste and agriculture
- Ending deforestation and increasing ecosystem restoration
- Scaling carbon dioxide removals from nature and engineered sources, alongside ambitious emissions reductions

Note: LULUCF = Land Use, Land Use Change and Forestry

As a first step, we are going to assess the key mitigation areas in terms of cumulative CO_2

Peak warming in the 21st century and key mitigation areas

°C



Comparable remaining carbon budget at start of 2026

Cumulative $GtCO_2$

650 - 1270

- Equivalent to **2°C** warming at **33% to 83%** probability

90-450

- Equivalent to a warming **between 1.5°C to 1.7°C** at **50%** probability

Note: Carbon budgets estimated based on IPCC's AR6
Source: Systemiq analysis for ETC; BNEF New Energy Outlook 2025; ESSD (2025) Indicators of Global Climate Change 2024: annual update of key indicators of the state of the climate system and human influence

We will anchor our energy analysis on BNEF's reference scenarios, while benchmarking against other scenarios

Preliminary

New Scenarios from BNEF to be released **May 2026**

	Scenario	Pathway Type	Net-Zero 2050?	Peak temperature	Included Sectors			Emissions Scope		
					Energy Use[1]	AFOLU[2]	Removals	CO_2	CH_4	N_2O
Reference	**BNEF** NEO 2025 Economic Transition	**Cost based technology change** with no further policy support for the energy transition beyond existing measures		**2.6°C** *at 67% probability*	●	○	○	●	○	○
Reference	**BNEF** NEO 2024 Net Zero	Normative scenario of an achievable stretch to get back on track to **net zero by 2050 by meeting sectorial carbon budgets**	✓	**1.75°C** *at 67% probability*	●	○	○	●	○	○
	IEA WEO 2025 Stated Policies	An exploratory scenario that models a **dynamic reading of today's policy** settings		**2.5°C** *at 50% probability*	●	○	●	●	●	●
	IEA WEO 2025 Net Zero	A normative scenario for a global pathway to be **aligned with a 1.5°C warming with limited overshoot**	✓	**1.65°C** *at 50% probability*	●	○	●	●	●	●
	ETC Accelerated But Clearly Feasible	A technically and economically feasible scenario that would require **more forceful policy support than current in place**	✓	**1.7°C** *at 50% probability*	●	○	●	●	●	○
TBD – to be included	**BP** 2025 Below 2°C Trajectory	Scenario assuming significant **tightening of climate policies** and **shift in societal behaviour and preferences** supporting efficiency		**2.0°C** *at 67% probability*	●	○	○	●	●	●
TBD – to be included	**Shell** 2026 Energy Security - Horizon	Normative scenario aiming for **net-zero emissions by 2050 with increased climate-friendly policies**	✓	**1.7°C** *at 50% probability*	●	●	●	●	●	●
TBD – to be included	**NGFS** Orderly Net-Zero 2050	Scenario assuming **climate policies introduced early** and become gradually more stringent - **physical and transition risks limited**	✓	**<1.7°C** *at 50% probability*	●	●	●	●	●	●

Other scenarios to consider: S&P's IRENA's; Rystad's; The Food and Land Use Coalition's (for AFOLU)

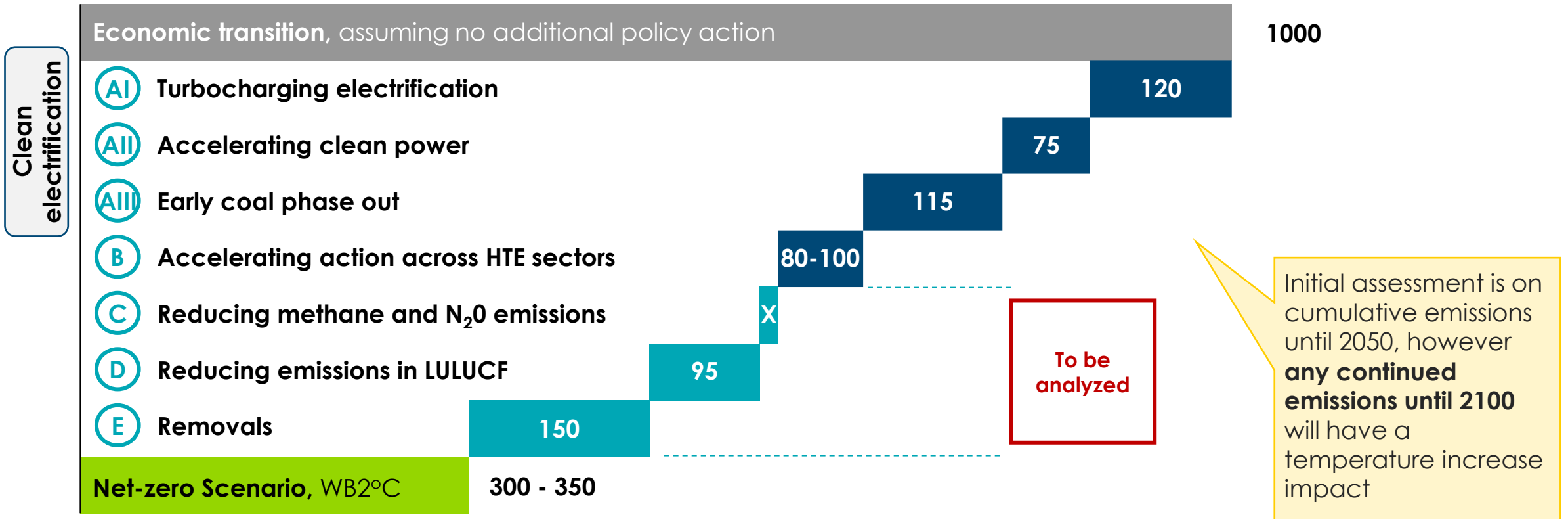
Source: Systemiq analysis for ETC; BNEF New Energy Outlook 2025; IEA (2025) World Energy Outlook; BP (2025) Energy Outlook; Shell (2025) The 2026 Energy Security Scenarios; NGFS, Scenarios Portal [Accessed January 2026]

Using BNEF's scenarios, clean electrification is half of the opportunity for a faster transition consistent with Paris agreement levels of well below 2°C

Preliminary

Key mitigation areas

Cumulative $GtCO_2$ 2026-2050

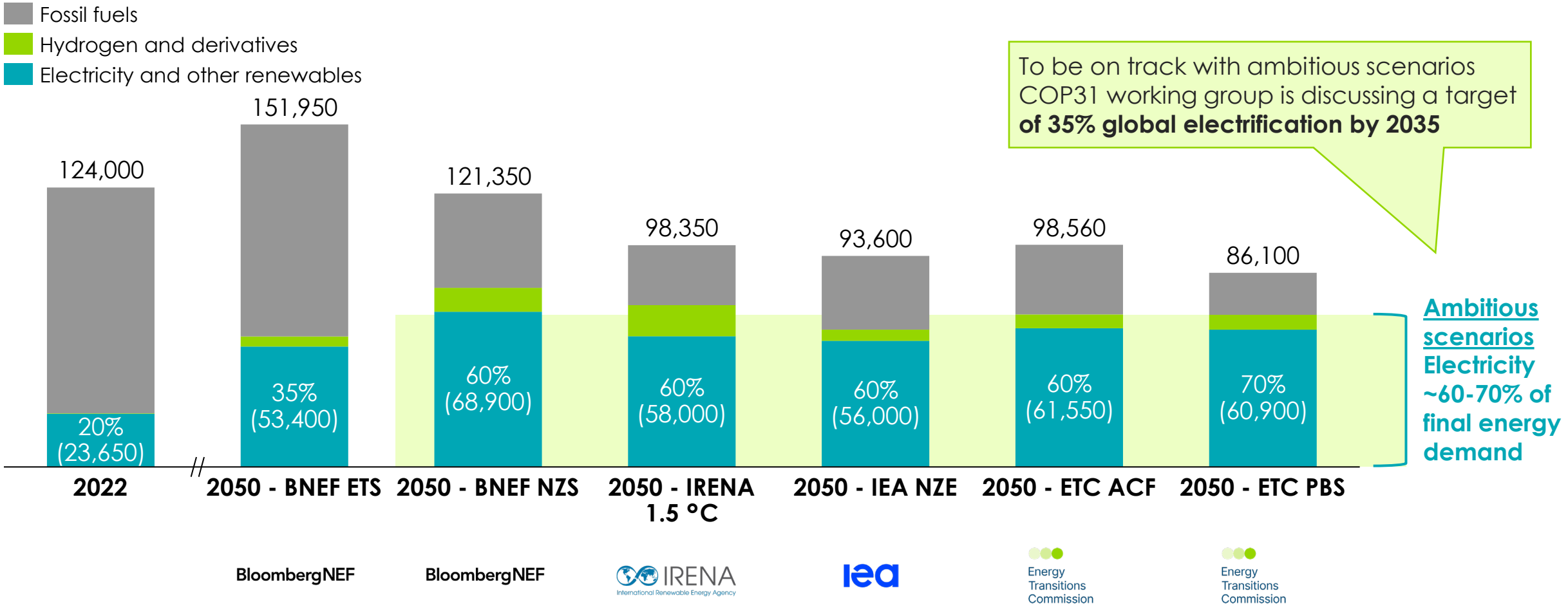


Source: Systemiq analysis for ETC; BNEF New Energy Outlook 2025

The Future is Electric: electricity demand more than doubles by 2050 in net-zero scenarios

Global final energy demand by energy source and scenario

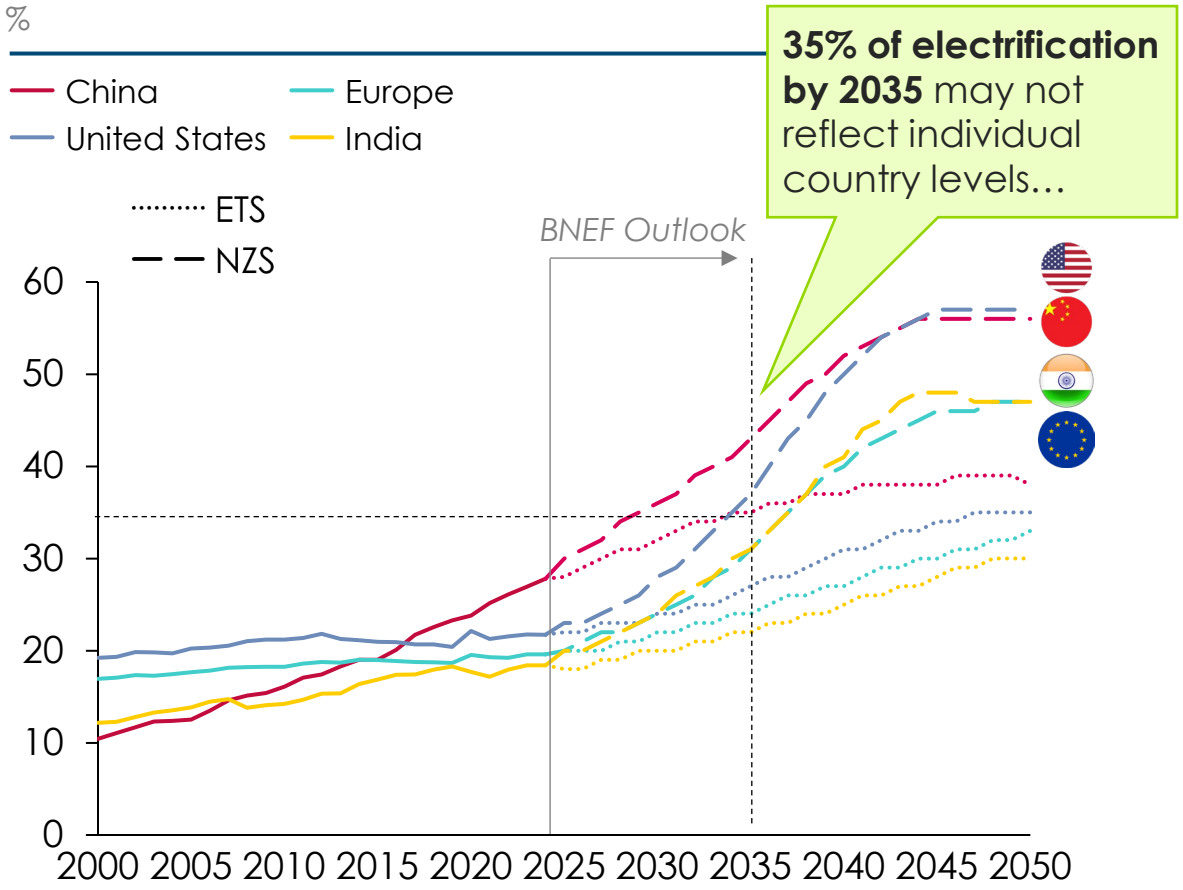
TWh



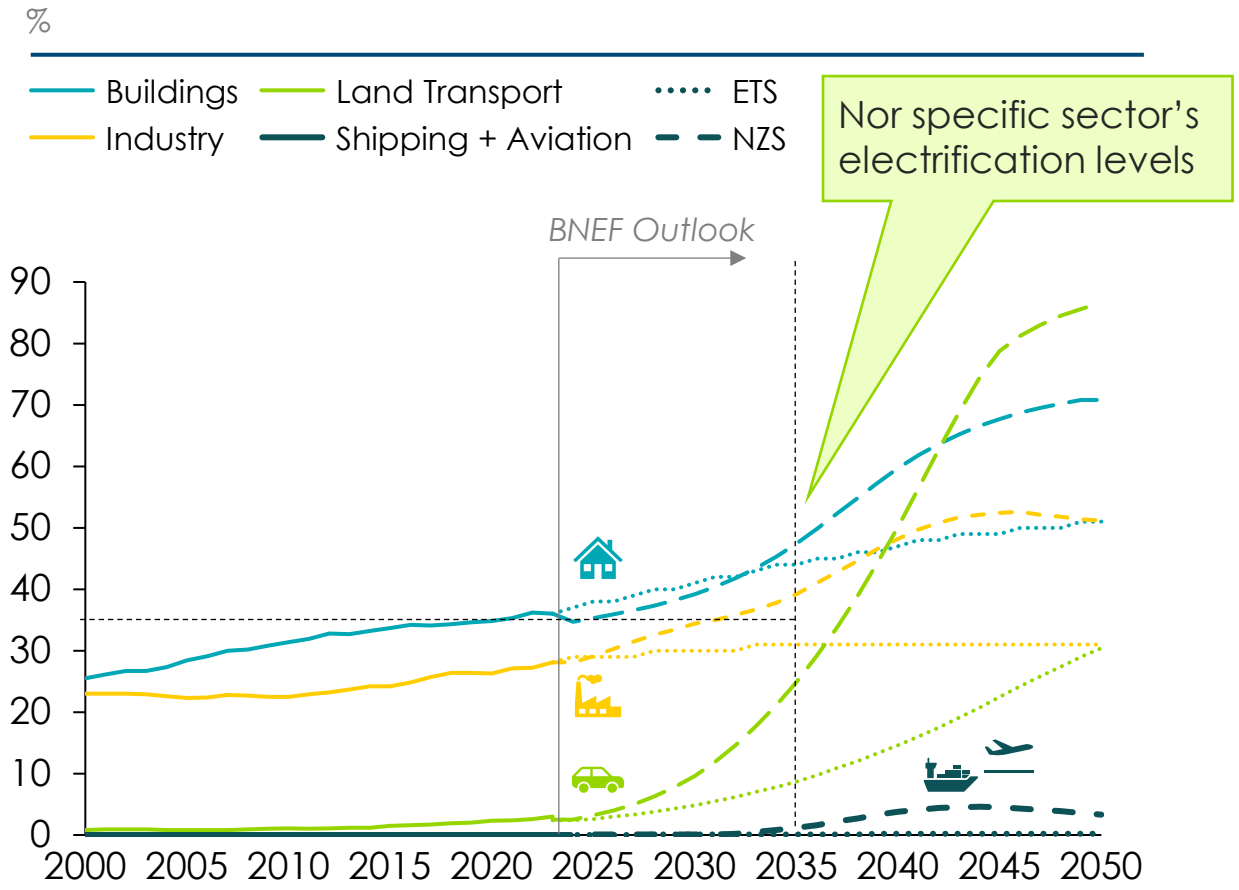
Note: ACF = Accelerated but Clearly Feasible Scenario; PBS = Possible but Stretching Scenario; NZS = Net Zero Scenario; NZE = Net Zero Emissions; Heat is included in "electricity and other renewables" in the BNEF NZS scenario. Source: ETC (2025), *Carbon in an electrified future: Technologies, trade-offs and pathways*; BNEF (2025), *New Energy Outlook*; IEA (2025), *World Energy Outlook 2025*: IRENA (2024), *World Energy Transition Outlook*.

However, electrification levels will differ by country and sector, with close to 50% shares attainable across major economies and sectors by 2050

Electricity share of total final energy consumption by country



Electricity share of total final energy consumption by sector

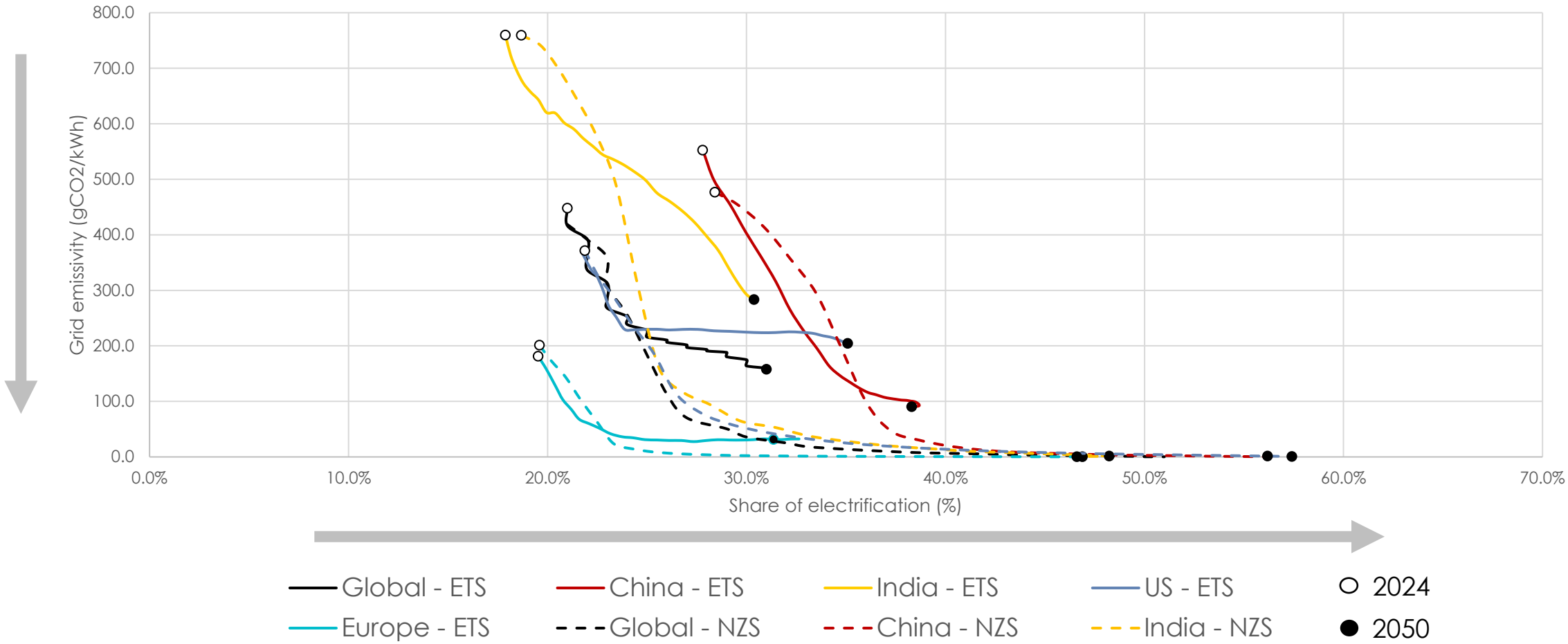


Notes: Historic data is from BNEF's ETS; Land transportation includes road and rail transport.
Source: (2025) World Energy Outlook 2025, BNEF (2025), *New Energy Outlook*

Grid decarbonisation is the essential companion to clean electrification

Grid emissivity vs electrification share from 2024-2050, global

gCO_2/kWh & %, respectively

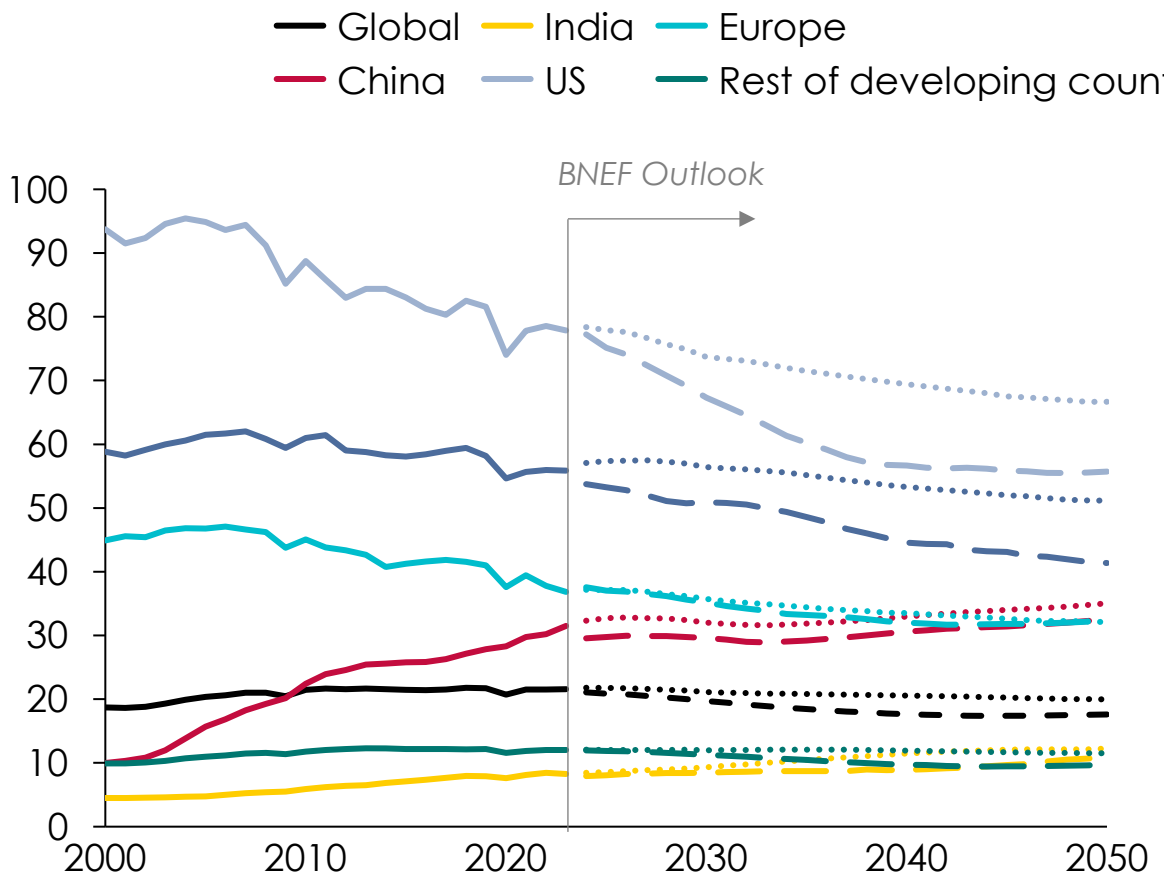


Note: curves show the incremental change in shares of electrification and grid emissivity over the selected time period.

