

# Energy Technology Perspectives 2012

Pathways to a Clean Energy System

**Paris Energy Meeting**

**IEA-Russia Round Table, 2 July 2012**

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International  
Energy Agency

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# ETP 2012 – Choice of 3 Futures

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## 2DS

a vision of a **sustainable** energy system of reduced Greenhouse Gas (GHG) and CO<sub>2</sub> emissions

The 2°C Scenario

## 4DS

reflecting pledges by countries to cut emissions and boost energy efficiency

The 4°C Scenario

## 6DS

where the world is now heading with potentially **devastating** results

The 6°C Scenario

# Clean energy: slow lane to fast track

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Cleaner coal power  
Nuclear power  
Renewable power  
CCS in power



CCS in industry  
Industry



Buildings



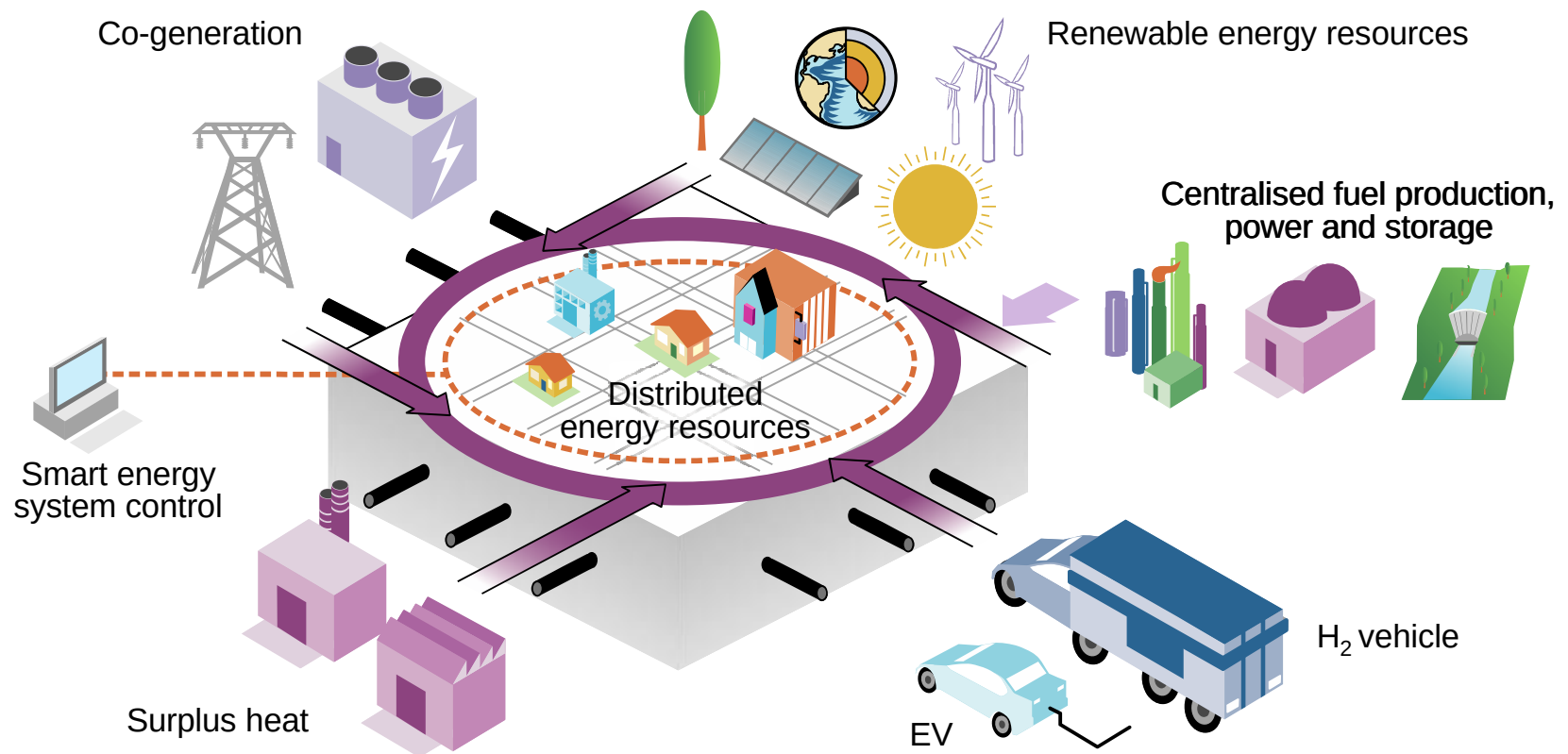
Fuel economy  
Electric vehicles  
Biofuels for transport

