Energy Technology Perspectives 2017

Catalysing Energy Technology Transformations

Dave Turk, Director (Acting) of Sustainability, Technology and Outlooks

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IEA

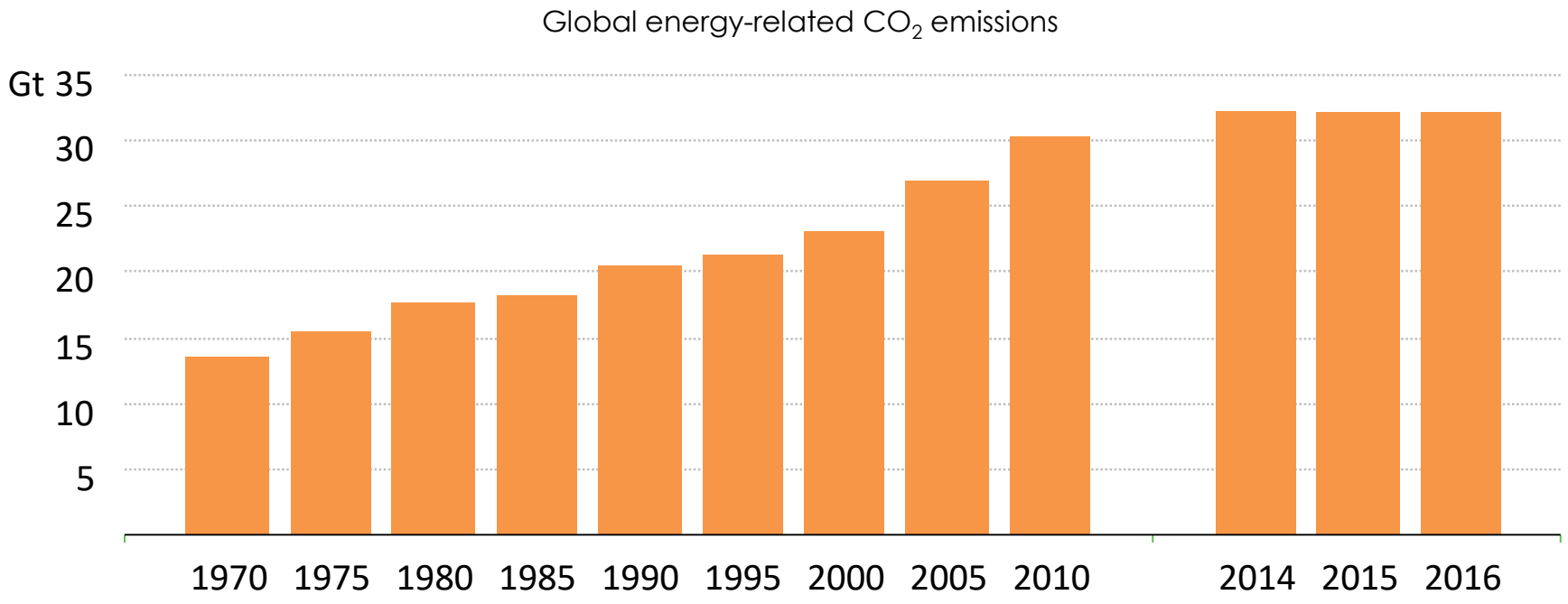
Introduction

- Accelerating technological progress strengthens economies, energy security and sustainability
- Policies and RD&D drive down costs and improve performance
- Clean energy technologies are progressing, but few on track
- Need to focus on all technologies; lack of progress on some puts even more pressure on others
- IEA's new work on digitalization and energy brings new insights in understanding the role of technologies and innovation

Key points of orientation

- Global energy markets are changing rapidly
  - *Renewables supplied half of global electricity demand growth in 2016, and increase in nuclear capacity reached highest level since 1993*
  - *Global energy intensity improved by 2.1% in 2016*
  - *Electric car sales were up 40% in 2016, a new record year*
- The energy sector remains key to sustainable economic growth
  - *1.2B people lack access to electricity; 2.7B people lack access to clean cooking*
  - *Largest source of GHG emissions today, around two-thirds of global total*
  - *Largest source of air pollution, linked to 6.5 million premature deaths per year*
- There is no single story about the future of global energy
  - *Fast-paced technological progress and changing energy business models*

