Energy Transitions Commission

ETC 2025 Work Programme: impact to date and what's next

ETC Representatives meeting

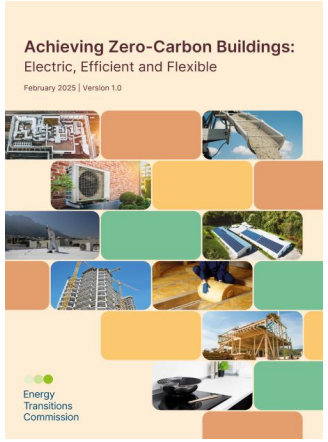
18 September 2025

2025 ETC Reports

Pillar 1: Amplifying ETC reports

Upcoming reports

February



A complete picture of the buildings sector's emissions and energy use. ETC describes how a combination of electric, efficient, and flexible solutions can decarbonise buildings.

May

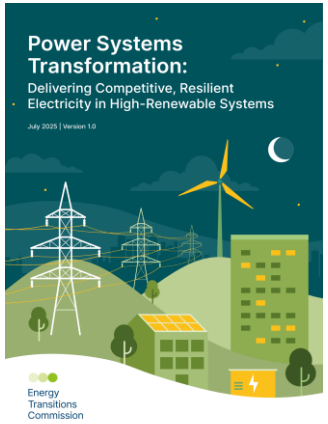
High-integrity carbon credits are required to scale up carbon dioxide removals and achieve corporate net-zero targets

Responding to SBTi's updated Net-Zero Corporate Standards consultation

June

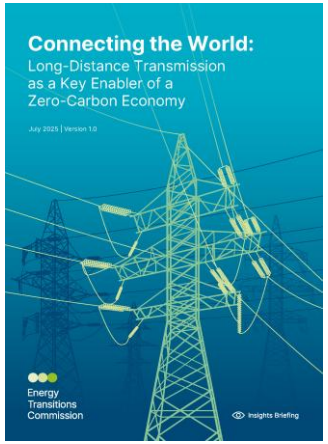
Global trade can accelerate the energy transition through two key areas: following principles for nearshoring supply chains and implementing carbon pricing.

July



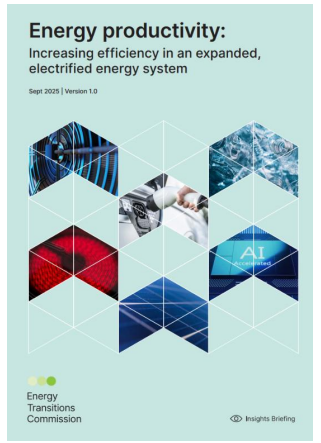
Operating and balancing power systems with high shares of wind and solar (e.g. 70-80%+) is possible through technologies existing today, delivering system stability and round-the-clock electricity.

July



Long-distance interconnectors play an important role in connecting low-cost clean energy to where it's needed most.

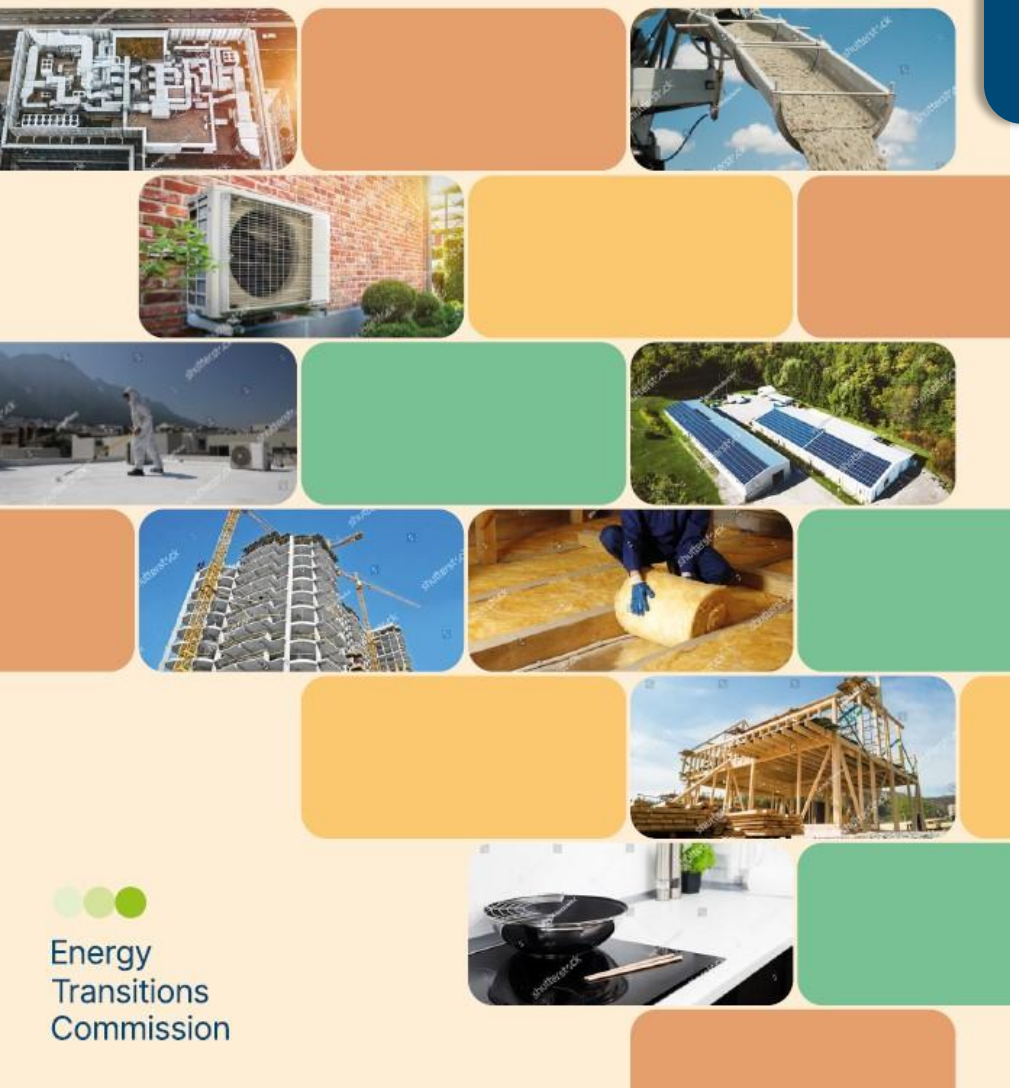
October



The world can more than double GDP by 2050 while cutting energy use by harnessing electrification, efficient technologies, and smarter material use.

November

Electrification and circularity can dramatically cut demand for carbon molecules while ensuring sustainable sourcing and safe end-of-life management resulting in zero net emissions.



Achieving Net-Zero Buildings: Electric, Efficient and Flexible (2024)

The Report outlines how to decarbonise the energy used to operate commercial and residential buildings, reduce embodied carbon from new buildings and accelerate the buildings energy transition

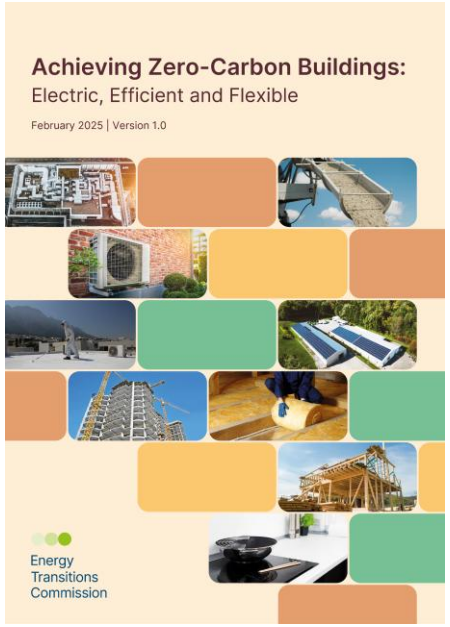
Key points:

- The global buildings sector contributes a third of global emissions (12.3 $GtCO_2$ in 2022), and 10% of direct use of fossil fuels.
- Key priorities include:
  - Transitioning away from fossil fuels by decarbonising heating and cooking with electric heat pumps and cookers.
  - Increasing the efficiency of growing electrical demand from cooling, appliances, lighting and electrified heating technologies.
  - Reducing the embodied carbon of the next generation of new buildings, by decarbonising steel, cement and concrete, and using alternative lower-carbon materials such as timber and hempcrete where sustainable supply can be guaranteed.
- Underpinning the entire buildings sector energy transition will be energy productivity – using less energy to power buildings, less materials to build, and better utilisation of existing buildings while maintaining the same living standards.

Achieving Zero-Carbon Buildings

Pillar 1: Amplifying ETC reports

February

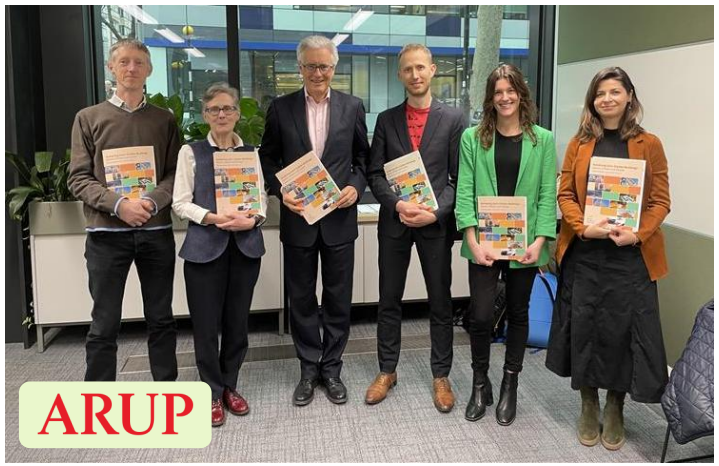


ETC draws a complete picture of the buildings sector's emissions and energy use and describes how a combination of electric, efficient, and flexible solutions can decarbonise buildings.

Targeted international media: trade titles and broadcast. Press release newswire distribution to over 30 countries and embargoed briefings with journalists led to coverage in over 600 news stories at launch.

- el periódico de la energía — Commercial buildings must lead the transition to net-zero emissions
- SmartCitiesWorld — How to decarbonise the building sector
- The Infrastructure Podcast — Episode 113 Guest: Lord Adair Turner, chair of the Energy Transitions Commission
- TerraGreen — Zero-carbon Cooling in a Warming World: Expanding access while reducing carbon emissions

ETC x Arup webinar drew around 300 attendees



Roundtable in Madrid with Built Environment Stakeholders

- **ETC members amplified key messages on social media**
- **Our buildings newsletter issue reached over 24,000 people**
- **ETC also joined panels hosted by WBCSD and Green Building Council España (GBCE)**

Next steps in the buildings campaign

Continue to partner with member organisations

ARUP Iberdrola Schneider Electric

Continue to partner with trade associations

Global Alliance for Buildings and Construction

COP30 BRASIL AMAZÔNIA BELÉM 2025

- Global ABC's COP30 pavilion
- Webinar series on heating/cooling and embodied carbon. Featuring insights from:
  - ETC's Buildings Decarbonisation report
  - GlobalABC's 650+ members, including case studies
  - Global ABC's annual global status report: progress towards zero-carbon buildings.

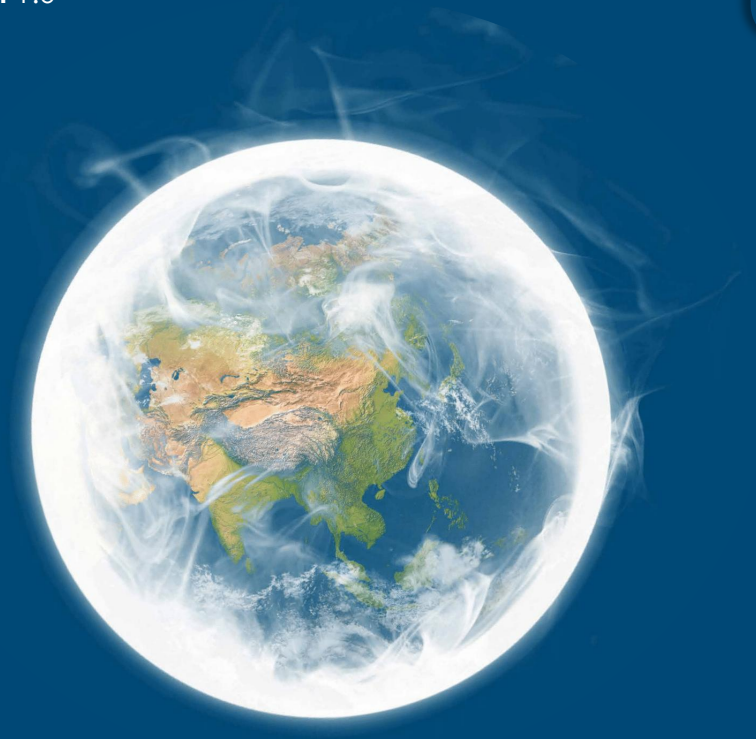
Questions for discussion

- **Should ETC engage with EU (or other regions) on buildings legislation?**
- **Any other partnerships ETC should be engaging with further?** E.g., WRI, World Green Buildings Council, others
- **Should ETC use the Energy Productivity campaign to retell the story with a focus on heating, cooling, cooking, appliances?**
- **What topics should ETC focus on?**
  - Heating & Cooling
  - Embodied Carbon
  - Appliances
  - Commercial buildings

The role of carbon credits in accelerated corporate action

May 2025

Version 1.0



Energy Transitions Commission

The role of carbon credits in accelerated corporate action (May 2025)

Building on ETC's 2022 report, *Mind the Gap*, this briefing note clarifies the role of high-integrity carbon credits in scaling up carbon dioxide removals and achieving corporate net-zero targets.

Key points:

In March 2025, SBTi published a draft revision of its Corporate Net-Zero Standard V2 (CNZS V2). In response, the ETC published this briefing, generally endorsing the high-ambition corporate strategies set out by the SBTi's Corporate Net-Zero Standard V2.

ETC welcomes additional action on scaling carbon credits outlined in the net-zero standard and notes that:

- Companies should base their use of carbon removals credits on their decarbonisation costs relative to revenue.
- Alongside ambitious Scope 3 emission reduction targets, companies that have low costs of decarbonisation should be required to gradually scale up purchase of carbon removals credits to address residual Scope 3 emissions
- SBTi have an opportunity to recognise companies that choose to be 'net-zero' today.

The role of carbon credits in accelerated corporate action

May

ETC clarifies the role of high-integrity carbon credits in scaling up carbon dioxide removals and achieving corporate net-zero targets, **building on our 2022 report, Mind the Gap**.

Responding to SBTi's updated Net-Zero Corporate Standards consultation

Shared the briefing directly with a list of key stakeholders, media, partners and businesses

"All good ideas, which we'll consider seriously."

David Kennedy, CEO of the Science Based Targets initiative

SCIENCE BASED TARGETS

ETC's members and partners helped disseminate this visual-led work on social media

Julio Friedmann • 2nd
Helping Reduce & Remove CO2 from the air and oceans through investment, ...
1w •

Huzzah! The Energy Transitions Commission has a new brief.

The ETC's new briefing note clarifies the role of high-integrity carbon credits in scaling up carbon dioxide removals and achieving corporate net-zero targets. The ETC generally endorses the high-ambition corporate strategies set out by @Science Based Targets initiative's Corporate Net-Zero Standard draft revision (CNZS V2) as an important step in helping to scale critical carbon dioxide removals.

All y'all can download the full analysis here:
https://lnkd.in/gfvEQ_J2


The role of carbon credits in accelerated corporate action
energy-transitions.org

You and 21 others 1 comment · 2 reposts

WRI Polsky Center for the Global Energy Transition
1,978 followers
1w •

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Download the full analysis: https://lnkd.in/gYZMnakc

Industrial Transition Accelerator (ITA)
1,687 followers
3d •

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Download the full analysis: https://lnkd.in/emp6kZy5

Next steps in the carbon credits campaign

SBTi's Corporate Net-Zero Standard V2 will be used to set company targets in 2027

- Over **855 stakeholders** contributed to SBTi's public consultation.
- **Pilot Phase 1: Over 320 organisations** from all regions and sectors took part to further refine the draft Standard.
- **Pilot Phase 2** will test the draft using real-world data to identify any implementation challenges and validate key methodological assumptions.