*Progress is too slow in  
almost all technology areas*

*Significant action is required  
to get back on track*

# A smart, sustainable energy system

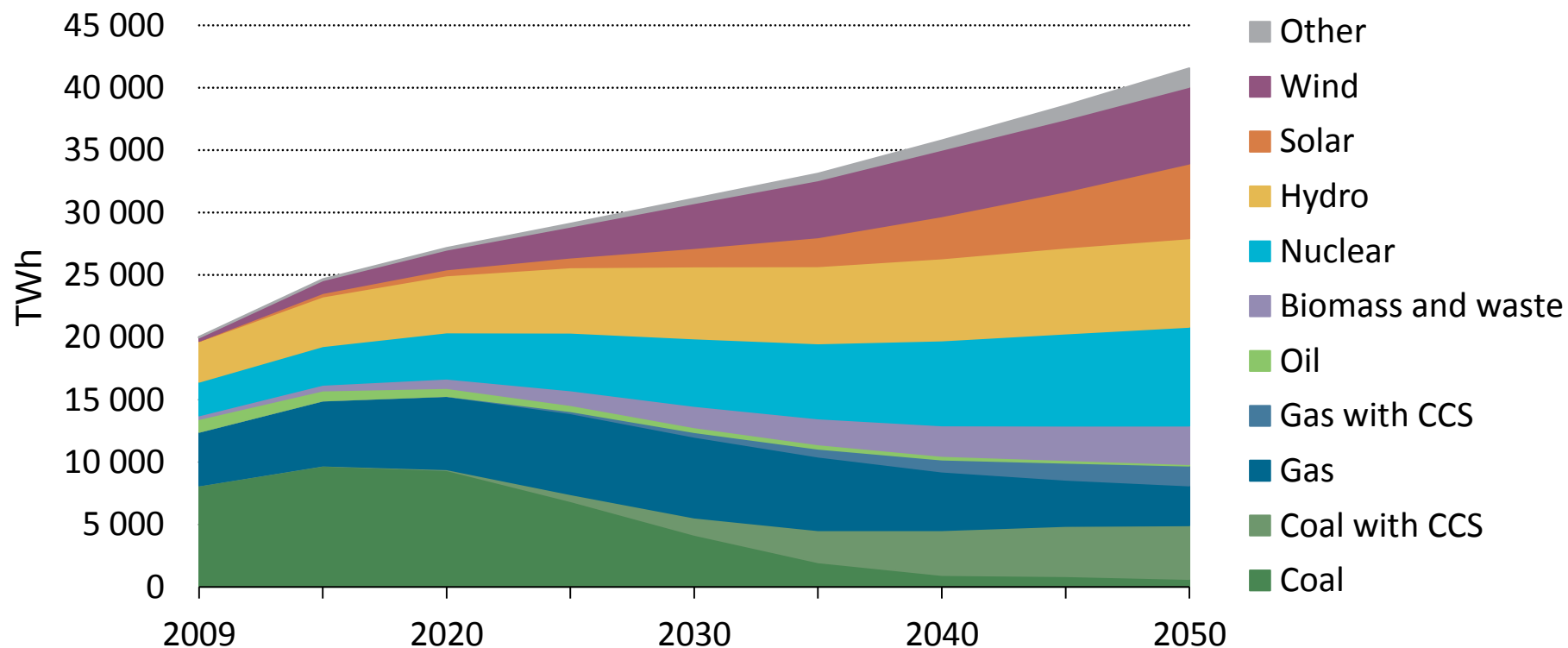
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*A sustainable energy system is a smarter,  
more unified and integrated energy system*