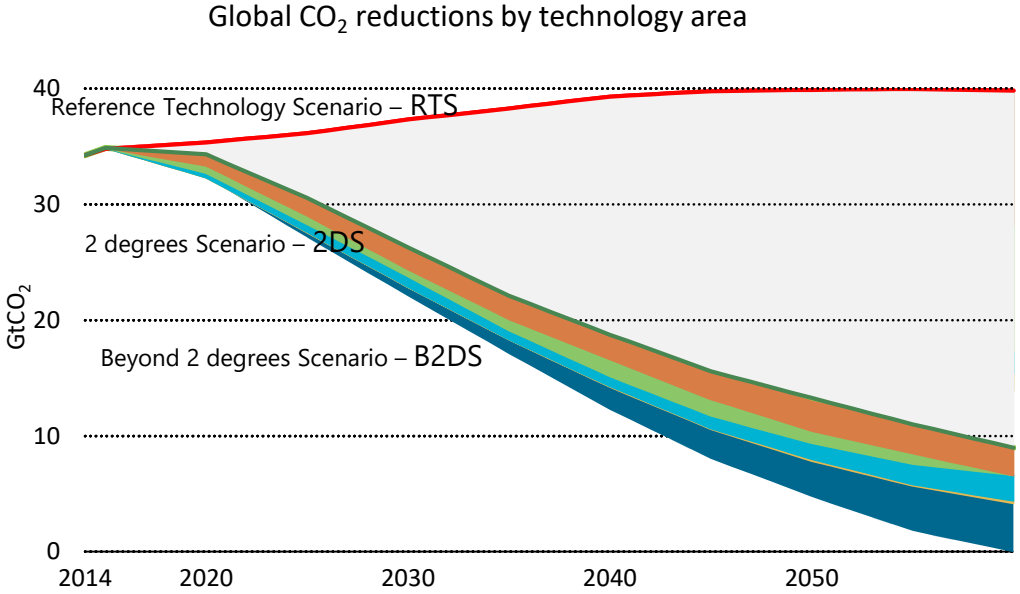
Global CO_2 emissions flat for 3 years – an emerging trend?

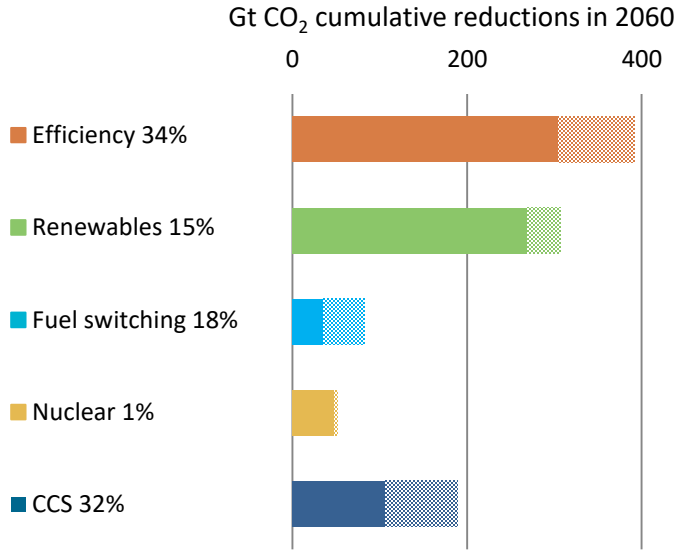


IEA analysis shows that global CO_2 emissions remained flat in 2016 for the third year in a row, even though the global economy grew, led by emission declines in the US and China.

How far can technology take us?

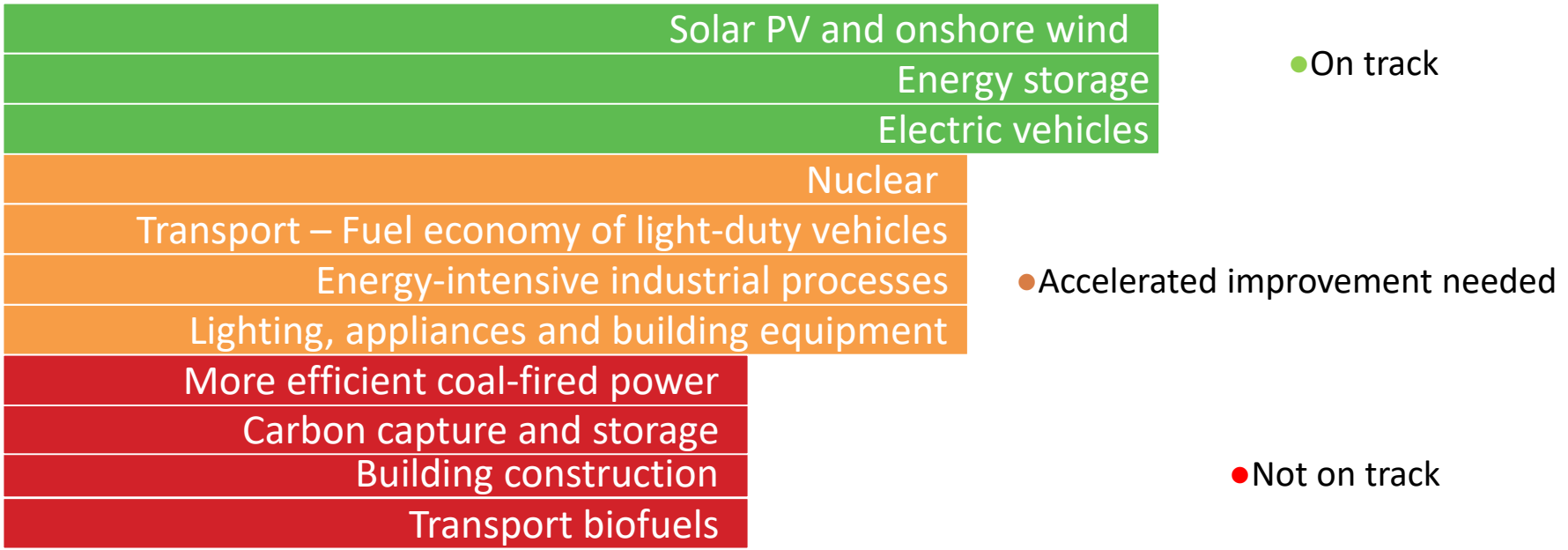
Technology area contribution to global cumulative CO_2 reductions