BNEF scenarios show the US remaining the most energy-intensive major economy, while China leads electrification growth through 2050

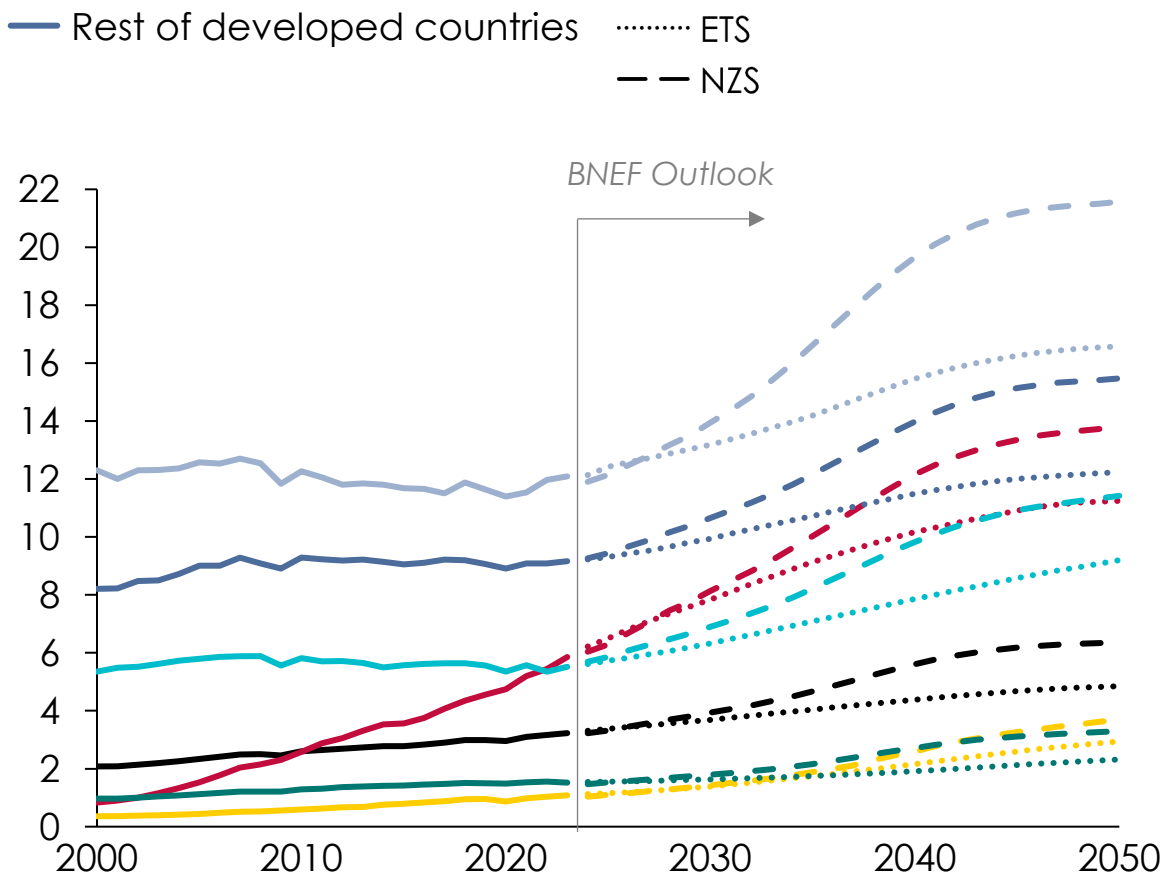
Primary energy demand per capita, BNEF scenarios, Global

kWh per capita



Final electricity demand per capita, BNEF scenarios, Global

kWh per capita

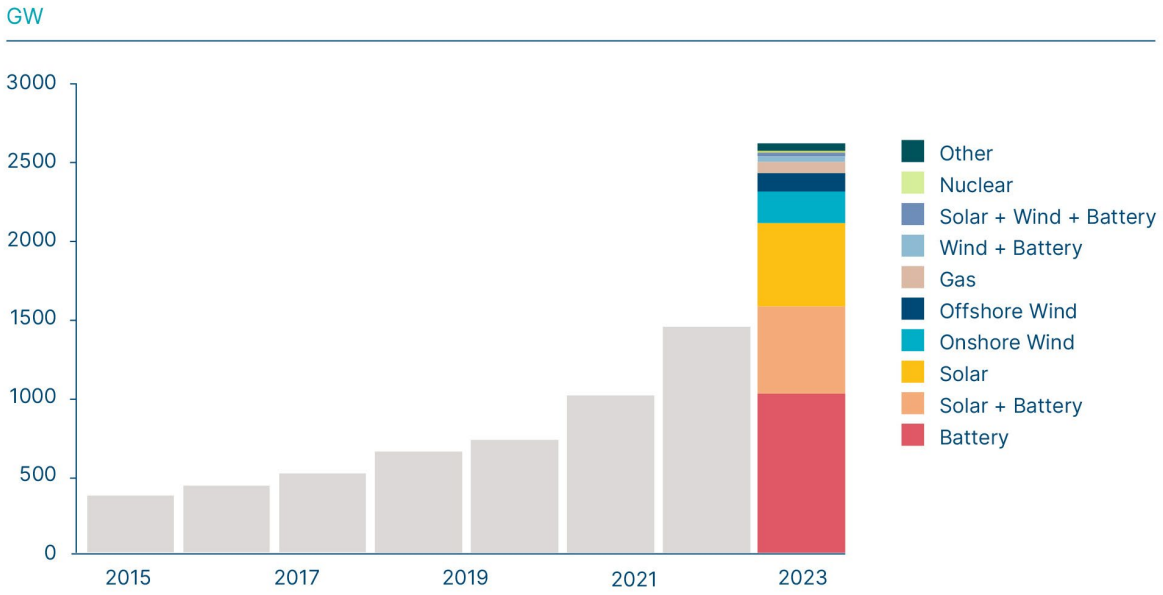


Notes: 1. Rest of developed countries include: Australia, Japan, Canada and South Korea; 2. Rest of developed countries include, according to BNEF categorisation, MENAT, Latin America, Southeast Asia, Rest of Asia Pacific and Sub-Saharan Africa;
Source: Systemiq analysis for ETC; BNEF New Energy Outlook 2025;

Grids is currently the biggest bottleneck for renewables scale-up – building grids faster (or making them more flexible) can reduce connection queues

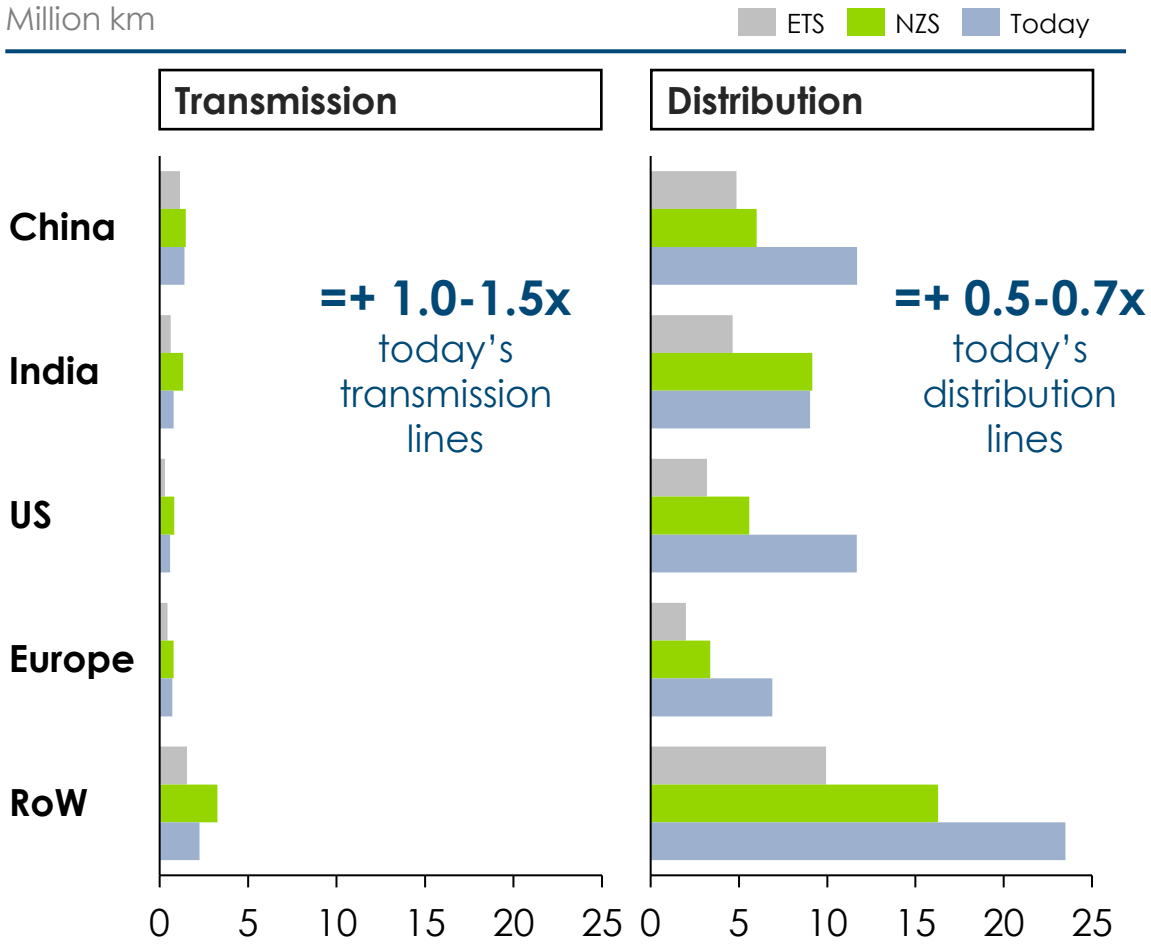
Case Study: US connection queue

US grid connection queue sizes (2015-2023)



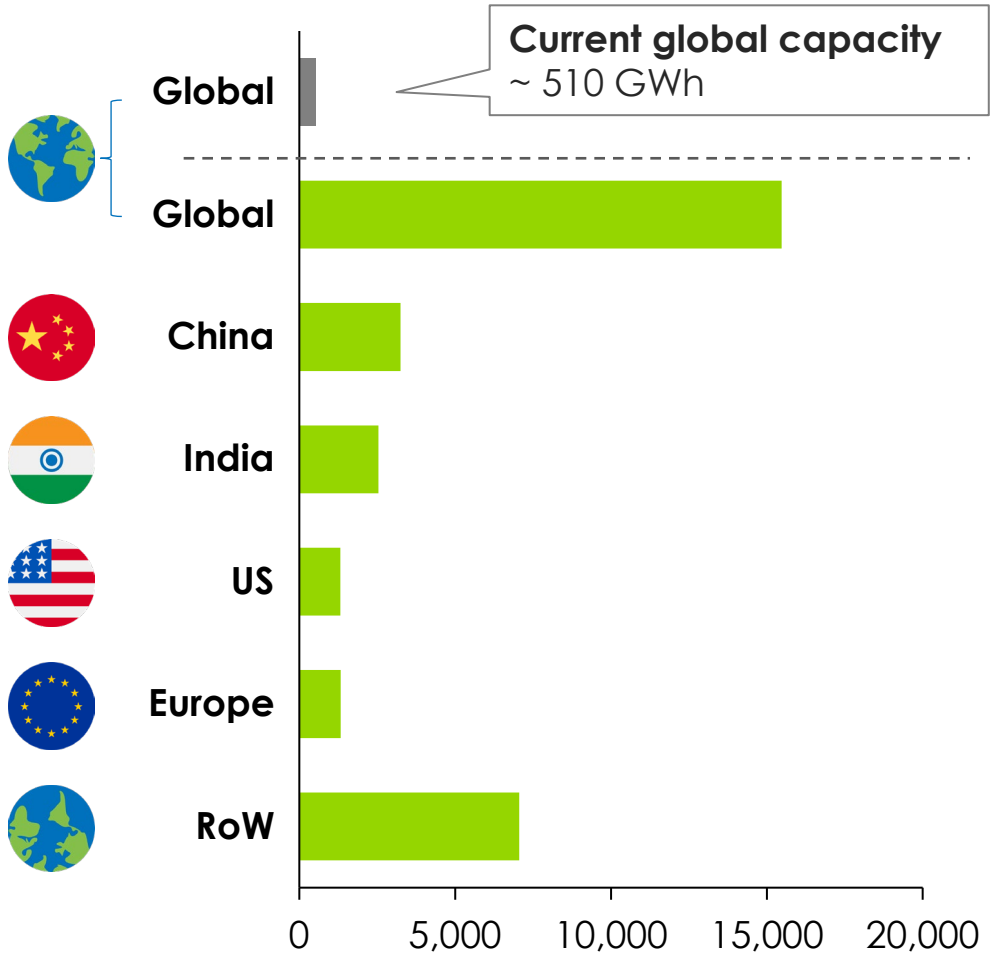
Projects in queues are growing, in 2023 the US had 1450 GW of wind and solar capacity in queue (equal to 50% current global wind and solar capacity).

Projected grid build in selected regions, 2024-2050



Storage needs to scale with renewables – tripling the global ratio of storage for every installed GW of either solar or wind by 2050

Battery capacity additions, 2024-2050
GWh



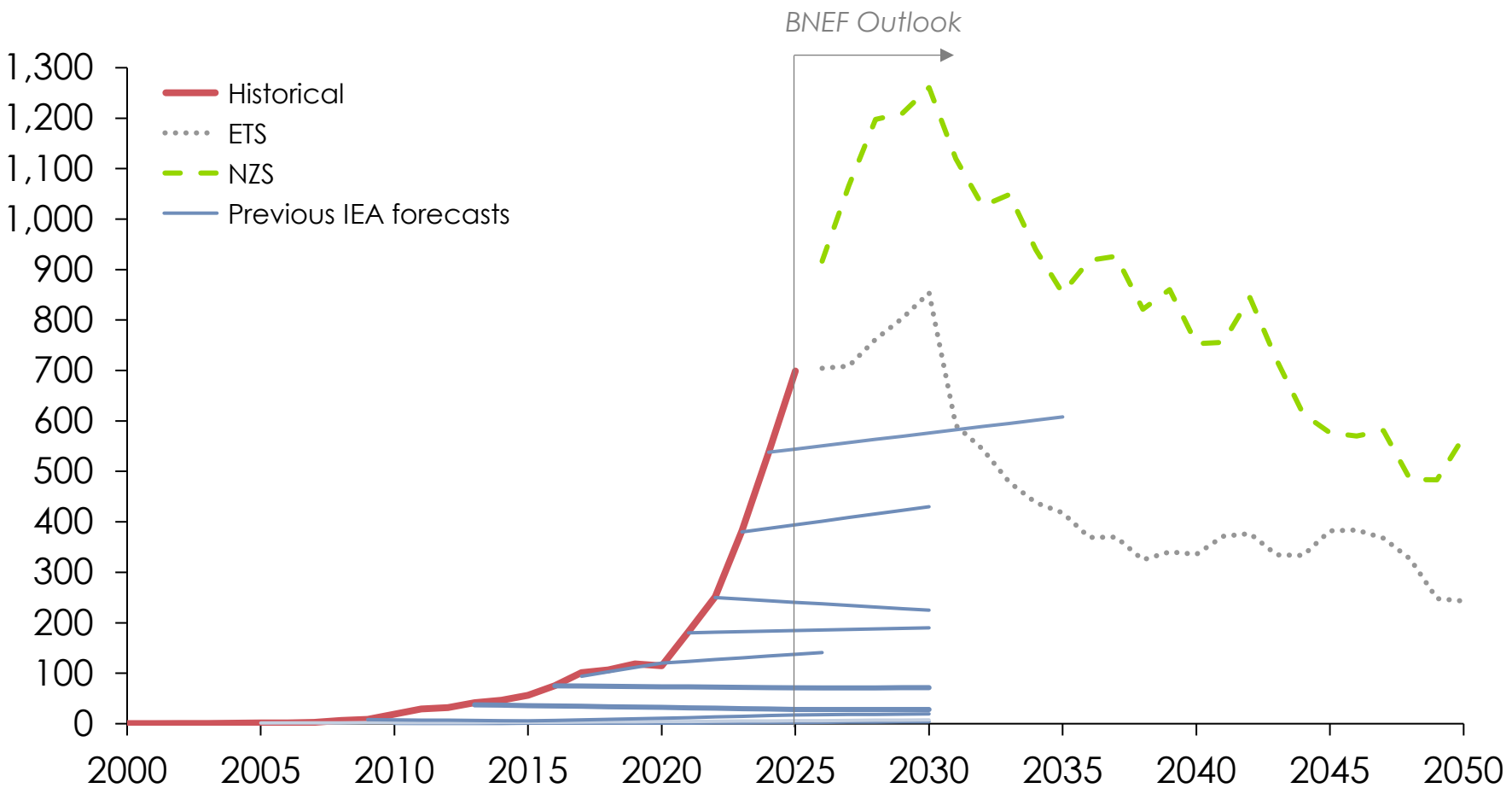
Storage / RES Installed capacity	2024	BNEF NZS	
		2035	2050
Global	4%	16%	13%
China	4%	15%	10%
India	1%	16%	15%
US	8%	16%	10%
Europe	4%	14%	11%
RoW	2%	17%	16%

Notes: Installed RES capacity includes small-and utility-scale solar PV and onshore + offshore wind;

With solar installations growing at a rate of 77% p.a. in the last 5 years, ~240GW of annual added capacity by 2050 likely an underestimate

Annual solar PV installations

GW



- BNEF ETS scenarios forecasts a **glut of solar capacity by early 2030:** explosive growth leading to idle plants – i.e. stranded business case for solar development in many markets
- Batteries trend towards lower utilization due to market saturation - **flatten price volatility compresses the arbitrage window** that makes the current business models of storage bankable
- **Flexible demand** could be a key driver to unlock better solar integration
- Noting that distributed solar potential is ~ **600 GW p.y.**