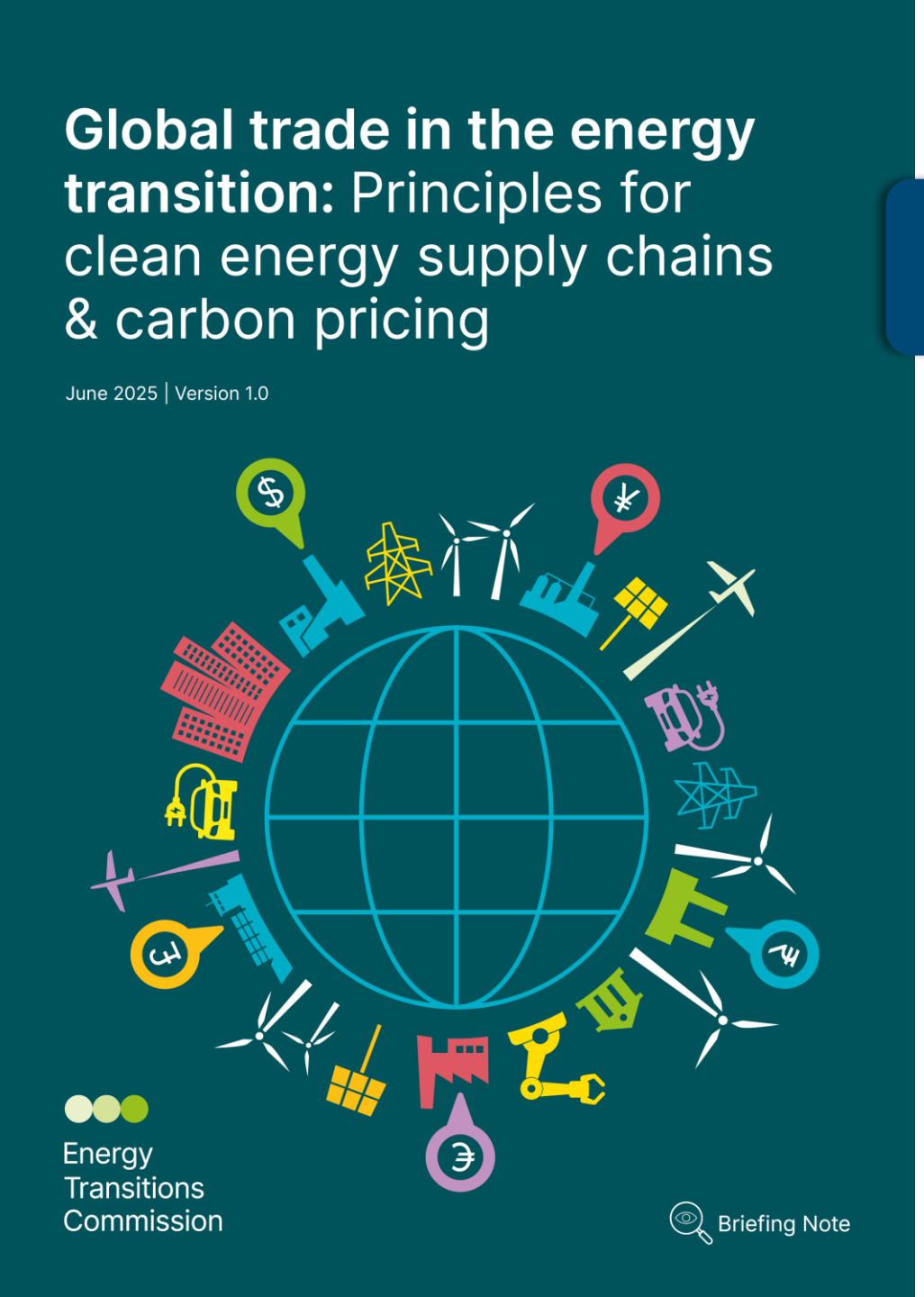
ETC is part of COP30 Activation group #8 (under axis 3) on '*Landscape regulation and regenerative agriculture*'.

COP30 BRASIL AMAZÔNIA BELÉM 2025

ETC's 100 Mt/year by 2030 biochar target from 2021 *Mind the Gap* report is likely to underpin a "Plan to Accelerate Solutions" at COP30.

Questions for discussion

- **What other activities should ETC pursue in this space?**
- **How should ETC further engage with SBTi?**



Global trade in the energy transition: Principles for clean energy supply chains & carbon pricing (2025)

This briefing note explores how strategic trade and industrial policy can accelerate – rather than hinder – the global energy transition

Key points:

- The report differentiates between industries where price parity between green and grey pathways has already been reached; and industries where it is not possible in the near-term, if ever
- Where price parity has been reached, 6 principles should guide the development of domestic supply chains:
  1. Aim for diversified supply chains but not complete autarky.
  2. Think straight about different dimensions of "security".
  3. Vary economic policy by sector to reflect different starting points and inherent characteristics.
  4. Use tariffs in a fact-based and WTO compliant fashion.
  5. Focus primarily on the location of employment and value-add, rather than ownership.
  6. Work with China to increase climate finance flows to LMICs to support the accelerated deployment of clean technologies.
- For industries where price parity not possible in the near term:
  - There will be a significant cost premium, but this will be at the B2B level; for most products, the end customer will see little impact.
  - Decarbonization will require a carbon price or equivalent regulation.
  - Given that many sectors are inherently international, there will either need to be global carbon prices or CBAMs to prevent carbon leakage

Global Trade in the Energy Transition

Pillar 1: Amplifying ETC reports

June

ETC discusses the role of trade in accelerating the energy transition and highlights two key areas: principles for nearshoring supply chains and carbon pricing.

At launch, presented key insights to the OECD

ETC members helped disseminate the report and findings on social media

Jean-Pascal Tricoire • 3rd+
Chairman at Schneider Electric
20h •

✓ Following

As the global energy landscape evolves, policy must keep pace. The Energy Transitions Commission's latest briefing offers timely insights on aligning technological progress and carbon pricing with effective global trade.

The ETC outlines a pragmatic and principled approach to two critical challenges:

• Building resilient domestic supply chains – Six policy principles to guide national strategies.
• Carbon pricing and CBAMs – A call for globally coherent policies to decarbonize hard-to-abate sectors.

Faustine Delasalle • 1st
Chief Executive Officer, Mission Possible Partnership
22h •

New briefing note from the Energy Transitions Commission on "Global trade in the energy transition: principles for clean energy supply chains and carbon pricing".

Clean trade can be a powerful accelerator of the global energy transition, enabling clean energy supply chains to scale up faster. However, growing concerns over concentrated supply chains and perceptions that carbon border adjustments are protectionist could significantly delay global progress.

Alan Thomson • 2nd
Director, Global Energy Business Leader at Arup
23h •

✓ Following

If you would like to know more about CBAM, carbon pricing, clean supply chains and other global net-zero mechanisms it is worth a read of this recent report from the Energy Transition Commission, one of Arup's Strategic Global Partners. A really concise, well written and informative overview of this rather dry, but important subject. #Arup #CBAM

Targeted international media, Tier 1, and trade outside of UK and US. Press release distribution to 30+ countries and briefings with journalists led to coverage in over 200 news stories around launch.

BusinessGreen	Report: Carbon levies and diverse supply chains 'essential' for energy transition
Energy Monitor	ETC briefing highlights global energy trade challenges
CARBONCOPY MAKING CLIMATE SENSE	Carbon Pricing Key to Drive Decarbonisation in Internationally Traded Sectors
Borderlex	Interview: Europe 'can win argument' over carbon border adjustment

CGTN

cna

Next steps in the Trade campaign

Further engagements with regional focuses

- **Late October:** Engaging with Chinese policymakers around the Bund Summit
- Participation in track-two dialogues with private sector companies

- **Late November:** Longi event with high-level business leaders (c-suite) on European supply chain and solar – ETC will participate and share insights from the report

- **After Climate Week NYC (/2026):** Pitch narrative to mainstream podcasters to engage with US. Could hook onto any further news on Trump's tariffs?
- Journalists that cover trade (not ETC's usual audience)

Questions for discussion

Stakeholder engagement

- Is there more we should be doing with the OECD to further this campaign?
- Which other key geographies to engage?
- Who are the other voices / what are the other views in this debate that we should consider?
  - How should we be engaging with LMICs who will have limited government capacity and where domestic prices could be impacted?

Content

- Is there any related work (analytical, policy, or implementation) that we should be aware of?

Private sector strategy

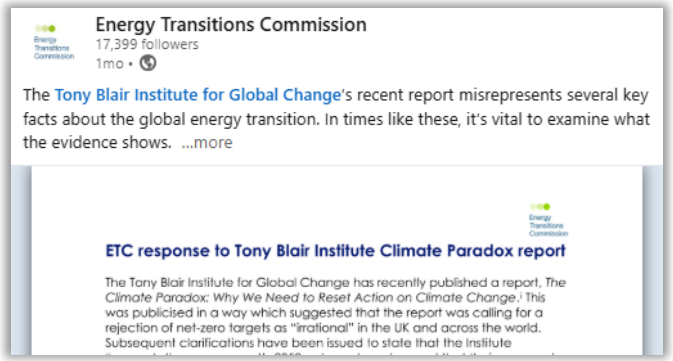
- How have companies started adjusting strategies in response to CBAM? What issues are you seeing?

ETC has sought to more actively engage in the state of transition debate

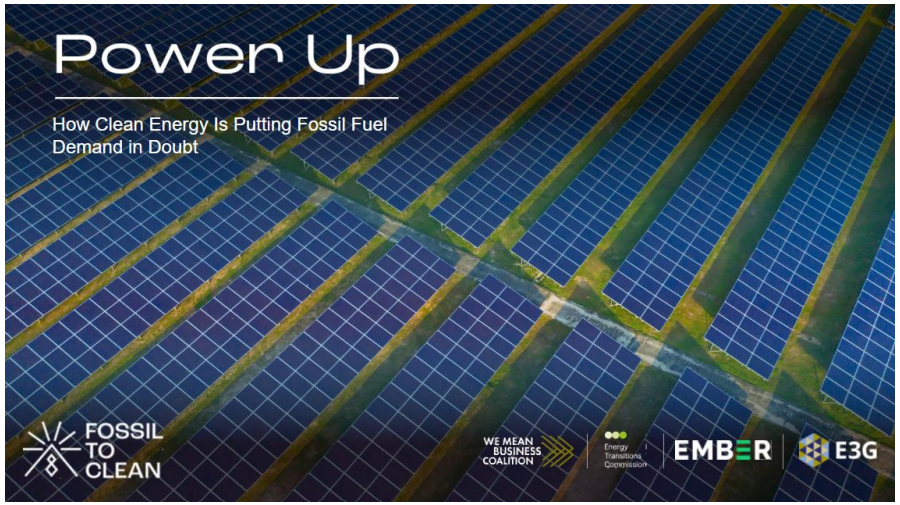
TONY BLAIR INSTITUTE FOR GLOBAL CHANGE

published a paper **that misrepresented several key facts about the global energy transition.**

Within a couple of days, ETC responded providing an evidence-based perspective, to educate, inform and combat disinformation.

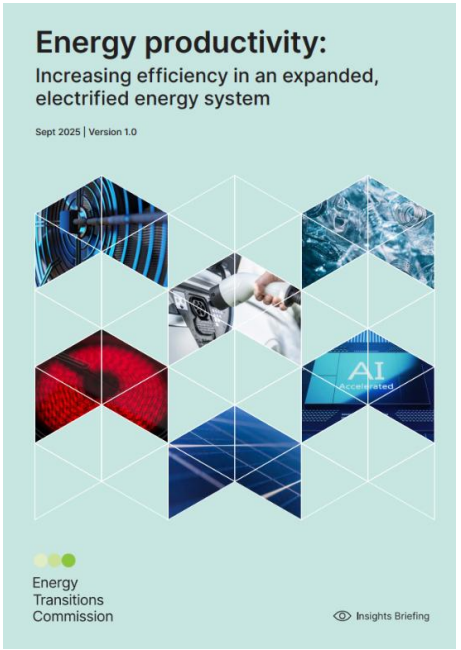


ETC's statement was welcomed by industry leaders, including from Impax, Ember, and MPP for setting the record straight.



New analysis based on existing data *Power Up: How Clean Energy is Putting Fossil Fuel Demand in Doubt* (published Sep 17th), shows the world is speeding up on clean energy use and infrastructure development, and as a result demand for oil, gas and coal is set to slow or peak in the next few years.

WMBC, ETC, Ember and **E3G** reviewed existing reports to repackage the story into a joint narrative



Electrification is a key driver of productivity, enabling GDP to grow while energy demand falls. Delay this decade means locking in fossil fuel demand.

ETC sought energy efficiency group **Mission Efficiency** to ensure their voice reflects our analysis and key messages

Pillar 2: Repackaging Existing Insights

We have a strong level of external engagement, beyond ETC membership

Over 60 events this year

INTERNATIONAL ENERGY WEEK

ABU DHABI SUSTAINABILITY WEEK

ECONOMIST IMPACT

Energy Storage Summit

Australian High Commission

ENERGY ASIA

FT LIVE CLIMATE IMPACT SUMMIT EUROPE

BERLIN ENERGY TRANSITION DIALOGUE.25

WGGF2025

10th Annual Global Conference on Energy Efficiency

IDRIC

MISSION 2025 A new economy rising: Join the global 'Mutirão'

POWERING PROSPERITY: ELECTRIFYING EUROPE'S GROWTH & ENERGY SECURITY

INNOVATION ZERO WORLD CONGRESS

SmartCitiesWorld CITIES CLIMATE ACTION SUMMIT

Corporate Leaders Group Europe

S&P Global Sustainable1

KEELE WORLD AFFAIRS Europe's Leading Series of Lecture Meetings on International Politics and Global Issues

And over 160 bilateral meetings,
including **interviews and podcast** recordings

MASDAR

EIT

The Rockefeller Foundation

GWEC GLOBAL WIND ENERGY COUNCIL

SCIENCE BASED TARGETS DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

Global Energy Alliance for People and Planet GEAPP

Energy&Climate INTELLIGENCE UNIT

Centre for Net Zero Powered by Octopus Energy Group

GLOBAL youth PHILANTHROPY 有斯公益

EMBER

CURRENT Enabling Network Technology throughout Europe

BOUNDLESS

THE TIMES

Global Renewables Alliance

PPCA Powering Past Coal Alliance

CLIMATE CARDINALS

GLOBAL INDUSTRY HUB

FT

IEMA SUSTAINABLE MATTERS

ET

XINHUA NEWS AGENCY

BATTERY INSIDERS

eDF

The Infrastructure Podcast

apco

Shaken NOT Burned

Department for Energy Security & Net Zero

Australian Government
Department of Climate Change, Energy, the Environment and Water

Department for Business & Trade

European Commission

Foreign, Commonwealth & Development Office

Informing the influencers and extending our reach

ETC has increased focus on international media

Descarbonizar los edificios a bajo coste

Expansión

US climate retreat highlights need for China-EU green co-op

GT Global Times

Von Immobilien zu Real Assets
Die Rolle der Erneuerbaren Energien in der Energiewende

[The Property Post]
Das Online-Meinungsportal für die deutsche Immobilienwirtschaft

Delivering companywide webinars to maximise reach

EMBER

LDES LONG DURATION ENERGY STORAGE COUNCIL

OECD

Corporate Leaders Group Europe

Translating key ETC insights into foreign languages supported by youth ambassadors

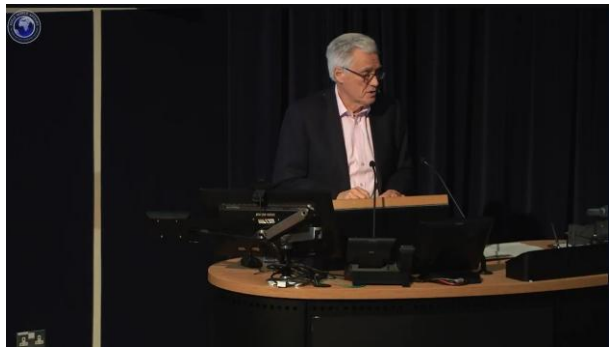
CLIMATE CARDINALS

Content "drops" to be translated into 150+ languages supported by 1200 activists

Reaching wider groups through events

KEELE WORLD AFFAIRS
Europe's Leading Series of Lecture Meetings on International Politics and Global Issues

Providing energy transition facts across the political spectrum



Partnering to drive greater impact and reach

GLOBAL OPTIMISM

Climate Action

WE MEAN BUSINESS COALITION

MI25ION

Reaching new audiences at international events

BERLIN ENERGY TRANSITION DIALOGUE.25

ENERGY ASIA

New engagement in 2025 are leading to new possibilities…

Collaborations with YouTube channels

Arranged partnerships with prominent youtubers (500k+ subscribers) to feature ETC content in their videos

Partnerships with youth organisations

Collaborating with climate youth leaders to increase ETC content reach, translate reports into more languages and have youth ambassadors disseminate insights

Assured energy transition fact database

Database of top ~20 misinformation tropes, equivalent facts and sources, with endorsement from global business leaders. Strategic interventions with senior media execs to "focus on facts"

Energy Transition 101 for Civil Society "data for the people"

Provide activists and students a common baseline of understanding of energy, the transition, and key recommendations to campaign for

Collaborations with other key actors

- Formalising partnership with **Global Optimism**
- Distributing energy productivity insights through **Mission Efficiency**
- Collaborating with **Global Alliance for Buildings** and Construction on webinars and decarbonising buildings

…but we could go even further in our engagement efforts

Globally

And in key regions

EUSEW 2025 Young Energy Ambassadors

Looking ahead to the rest of 2025

New York Climate Week, 21-28 September

- Adair will be ETC's main representative (21-23), supported by Maaike Witteveen (21-24) and Peter Hulshof (21-24)

- ETC will not be hosting events, but are attending key events:

  - *21st: MPP "Build Clean Now" CEO dinner event, Mission 2025 events, perhaps with Christiana Figueres*

  - *22nd: Utilities Alliance CEO Dinner and presentation of ETC Power Report*

  - *23rd: Global Renewables Summit CEO lunch and roundtable on Future-proof power systems: flexibility, storage, grids and interconnection*

There is very limited availability to secure ETC speakers for member hosted/recommended events, please let us know if opportunities arise

COP30 Belém, 10-21 November

- Adair will be ETC's main representative, supported by Andrea Bath, and ETC Vice-Chair Faustine Delasalle

- ETC has been invited to participate in the COP30 Action Agenda, regarding bioenergy and carbon removals

- Plans are in early stages, we are exploring:
  - *Speaking at the GRA Renewables Summit*
  - *Speaking at Buildings Pavillion for the UN Cool Coalition*
  - *Support for the MPP/ITA campaign*
  - *Continued opportunities with Mission 2025, WMBC, ECIU, GSCC*
  - *Wider events for members*

We are still in early stages of planning for COP30 and are very open to participating at events hosted or recommended by members

Questions for discussion

General: In a busy landscape, how and where should ETC best target engagement?