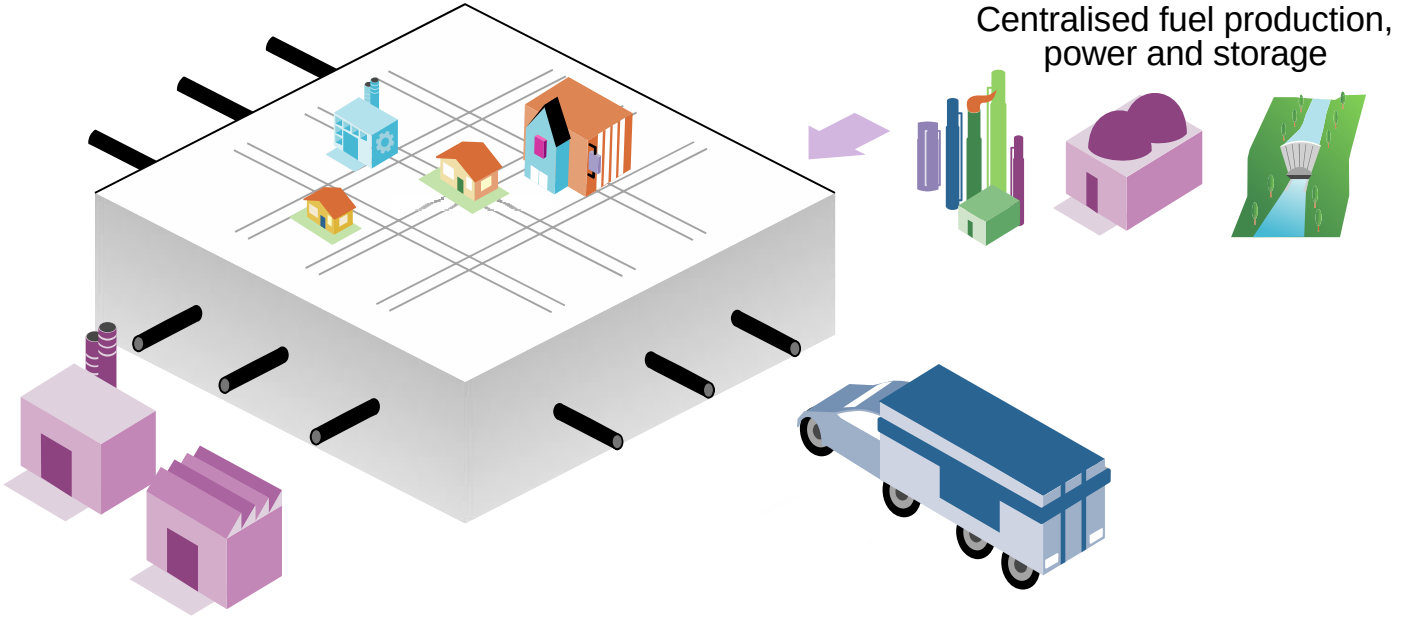
Pushing energy technology to achieve carbon neutrality by 2060 could meet the mid-point of the range of ambitions expressed in Paris.

The potential of clean energy technology remains under-utilised



Recent progress in some clean energy areas is promising, but many technologies still need a strong push to achieve their full potential and deliver a sustainable energy future.