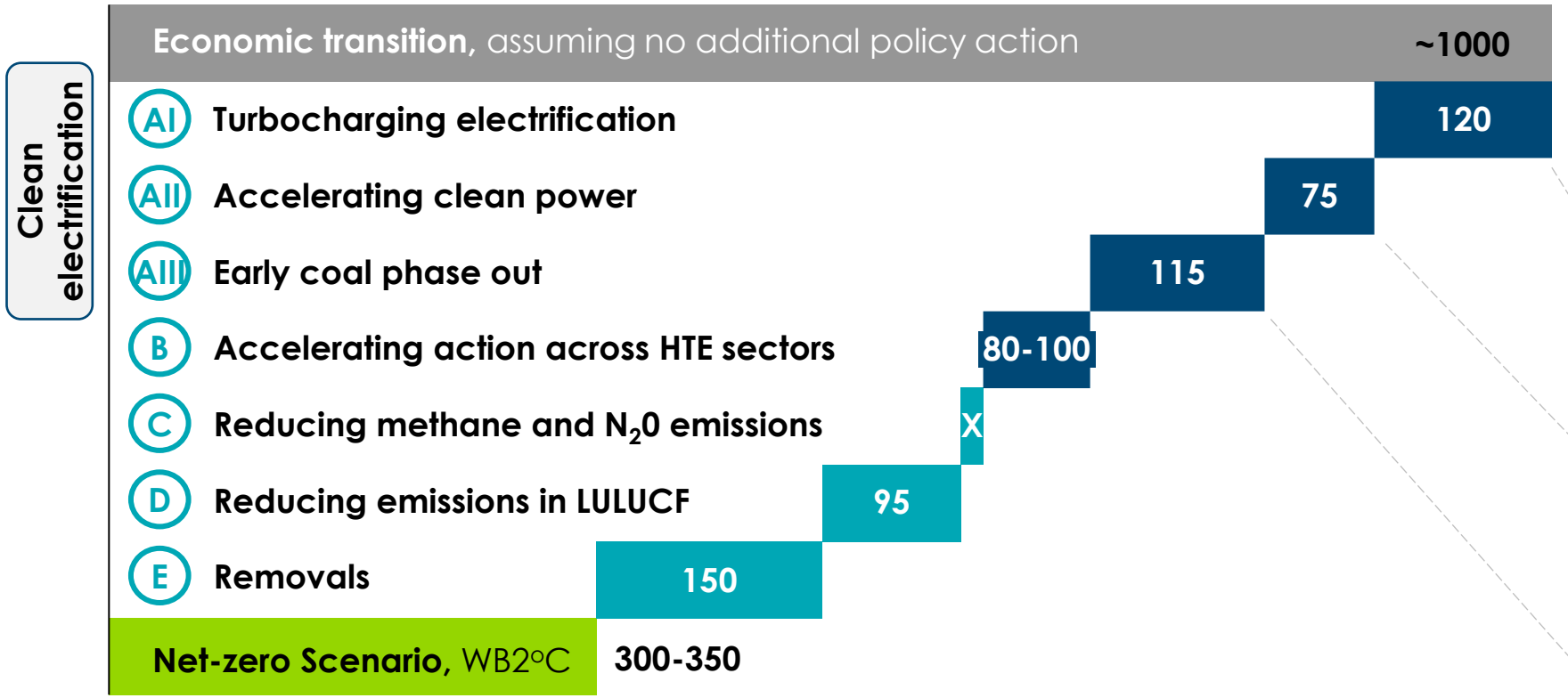
Source: BNEF (2025) New Energy Outlook

Turbocharging clean electrification will require uptake of end-use technologies to go hand in hand with grid decarbonisation

Revised

Key mitigation areas

Cumulative GtCO2 2025-2050



Key insights

- **EVs** are scaling fast, but faster uptake is still essential
- **Heat pumps** are the key deployable technology for heating electrification in buildings and light industry
- Clean electricity essential for electrification. Will also require **grids, storage, flexibility and revenue models** that can sustain investment
- **Regional pathways for coal** and implications will be addressed in the country and regional chapters that follow

Source: Systemiq analysis for ETC; BNEF New Energy Outlook 2025

Agenda

- Key opportunities to accelerate clean electrification
- **China: finally decreasing coal dependency?**
- India: unparallel potential for solar
- Indonesia: spotlight on ETC's work with IESR
- Solarizing Africa: opportunities to leapfrog to clean electrification
- Europe: decreasing reliance on gas
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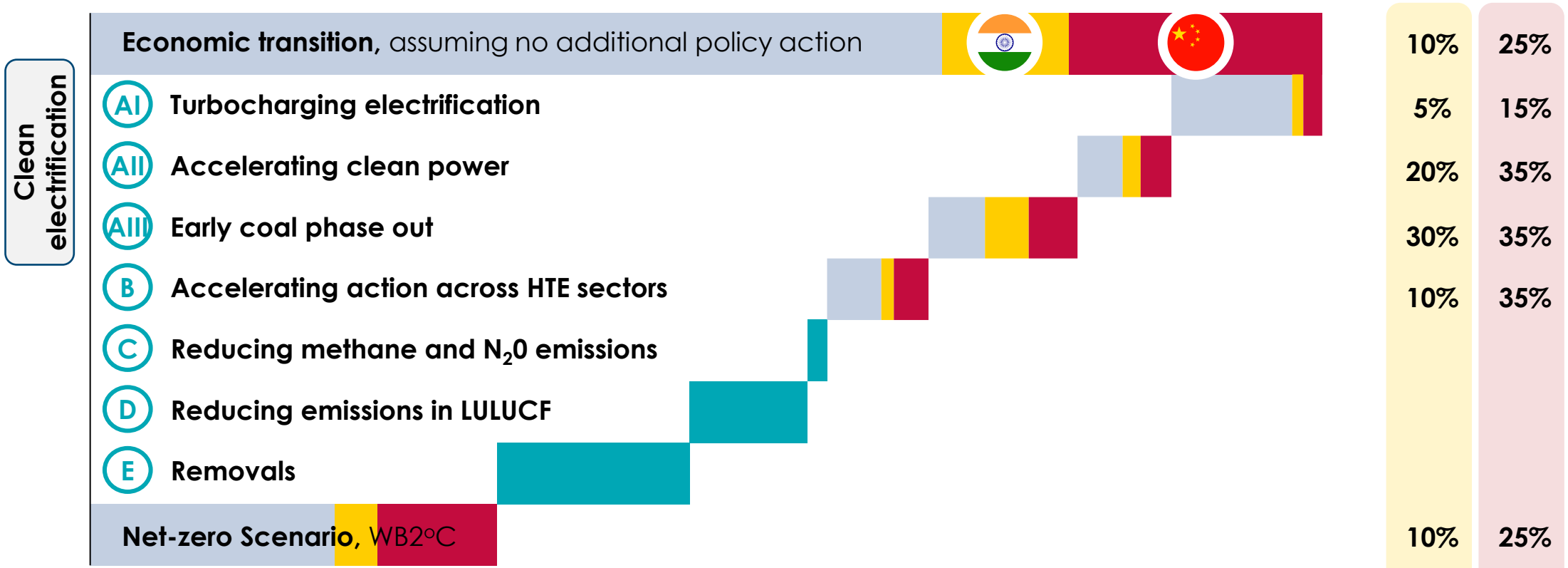
China and India stand out as decisive geographies for the world to be able to stay "well below 2°C"

Preliminary

Key mitigation areas
Cumulative GtCO2 2025-2050

Relative size within block
% of global



Source: Systemiq analysis for ETC; BNEF New Energy Outlook 2025

China's 15th Five-Year Plan doubles down on clean power expansion, but stops short of a coal phase-out

Map of clean energy bases and electricity transmission routes in China's 15th Five-Year Plan

5 year plan

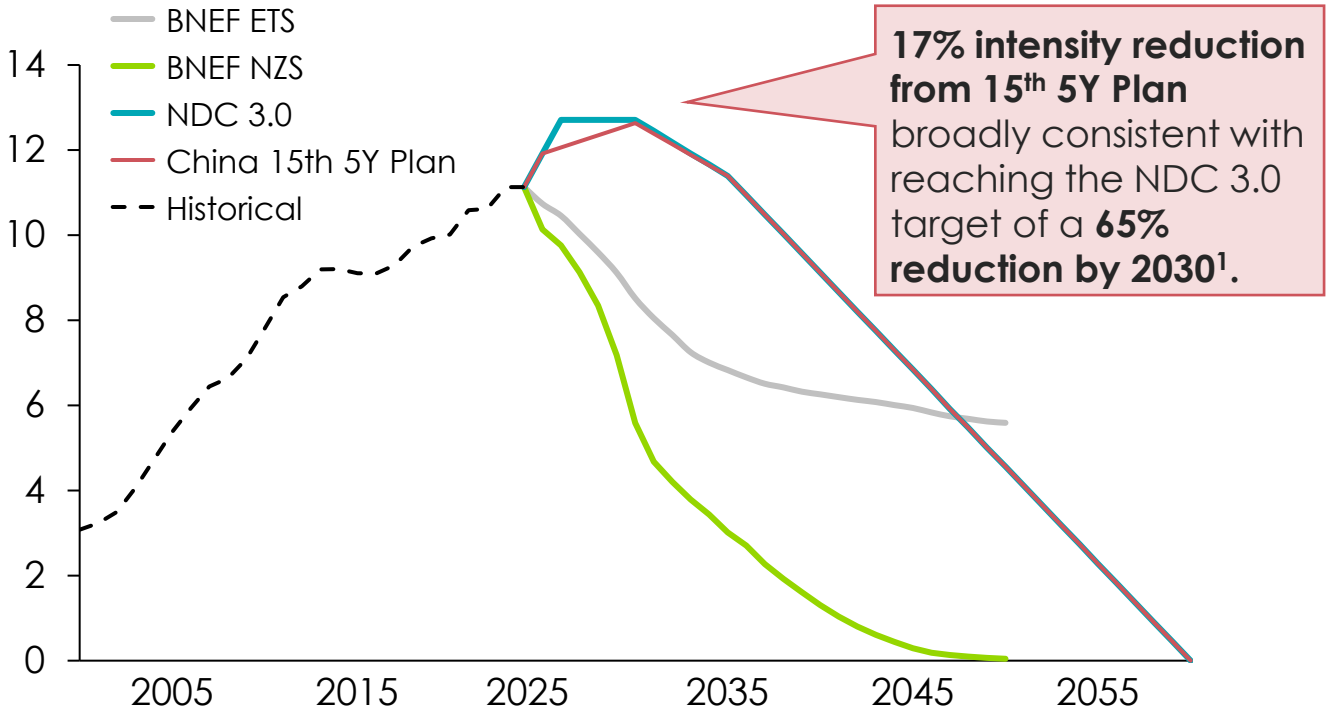
- China continues to prioritise scaling clean energy and cleantech over strict emissions caps in formal planning, focusing on industrial expansion and system transformation – targets of 'peaking' ahead of 2030 and 7–10% emissions reduction by 2035 expected to drive progress.
- China's new target to double non-fossil energy in 10 years could result in more ambitious than its existing 25% by 2030 and 30% by 2035 goals, given its current rate of deployment
  - Solar and wind capacity to reach 3600GW in 2035, up from 1200GW in 2024
  - Major emphasis on hydropower development
  - Offshore wind to reach 100GW in 2035, up from 48GW in 2025
  - Nuclear power development will continue, with target of 110GW in 2030, up from 62GW in 2025
- Track history of Five-Year Plan targets being supported by strong execution

Source: China's 15th 5-year plan for National Economic and Social Development (2025); 'China's 15th Five-Year Plan — Implications for climate and energy transition', CREA (2026);

China's 15th Five-Year Plan broadly aligns with the decarbonization targets outlined in its NDC 3.0.

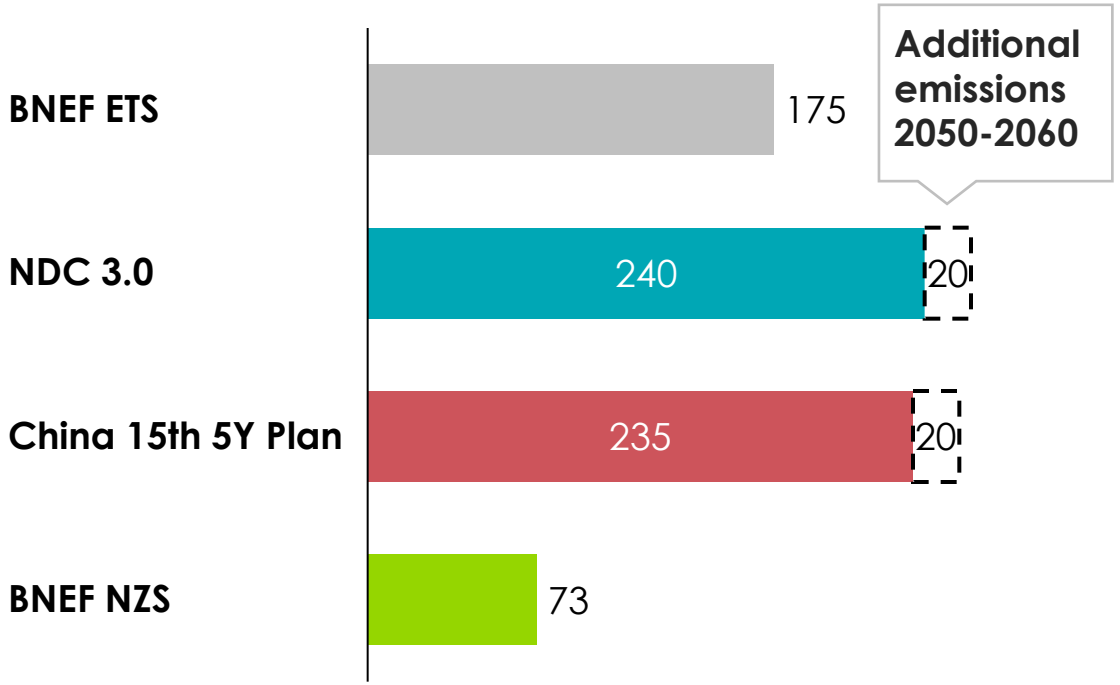
Energy-related CO_2 Emissions

Gt CO_2



Cumulative energy-related CO_2 Emissions, 2026-2050

Gt CO_2



China's 15th 5Y plan includes drivers for emissions, but no timeframe is specified for actions:

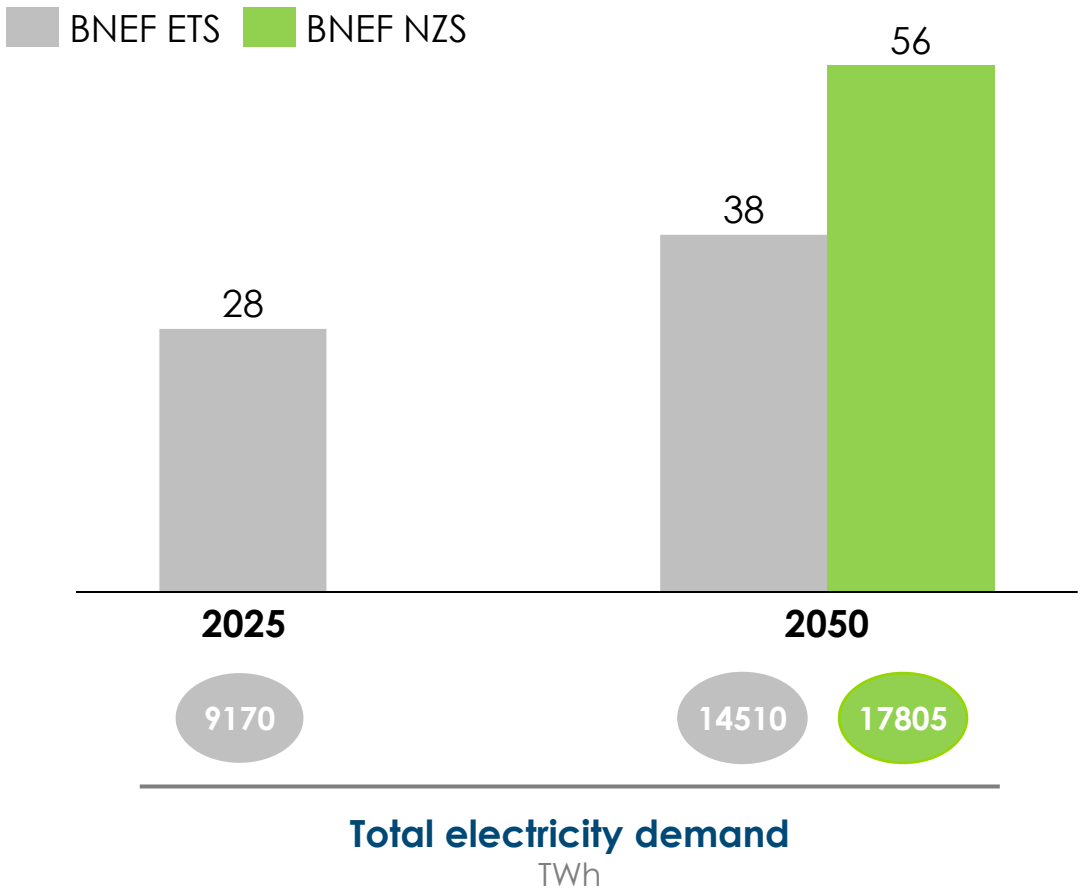
- China to expedite implementation of an oversight system for stationary pollution sources, fixed industrial facilities, centred on emissions permits, tightening regulatory control over facility-level emissions
- Carbon emissions statistical and accounting systems to be refined, with enforcement of carbon performance assessments across local authorities, industries, enterprises, projects, and products

1. Assumption aligned with a 5% GDP Growth

Source: BloombergNEF (2025) New Energy Outlook 2025; China's 15th 5-year plan for National Economic and Social Development (2025)

Additional Chinese industry electrification is the biggest difference between an economic transition and staying well below 2°C

BNEF Electricity share of final demand, China
% of final demand



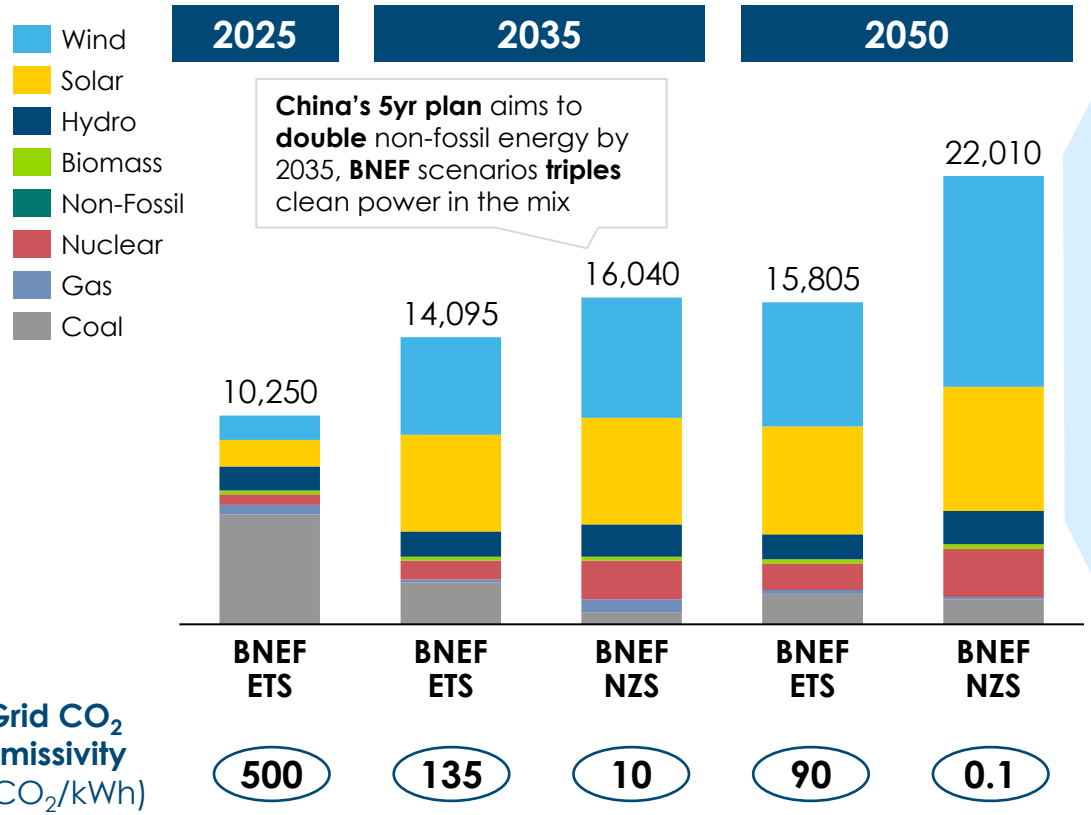
Drivers of electrification	Current 2025	BNEF ETS 2050	BNEF NZ 2050
Air Conditioning Units per person (Added TWh after 2025)	0.40 (-)	0.75 (420)	0.85 (420)
Data Centers TWh	110	845	NA
Passenger EV sales % of new sales	40	95	100
Commercial EVs % of new sales	10	80	95
Industry electrification % of final energy	35	40	60

Source: BNEF (2025), *New Energy Outlook 2025.*

On top of rapid solar deployment, well below 2°C will require further scale up of nuclear and wind generation to displace coal