Buildings:

- Should ETC engage with EU (or other regions) on buildings legislation?
- Any other partnerships ETC should be engaging with further? E.g., WRI, World Green Buildings Council, others
- Level of focus within the ETC's upcoming Energy Productivity campaign?

Carbon credits: What other activities should ETC pursue in this space? How should ETC engage with SBTi further?

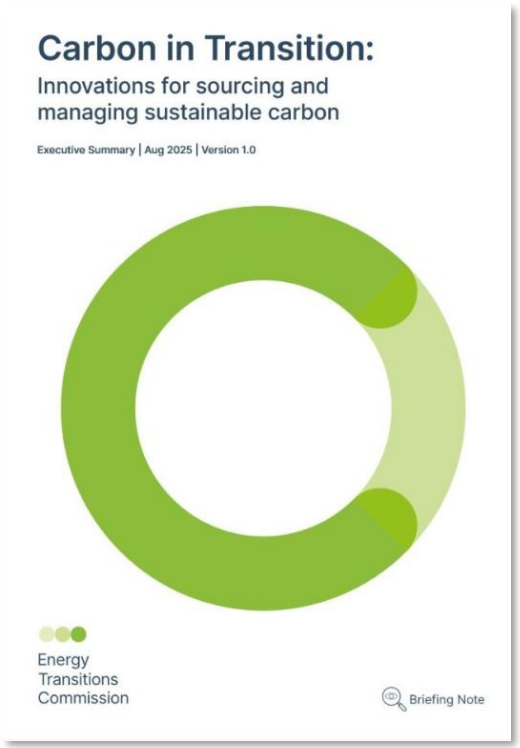
Trade & CBAM:

- Is there more we should be doing with the OECD to further this campaign? Which other key geographies to engage?
- Who are the other voices / what are the other views in this debate that we should consider?
- How have companies started adjusting strategies in response to the CBAM? What issues are you seeing?

Low-carbon molecules

Key ETC focuses for the Autumn: Carbon Molecules and Energy Productivity

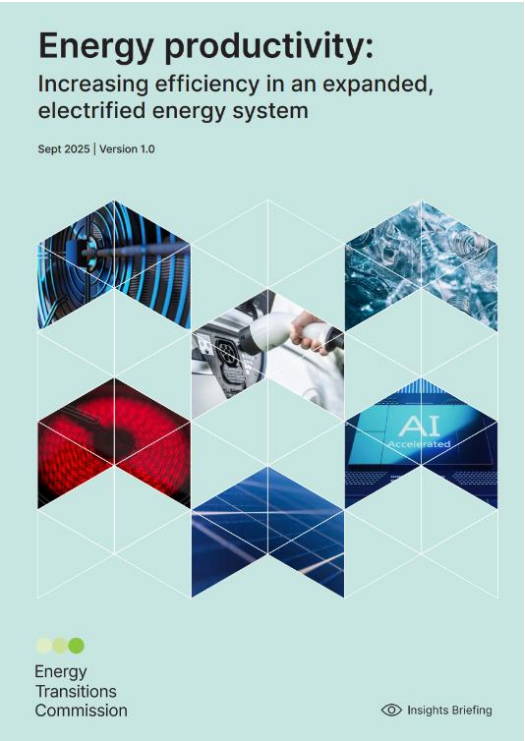
WIP title and cover



Even in a net-zero world, carbon molecules remain essential. **Electrification and circularity** can dramatically cut demand while ensuring sustainable sourcing and safe end-of-life management resulting in zero net emissions.

Launching in Autumn 2025
Provides a holistic roadmap for managing carbon in a net-zero system ahead of COP30, ensuring discussions extend beyond energy supply to include materials, circularity, and end-of-life strategies

WIP title and cover



The world can more than **double GDP** by 2050 while cutting energy use by harnessing electrification, efficient technologies, and smarter material use, turning the **COP28 efficiency pledge** into a practical pathway

Launching in Autumn 2025
Frames and guides delivery of COP28 pledge to double the global rate of energy efficiency improvement by 2030.

The Carbon Molecules workstream is heading into its final stages

Overall objective of the carbon molecules workstream

Understand the volume of carbon molecules demanded in a low-emission future for the energy and materials sectors, and how to supply that demand in an optimal and sustainable way.

	2024 Q4	2025 Q1	2025 Q2	2025 Q3	2025 Q4
Workplan	**Phase 1A** How large can and should the **role of direct electrification** be in a zero-emission economy **Phase 1B** **The role of hydrogen** and **derivatives (i.e., ammonia)** in a zero-emission economy?	**Phase 2** The potential to **recycle** and **reuse carbon molecules**	**Phase 3** **Sources** of **primary carbon**: **costs** and **sustainability** and **end-of life carbon management**	**Phase 4** **Report production and communication campaign running into COP30**	
Deliverables	**For each phase** • A 5-pager published externally • A series of short innovation briefs for publication			• Publication of the ETC report ahead of COP • A series of short innovation briefs for publication	
Key interactions	**For each phase** • 1-2 workshops with ETC Commissioners			• Report reviews • Report launch at COP	

Current phase

We explored 30+ emerging technologies that shape the way carbon is sourced, used and managed at end of life

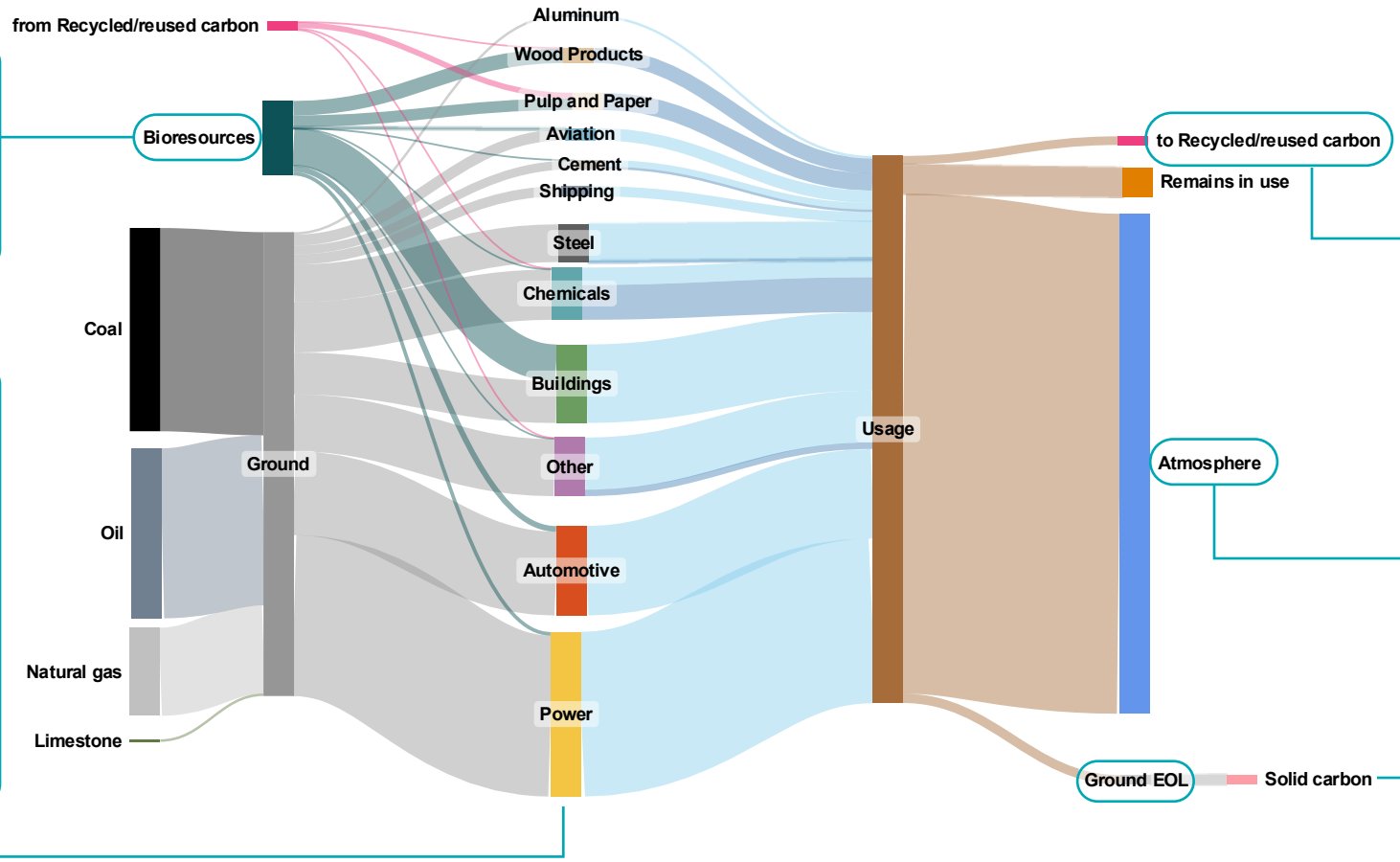
Carbon source and destination for the Energy and Materials Sectors, today

Bioresources

- Biomass fermentation
- Micro-algae
- Precision fermentation
- Macro-algae
- Cultivated meat
- Energy cane
- Advanced catalysts

Electrification and H_2

- High temperature industrial heat
- Molten oxide electrolysis (steel)
- Electrowinning (steel)
- Solid-state/battery advancements
- Sodium batteries
- Micro-nuclear reactors
- Geological hydrogen
- *Electrolyser and BOP optimization*



Material recycling

- Mechanical recycling
- Gasification
- Pyrolysis
- Reuse
- Depolymerization

Carbon utilisation

- Electrochem reduction
- Hydrogenation
- Biocatalysis
- Reverse-Water-Gas-Shift

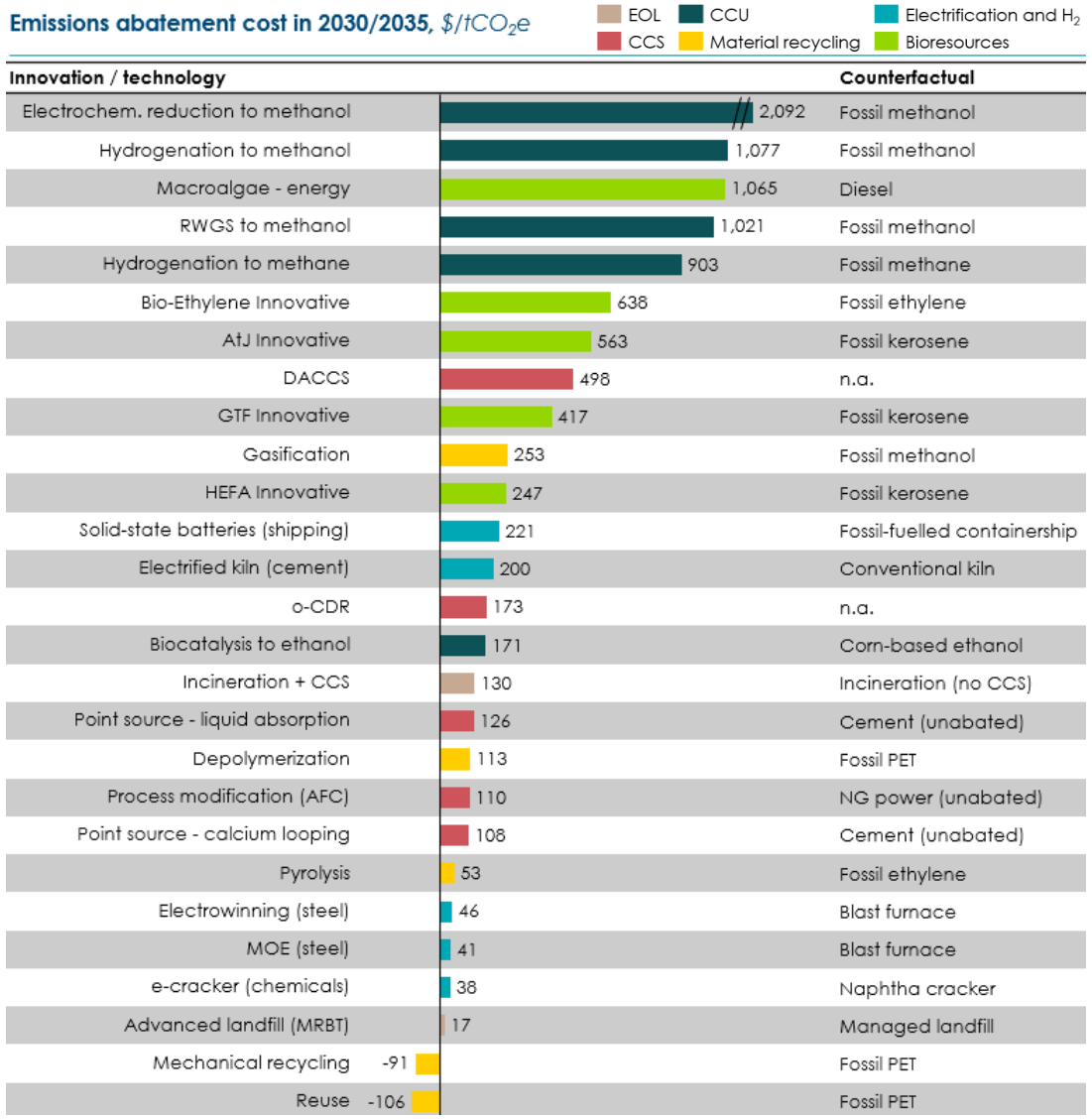
Carbon capture

- DACCS
- Point source AFC
- Ocean based CDR
- *Point source Liquid/ solid absorbents*
- Point source calcium looping

End-of-life

- Advanced Landfill
- CO_2-to-stone
- *Depleted O&G reservoirs*
- *Saline aquifers*

Technologies with low energy requirements, like reuse and recycling, currently have the lowest cost of abatement.