Systems Integration is essential for a sustainable energy future



We need to move away from a one-directional energy delivery philosophy

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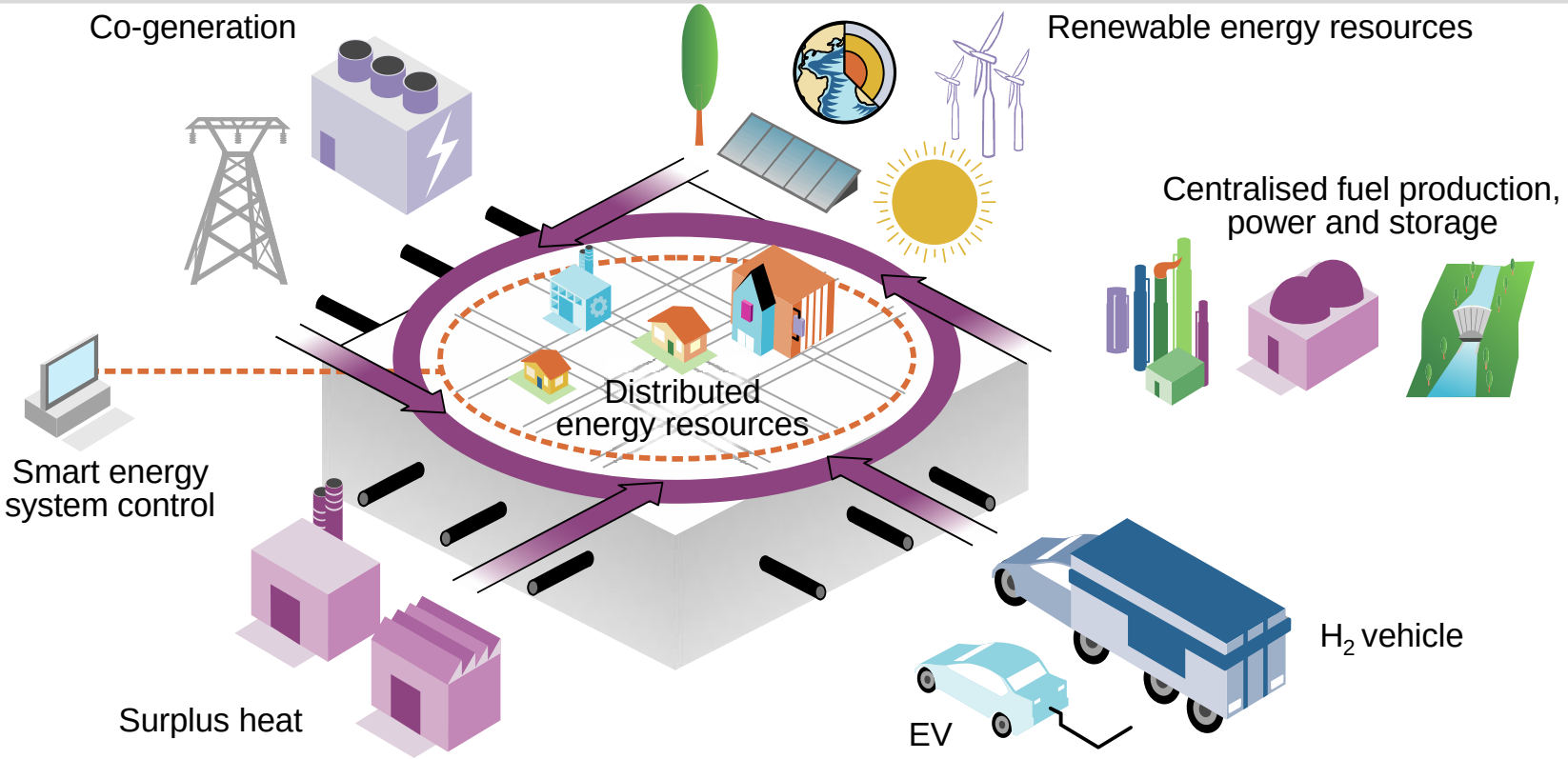
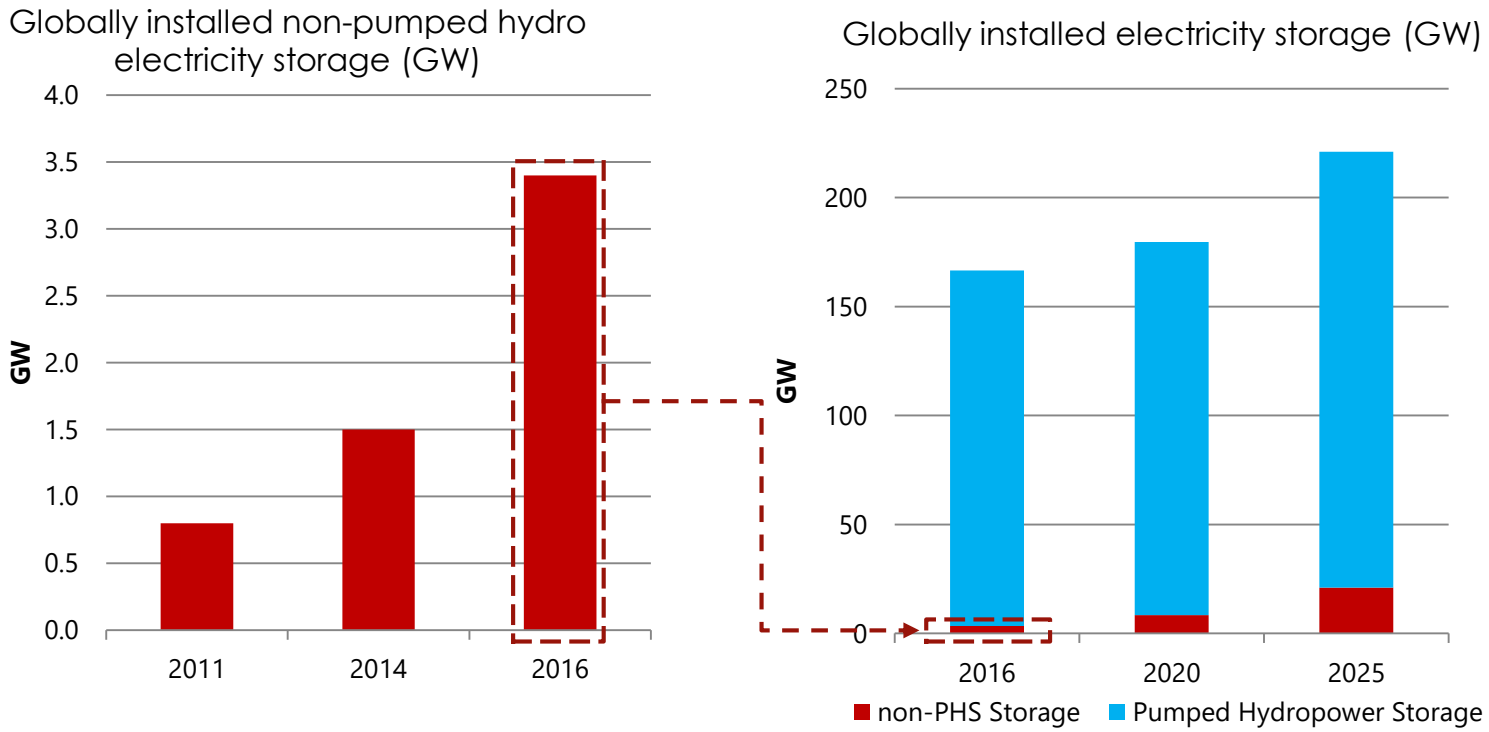