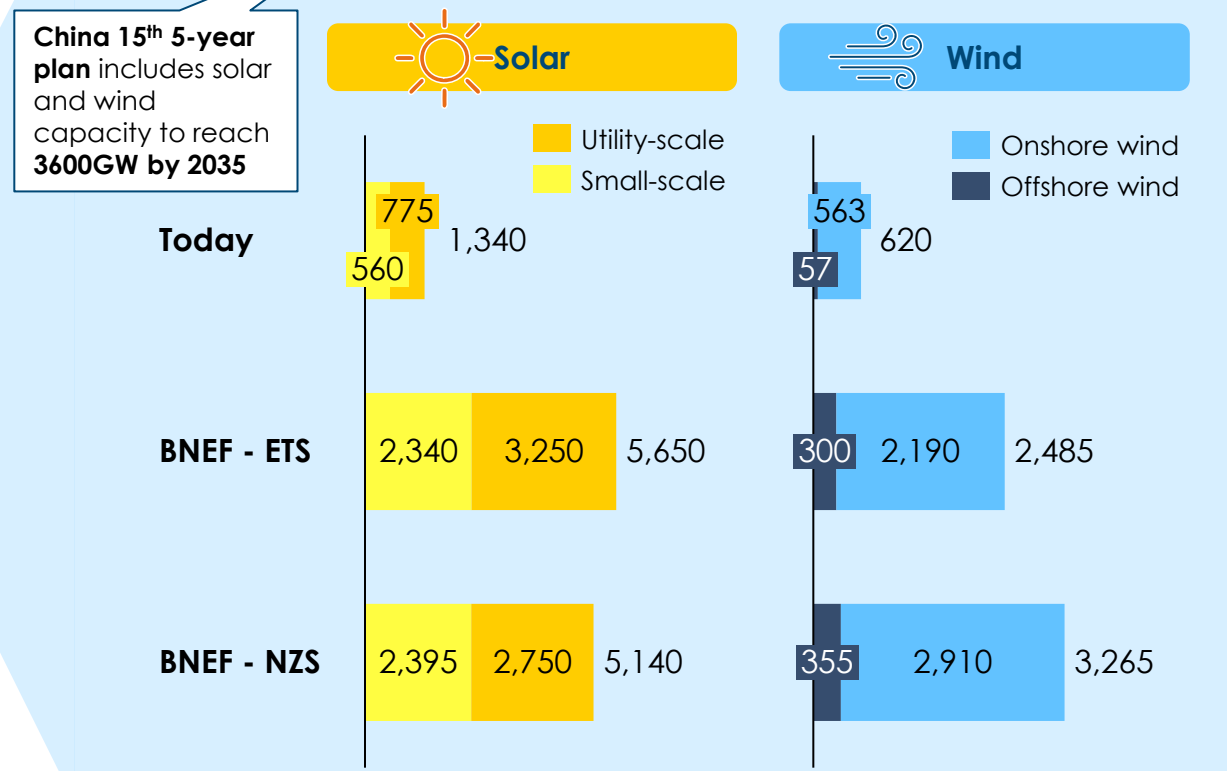
Electricity generation mix – BNEF ETS & NZS

TWh



Total VRE capacity additions, 2025 – 2050 cumulative

GW



China's 15th 5Y plan includes drivers for renewables, but no timeframe is specified for actions:

- Wind, photovoltaic, hydro, and nuclear energy to continue to be developed
- Acceleration of smart grid construction and management, via transmission corridors, inter-provincial and cross grid operating zones, supercomputing

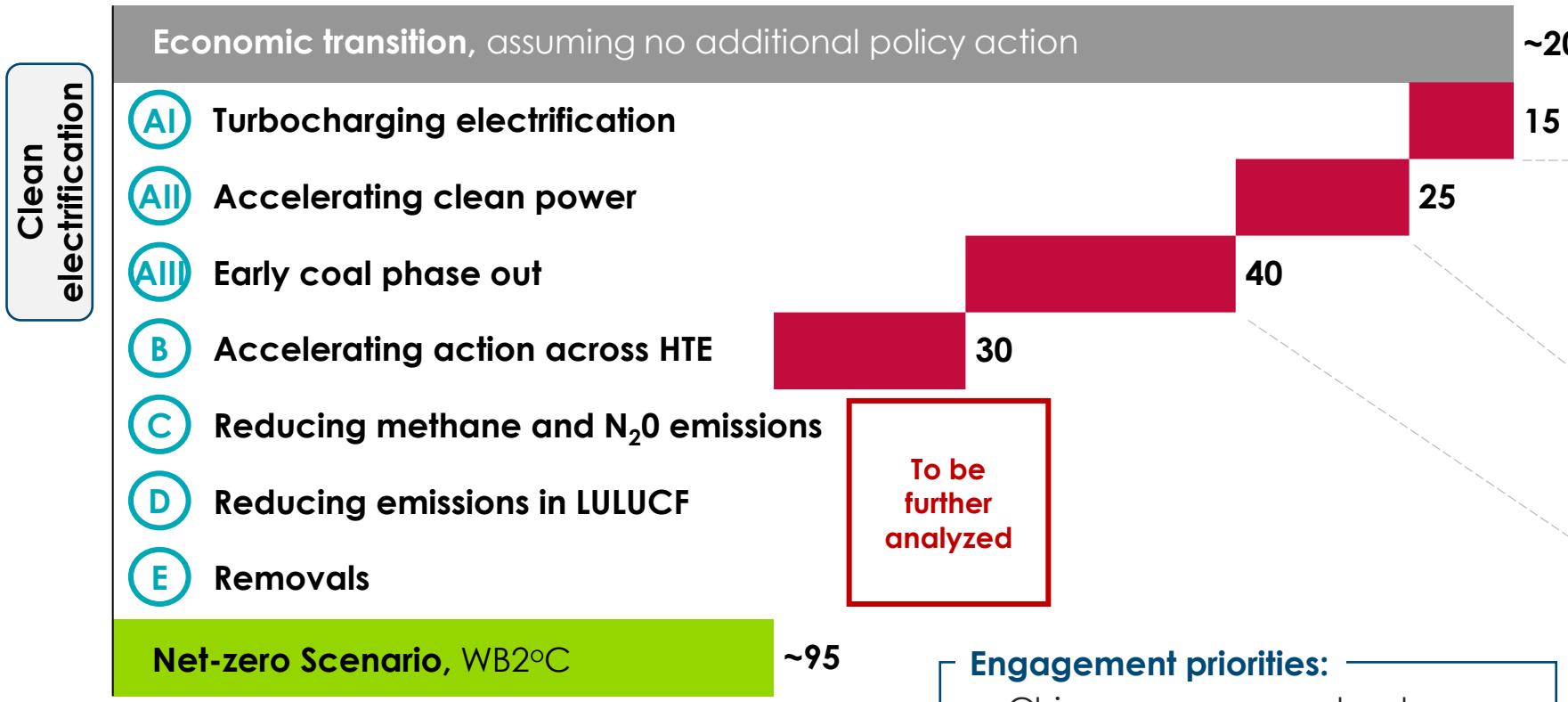
Source: BNEF (2025), *New Energy Outlook 2025;* Central Committee of the Communist Party of China (2025) China's 15th 5-year plan for National Economic and Social Development (2025); CREA (2026) China's 15th Five-Year Plan — Implications for climate and energy transition; ; BNEF (2024) Long Term Electric Vehicle Outlook.

China's pathway to well below 2°C depends on how they can effectively phase out of coal, alongside hard-to-electrify sector action

Preliminary

Key mitigation areas

Cumulative $GtCO_2$ 2025-2050



Engagement priorities:

- Chinese government actors
- Policy-linked research institutes (ERI, CNREC, Tsinghua, CAS, etc.)

Key insights

- **Industrial electrification** is the biggest difference for a faster transition
- Strong solar and wind deployment requires **grid integration**; further nuclear can reinforce further grid decarbonization
- **No phase out coal commitments,** but early signs of peak generation
- To be discussed in next section, but **reinforcing Carbon Pricing** under ETS is key

Source: Systemiq analysis for ETC; BNEF New Energy Outlook 2025

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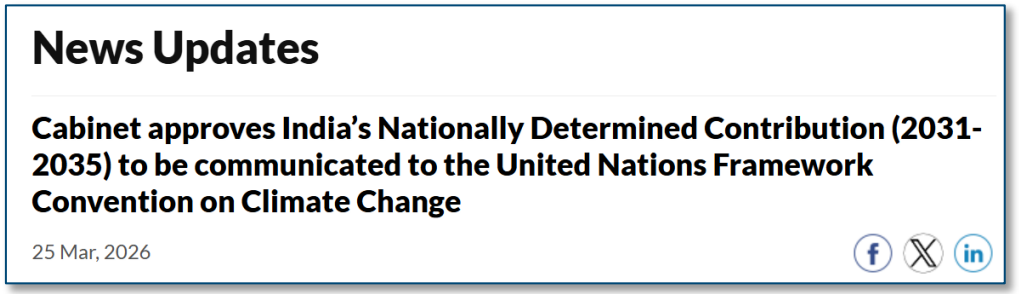
India's latest NDC and NITI Aayog's net zero pathway frame a development-first transition, but still centered on electrification and renewables

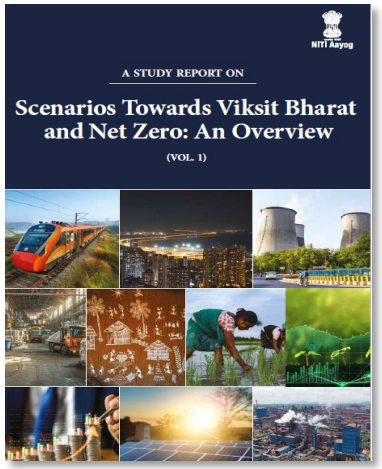

News Updates

Cabinet approves India's Nationally Determined Contribution (2031-2035) to be communicated to the United Nations Framework Convention on Climate Change

25 Mar, 2026

India's 3rd NDC

- Formal international climate commitment under the UNFCCC, defining the country's contribution to global mitigation efforts
- Cabinet approved India's NDC for 2031-2035 in March 2026



Illustrative scenarios

Niti Aayog

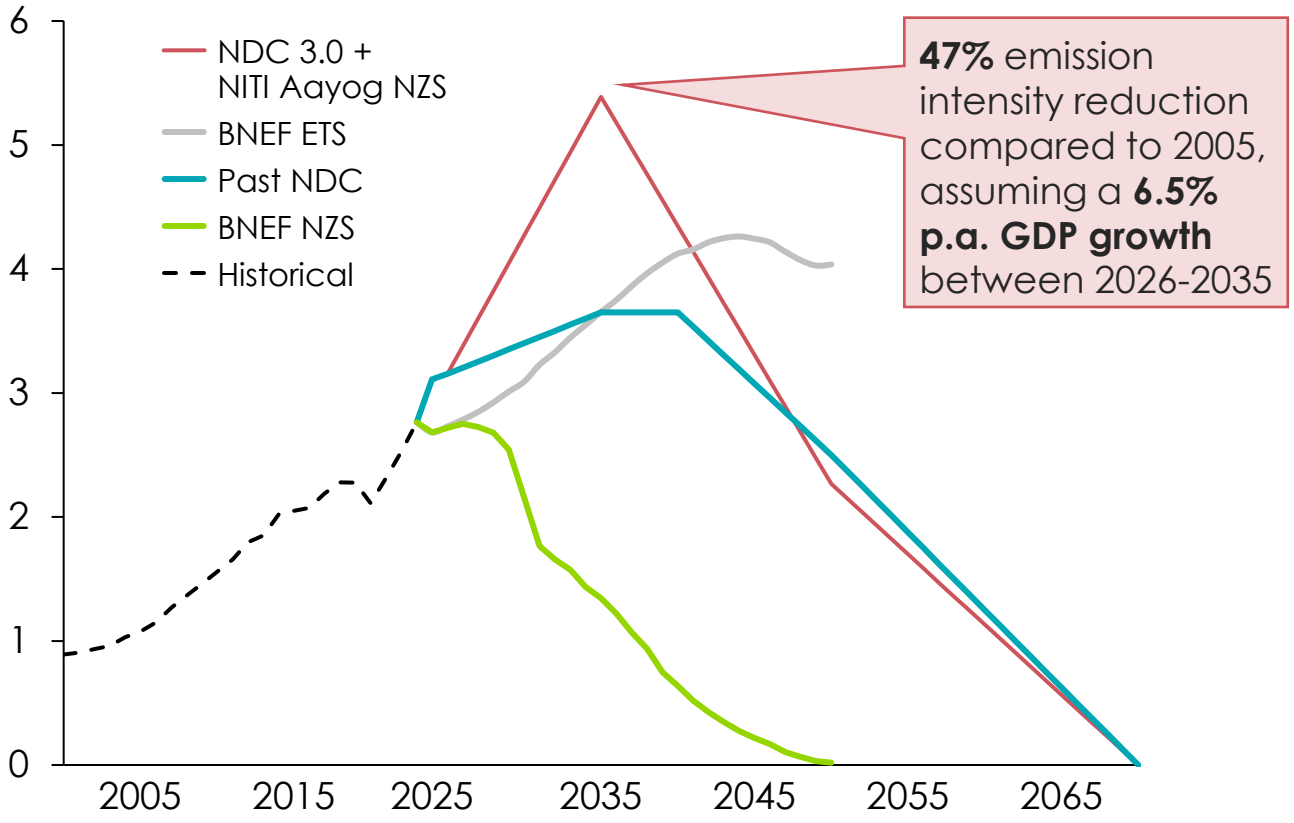
- Produced by the Government of India's policy think tank, together with inter-ministerial working groups and external experts
- Models pathways for India to reach net zero while becoming a developed economy
- Final energy demand rises from 8,000 TWh in 2025 to 16,000–19,000 TWh in 2050
- Even in their Net Zero Scenario, coal is projected to contribute ~35% of India's Primary energy supply in 2050

Source: NITI Aayog (2026) A Study Report On - Scenarios Towards Viksit Bharat and Net Zero: An Overview (Vol. 1); PMINDIA (2026) Cabinet approves India's Nationally Determined Contribution (2031-2035) to be communicated to the United Nations Framework Convention on Climate Change

If India continues to grow at 6.5% p.a., the recently announced pledge of 47% cut in emissions intensities by 2035 still implies emissions growth

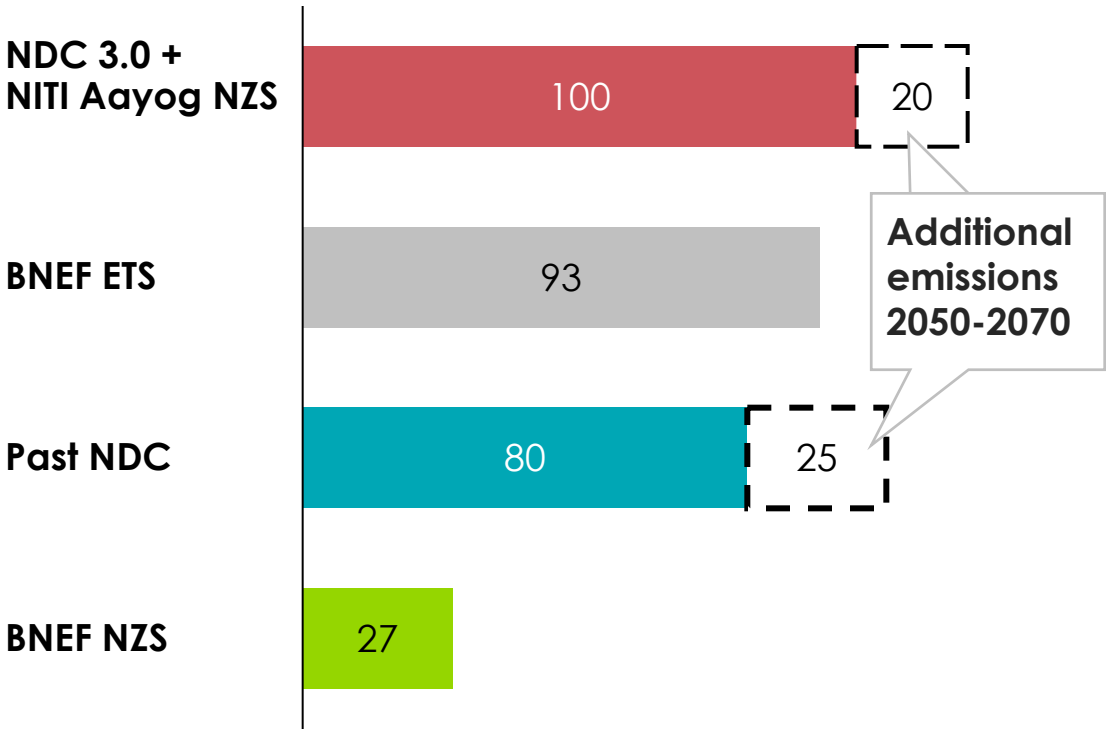
Energy-related CO_2 Emissions

Gt CO_2



Cumulative energy-related CO_2 Emissions, 2026-2050

Gt CO_2

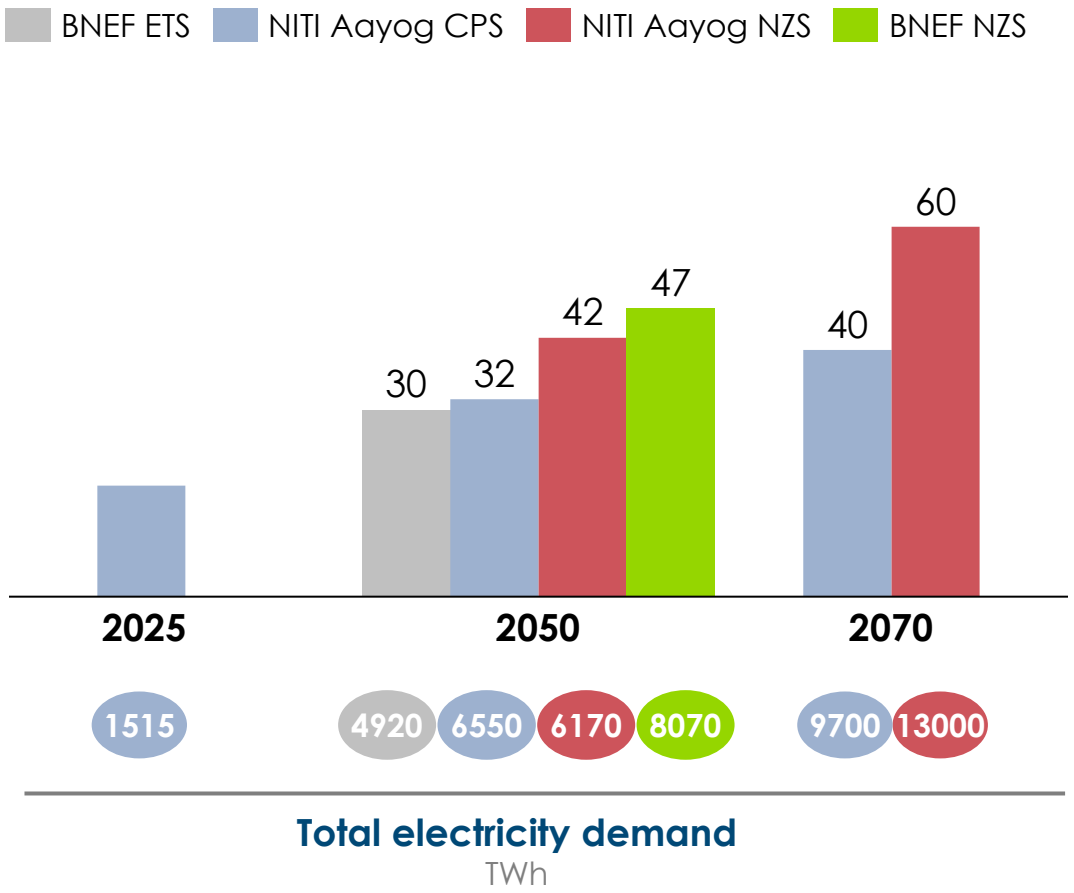


Source: BloombergNEF (2025) New Energy Outlook 2025; IEA (2025) 'CO2 emissions from fuel combustion India'; NITI Aayog (2026) A Study Report On - Scenarios Towards Viksit Bharat and Net Zero: An Overview (Vol. 1); IMF; PM India (2026) Cabinet approves India's Nationally Determined Contribution (2031-2035) to be communicated to the United Nations Framework Convention on Climate Change; IEA (2025) World Energy Review; JRC/IEA 2025 Report (2025) GHG emissions of all world countries; Global Carbon Budget (2025) Fossil fuel CO2 emissions hit record high in 2025; Climate Change Tracker available at: https://climatechangetracker.org/climate-change-progress/current-remaining-carbon-budget-and-trajectory-till-exhaustion [Accessed November 2025]

NITI Aayog's Net Zero scenario high electrification share is driven by increased use of appliances in buildings and hydrogen in industry