Key messages

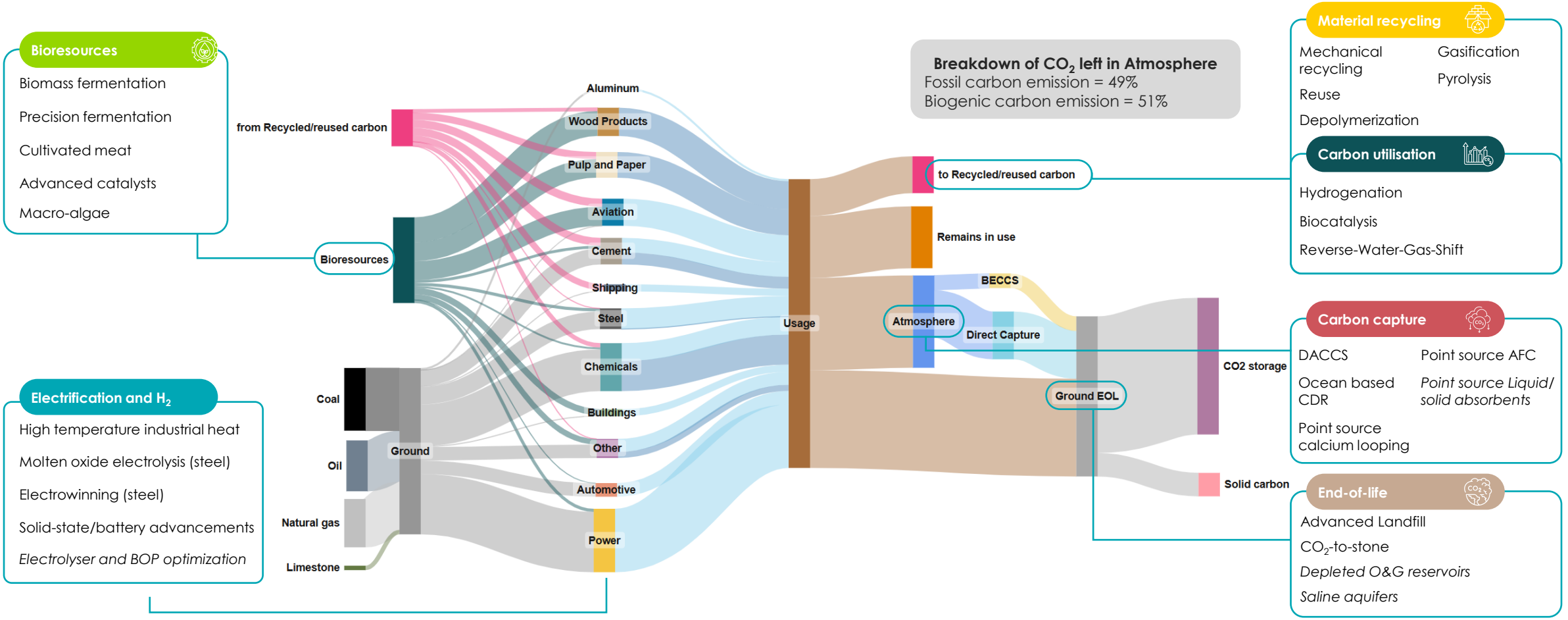
1. Reuse and recycling has negative cost of abatement
2. Direct electrification technologies(electro winning, MOE, and e-cracking) are low-cost options if they progress to a higher TRL level
3. CCS is economic, but DACCS projections for 2030 are still very expensive
4. CCU is very expensive and cannot play a major role yet

DAC, gasification and CCU **are energy intensive**.
Their competitiveness depends on cost of clean electricity

Hence, in the long term their role might be more significant than the chart suggest

Net zero 2050 balance shows 57% of carbon supply still derives from fossil fuels extracted from the ground

Carbon source and destination for the Energy and Materials Sectors, ACF scenario 2050



Key messages from the forthcoming Carbon Molecules report

Key messages

01. **Electrification technologies and re-use models are most effective** for reducing carbon demand further, and offer low abatement costs relative to sourcing and other circularity technologies

02. **Carbon demand will persist** even in a decarbonized world. Around **~3-5Gt** of carbon will be needed across energy and materials sectors. It must be actively planned for and managed.

03. **Around a third of carbon used could be circular, but we need intervention to realise this,** as the business case is challenging across multiple recycling and carbon utilisation technologies

04. **Sustainable primary carbon is constrained (biomass), or emerging (DAC, ocean-based), but there is upside potential to biomass** through alternative protein biotech and utilising degraded land. This land-use would have to be carefully governed to avoid food security and biodiversity risks

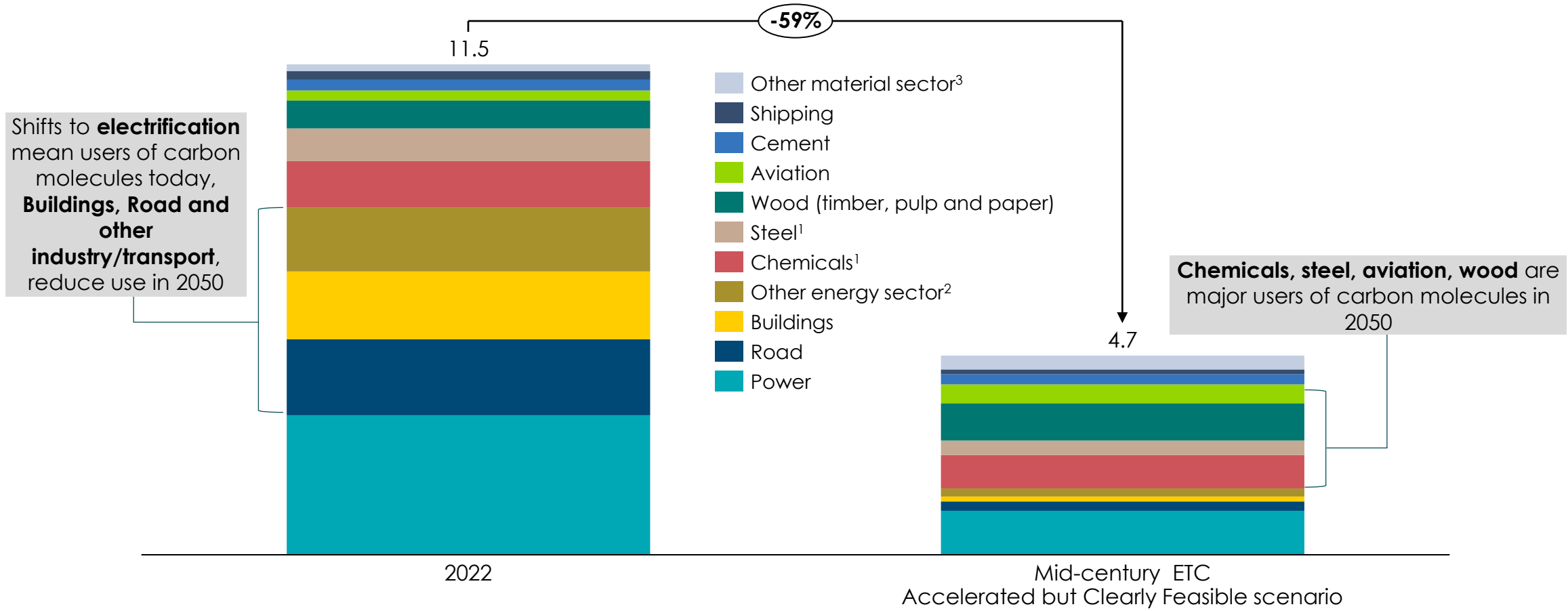
05. **Linear end-of-life solutions, such as CCS and landfill to waste are being advanced,** and will play a role, especially where circularity solutions are challenged. These technologies would provide the necessary backstops, and pragmatic solutions especially in the near term.

06. **Deep technology innovation is essential to close the gap**—promising technologies such as steel electrification, high temperature heat, alternative proteins, and O-CDR are still at early stage and there is uncertainty around costs

2. Carbon demand will persist even in a decarbonized world

Carbon Demand Across the Energy and Material Sectors

Gigatons of carbon (C)

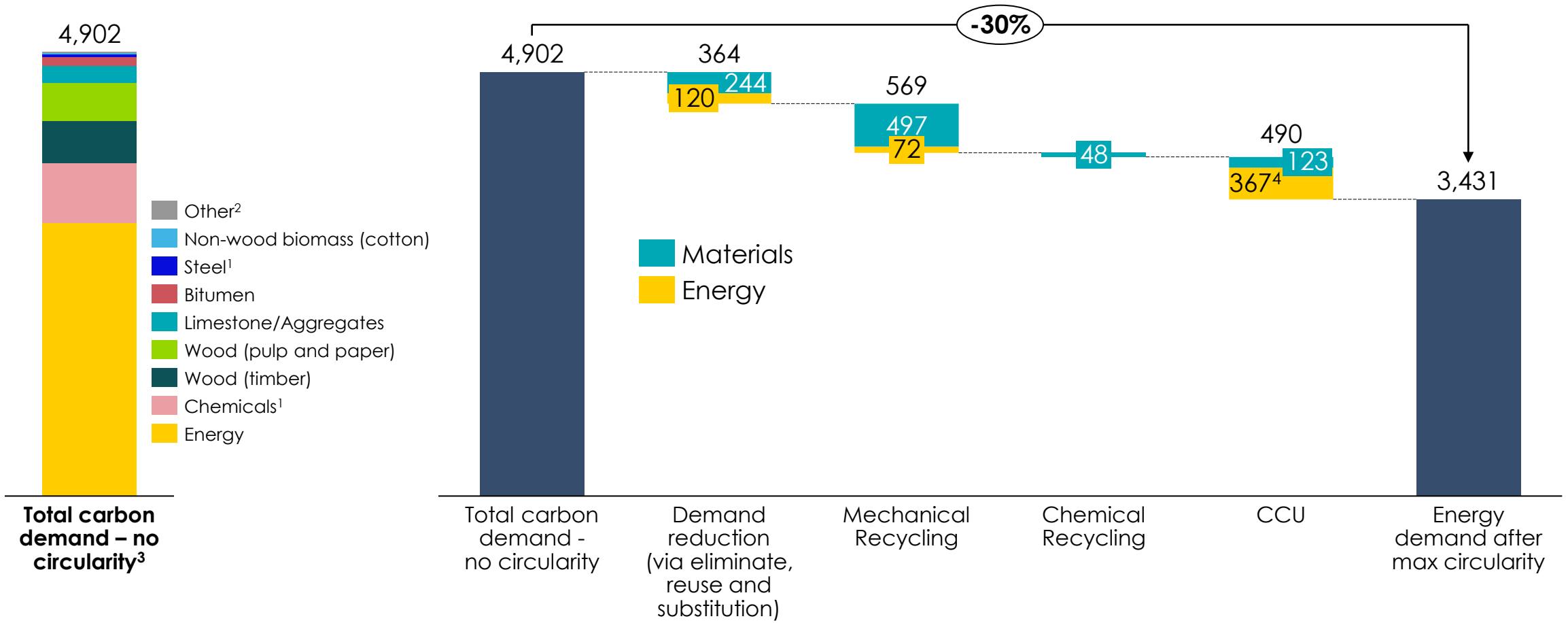


Notes: *ACF = Accelerated but Clearly Feasible scenario, based on ETC Fossil Fuels in Transition (2023) with minor updates. Sources: Chemicals: Planet Positive Chemicals Report (Systemiq, 2022, BAU Net-Zero scenario); Biomass: ETC Bioresources report (2021); Steel: MPP STS (2022); Cotton, Bitumen and Soda Ash: Systemiq analysis (2025) . 1. Include energy based carbon feedstocks, a proportion of which which end in the final products (e.g. chemicals for plastics and steel), and others end in process emissions. 2. Includes remaining demand remaining sectors, primarily other industry and other transport. 3) Other material sectors include non-wood biomass, limestone, carbon ash, biochar, carbon fibre and charcoal Carbon-based fuels include those fuels that also require carbon sources, e.g. e-methanol and synthetic aviation fuels.

3A. Maximum material circularity can reduce primary carbon demand in 2050 by 30%

Carbon Demand Across the Energy and Material Sectors, 2050

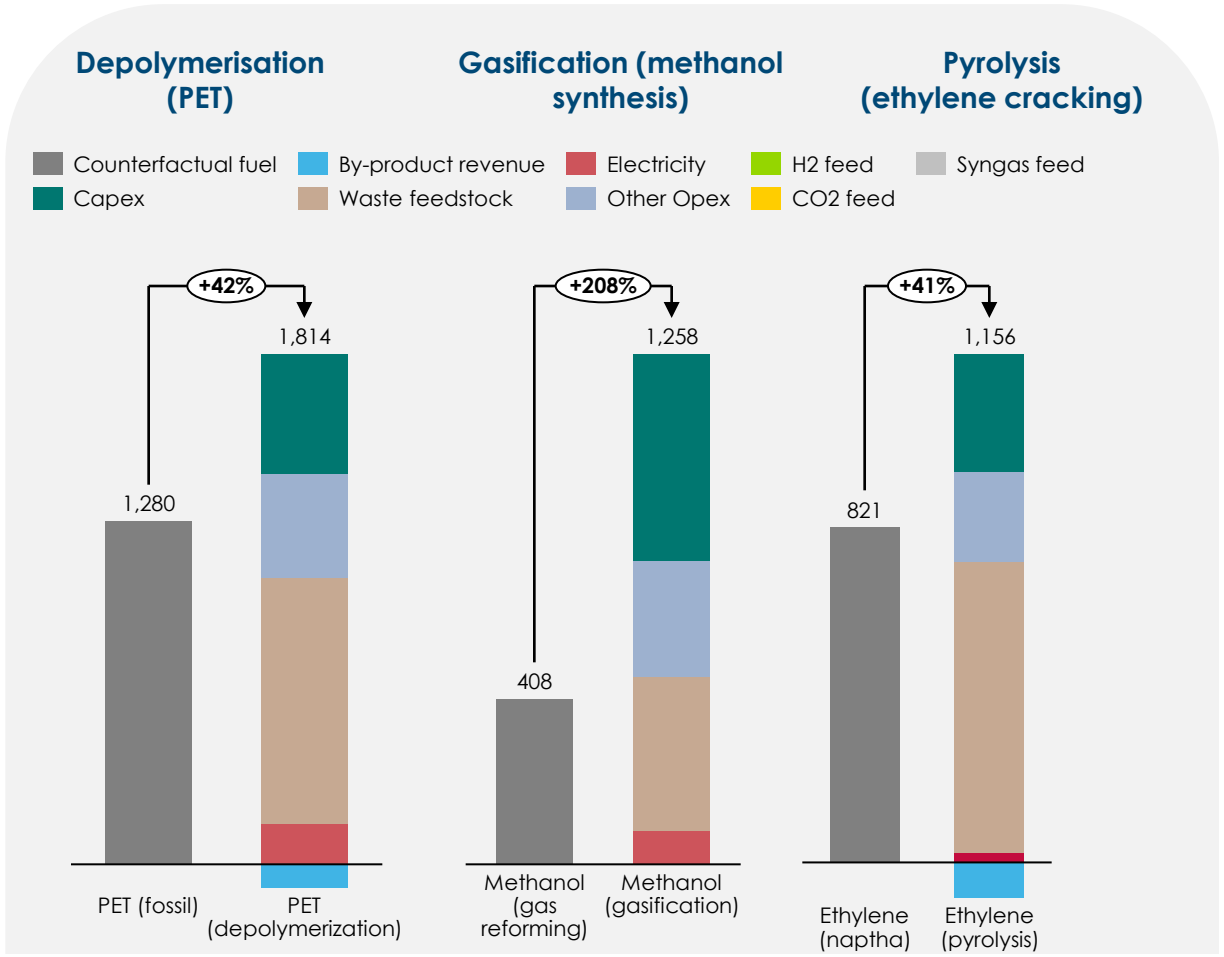
Million tons of carbon (C)



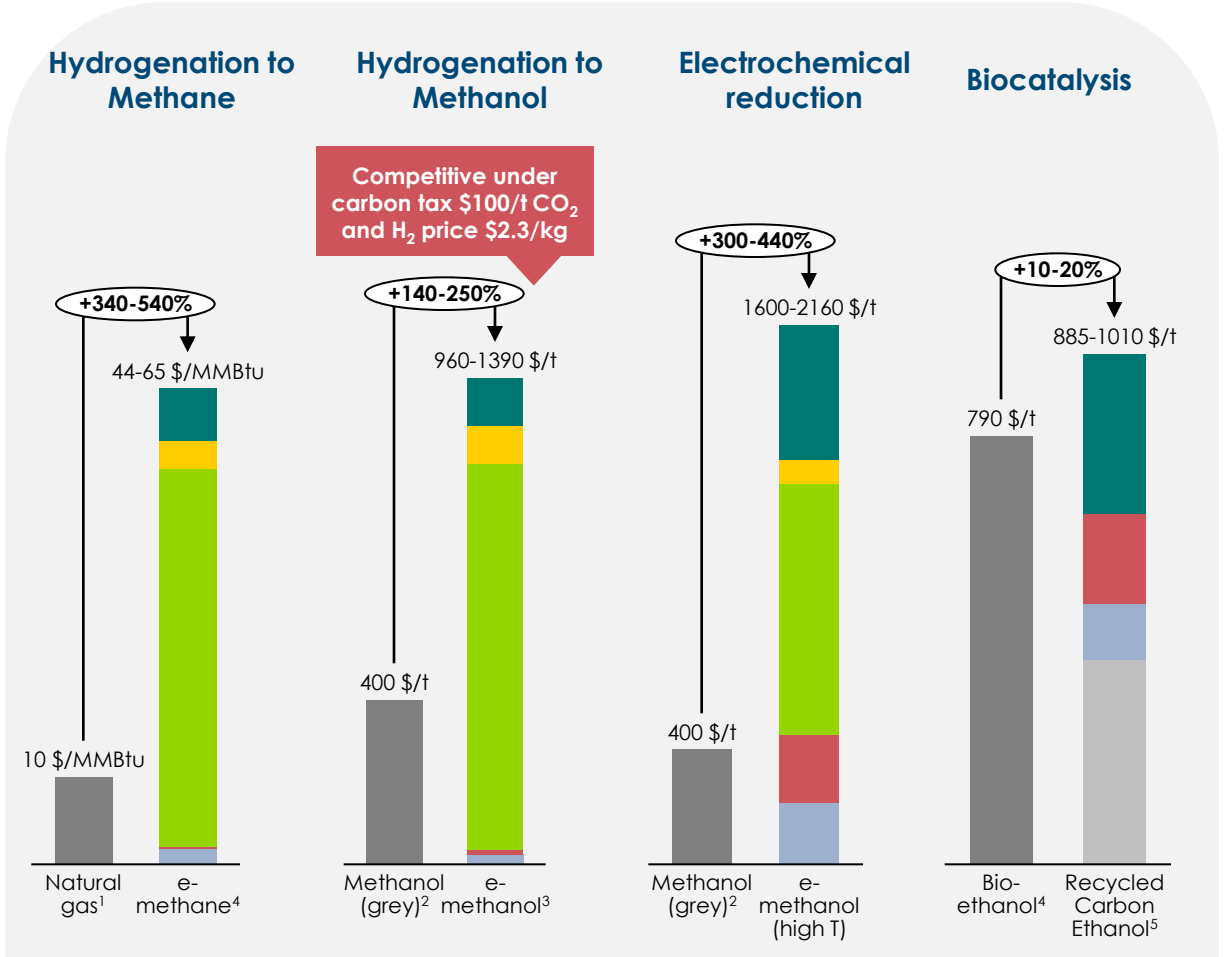
Notes: 1) Chemicals and steel include the feedstock from the energy system that has remained in material, i.e. plastic, in order to show the circularity levers. 2) Other includes carbon ash, biochar, carbon fibre, charcoal based on range in Systemiq reports. 3) Total carbon demand is shown without applying the circularity levers of ACF. 4) EOR is not reducing the carbon demand. Sources: Energy: Systemiq analysis (2025), based on Fossil Fuels in Transition (ETC, 2023); Chemicals: Planet Positive Chemicals Report (Systemiq, 2022, BAU Net-Zero scenario), and Systemiq (2024) Plastic Treaty Futures.; Biomass: ETC Bioresources report (2021); Steel: MPP STS (2022); Cotton, Bitumen and Soda Ash: Systemiq analysis (2025)