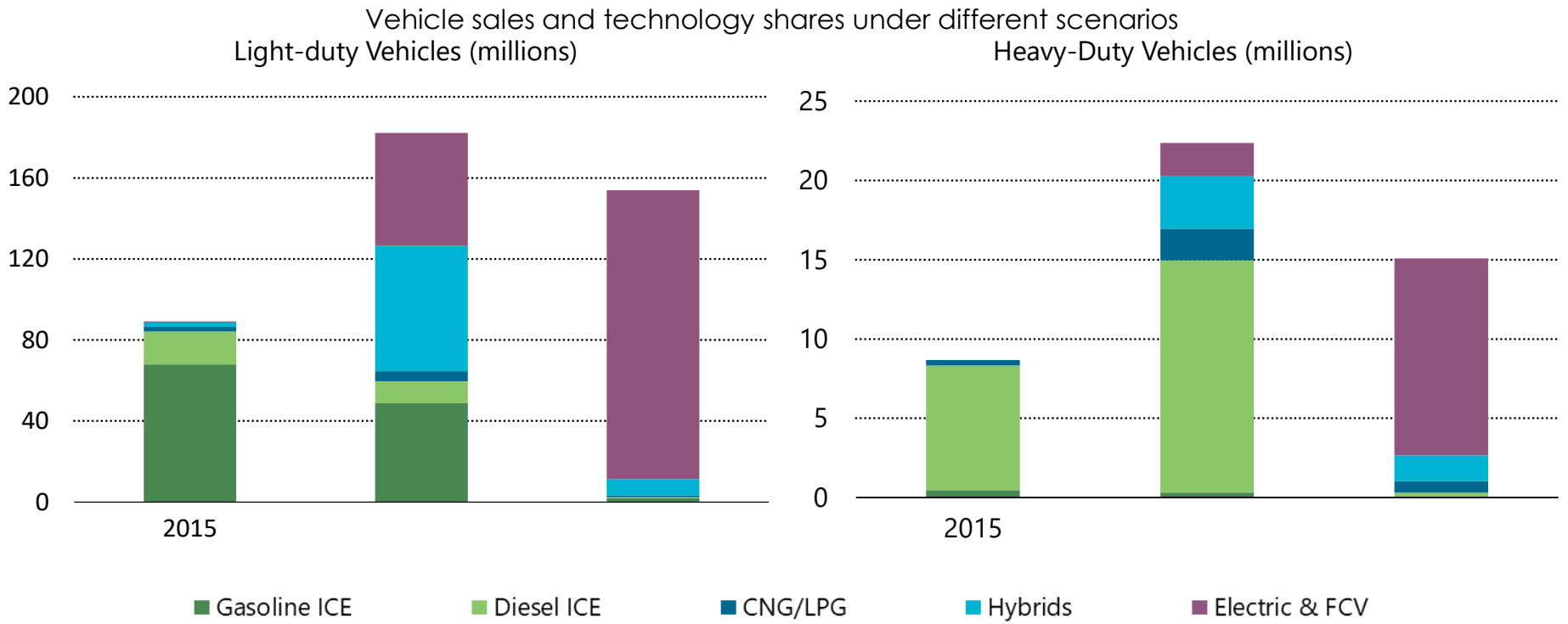
We need to move away from a one-directional energy delivery philosophy to a digitally-enhanced, multidirectional and integrated system that requires long-term planning for services delivery.