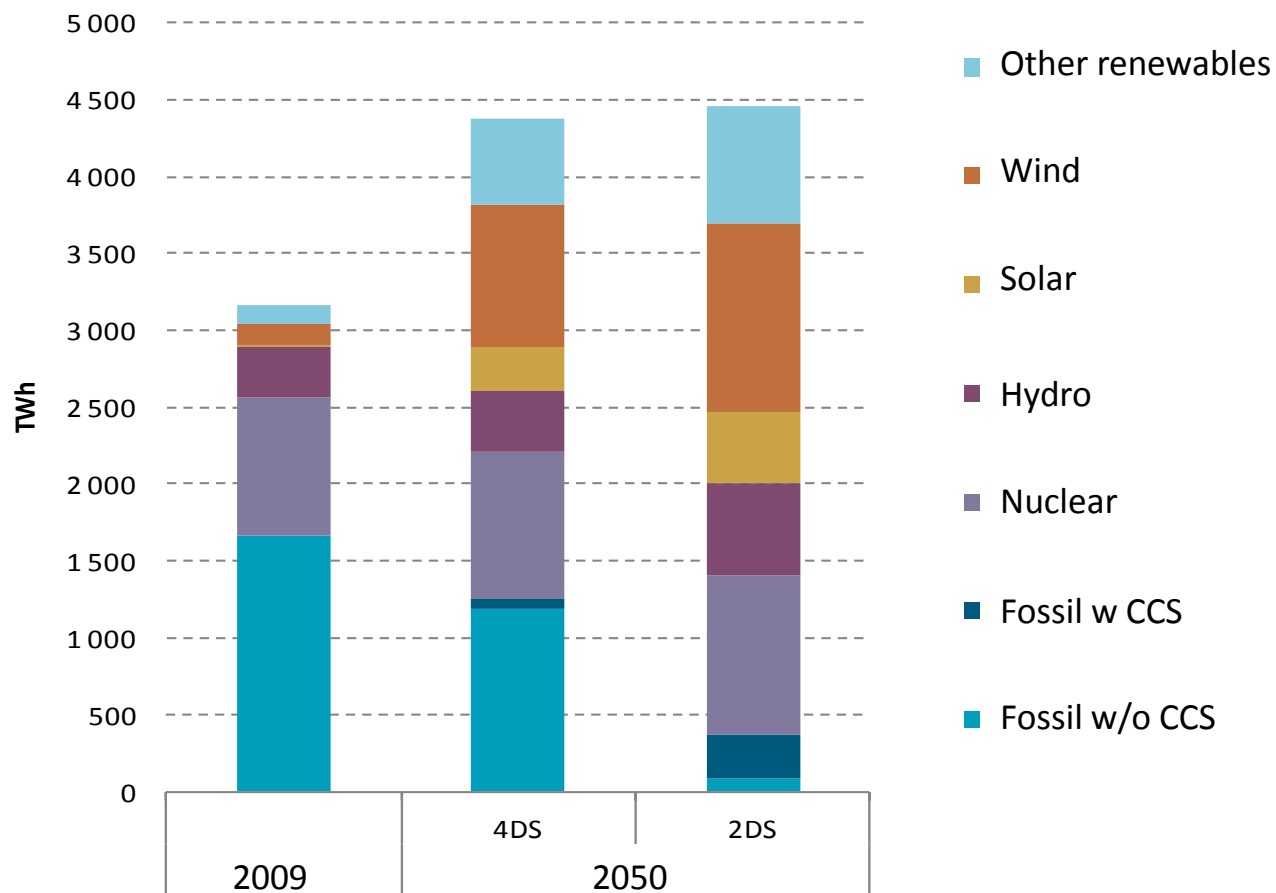
# Low-carbon electricity: a clean core

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*Renewables will generate more than half the world's electricity in the 2DS*