3B. However, the business case is challenging for chemical recycling and carbon utilisation technologies

Chemical recycling and thermo-conversion
Levelised cost of production $/tonne (2025)



Carbon utilisation technologies
Levelised cost of production $/tonne (2025)

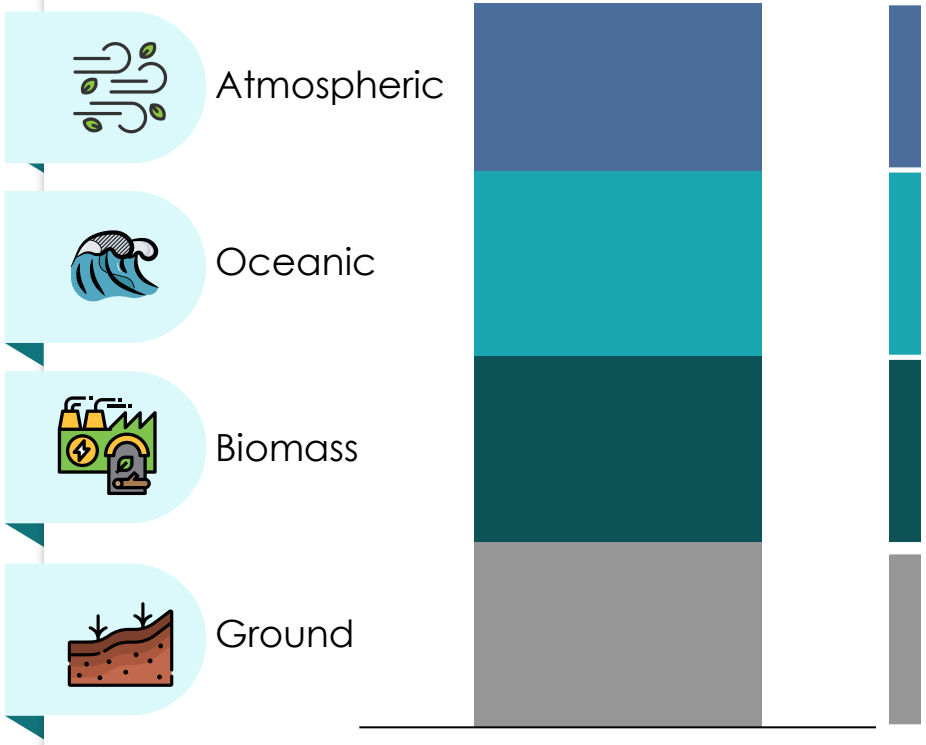


Sources/Notes: 1) Ten-year historical mean of EU Natural Gas TTF. 2) 20-year historical mean (Methanex). 3) EU PtX modelling (MPP, 2024). 4) Conventional ethanol from corn (IRENA). 5) Capex from LanzaTech (EIC presentation, 2022; IEA Bioenergy, 2020); Depolymerisation estimation is based on published data: Singh et al. (2021). Gasification and pyrolysis based on BEIS, NREL and Systemiq PCC model.

4A. Sustainable primary carbon is constrained (biomass), or still emerging (DAC, ocean-based capture)….

Sources of primary carbon supply

Illustrative



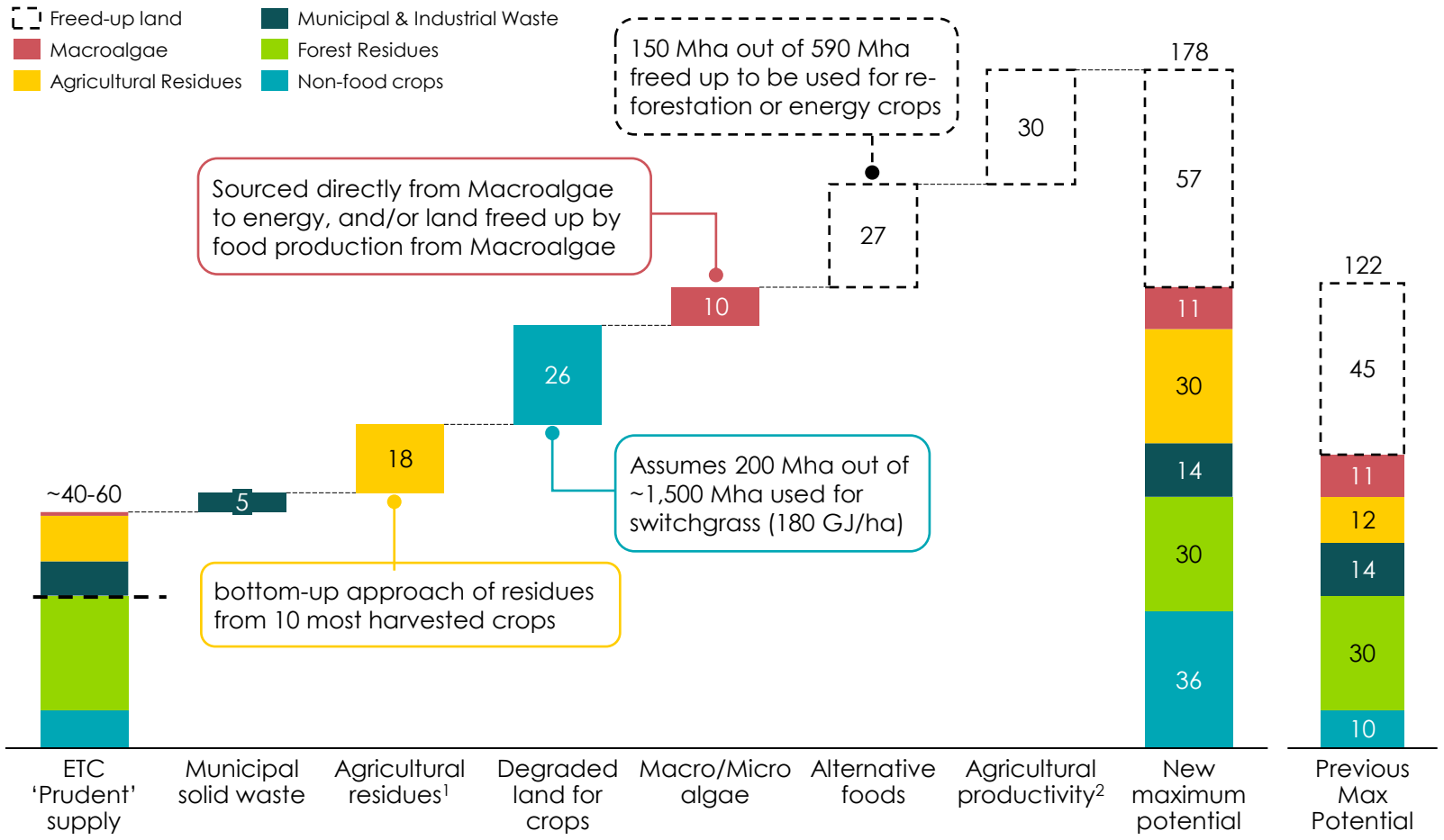
Status

- DAC technologies still emerging and **expensive at 480 $/tonne**[1] projected for 2030.
- Ocean-based capture **still at TRL 6**, with only small numbers of plant at pilot[2]
- Sustainable biomass[3] that does not encroach on food production and nature **limited to 40-60EJ**[4]
- Carbon capture required to allow for fossil carbon to be sustainable, but **does not address upstream emissions**

Notes/sources: 1) Revised ETC projections (2025) 2) Prince Aleta (2024) Direct ocean capture: the emergence of electrochemical processes for oceanic carbon removal 3) The term 'sustainable biomass' is used to describe organic material that is renewable, has a lifecycle carbon footprint equal or close to zero (including considerations for the opportunity cost of land), and for which the cultivation and harvesting practices used are mindful of ecological considerations such as biodiversity and health of the land. 4) SYSTEMIQ analysis for ETC (2021).

4B. … but there is potential upside to biomass availability due to biotech and use of degraded land for crops, if land-use if governed appropriately

Biomass supply potential, EJ primary biomass



Indicative measures to manage degraded land-use for biomass

Measures

1. Eligibility baseline & definition
2. Geo-registration & continuous satellite MRV[3]
3. Digital chain of custody & traceability
4. Restoration review & performance linked incentives
5. Enforcement, exclusions & transparency

Notes/sources: 1) From total unprocessed residues, 70% are left on ground and a recoverability of ~50% is assumed. Production from 2023 is taken and extrapolated to 2050 using the same CAGR for the 2003 – 2023 period. 2) 0.9 CAGR taken from 2019 to 2050 plus an additional 12% increase by 2050 due to technological advancements yields a total of 40% increased productivity. This frees up 640 million ha, which is split in the same way as freed land from Alternative Proteins or Macroalgae, yielding additional 30 EJ
Sources: Systemiq Analysis (2025) using FAO data, ETC analysis; ETC (2021), Bioresources Within a Net-Zero Emissions Economy: Making a Sustainable Approach Possible.

5. Linear end-of-life solutions, such as CCS and landfill to waste are being advanced

Emerging point-source capture technologies

Calcium looping: Captures CO_2 using a looping cycle of limestone-based reactions

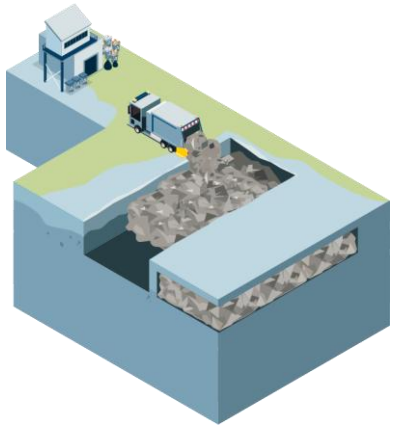
Suitable for cement:
High tolerance in impurities and integration with existing infrastructure[1]

Process modification: Captures CO_2 and utilizes it in the power production process via Allam-Fetvedt Cycle

Suitable for power: Enables 99% capture rate and fully integrates CO_2 capture within its core thermodynamic process

They can both be economically viable in 2030 with carbon price of 90 $/tCO$_2$

Advanced landfilling technology



Pre-landfill material recovery and biological treatment (MRBT)

Waste is stabilised via aerobic processing (e.g. composting) to reduce methane-generating potential before landfilling.[3]

- Advanced landfill **reduces emissions from MSW by 90%** compared to managed landfill, and it could be implemented at a **marginal additional cost** of ~$30/tWaste
- It is almost as effective as incineration + CCS but can be more affordable with higher TRL

Notes/sources: MRBT = Material Recovery and Biological Treatment. MSW managed to advanced landfill abated 1,9 tonnes for incremental $30/t waste. Incineration + CCS abates 1tonne for incremental $130/t waste. This results in cost of abatemement equal to $16 per tonne for advanced landfill and $130 per tonne for incineration + CCS.
1) Arias et al. (2024) 2) FutureBridge (2022) Allam- Fetvedt Cycle 3) "Reducing waste management's contribution to climate change" (Zero Waste Europe, 2024).

6. Deep-tech innovation is required to fill the gap

Promising but early-stage technologies

Many of the most impactful solutions remain in early stages of development and deployment,

	TRL
MOE/Electrowinning	5
o-CDR	6
Cultivated meat	4
Mineralisation	6

Barriers to scaling

Barriers across technical, environmental, economic, and policy dimensions. Such as:

- Capacity and scalability constraints
- High costs and immature supply chains
- Environmental and safety concerns
- Need for supportive and adaptive policy frameworks

Building diverse and adaptive portfolios

No single solution can address the full challenge. The optimal mix will depend on geography, sector, and time horizon.

- Balance cost, readiness, and resource efficiency
- Stay responsive to evolving constraints and opportunities
- Combine near-term deployment of available options with investment in long-term innovation

We have number of communications assets and launching a major report on Carbon Molecules before COP

Report finalization

Now

Integrating member and expert feedback

Report launch

Late Oct/early Nov

Executive summary and Long report launch

COP activities

Mid-November

Promotion of report key messages at events

Energy productivity

Agenda

- **Key messages from the report**
  - The productivity potential in final energy to useful energy
  - The productivity potential in primary energy to final energy
  - Wider impacts: Implications for living standards, costs and resources
  - Implications for COP28 target: doubling the energy productivity rate in the next 2 decades
  - Long term energy growth: rebounds, AI and limitless long term potential
  - Key priorities to seize the productivity improvement opportunity
- Next steps and Comms plan

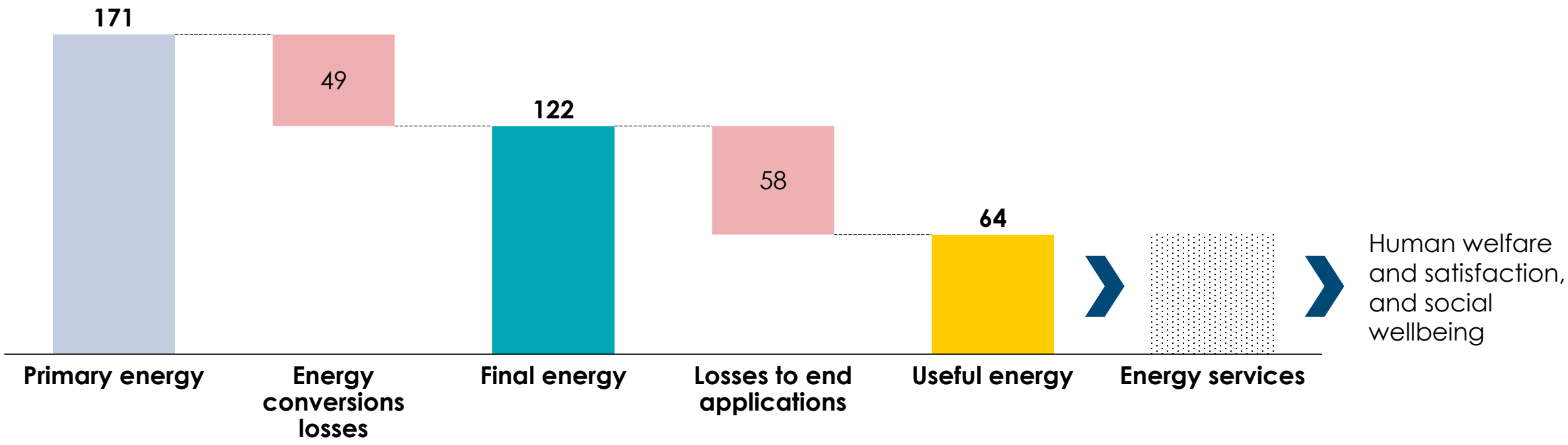
Key messages

- Between now and 2050, the **world could expand energy services and double global GDP while reducing primary and final energy demand, through deploying energy productivity levers**
- **Electrification and electrical equipment efficiency are the biggest drivers for energy productivity. The greatest opportunity is therefore in building and road transport sectors**, through electrification of heating, cooking and vehicles.
- **The COP28 4% per annum efficiency target is achievable for two decades** thanks to impact of electrification ramp-up, provided **policies are enacted now**
- **Energy demand could however increase at a faster pace than expected due to** rebound effects, AI and new future energy applications
- To seize opportunity, countries should: (i) **Develop national policy frameworks** which identify opportunities by sector (ii) Implement policies to improve final energy productivity, with strong **focus on electrification and equipment/vehicle efficiency** and (iii) Set clear plans to for **power sector decarbonisation**

Global energy flows can be measured in primary, final, and useful energy

Global energy flows

000 TWh, 2023



E.g.