The value of storage is starting to drive new solutions



Positive market and policy trends supported a year-on-year growth of over 50% for non-pumped hydro storage
But near-term storage needs will remain largely answered by existing or planned pumped hydro capacity.

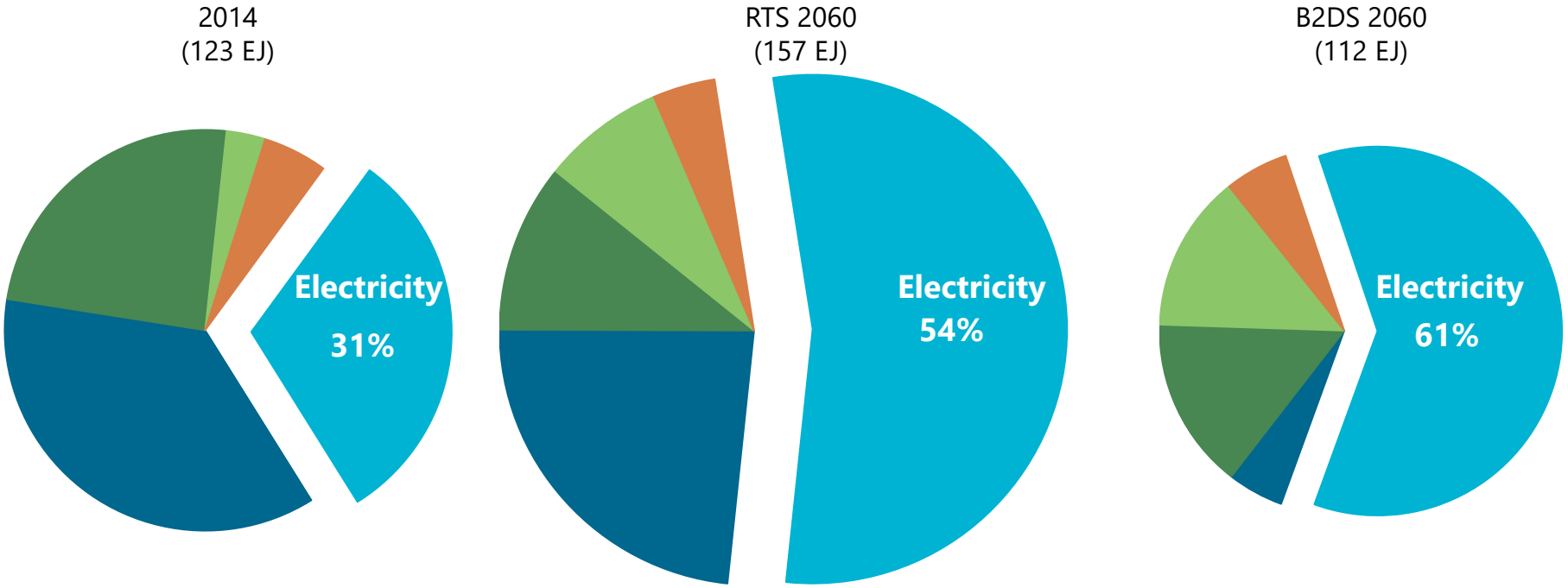
Can we change the landscape of transport ?



The transportation sector already experiences technological change, but won't shed its oil dependency without assertive policies.