Electricity share of final demand, India

% of final energy demand



Total electricity demand

TWh

Drivers of electrification	Current	BNEF ETS	BNEF NZS	NITI Aayog NZS
	2025	2050	2050	2050
Air Conditioning Units per person (Added TWh after 2025)	0.05 (-)	0.20 (595)	0.15 (595)	0.5 (270)
Data Centers TWh	10	550	NA	395
Passenger EV sales % of new sales	5	86	100	70
Commercial EVs % of new sales	<1	28	93	25-90[1]
Industry electrification % of final demand	15	15	30	35

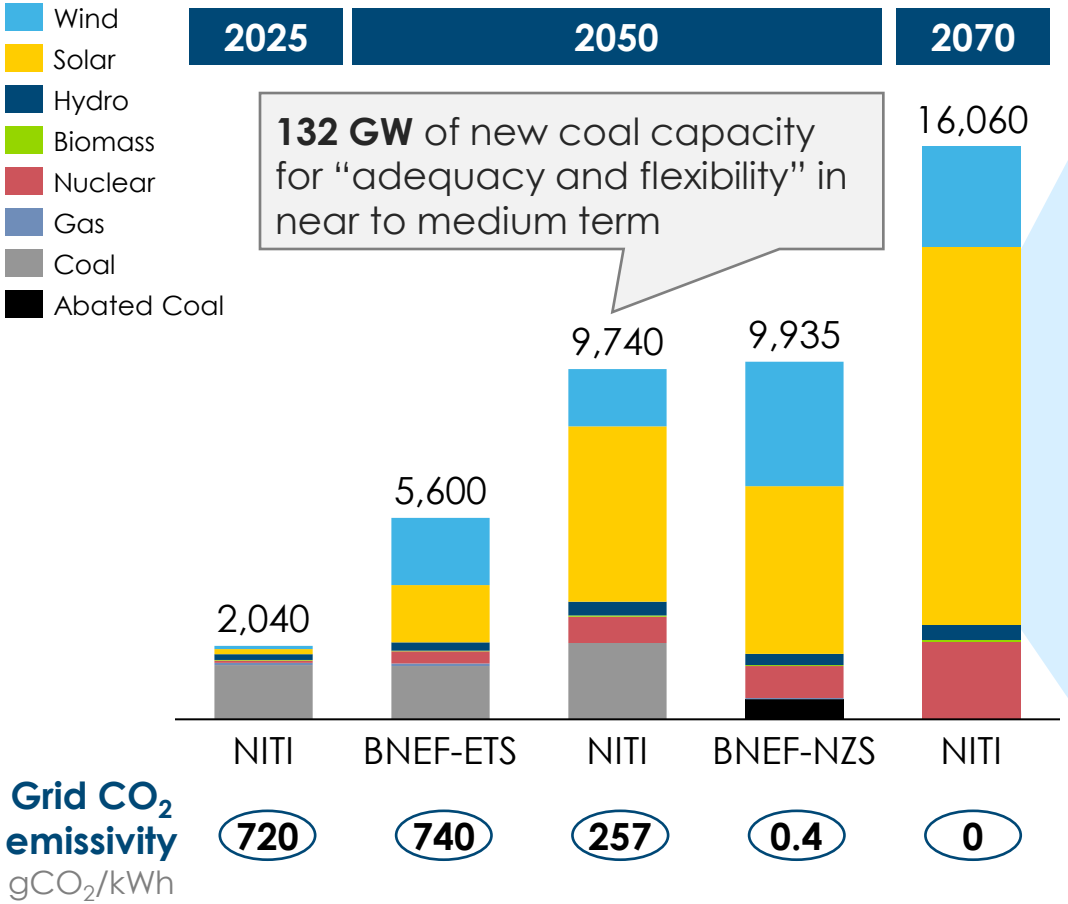
1. Vehicle payload ranging from under 3.5 tonnes to above 12 tonnes

Source: NITI Aayog (2026) A Study Report On - Scenarios Towards Viksit Bharat and Net Zero: An Overview (Vol. 1, Sectoral insights: Industry, Transport, Buildings); BloombergNEF (2025) New Energy Outlook 2025

NITI Aayog's net zero pathway is driven by massive solar buildout, but still projects new unabated coal capacity by 2050

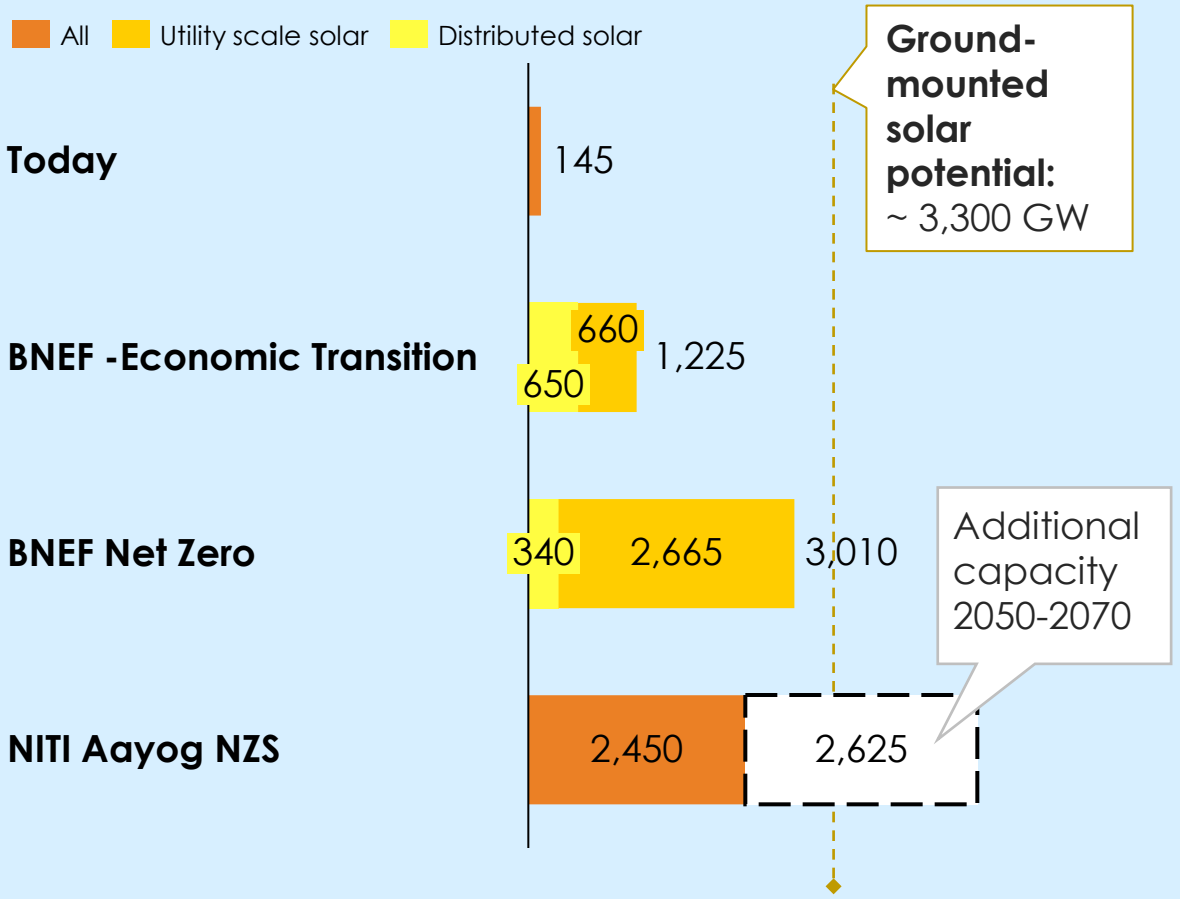
Electricity generation mix – multiple scenarios

TWh



Total solar capacity additions, 2025 – 2050 cumulative

GW

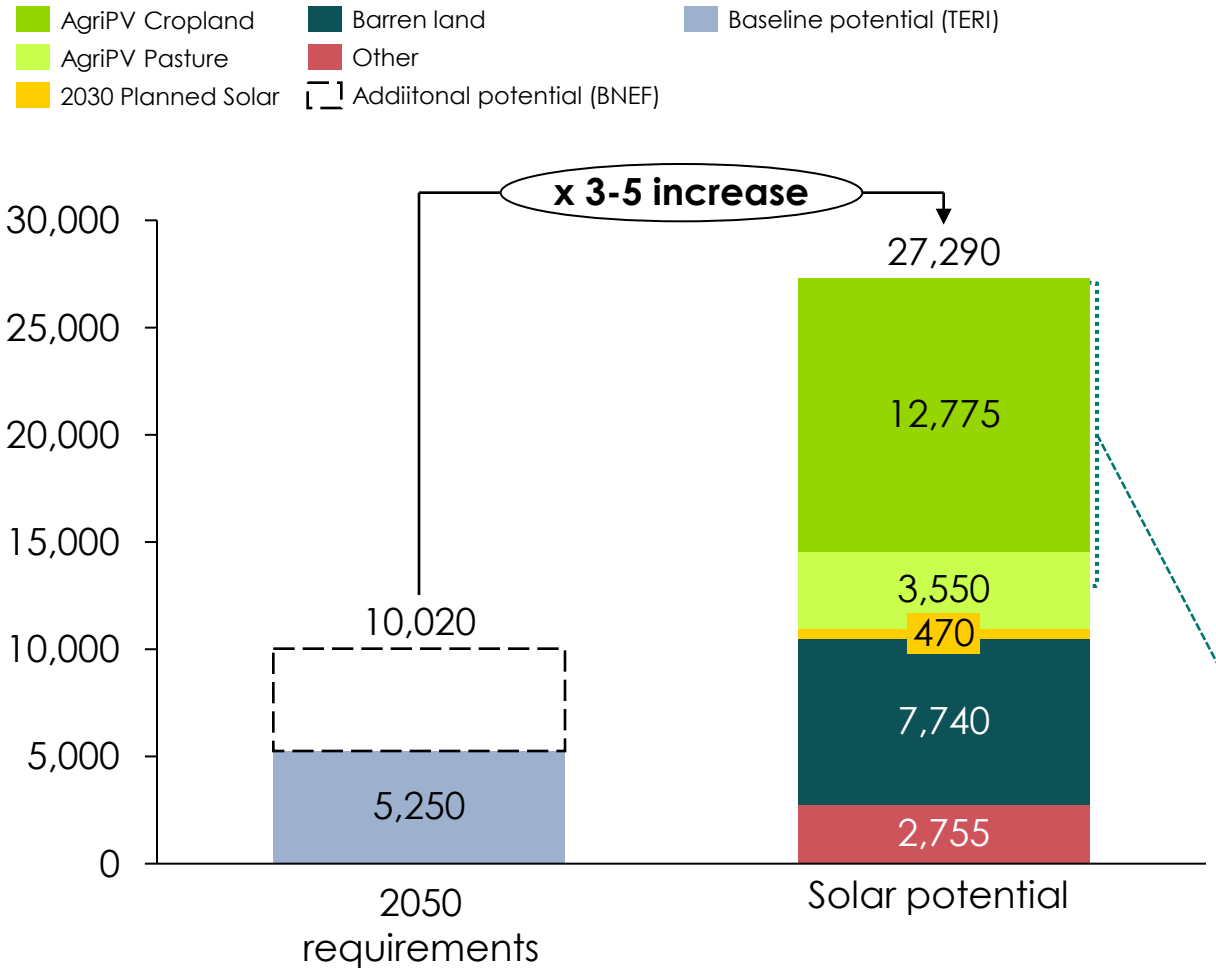


Source: NITI Aayog (2026) A Study Report On - Scenarios Towards Viksit Bharat and Net Zero: An Overview (Vol. 1); BNEF (2025) New Energy Outlook 2025; NITI Aayog (2026) A Study Report On - Scenarios Towards Viksit Bharat and Net Zero: An Overview (Vol. 1); EMBER (2026) Battery storage is now cheap enough to unleash India's full solar potential; ; BNEF (2024) Long Term Electric Vehicle Outlook.

ETC, in partnership with TERI and GEAPP, finds that AgriPV could turn India's land constraints into an outsized solar opportunity

India's electricity requirements in 2050 compared with solar potential

TWh



- Previous AgriPV range established by GIZ was for around **3,000-13,000 GW of solar**
- New **TERI + ETC analysis confirms at least 8,000 GW** of AgriPV possible on high potential cropland.
- **At least 2,000 GW (3,500 TWh) of this is considered 'high certainty'**

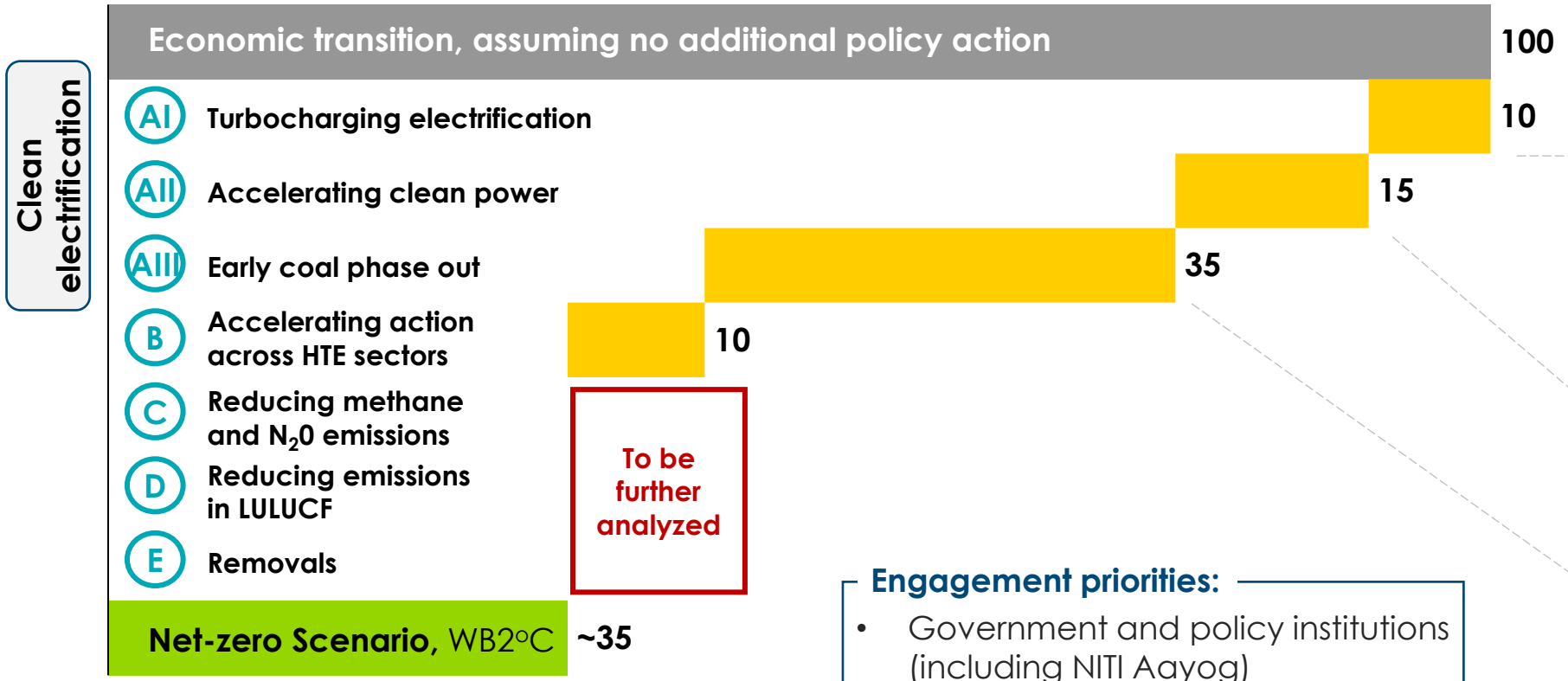
Note: Electricity generation calculated using an average solar capacity of 18%. Source: BNEF (2025) New Energy Outlook 2025; TERI (2023), India's Electricity Transition Pathways to 2050: Scenarios and Insights; TERI (2025), Reassessment of Solar Potential in India: A Macro-level Study

Early coal phase out in India represents half of the way to be "well below 2°C" aligned

Preliminary

Key mitigation areas

Cumulative $GtCO_2$ 2025-2050



Engagement priorities:

- Government and policy institutions (including NITI Aayog)
- Industrial players in key sectors (steel and cement)
- FI community, specially MDBs

Key insights

- **Air conditioning efficiency and EVs** at the core of demand side electrification
- Solar at the backbone of India's pathway, with **AgriPV suggesting much larger practical build-out** potential than usually assumed
- **No sign of lowering coal generation,** while it is the single most important lever for a faster transition in India
- To be discussed in next section

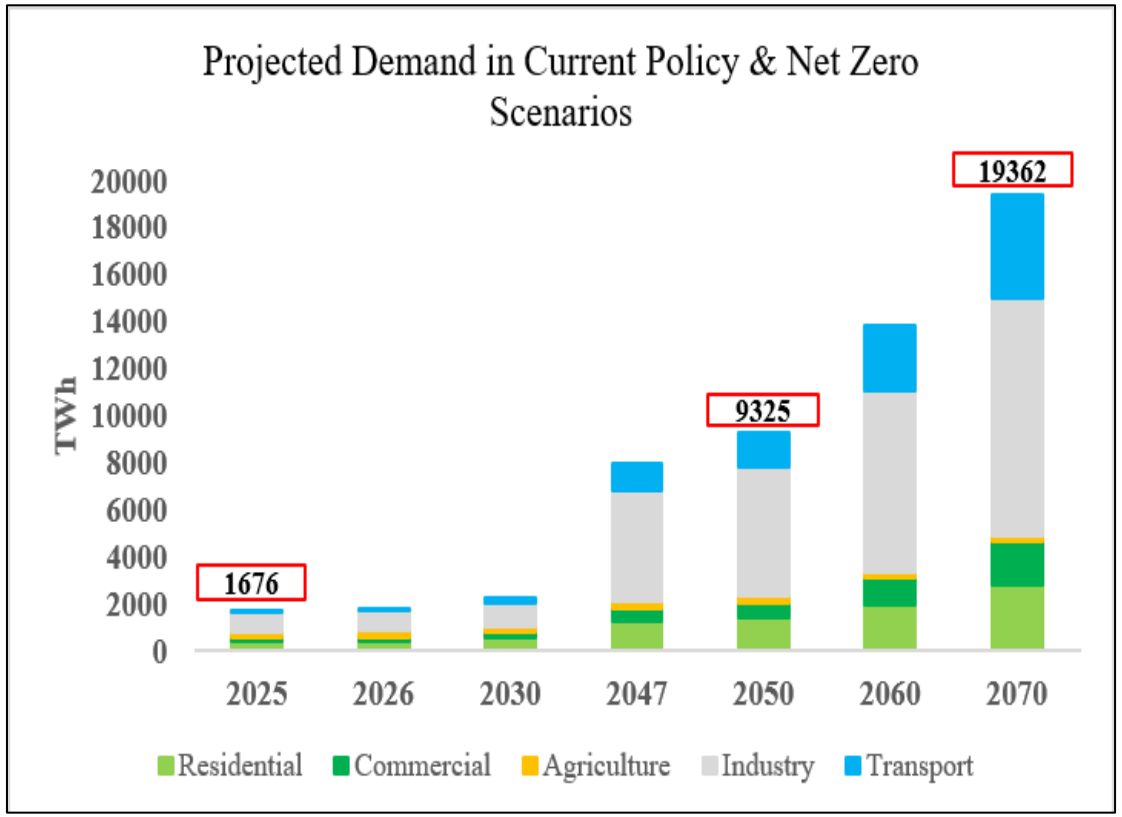
Source: Systemiq analysis for ETC; BNEF New Energy Outlook 2025

Accelerating Agri PV in India: From Pilots to Policy-Led Scale-Up

Presented by:
Dr. Arunendra Kumar Tiwari
Fellow, TERI, New Delhi, India

Need for AgriPV in India

Rapidly Increasing Electricity Demand



India's Solar PV Potential

1. Macro Solar Reassessment **~10,830** GW (TERI)
2. Ground-mounted: **~4,900 GW**
3. AgriPV **3,156 GW - 13,803GW** (GIZ)

AgriPV as Solution

1. India has one of the world's largest agricultural land bases, covering approximately **58.7%** of its total land area
2. Maximizes **land productivity** by enabling **dual use** for both farming and solar power generation.