- Crude Oil
- Coal

- Refining losses
- Heat losses in generation

- Electricity
- Diesel

- T&D losses
- Energy to wheel losses

- kWh of heat to spaces
- kWh of kinetic energy to car wheels

- Warm or cooled spaces
- Kilometers travelled

Source: Systemiq analysis for ETC

Useful energy increases by 2050 while GDP doubles, while primary and final energy demand decreases thanks to productivity levers

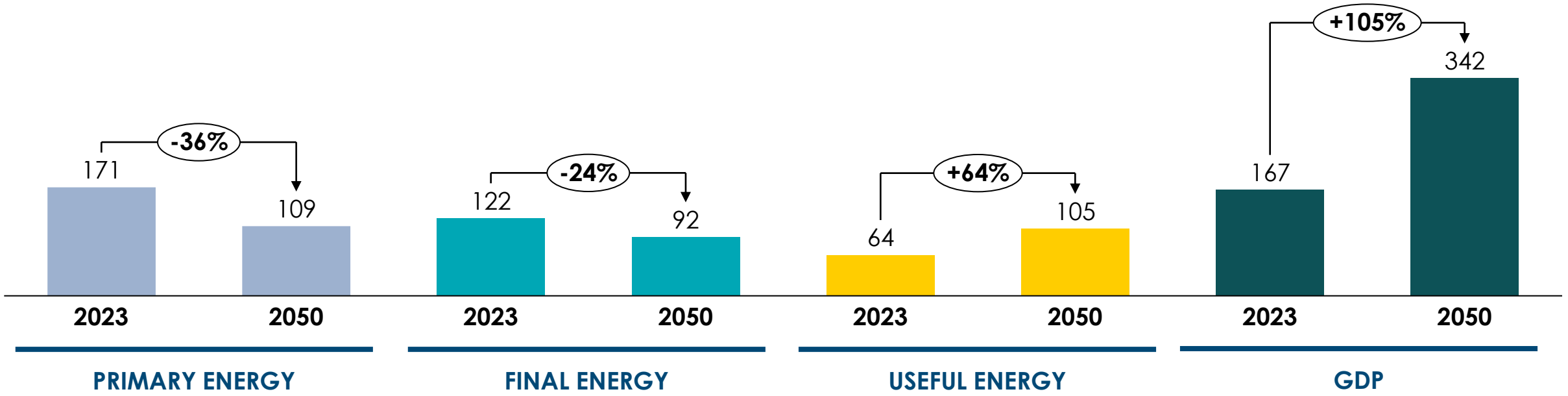
NZ Energy demand with Productivity levers

Energy in 000 TWh; GDP in constant 2021 Bn.US$

Shift away from Extraction…. *Fewer losses in refining & power conversion*

Towards Electrification… *Fewer losses in the delivery to end use applications*

For greater energy services *More energy end use*



Source: IEA (2025) World Energy Outlook; MPP (2023) Hard-to-Abate Sector Transition Strategies; ETC (2025) Achieving Zero-Carbon Buildings; ETC(2023), Fossil Fuels in Transition; BNEF (2023) Vehicle Outlook; Systemiq (2022); Planet Positive Chemicals; Systemiq analysis for ETC.

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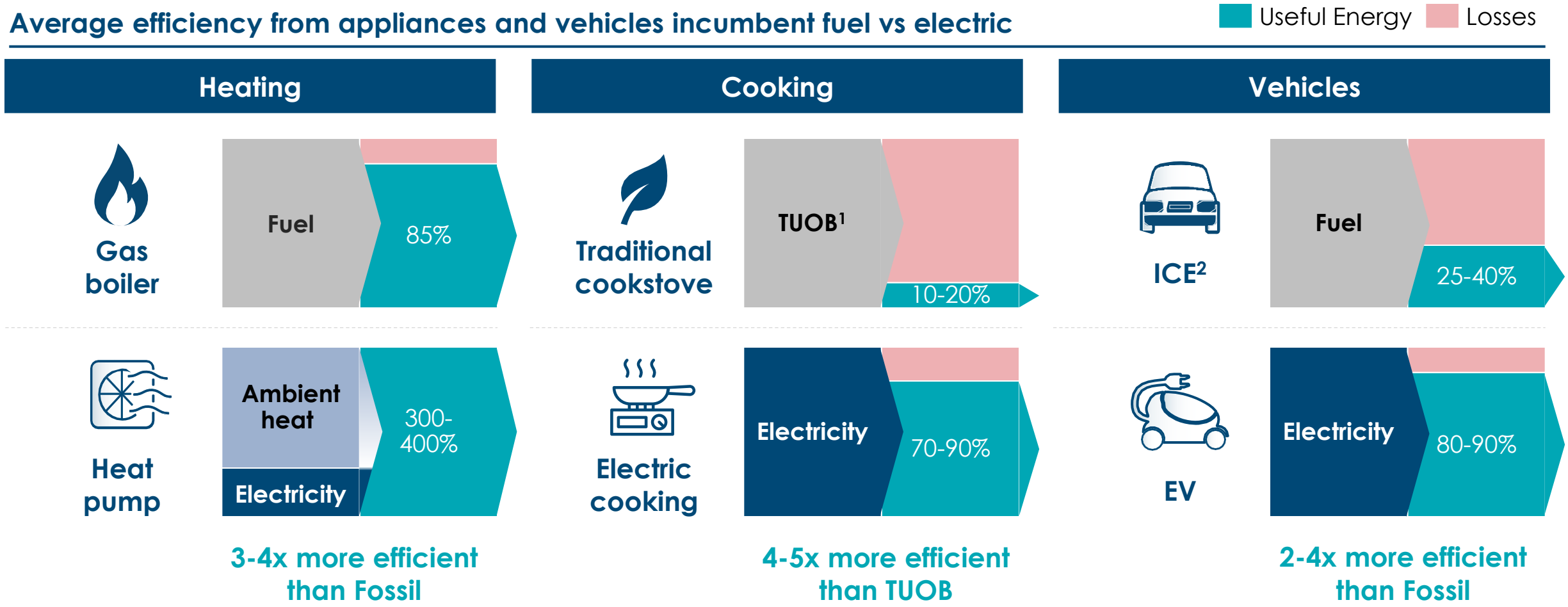
Electrification is energy efficiency – heat pumps, electric cooking and EVs use 2-5 times less energy than alternative technologies

Average efficiency from appliances and vehicles incumbent fuel vs electric

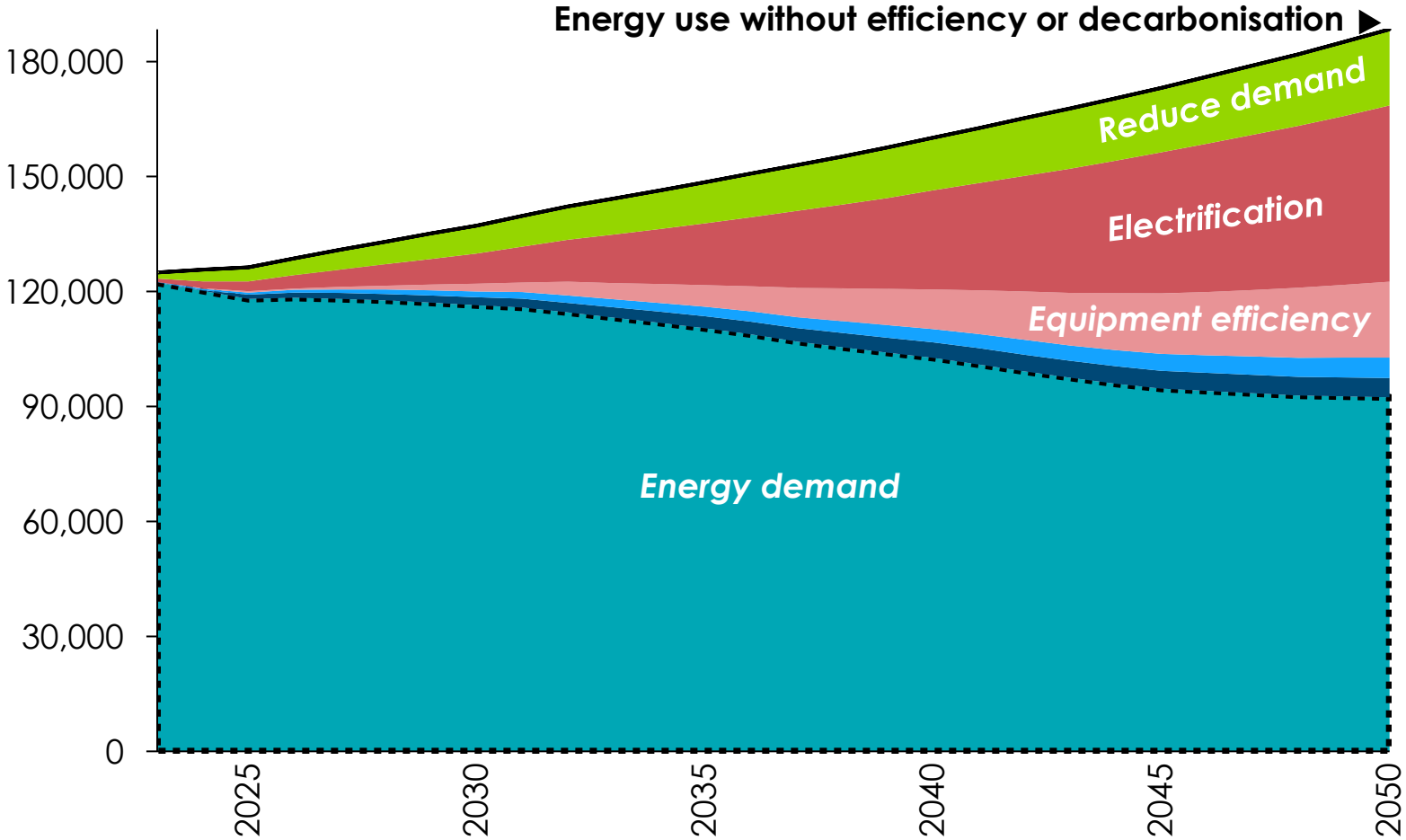


1. Traditional use of biomass; 2. Internal combustion engine
Source: RMI (2024), *Clean Tech Revolution;* ETC (2025) Achieving Zero-Carbon Buildings

A combination of all productivity levers could reduce final energy demand by 50% vs BAU

Final Energy demand vs. Productivity levers
TWh

% Reduction potential compared to 2050 Energy use without efficiency or decarbonisation



Key actions

- **- 11%** **Demand reduction:** services (e.g. public transport), reducing & re-using (e.g. petro-chemicals) and better operations (e.g. aviation)
- **- 24%** **Electrification:** switching to electric vehicles, electric heating and cooking
- **- 10%** **Improving efficiency of key electrical equipment:** AC, heat pumps, EVs, industrial motors, lighting and other
- **- 3%** **Better insulation in buildings:** better buildings codes and fabric improvements
- **- 3%** **Sector specific mainly heavy industry and long-distance transportation**

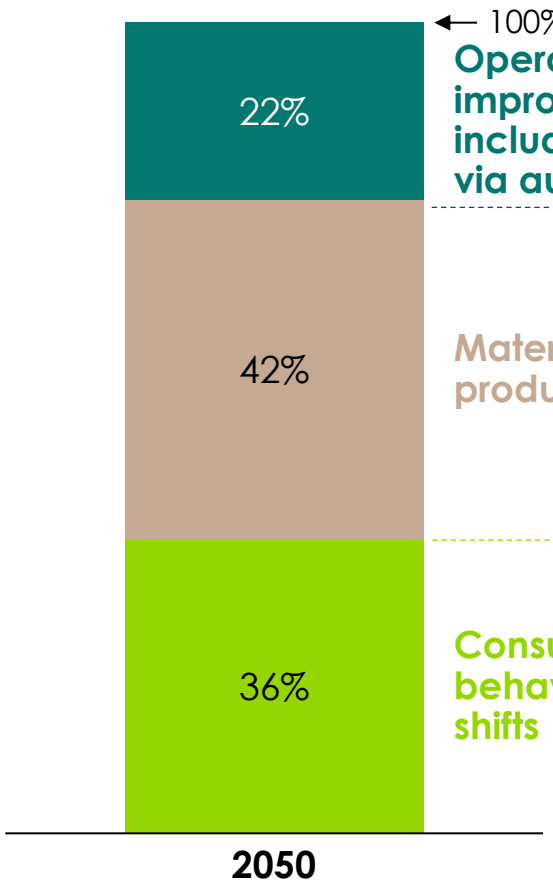
-51%

Source: IEA (2025) World Energy Outlook; MPP (2023) Hard-to-Abate Sector Transition Strategies; ETC (2025) Achieving Zero-Carbon Buildings; ETC(2023), Fossil Fuels in Transition; BNEF (2023) Vehicle Outlook; Systemiq analysis for ETC.

Only 36% of demand reduction depends on end consumer behaviour change

Demand reduction deep-dive

%



Operational improvement including via automation

- **Streamline operations**
  - Aviation
  - Shipping
- **Autonomous vehicles** in Road
- **Energy management** in Buildings

Material and product efficiency

- **Recycling**, extended **product lifetime**, **reuse** and material efficiency in:
  - Cement
  - Aluminum
  - Steel
  - Plastics

Consumer behaviour shifts

- **Recycling** and **reduction** in:
  - Plastics
  - Aluminum
- **Speed reduction** in Road
- Shifting to **alternative modes of transports**, e.g. away from cars

Source: Systemiq analysis for ETC

Realizing the potential of more efficient electrical equipment and vehicle will depend on standards & labelling programmes coupled with stock turn-over

Level of impact

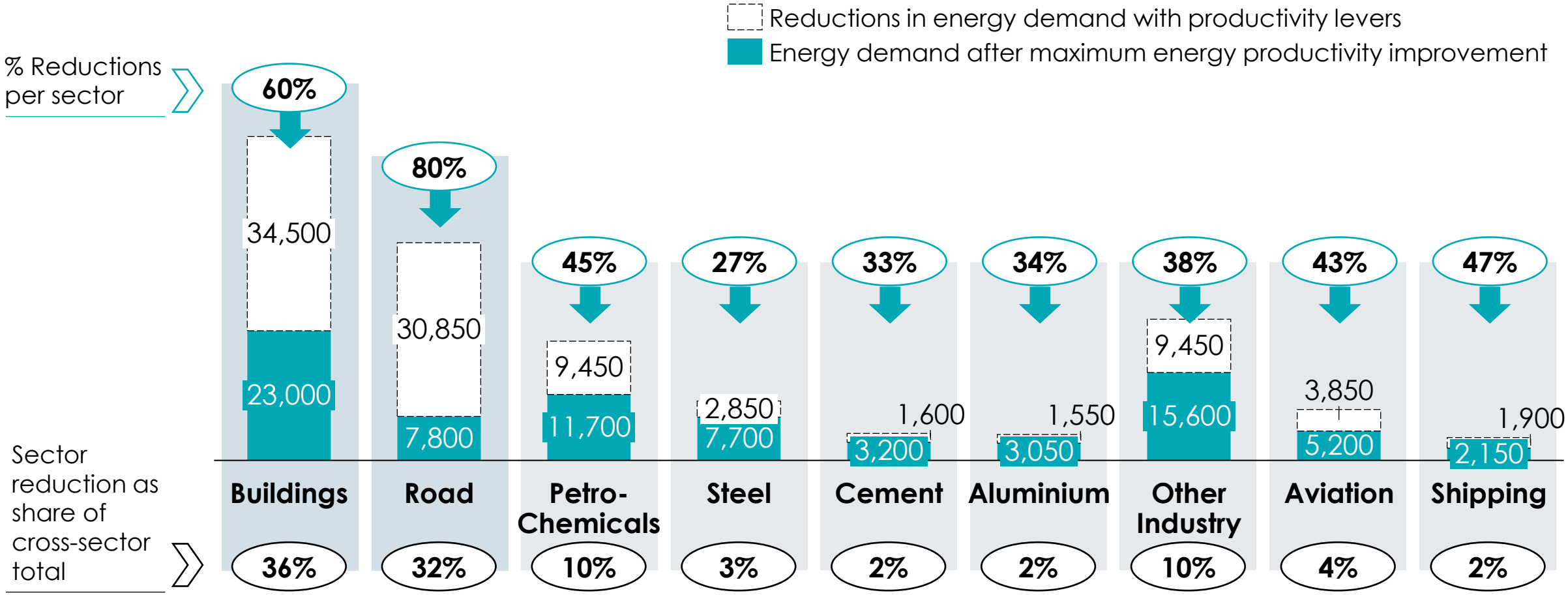
Key electrical equipment	Efficiency potential
Air conditioning and Heat Pumps	• ACs currently vary between **3 to 12 in seasonal energy efficiency rating (SEER)** • Additional opportunity to further **increase best in class efficiency** of ACs and Heat Pumps (which are essentially the same technology)
Electric Vehicles	• Improvements such as Reducing vehicle weight (including via lighter batteries), improving aerodynamics, and increasing powertrain efficiency could **cut the energy required per kilometer travelled by as much as 50% by 2050**
Industrial motors	• IE5 standard, are **40% more efficient than 2 generations before**, the IE3 standard, yet 3/4 of world motors in 2021 were still at IE2 or below
Light bulbs	• LED light bulbs use **80% less electricity than incandescent bulbs -** and this remain a massive opportunity in developing economies
Refrigerators	• High efficiency refrigerators use **25% less energy than typical models**

Source: ETC (2025), The Road Ahead; ETC (2025) Achieving Zero-Carbon Buildings; IEA (2021) Net Zero by 2050

Buildings and road transportation hold the biggest opportunity: together they hold ~70% of the potential productivity gain in final energy demand

Final energy demand in 2050

TWh



Note: Does not include fuel switch nor CCS for Net-Zero

Source: IEA (2025) World Energy Outlook; MPP (2023) Hard-to-Abate Sector Transition Strategies; ETC (2025) Achieving Zero-Carbon Buildings; ETC(2023), Fossil Fuels in Transition; BNEF (2023) Vehicle Outlook; Systemiq analysis for ETC.