Enhanced buildings efficiency could also improve system flexibility

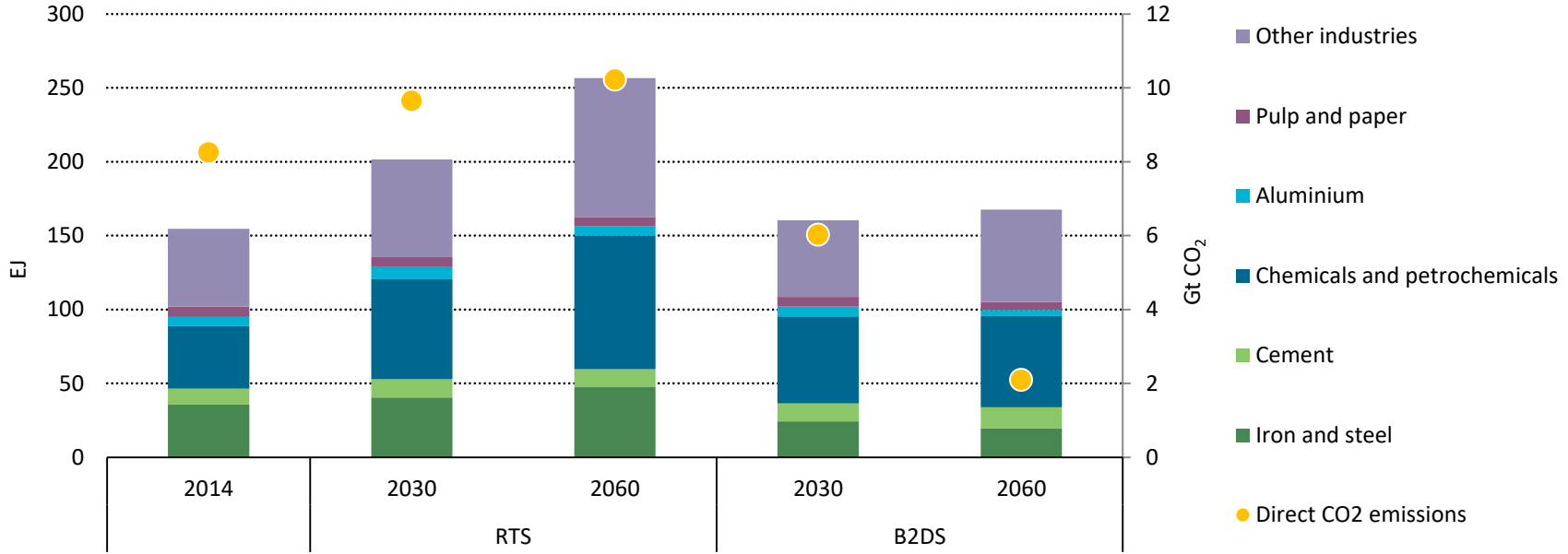
Energy use in the buildings sector under different scenarios



Efficiency technologies can provide the same level of comfort while reducing energy demand despite doubling floor area.

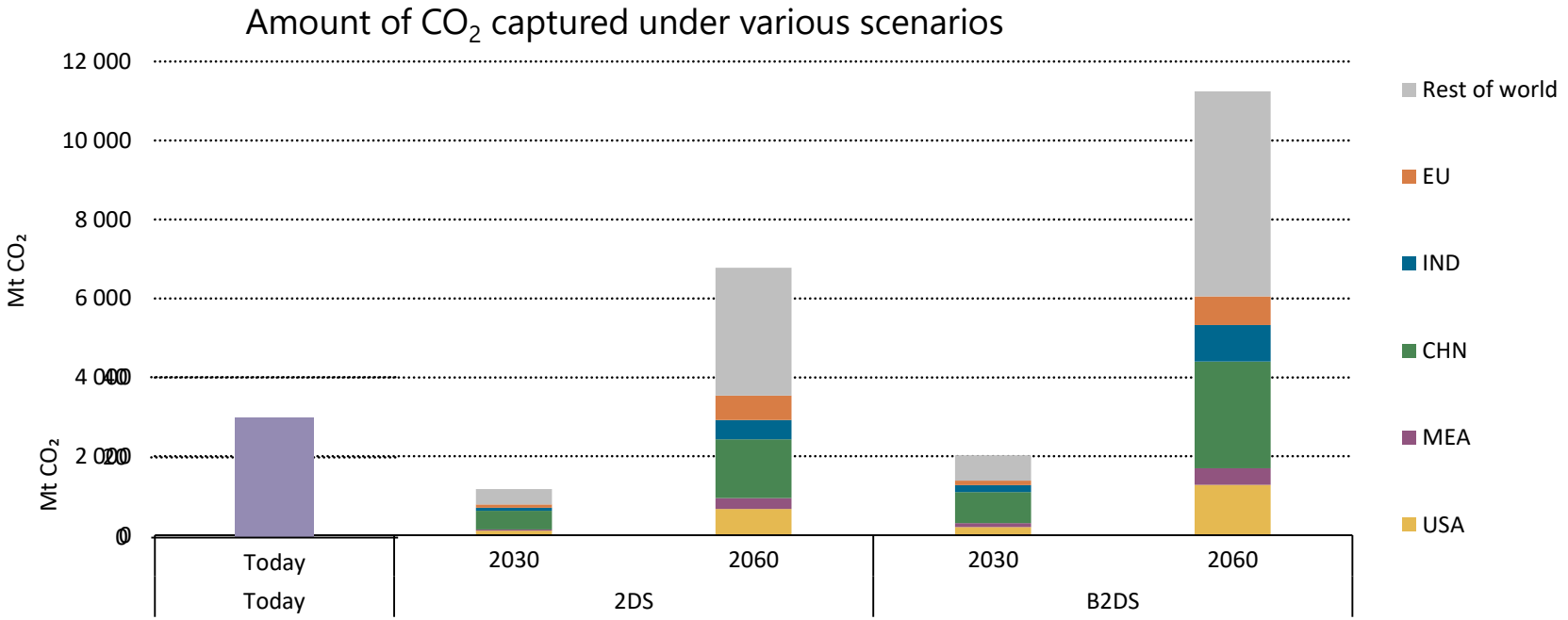
We need to produce materials more sustainably