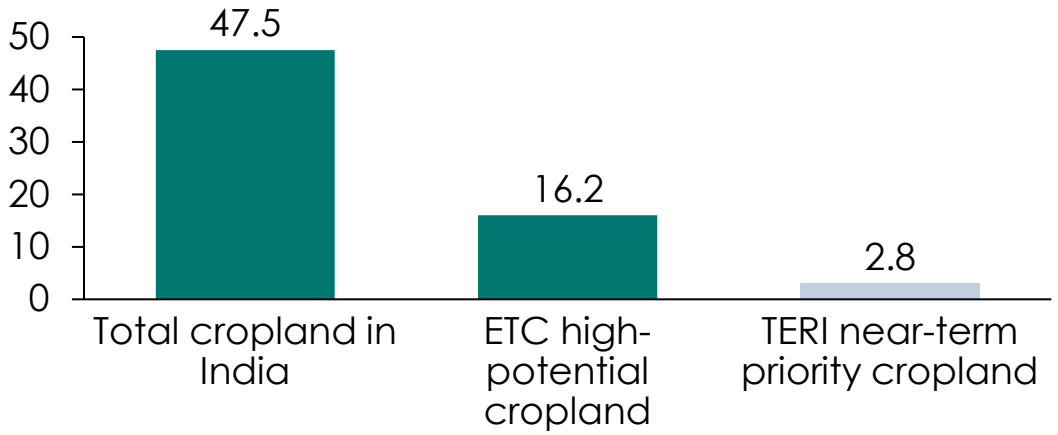
Objective of the TERI-ETC Study

- Develop a **crop suitability matrix** for India, to support future AgriPV planning and future detailed assessments.
- To conduct **assessment** of deployable AgriPV potential.
- Assess the AgriPV pilot sites and suggest best practices

Key findings from TERI and ETC reports

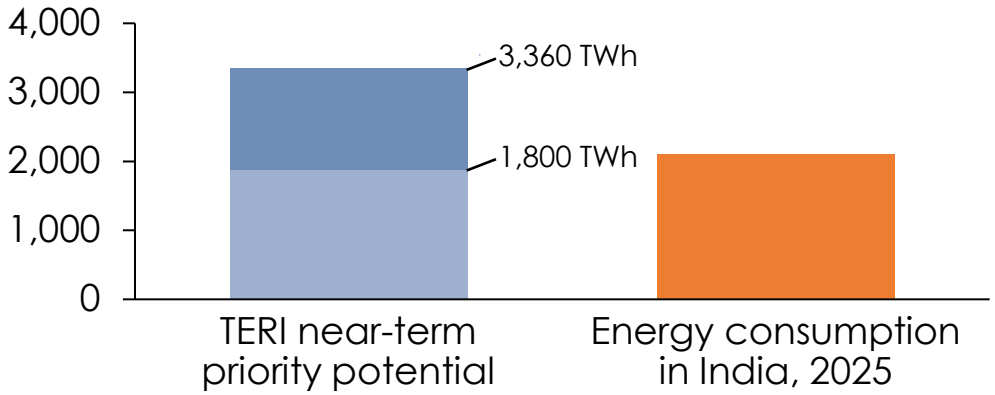
Identifying AgriPV-suitable cropland in India

Million hectares



High-certainty AgriPV electricity potential, compared with 2025 demand

TWh



- Out of 160 million ha of total national cropland, **47.5 million ha** identified as suitable for AgriPV based on multi-criteria GIS screening.
- A crop suitability matrix was created, ranking crops from most to least suitable at a state-level.
- Applying this matrix and other feasible deployment assumptions, ETC finds a 'High Potential' scenario of **16 million ha.** of cropland suitable for AgriPV.
  - This would produce 12,775 TWh, or 8,100 GW, **sufficient in meeting India's energy consumption needs by 2050.**
- Further work by TERI applying state-based data showcases that high-confidence cropland that should be prioritised in the near-term is **2.8 million ha.**
  - This represents a potential of 1,880-3,360 TWh, or 1,192–2,129 GW, **enough to meet India's energy consumption today.**

Key Findings of the Site Visits

- ✓ Pilot evidence confirms the operational feasibility of AgriPV on existing agricultural land and reflects different crop yield.
- ✓ Results show that leafy vegetables and fruits yield increases by 10-to-20% under AgriPV, with water savings averaging by 30%.
- ✓ For wheat, yield reductions were offset by quality improvements and higher realised prices.
- ✓ Applicability on 'least suitable' crops - rice paddies, remains uncertain and requires further research.
- ✓ AgriPV at distribution level minimises the losses, improves voltage profile and reliability.

Dayalbagh Edu. Institute, Agra

KVK Ujwa Plant, Delhi

GroSolar Plant, Dhule

Sahyadri Farm, Nasik

Adarsh Jeevan farm, Sagar

Indira Solar farm, Tikamgarh

Next Steps

Remaining Activities under Phase 1

- *Modelling on Impact of Agri-PV on Local Feeder*
- *Report with implementation roadmap and policy recommendations*

Phase 2:

Phase 2 focuses on converting Phase 1 insights into scalable, field-ready pathways for accelerating AgriPV deployment in India.

- ✓ *Identify high-potential AgriPV clusters based on solar, agriculture, demand, and grid readiness*
- ✓ *Develop region- and crop-specific AgriPV deployment models*
- ✓ *Design farmer-centric and financially viable business models*
- ✓ *Create standardised technical, financing, and implementation frameworks*
- ✓ *Support pilot project development, stakeholder engagement, and policy readiness*

Website: https://www.teriin.org/

TERI's Energy Programme

TERI's work in Electricity and Renewables

Thank You!

Building India's Future Agri-Energy Ecosystem

Q&A

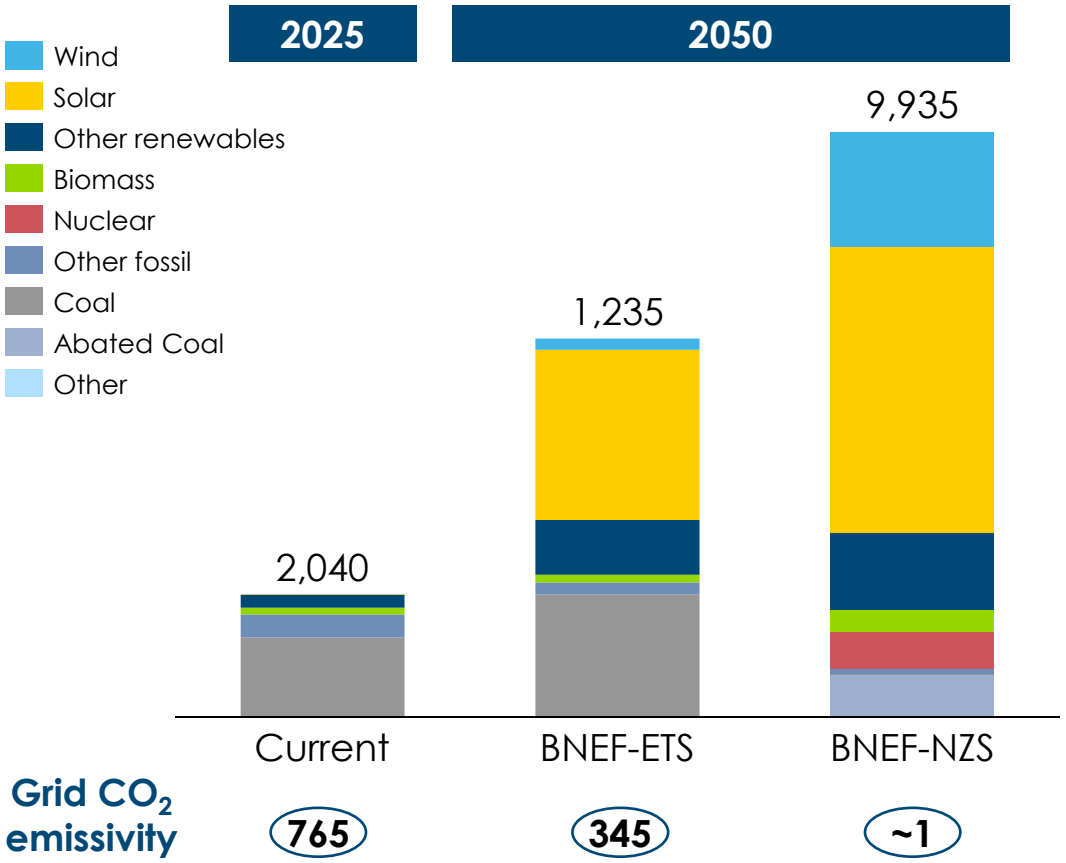
Agenda

- Key opportunities to accelerate clean electrification
- China: finally decreasing coal dependency?
- India: unparallel potential for solar
- **Indonesia: spotlight on ETC's work with IESR**
- Solarizing Africa: opportunities to leapfrog to clean electrification
- Europe: decreasing reliance on gas
- Next steps

Indonesia's power transition hinges on replacing coal generation with strong renewables build out

Electricity generation mix – multiple scenarios

TWh



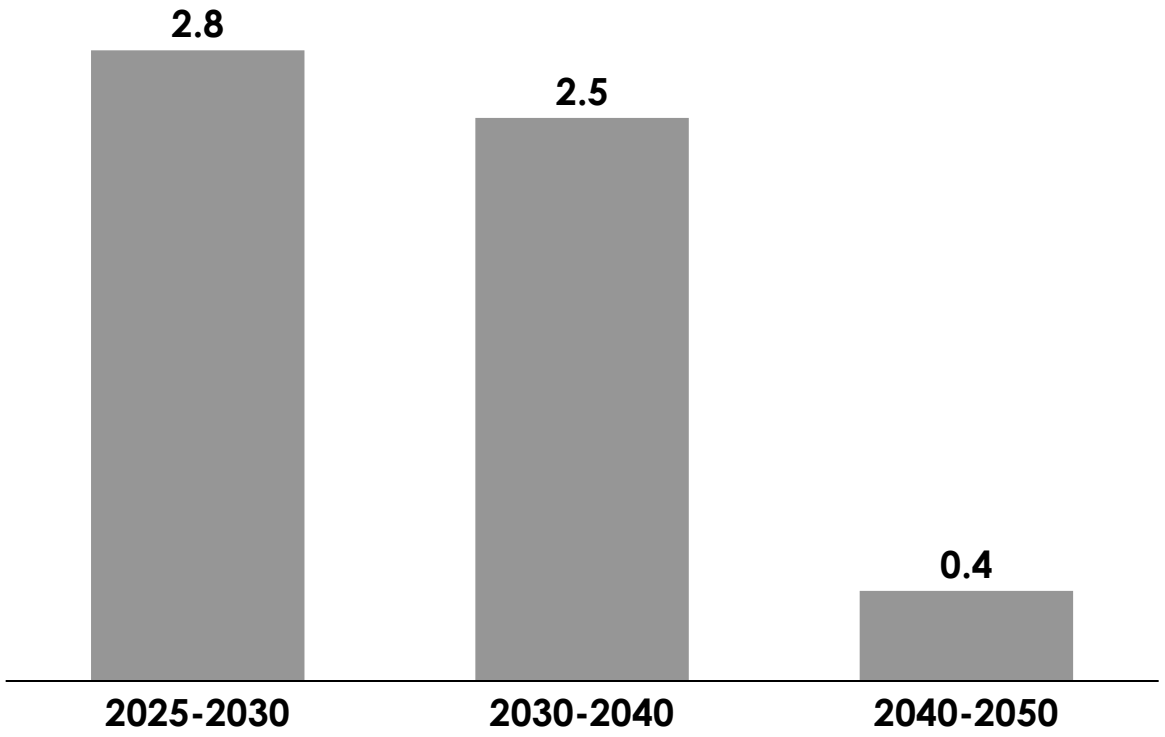
Grid CO_2 emissivity

gCO_2/kWh

Current	BNEF-ETS	BNEF-NZS
765	345	~1

BNEF ETS, Indonesia unabated coal annual average build out

GW/yr



Source: Systemiq analysis for ETC; BNEF New Energy Outlook 2025

PROJECT OBJECTIVES AND KEY QUESTIONS FOR THE INDONESIA ETC STUDY

OBJECTIVE OF THE STUDY

The Indonesia Power System Transformation project seeks to:

- **Showcase the demand-side case for clean power**
- **Reframe renewable energy and electrification as key opportunities to reach Indonesia's economic growth targets**
- **Build a collective sense of urgency from stakeholders and decision makers through a report and robust communication strategy**

Delivered by

IESR Institute for Essential Services Reform · INDEF · SYSTEMIQ

Supported by

APINDO · aplsi

KEY QUESTIONS WE ARE ANSWERING IN THE STUDY

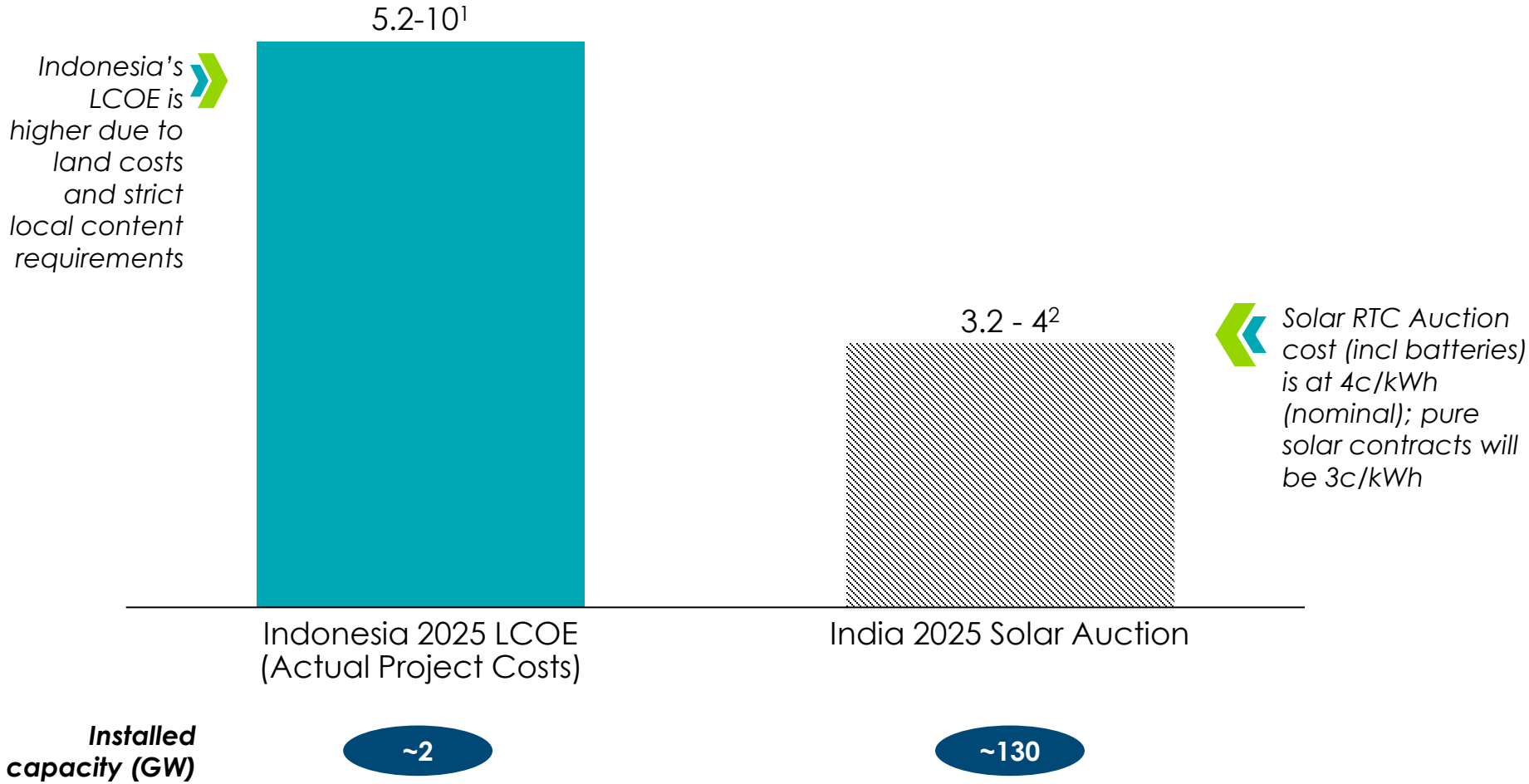
❑ **ELECTRICITY DEMAND**
How will electricity demand evolve this decade?

❑ **ELECTRICITY SUPPLY**
What electricity supply mix can meet growing demand at lowest-cost?

❑ **ECONOMIC GROWTH**
What is the electricity demand and supply scenario that delivers highest growth?

❑ **STRATEGIC CATALYSTS**
How can electrification and renewables be unlocked, to support economic growth?

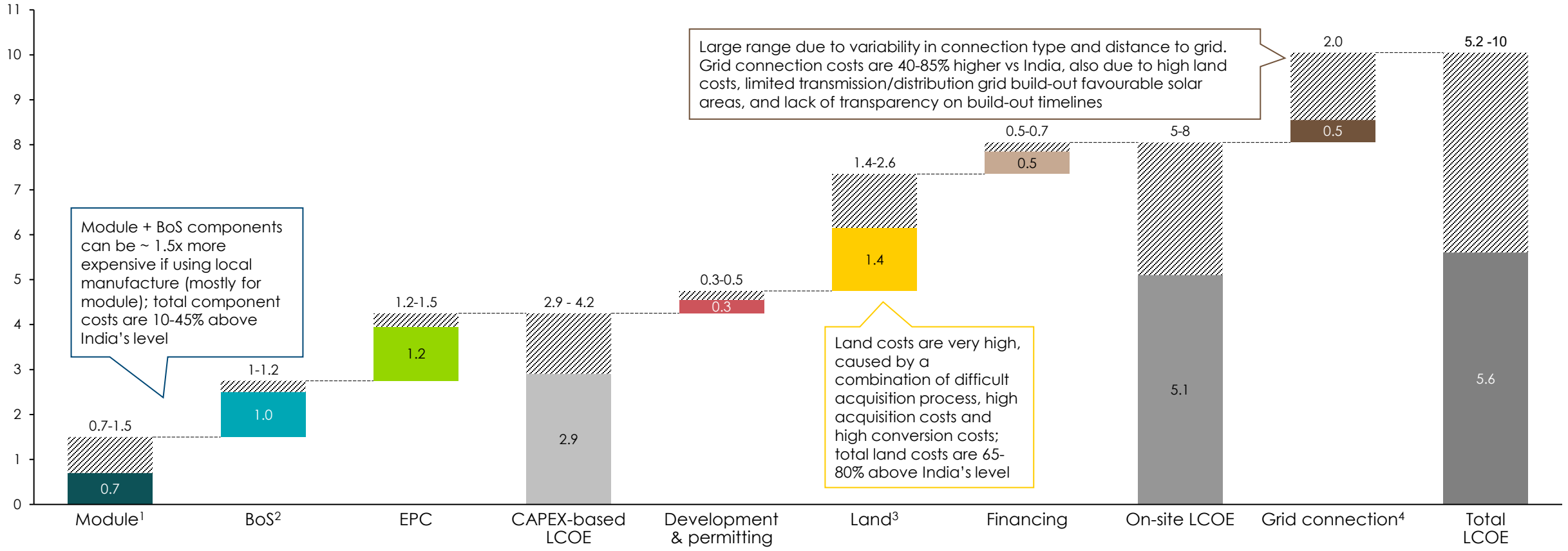
INDONESIA IS CURRENTLY WELL BEHIND INDIA IN THE SOLAR PV RACE, WITH STARK DIFFERENCES IN SOLAR PV LCOE AND INSTALLED CAPACITY AS OF 2025



THE HIGH COST OF SOLAR IS DRIVEN BY HIGH MODULE COSTS, LAND ACQUISITION COST, AND TRANSMISSION COSTS

Breakdown of Indonesia's versus India's solar LCOE today

$c/kWh, favourable Solar locations



Notes: 1. Survey results of 12 to 20 c/Wp, with upper range representing local manufactured prices; 2. BoS includes inverter, electrical components, mounting or floaters (if applicable) and others. 3. Based on average land price and additional land conversion cost for 5 major islands modelled in our study (Java, Sumatera, Kalimantan, Sulawesi, MPNT) 4. Large range as cost depends on connection type (subsea/overland etc.) and distance to transmission grid
Source: Expert interviews, Systemiq analysis

LOW-COST SOLAR | THE 3-STEP JOURNEY TOWARDS LOW-COST SOLAR FOR INDONESIA

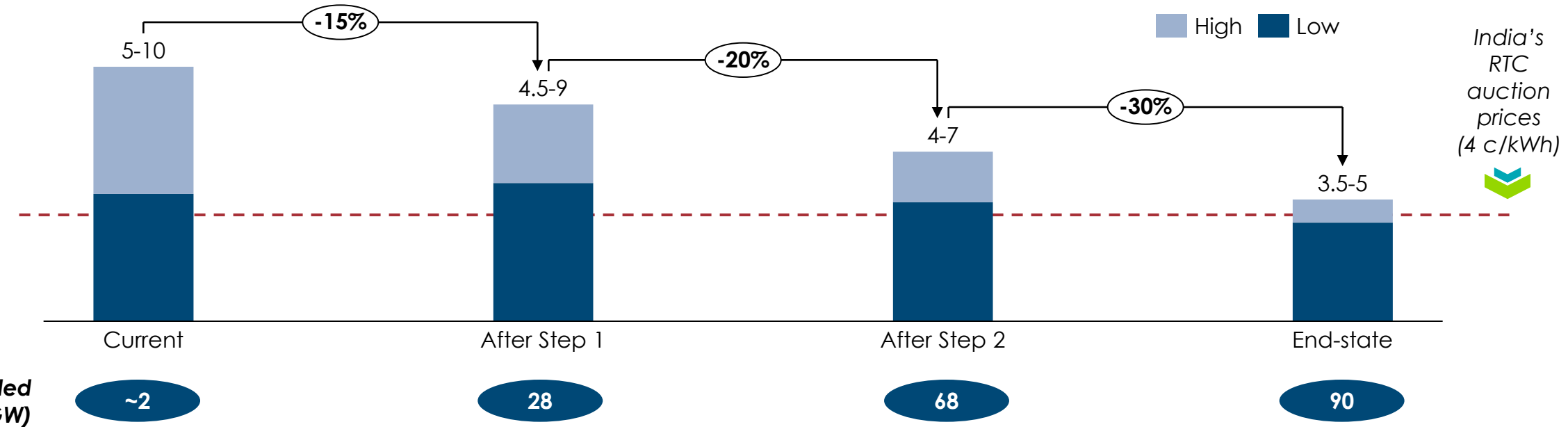
Scenario assumptions for LCOE of Large-scale Solar PV