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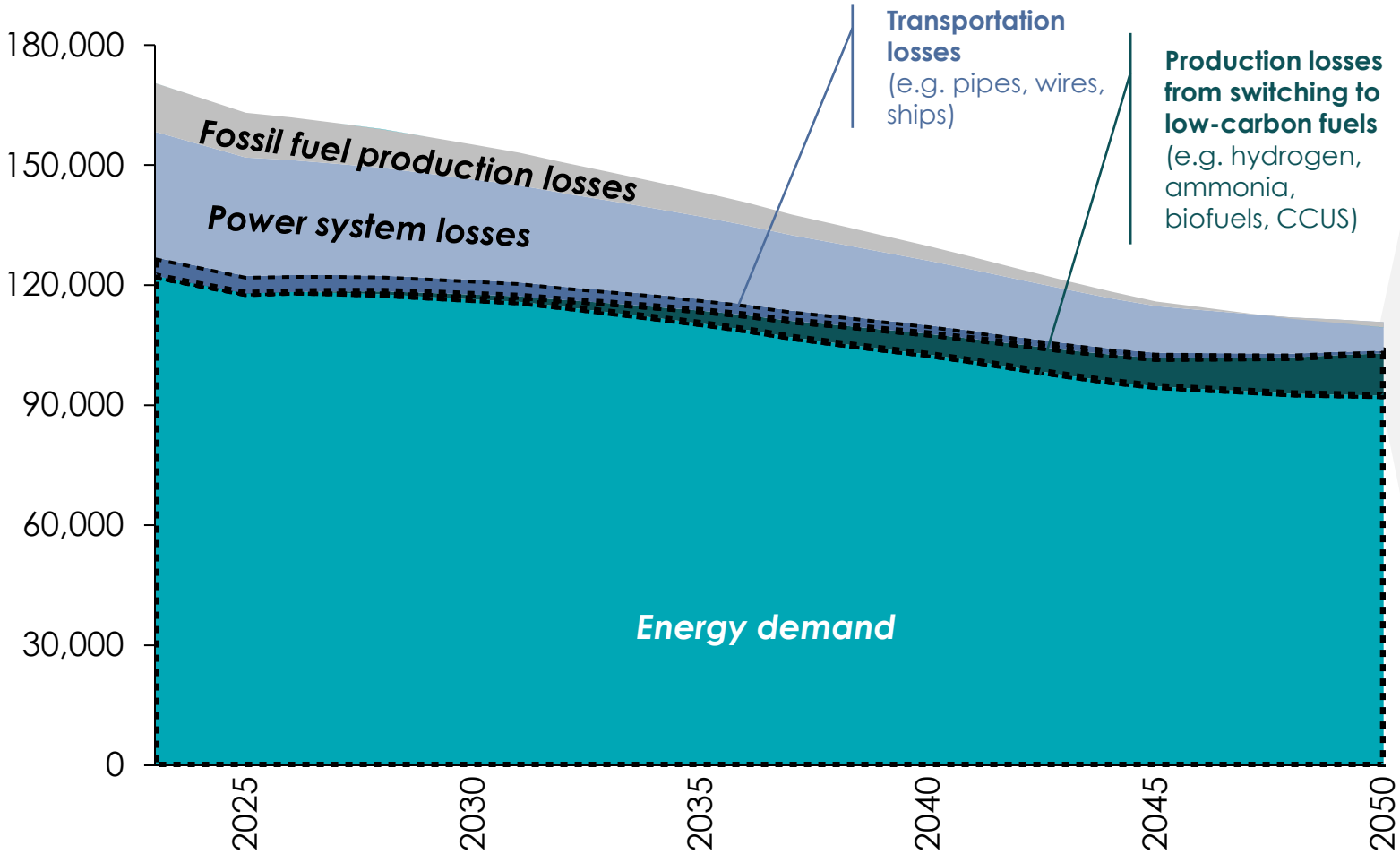
The phase down of fossil fuel consumption, along with the switch from thermal generation to renewables, are main drivers of lower primary energy demand

Primary energy demand
TWh



Reductions on primary energy losses driven by:

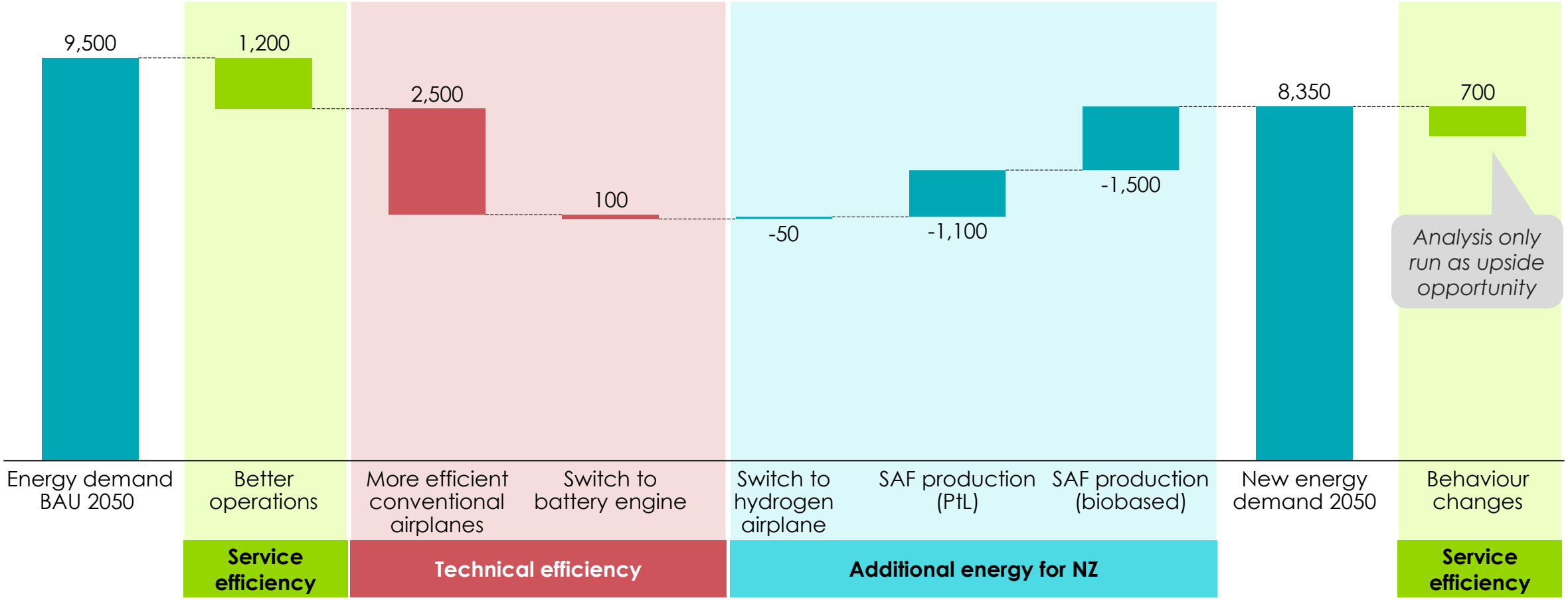
- **Growth of renewables in the power system**, which are more efficient than fossil generation
- **Lower fossil fuel conversion losses** (e.g. in refining) decline as fossils phase down

Source: IEA (2025) World Energy Outlook; MPP (2023) Hard-to-Abate Sector Transition Strategies; ETC (2025) Achieving Zero-Carbon Buildings; ETC(2023), Fossil Fuels in Transition; BNEF (2023) Vehicle Outlook; RMI (2024) The Incredible Inefficiency of the Fossil Energy System; Systemiq analysis for ETC.

In aviation, making conventional airplanes more efficient is single most important lever

Primary energy demand in 2050 and impact of productivity levers

TWh



Source: Schäfer, A. (2019). "Technological, economic and environmental prospects of all-electric aircraft". *Nature Energy*. **4** (2): 160–166., MPP analysis

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NZ Energy demand with Productivity levers

Energy in 000 TWh; GDP in constant 2021 Bn.US$

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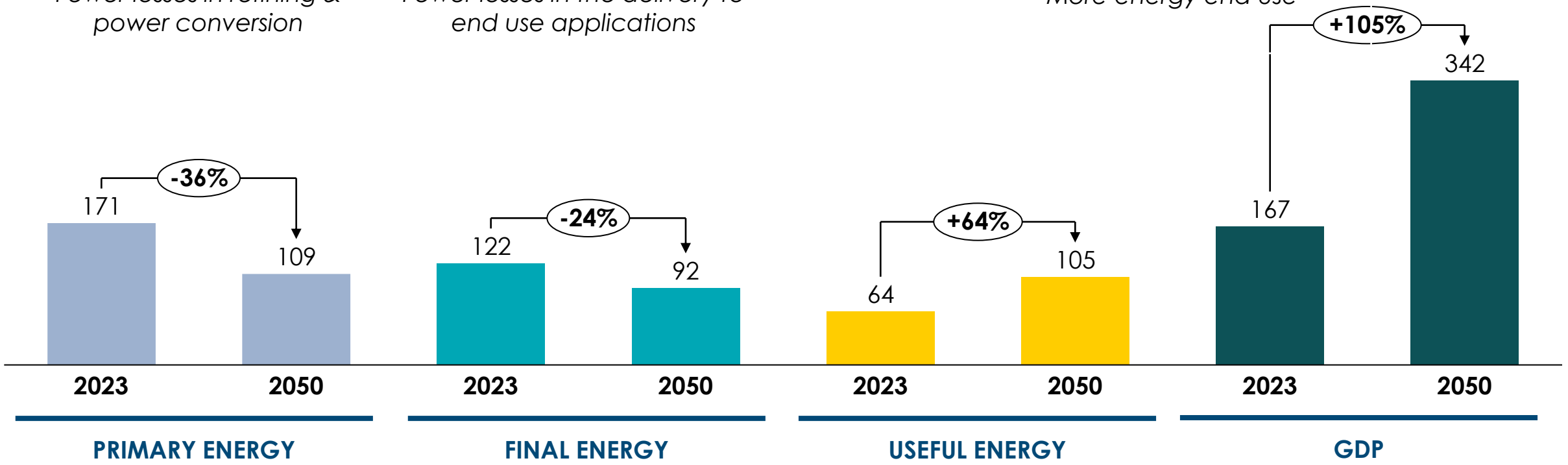

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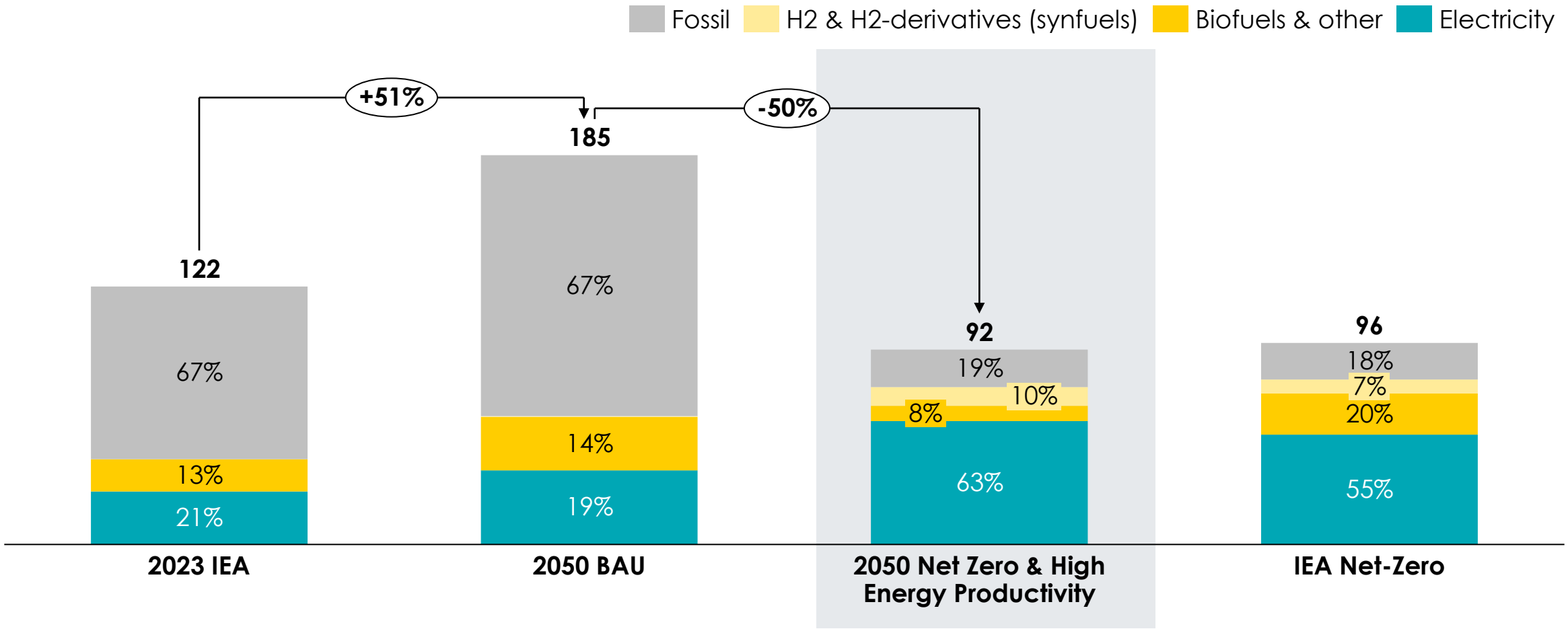
Reaching net-zero whilst maximising energy productivity gains can lead to lower energy demand without compromising on living standards

Global Final Energy demand

000 TWh



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The cost-effectiveness of improving energy productivity will vary by sector with passenger EVs, heating and electrical equipment closer to affordability

✓ Upfront cost & opex comparable to alternative

✓ Higher upfront cost vs alternative, but lower opex

Cost profile by sector	Context
✓ **Passenger Road transportation**	• Passenger EVs already have a lower total cost of ownership than ICE, and will soon be cheaper to buy upfront (as in China)
✓ **Household appliances and insulation**	• Regulations for appliance efficiency are likely to impose minimum costs • Improving building insulation will impose some cost upfront in new buildings
✓ **Heat pumps in homes and light industry**	• Installing heat pumps to replace boilers in existing homes and industrial applications will have significant upfront costs

Source: Systemiq analysis for ETC.

In addition to electrification, productivity levers can reduce investment and land needed for renewable generation, and strengthen energy security

- Improved energy productivity could **reduce the total investment required** to build a zero carbon economy **by ~ $0.6 trillion per annum over the next 25 years**

- Improved energy productivity could reduce the land **area requirements for solar PV and wind turbines from around 0.6 to around 0.4 million km2**. This reduction would be equivalent to Ecuador's land size.

- Reducing energy demand will **improve energy security by cutting reliance on imports**. Through energy productivity levers, German energy imports could be reduced by 25% by 2035, cutting the import bill by €20 billion,

Source: Eurostat, BNEF Data Viewer LCOE, MPP (2023) Hard-to-Abate Sector Transition Strategies; ETC (2025) Achieving Zero-Carbon Buildings; ETC(2023), Fossil Fuels in Transition; BNEF (2023) Vehicle Outlook; ETC (2024), Material and Resource Requirements for the Energy Transition, Clean Energy Wire (2025) Fossil fuel imports to Germany go down as costs increase, Systemiq analysis for ETC.