Energy use and direct CO_2 emissions in various industrial sectors under different scenarios



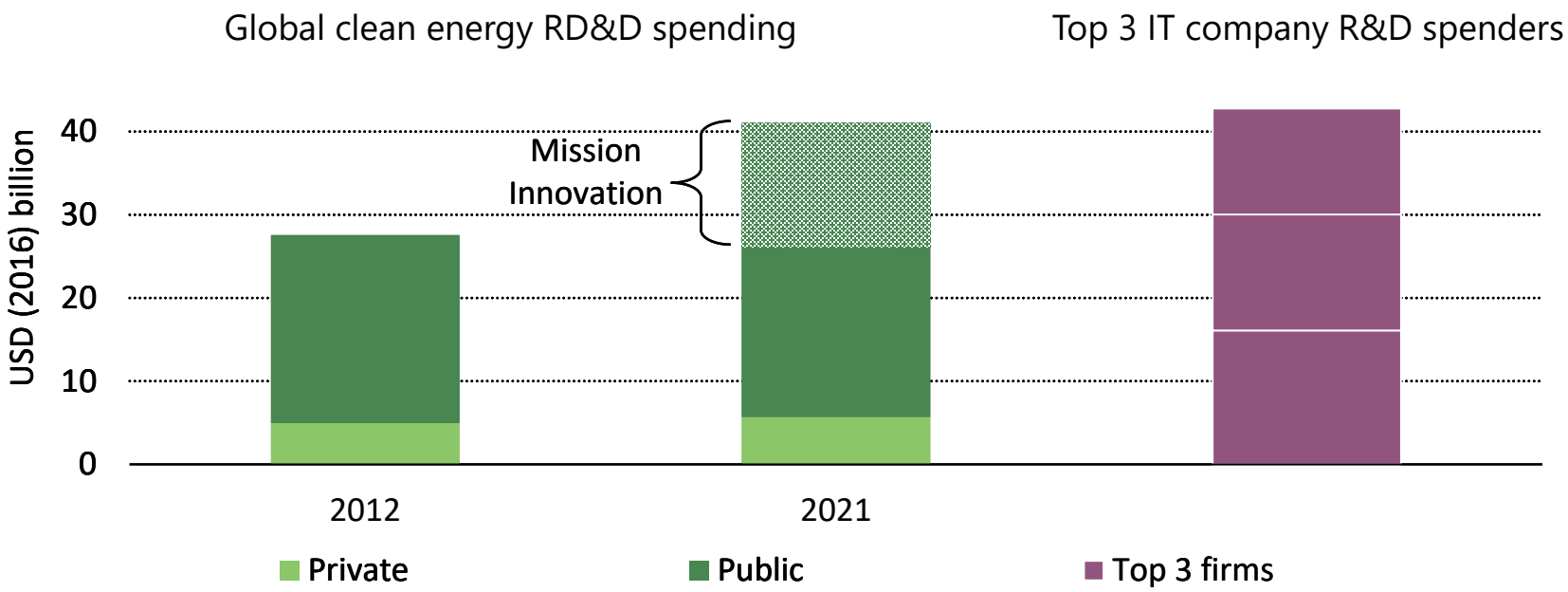
Effective policies and public-private collaboration are needed to enable an extensive roll-out of energy and material efficiency strategies as well as a suite of innovative technologies.

A challenging task ahead for CCS



CCS is happening today, but needs to be ramped up hundreds of times to achieve long-term goals. The role for CCS varies based on local circumstances.

Global clean energy RD&D spending needs a strong boost



Global RD&D spending in efficiency, renewables, nuclear and CCS plateaued at $26 billion annually, coming mostly from governments.
Mission Innovation could provide a much needed boost.

Conclusions of the ETP 2017

- Early signs point to changes in energy trajectories, helped by policies and technologies, but progress is too slow
- An integrated systems approach considering all technology options must be implemented now to accelerate progress
- Each country should define its own transition path and scale-up its RD&D and deployment support accordingly
- Achieving carbon neutrality by 2060 would require unprecedented technology policies and investments
- Innovation can deliver, but policies must consider the full technology cycle, and collaborative approaches can help

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