$c/kWh

What needs to happen for cost reduction in the cost journey

Unlock catalytic projects	Scale policy support	Scale-up domestic manufacturing
• Catalytic large-scale projects are unlocked (e.g., Singapore Export) for buyers willing to pay premium. • Small cost reduction through improvements in permitting, financing and installation/EPC	• Solar PV deployment scales as costs come down and policy support improves • Policy support brings key cost components (land, permitting) • Scale increased through RUPTL and 100 GW programme delivery	• Large scale-up in Solar PV project delivery unlocks low-cost solar at level seen in recent auctions in leading solar markets • Continued policy support • Coordinated scale-up of domestic solar manufacturing

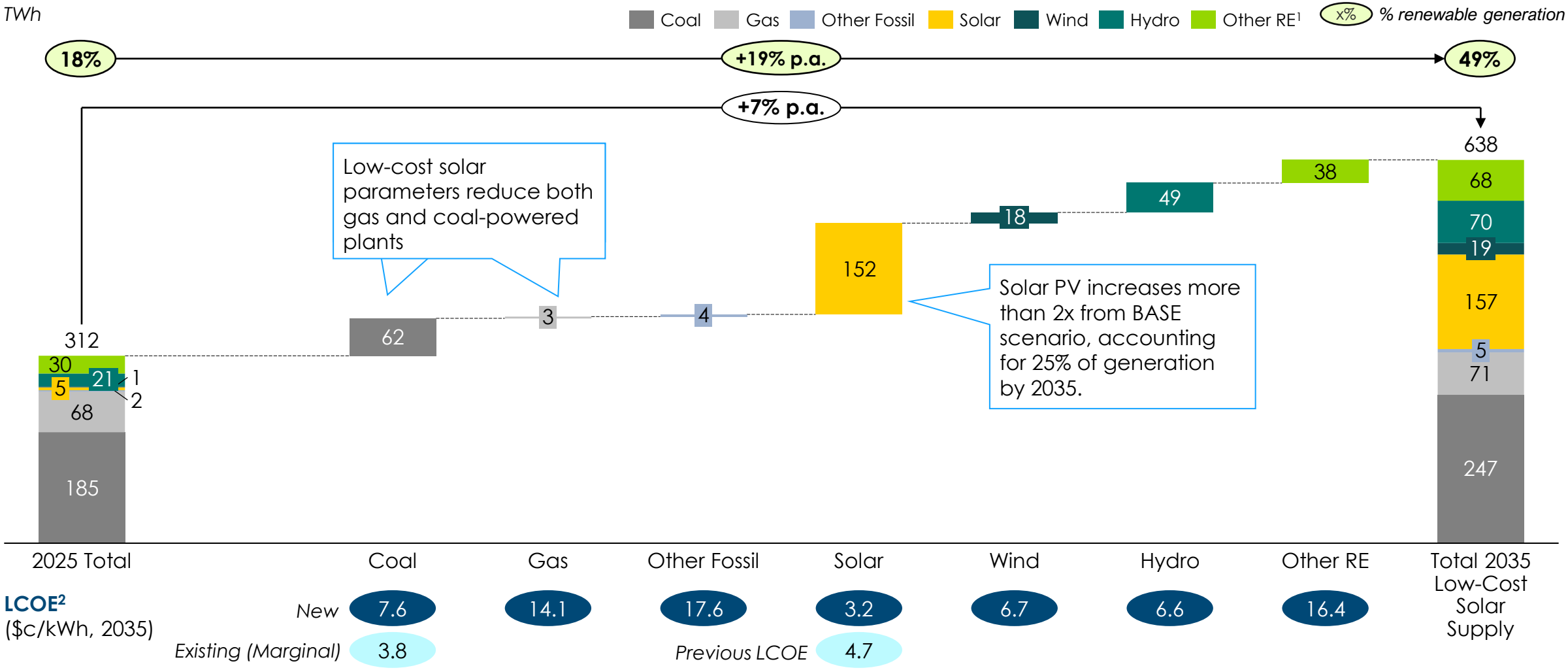
Team is currently working with ReNew power on understanding the LCOE journey of India, and what parts can Indonesia replicate



Installed capacity (GW)

LOW-COST SOLAR | IF SOLAR PV LCOE COMES DOWN MORE RAPIDLY, SOLAR COULD ACCOUNT FOR 25% GENERATION BY 2035

2025-2035 ELECTRICITY SUPPLY (ADDITION) IN HIGH ELECTRIFICATION DEMAND + LOW-COST SOLAR SCENARIO, BY SECTOR



Note: current supply modelling still includes DMO-priced coal. For scenario D, this will be updated to export-priced coal in the next model runs.

Notes: 1) Includes bio-energy and geothermal; 2) The Levelized Cost of Electricity (LCOE) figures represent the average costs across grouped technology categories, including: Coal, Gas (CCGT, Gas Machine with LNG, and Simple-cycle Gas with LNG), Other Fossil (Diesel and Nuclear), Hydro (Large and Small), Other RE (Biogas, Biomass, Waste-to-Energy, and Geothermal).

INCREASING RENEWABLE ELECTRICITY SUPPLY CAN DRIVE ECONOMIC GROWTH

Oil imports

$60 Bn

cumulative savings between 2025-2035

Subsidy savings

$1.7 Bn

per year by 2035

New export sectors

$8-9 Bn

annual revenues by 2035

Energy system investment

$~200 Bn

between 2025-2035 into energy system and electrification

Jobs

45,000

Cumulative net additional jobs by 2035

Indirect structural & strategic gains

01 (Export) Competitiveness

02 Energy price stability

03 Energy system resilience

04 Reduced air pollution

05 Climate credibility

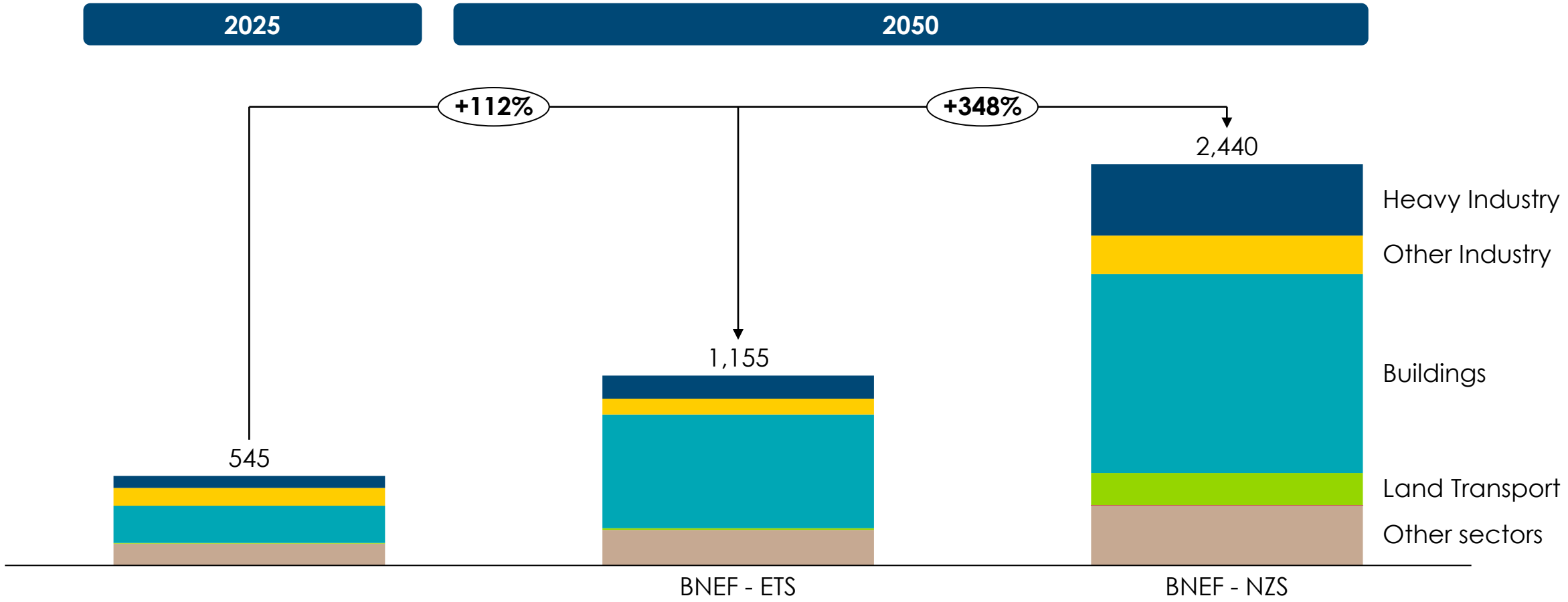
Agenda

- Key opportunities to accelerate clean electrification
- China: finally decreasing coal dependency?
- India: unparallel potential for solar
- Indonesia: spotlight on ETC's work with IESR
- **Solarizing Africa: opportunities to leapfrog to clean electrification**
- Europe: decreasing reliance on gas
- Next steps

According to BNEF scenarios, power demand in Sub-Saharan Africa could increase fivefold by 2050, making clean scale-up a development imperative

Power demand in Sub-Saharan Africa, BNEF scenarios

TWh



Notes: For demand, other sectors aligns with BNEF definition, including non-energy use;
Source: Systemiq analysis for ETC; BNEF New Energy Outlook 2025;

Solarizing Africa: Advancing the Continental Clean Energy Transition

In Partnership with

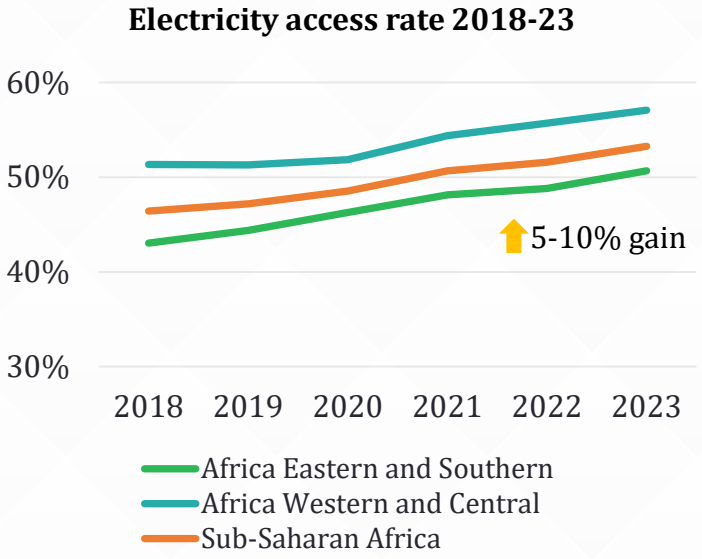
and

Presented by: Ms. Namrata Mukherjee, Strategic Planning Specialist, ISA

ETC Representatives Meeting, 14 May 2026

Africa will play a decisive role in achieving an equitable and just energy transition

Current pace of electrification would not suffice as 660 mn without energy access



What needs to be done is well known, but HOW of policy and regulatory reforms, innovative financing and institutions critical

The M300 initiative is actively working to foster an ecosystem in Africa

PRESS RELEASE

Heads of State Commit to Concrete Plans to Transform Africa's Energy Sector, with Strong Backing from Global Partners

Thirty African Heads of State and governments today committed to concrete reforms and actions to expand access to reliable, affordable, and sustainable electricity to power economic growth, improve quality of life, and drive job creation across the continent.

300 million

Electricity Access by 2030

$50+ billion

Country commitments and partner pledges

8/10 people

Reside in remote regions and DRE being most suited solution

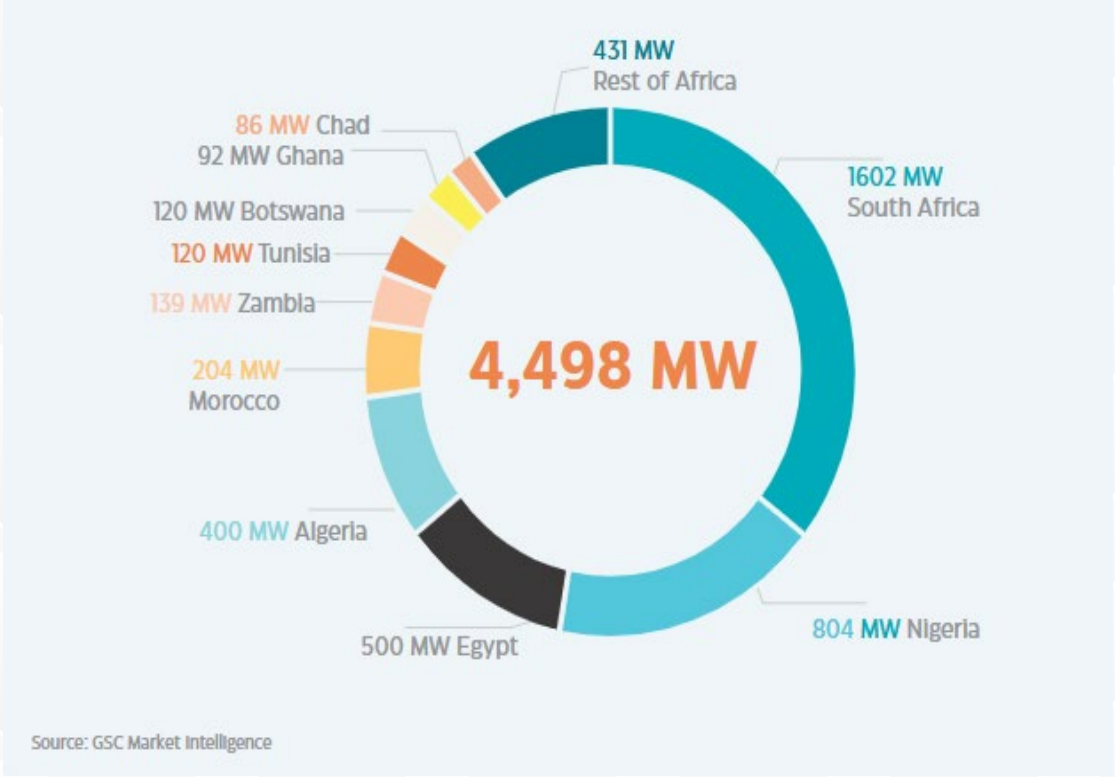
ISA's initiatives are complementing M300

Africa Solar Facility: De-risking investments for DRE	**Country Partnership Framework:** Deepening solar penetration	**Solar in Agriculture:** Enabling food security	**Fellowship and STAR-C :** Building local institution and capacity	**AI in energy:** Leap-frogging to efficiency and advancement

Africa's Solar Market in 2025

- Utility-scale projects accounted for around 56% new additions in 2025, **while distributed solar around 44%.**
- South Africa is Africa's solar champion, accounting for around half of the continent's installed solar capacity.
- **South Africa (1,602), Nigeria (803 MW), Egypt (500 MW)** lead Africa in terms of **additional installed capacity in 2025**. The new installations represent 54% in 2025.
- In 2025, only the **10 top largest markets** accounted for around **90%** of new solar installations.
- Nigeria's solar market is dominated by DREs, including SHS, C&I rooftops, and private mini-grids. Nigeria witnessed 141% new additional capacities in 2025.

New Solar PV Installations in 2025 (Top ten markets and rest African countries)



Source: GSC, Africa Market Outlook for Solar PV, 2026 - 2029

Objective and scope of the report

Core objective of the report

Decision Framework/ Blueprint for Head of state / Ministers / Senior government officials

- **Why the productive use case of solar is necessary for the continent?**
- **Why is deployment at scale not happening?** ***Barriers***
- **How to address the Barriers?** ***Enablers and Actual Case Studies***
- **What actions to be taken by stakeholders and by when?**

Themes

1. **Distributed Renewable Energy for Last-Mile Access**
   Economic rationale, replicability, and program design for scale
2. **Solar for Agriculture and Productive Value Chains**
   Irrigation, rural productivity, and energy–food security linkages
3. **Utility-Scale Solar and Regional Power Integration**
   Large-scale deployment, interconnections, and system readiness
4. **Solar e-Mobility**
   Economic rationale, business models, enablers & barriers
5. **Digitalization as a Scale Enabler**
   Utility reform, planning tools, and transparent procurement

Cross Cutting Themes

- **Capacity Building and Institutional Readiness**
  Skills, systems, and delivery capability for sustained impact
- **Enabling Ecosystem: Policy, Finance, and Innovation**
  Regulatory reform, financing architecture, and risk mitigation

Methodology for draft chapters

1

Literature Review and Evidence Synthesis

Reviewed international, regional, and national literature to distil actionable insights and lessons learned.

2

Research Design and Data Instrumentation

Designed a targeted research questionnaire for African countries to address key knowledge gaps

3

Stakeholder Consultations and Expert Interviews

- Stakeholder consultation done with minister level representatives from 6 countries – Senegal, Ethiopia, Gambia, Rwanda, Uganda, Zimbabwe
- Conducted interviews with representative institutions, including SELCO, SNV, GOGLA, RES4Africa, Mercy Corps, COMESA, EACREEE, SONELE (Comoros), Mashreq Company (Egypt), and Ministries of Agriculture (Egypt and Morocco).
- Additional consultations underway/planned with regional energy centers, IFIs, international development partners, project developers, and sector experts.

A stakeholder consultation is planned in Europe RCM to understand the challenges stakeholders face when investing in Africa

Solar Energy Thematic Areas and African Context

Solar Thematic	Necessity	Barriers	Enablers
Distributed Solar – Mini-grids	**Least cost pathway to universal energy access**	➢ Policy and regulatory uncertainty ➢ Weak institutional coordination ➢ Financing gap ➢ Low demand density ➢ Limited Technical Capacity	✓ Regulatory clarity ✓ Institutional anchoring ✓ Demand simulation ✓ Financing innovation ✓ Capacity building
Solar Pumps	**Transforms subsistence farmers into commercial producers**	➢ High Upfront Capex ➢ Fragmented Institutional Mandates ➢ Low Farmer Awareness ➢ Weak Supply chains ➢ Currency insecurity	✓ Financing innovation ✓ Demand aggregation ✓ Institutional coordination ✓ Quality standards ✓ Capacity building
Utility-scale Solar	**Foundation for industrialization**	➢ Offtaker risk ➢ Currency volatility ➢ Weak grid infrastructure ➢ Opaque procurement ➢ Fragmented institutional mandates	✓ Offtaker credit enhancement ✓ Risk mitigation instruments ✓ Dedicated solar agency ✓ Transparent procurement ✓ Regional interconnections
Solar e-mobility	**Cleaner air and energy independence**	➢ Macro and finance ➢ Infrastructure ➢ Grid access ➢ Policy environment ➢ Skills and capacity	✓ Finance and capital – enhancing bankability for private investors ✓ Policy & regulatory clarity ✓ Market development ✓ Ecosystem and coordination
Digitisation of Utilities	**Precondition for scaling solar**	➢ Upfront Capex ➢ Lack of technical capacity ➢ No performance incentive ➢ Pilot fatigue - Donor-funded pilots never integrated into core utility systems; fail to scale	✓ Self-financing digitalization: Pilot AMI in high-loss feeders ✓ Performance based loans ✓ Open data policies ✓ Capacity building

Proposed Roadmap Framework – Illustrative for Solar e-Mobility

ACTOR	IMMEDIATE **Establish foundations** *Priority actions to unlock deployment*	MEDIUM TERM **Build systems & scale** *Deepen coordination across actors*	LONG TERM **Sustain & optimise** *Embed enabling environment at scale*
Head of State / Cabinet	▪ Declare e-mobility national priority with measurable targets ▪ Set government fleet EV procurement target as demand signal	▪ Embed e-mobility in national development plans with sectoral timelines ▪ Mandate public transport electrification roadmap	▪ E-mobility embedded in national development plans ▪ Government fleet fully electrified as anchor demand signal
Ministry of Energy & Transport	▪ Draft e-mobility regulation ▪ Introduce EV import duty exemptions	▪ Commission demand mapping & least-cost charging plan ▪ Ring-fence EV budget	▪ Fully harmonised national EV regulatory framework in place ▪ EV import duty and VAT exemptions embedded in fiscal policy
Energy Regulator / Standards	▪ Introduce EV-specific electricity tariffs ▪ Streamline charging licence process	▪ Set battery safety & performance codes ▪ Mandate swap station standards ▪ Establish dedicated EV unit	
EV Delivery Unit / REA	▪ Establish national EV delivery unit with ring-fenced mandate ▪ Establish cross-ministerial e-mobility task force	▪ Track interoperability KPIs; battery compliance portal ▪ Coordinate between ministries, utilities & operators ▪ Manage charging concession pipeline	▪ Deploy charging hubs; integrate with grid feeders & smart substations ▪ Self-sustaining coordination architecture with institutionalised knowledge transfer
Private Sector / Operators	▪ Advocate for import duty exemptions on EVs and solar components ▪ Adopt interoperable battery platforms; open swap networks to multi-brand EVs	▪ Manage fleet charging; report utilisation & grid demand ▪ Build solar swap stations & depot charging ▪ Engage in EV regulation consultations; self-regulate	▪ Hire 70%+ local staff with certified training ▪ Run women's entrepreneur programme ▪ Self-sustaining commercial e-mobility ecosystem
Financier / DFI / ISA	▪ Approve blended finance framework with multi-year commitment ▪ Approve performance-based grant framework	▪ Structure subsidy instruments; set credit terms ▪ Develop financial models; site selection ▪ Aggregate developer assets; standardise contracts	

The Cost of Inaction vs. The Opportunity of Action

The ISA flagship report will provide a continental wide blueprint. The thematic specific roadmaps are intended to provide the timeline and accountability. What is required now is political leadership — at national and continental levels — to adopt these roadmaps, allocate budgets, and hold ministries accountable. The International Solar Alliance stands ready to support every African nation in this journey. The sun does not set on Africa's opportunity. But it will wait for no one.