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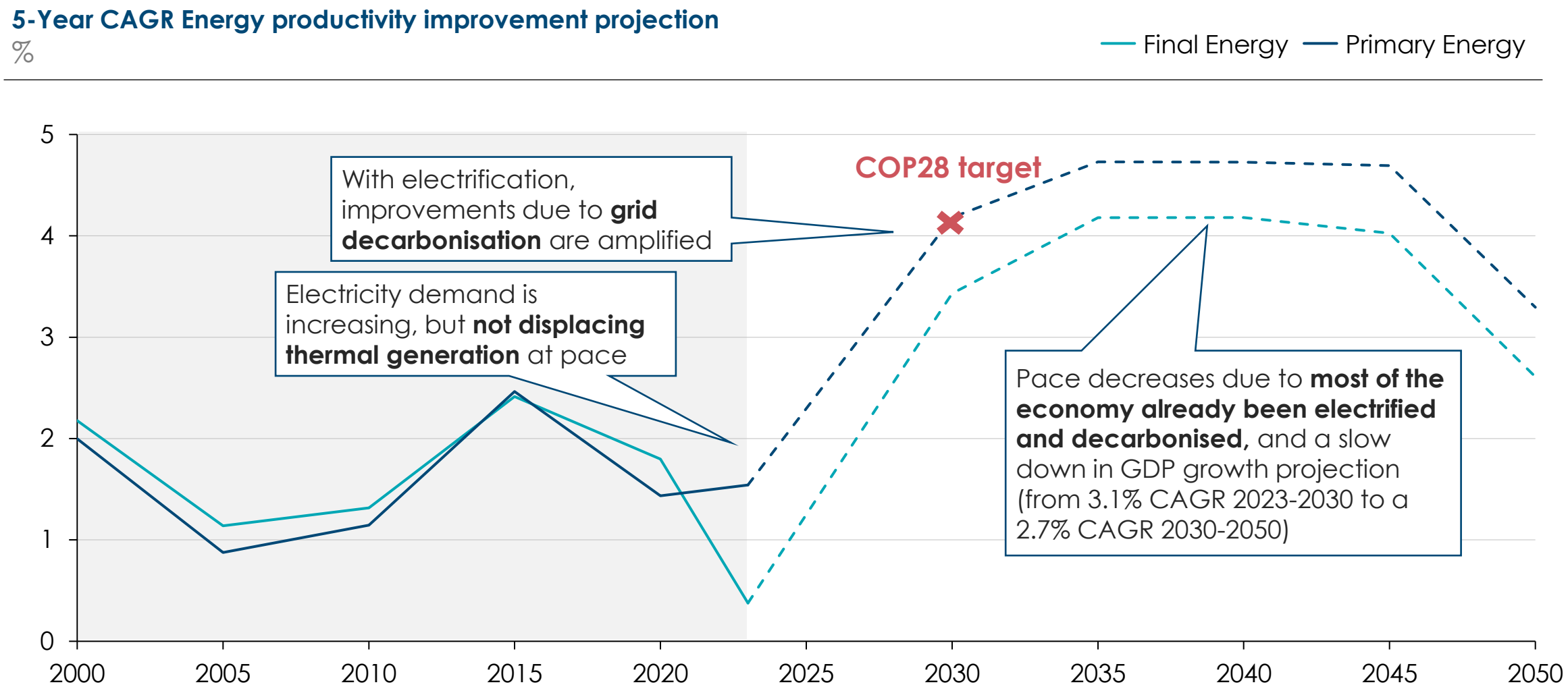
Realising COP28 targets for a 4% improvement in energy intensity by 2030, will depend on immediately accelerating efforts in energy productivity



Source: Systemiq analysis for ETC, Our World in Data, World Bank, IMF Real GDP Annual Growth, IEA World Energy Outlook 2024

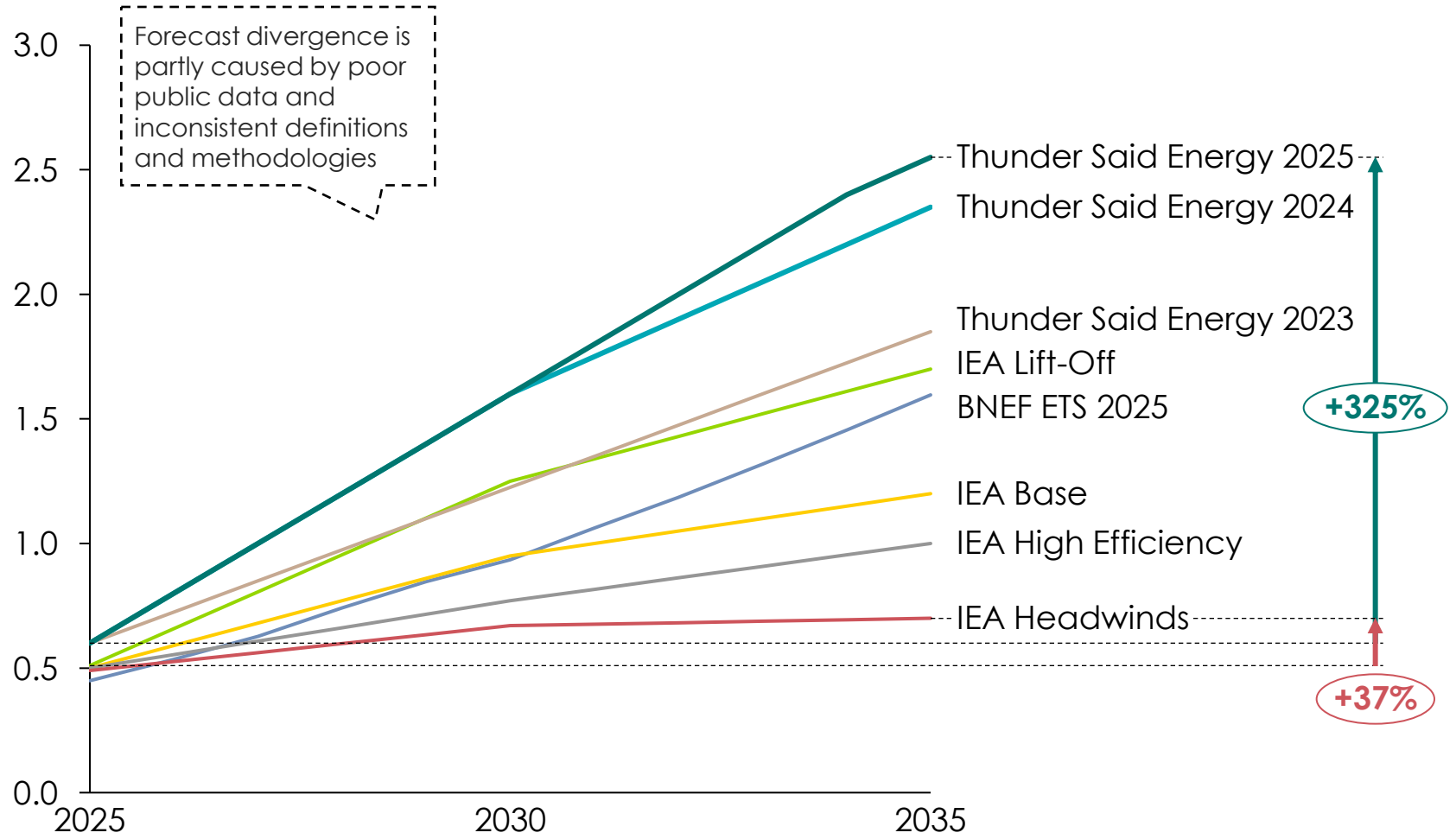
Agenda

- **Key messages from the report**
  - The productivity potential in final energy to useful energy
  - The productivity potential in primary energy to final energy
  - Wider impacts: Implications for living standards, costs and resources
  - Implications for COP28 target: doubling the energy productivity rate in the next 2 decades
  - **Long term energy growth: rebounds, AI and limitless long term potential**
  - Key priorities to seize the productivity improvement opportunity
- Next steps and Comms plan

The long run picture: rebound effects, AI and future energy applications will likely increase energy use

Global data centre annual demand projections by scenario

'000 TWh/year



- **Beyond electrification and the next 25 years**, energy demands will likely return to strong growth – as energy use increase human welfare
- **Rebound effect, AI and new energy uses** could result in higher energy use in the next 25 years
- Energy productivity improvements should be pursued **while planning for growing energy supply systems**

Sources: BNEF (2025), *New Energy Outlook;* IEA (2025), *Energy and AI;* Thunder Said Energy (2025), *AI energy: industrial demand and the Jevons effect?*

Agenda

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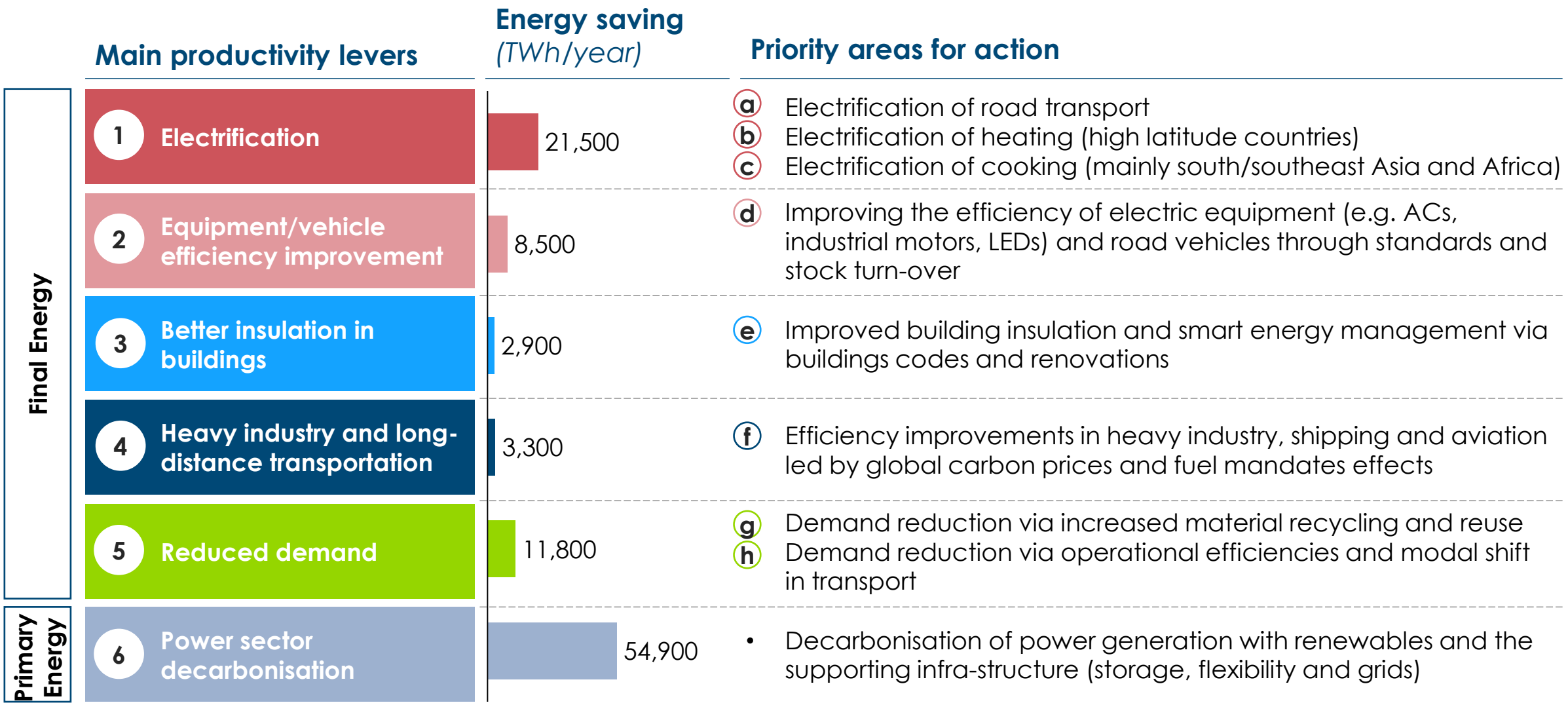
To maximise energy productivity levers, several priority areas



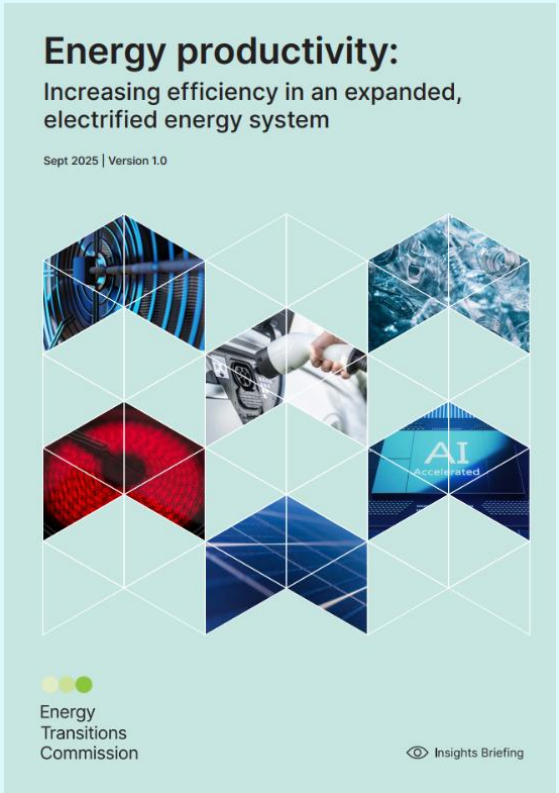
Source: Systemiq analysis for ETC

Agenda

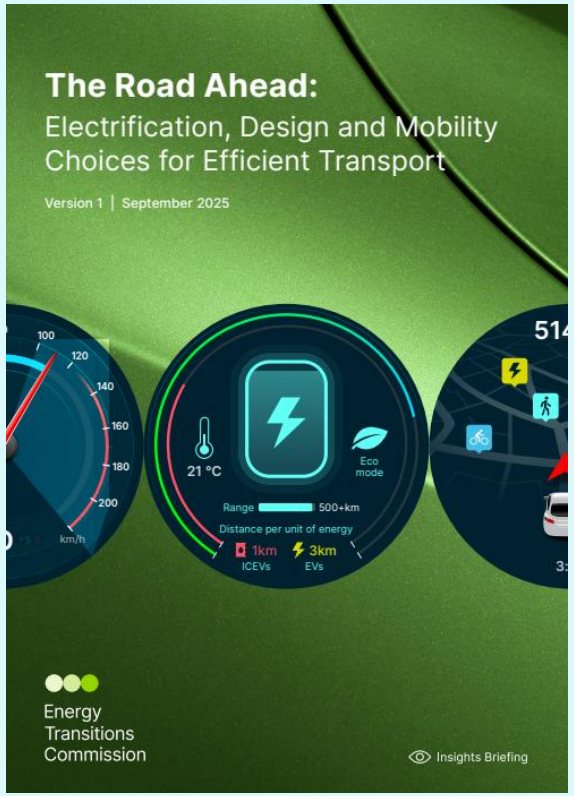
- Key messages from the report
- **Next steps and Comms plan**

Insights Briefing Launch Campaign Plan – Staged roll out

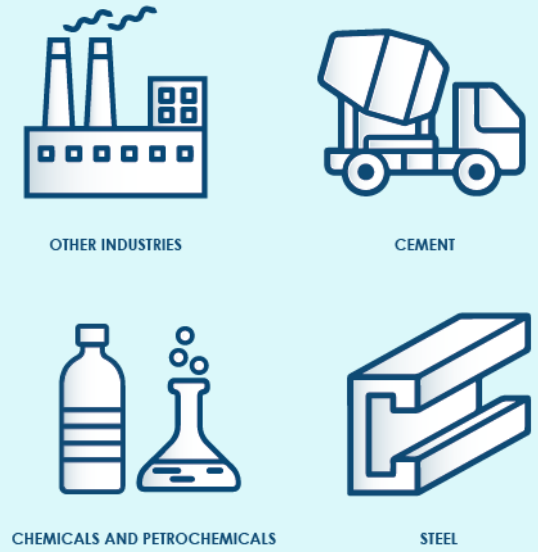
Phase 1 - October
Energy Productivity Insights Briefing



Phase 2 – December
Electrification of Road Transport



Phase 3 – early 2026
Harder to Abate Annex



Insights Briefing Launch Campaign Plan – Staged roll out – Phase 1

Media

- **5 targeted media briefings under embargo.**
- **Potential op-ed placement in Tier 1 outlet**, framing energy productivity as a key lever of the transition.
- **Press release distribution** to media contacts.
- Media engagement/broadcast **campaign around COP30.**

Digital

- **Publish key messages summary** on the website.
- **Wedge chart animation** on overall productivity potential (also to be used for journalists' briefings).
- **Social media campaign** using exhibits from the report.
- Social media amplification throughout COP30.

Member and Partner Engagement

- **Bilaterals** with members and partners (Schneider Electric, RMI, Ember, IEA)
- **Arm ETC Commissioners with key messages** for panels and discussions at NYCW and COP30.
- **Partner collaboration** with Mission Efficiency at COP30.