If Africa Acts Now

- **100 - 200 GW solar installed by 2030, ~500GW by 2040 and ~ 1TW by 2050**
- **Universal energy access** achieved
- **14 million** green jobs created
- **Emissions avoided**
- **Local solar manufacturing** ecosystem established

If Africa Delays

- **<60 GW** installed (business as usual)
- **400+ million** still without power
- **$1+ trillion** stranded costs in isolated systems
- **Youth unemployment crisis** deepens
- **Emissions rise** as diesel and coal expand
- **Continued import dependence** on fossil fuels and foreign modules

The Flagship Report is intended to be launched during ISA's Africa Regional Committee Meeting at Zimbabwe in August 2026


Thank You

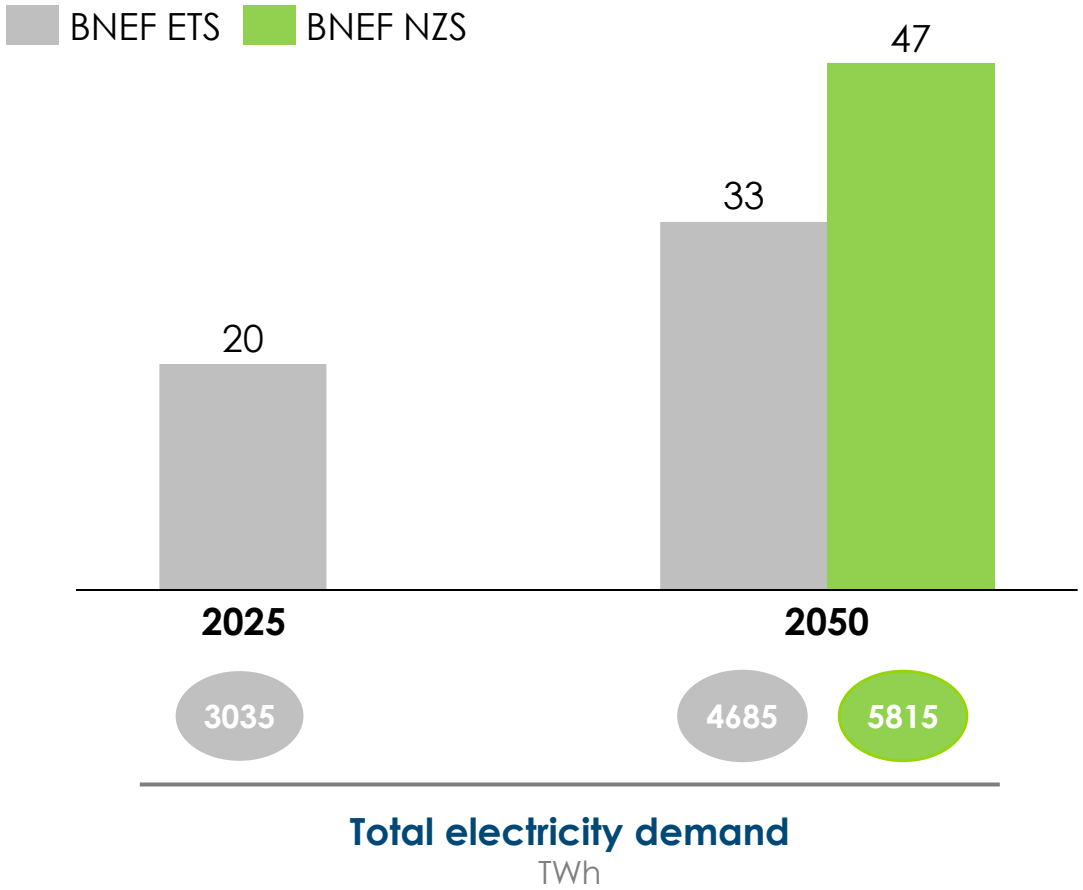
Agenda

- Key opportunities to accelerate clean electrification
- China: finally decreasing coal dependency?
- India: unparallel potential for solar
- Indonesia: spotlight on ETC's work with IESR
- Solarizing Africa: opportunities to leapfrog to clean electrification
- **Europe: decreasing reliance on gas**
- Next steps

According to BNEF, Europe's electrification beyond ETS would be driven by buildings and, to a certain extent, industry

BNEF Electricity share of final demand, Europe

% of final demand



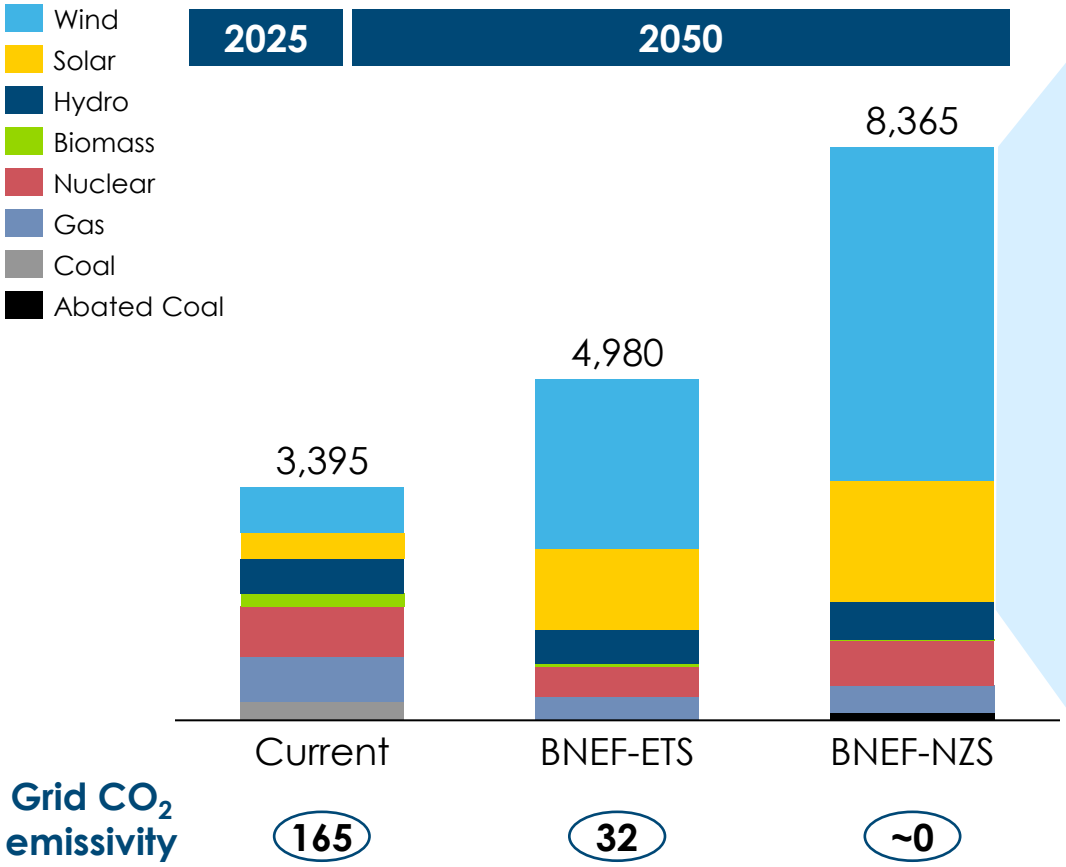
Drivers of electrification	Current 2025	BNEF ETS 2050	BNEF NZ 2050
Buildings electrification % of final energy	35	45	65
Data Centers TWh	60	490	NA
Passenger EV sales % of new sales	35	95	100
Commercial Evs sales % of new sales	15	85	95
Industry electrification % of final energy	30	40	50

Source: BNEF (2025) New Energy Outlook 2025; BNEF (2024) Long Term Electric Vehicle Outlook.

In BNEF generation scenarios, unabated coal phase out happens even under ETS, but higher electrification under NZS demands faster wind build-out

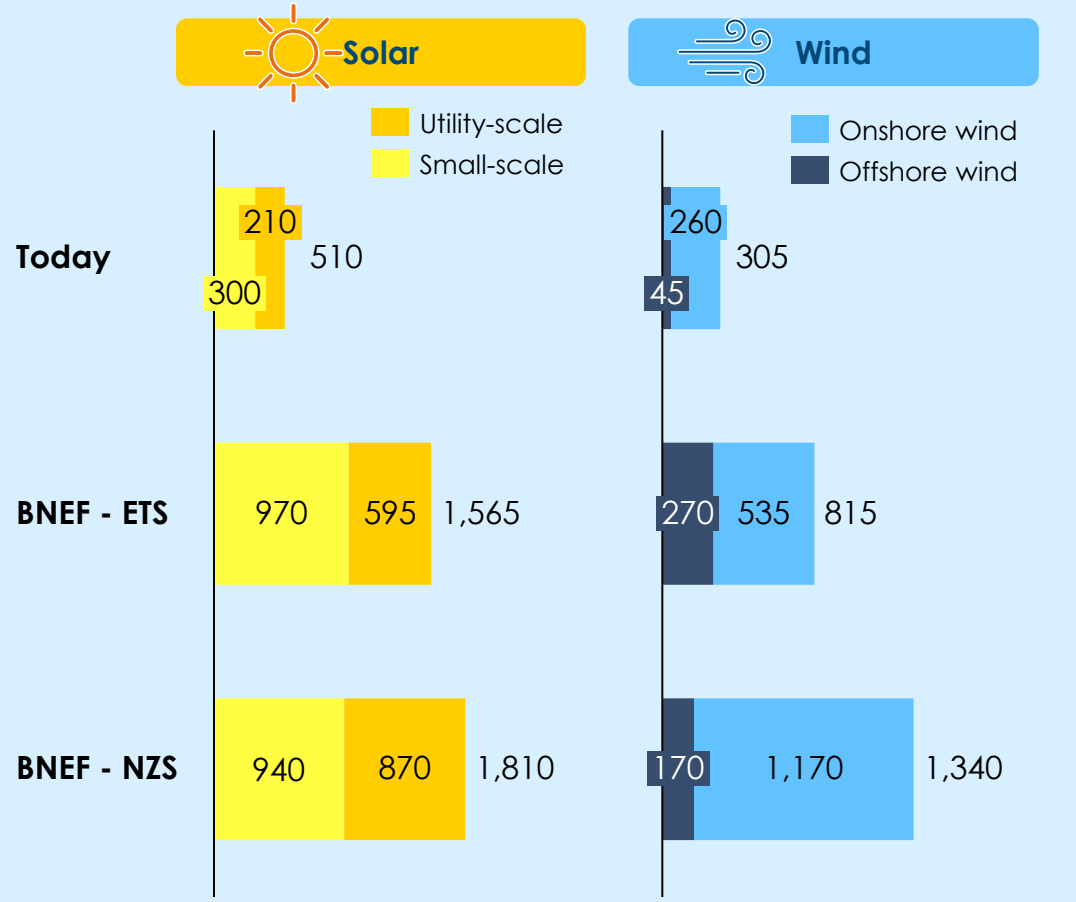
Electricity generation mix – multiple scenarios

TWh



Total VRE capacity additions, 2025 – 2050 cumulative

GW

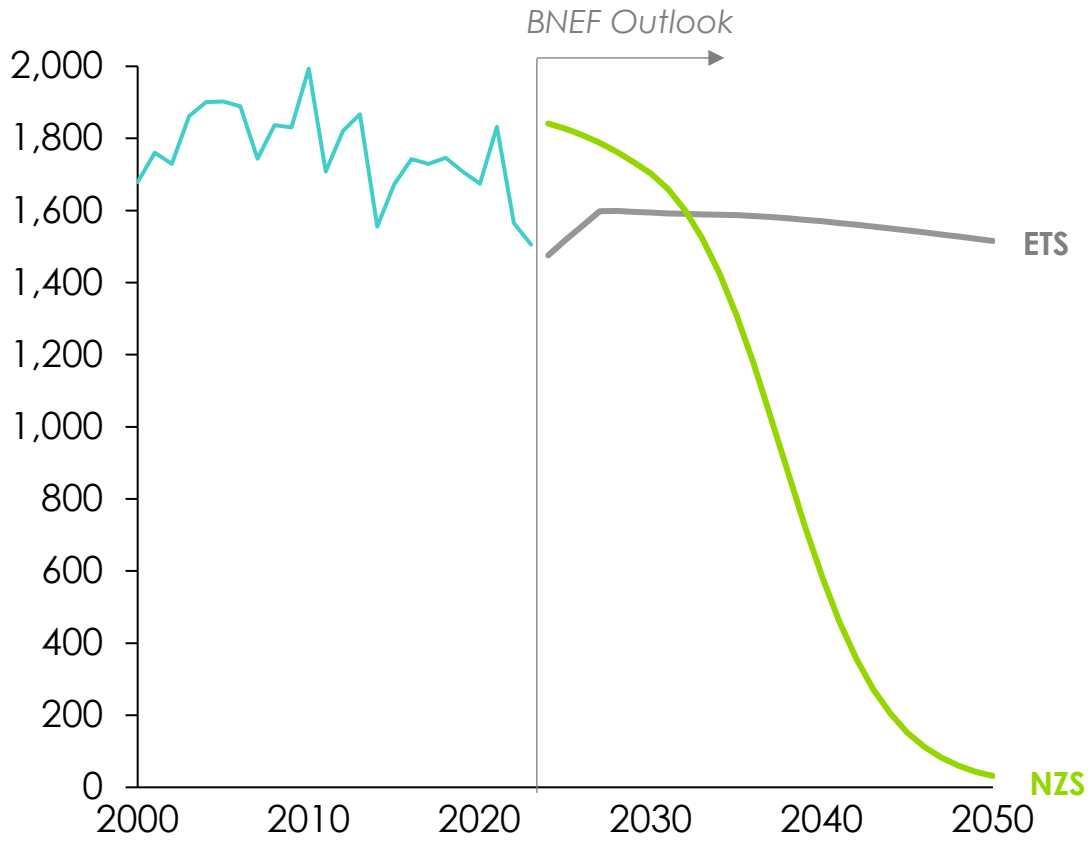


Source: BNEF (2025) New Energy Outlook 2025.

According to BNEF, Europe's pathway to lower gas dependence relies on accelerated electrification of buildings and reductions in gas-fired power

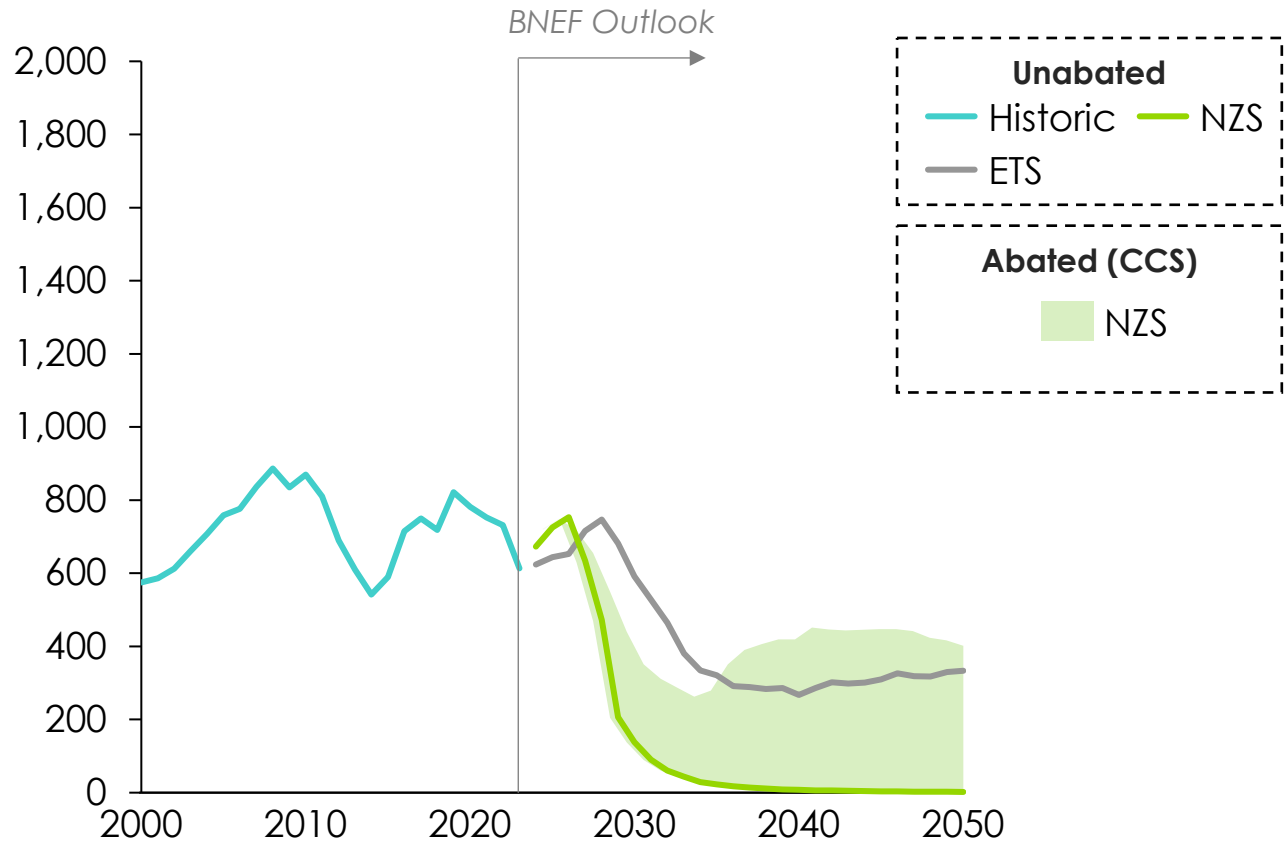
BNEF, Europe Gas consumption, Buildings Final energy

TWh



BNEF, Europe gas-fired power generation

TWh



Source: Systemiq analysis for ETC; BNEF (2025) New Energy Outlook;

Agenda

- Key opportunities to accelerate clean electrification
- China: finally decreasing coal dependency?
- India: unparallel potential for solar
- Indonesia: spotlight on ETC's work with IESR
- Solarizing Africa: opportunities to leapfrog to clean electrification
- Europe: decreasing reliance on gas
- **Next steps**

Next steps

Analysis

- **Clean electrification:** Finalise key regional and sector metrics, cost-of-action analysis, priority public policies and responsible near-term targets, integrating the new BNEF NEO when ready
- **Hard-to-electrify sectors:** Focus of the next section, assessing decarbonisation levers by industry and in regions with high production volumes and carbon intensity, as well as the enabling infrastructure required to decarbonise these sectors, including hydrogen and CCS
- **Methane emissions from fossil fuels:** Stress-test fossil methane reductions against *Keeping 1.5°C Alive* work from ETC (2021), distinguishing between automatic declines from fossil fuel phase-down and additional abatement needed by 2030 across coal and oil & gas.
- **AFOLU (agriculture, food, agriculture and land use):** Clarify assumptions on diet change, agricultural best practices and land-use outcomes, and define a transparent treatment of forest protection, restoration and management across scenarios, building on existing partner work and specialist interviews (e.g. Food and Land Coalition, WRI, Shell Venture Capital, Environmental Defense Fund, IIASA).
- **Removals:** Refresh removals assumptions against ETC's previous work, clarifying the credible role, scale and timing of removals within a well-below-2°C pathway.

Engagement

- **Continue targeted discussions with priority stakeholders in key geographies** to test emerging findings and sharpen the implications for policies, targets and sequencing.

Q&A

Energy
Transitions
Commission

The Energy Transitions Commission is hosted by SYSTEMIQ Ltd.