# Renewables need to dominate EU electricity



*Renewables cover two-thirds of the electricity mix in 2050 in the 2DS, with wind power alone reaching a share of 30% in the mix.*

# All flexibility sources will be needed

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Dispatchable  
power plants

Demand side  
Response  
(via smart grid)

Energy storage  
facilities

Interconnection  
with adjacent  
markets



Biomass-fired  
power plant



Industrial

residential



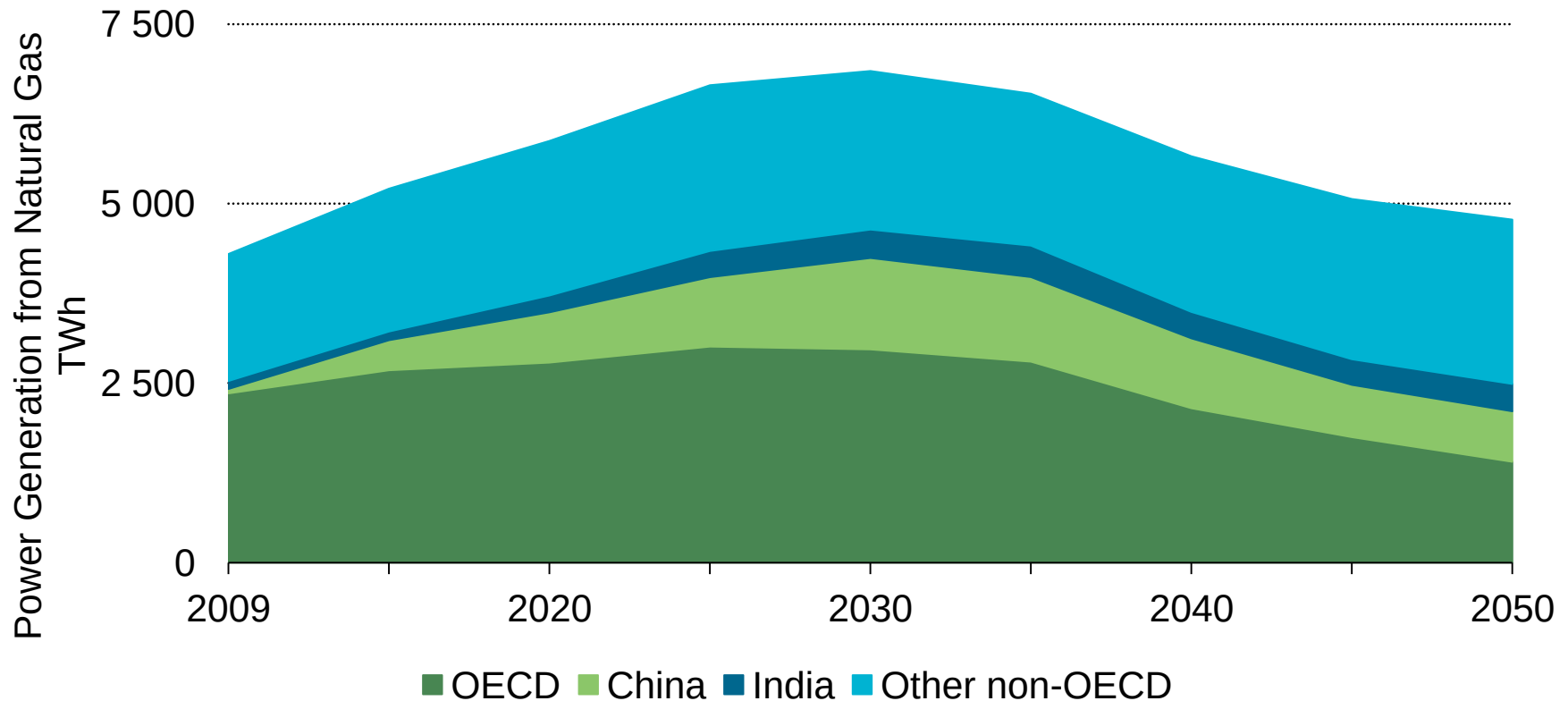
Pumped hydro  
facility



Scandinavian  
interconnections

# Natural Gas: a transitional fuel

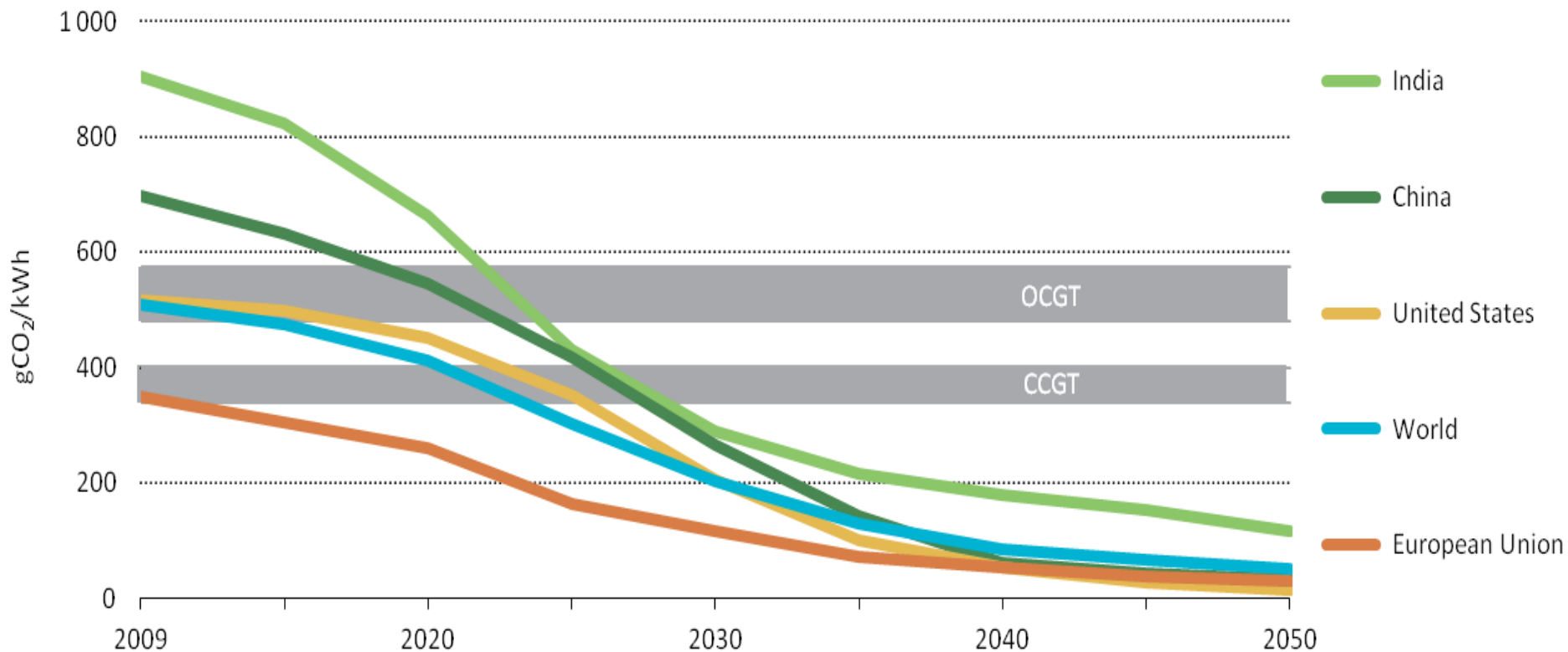
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*Around 2030, natural gas becomes 'high carbon'*

# Natural Gas is not a panacea

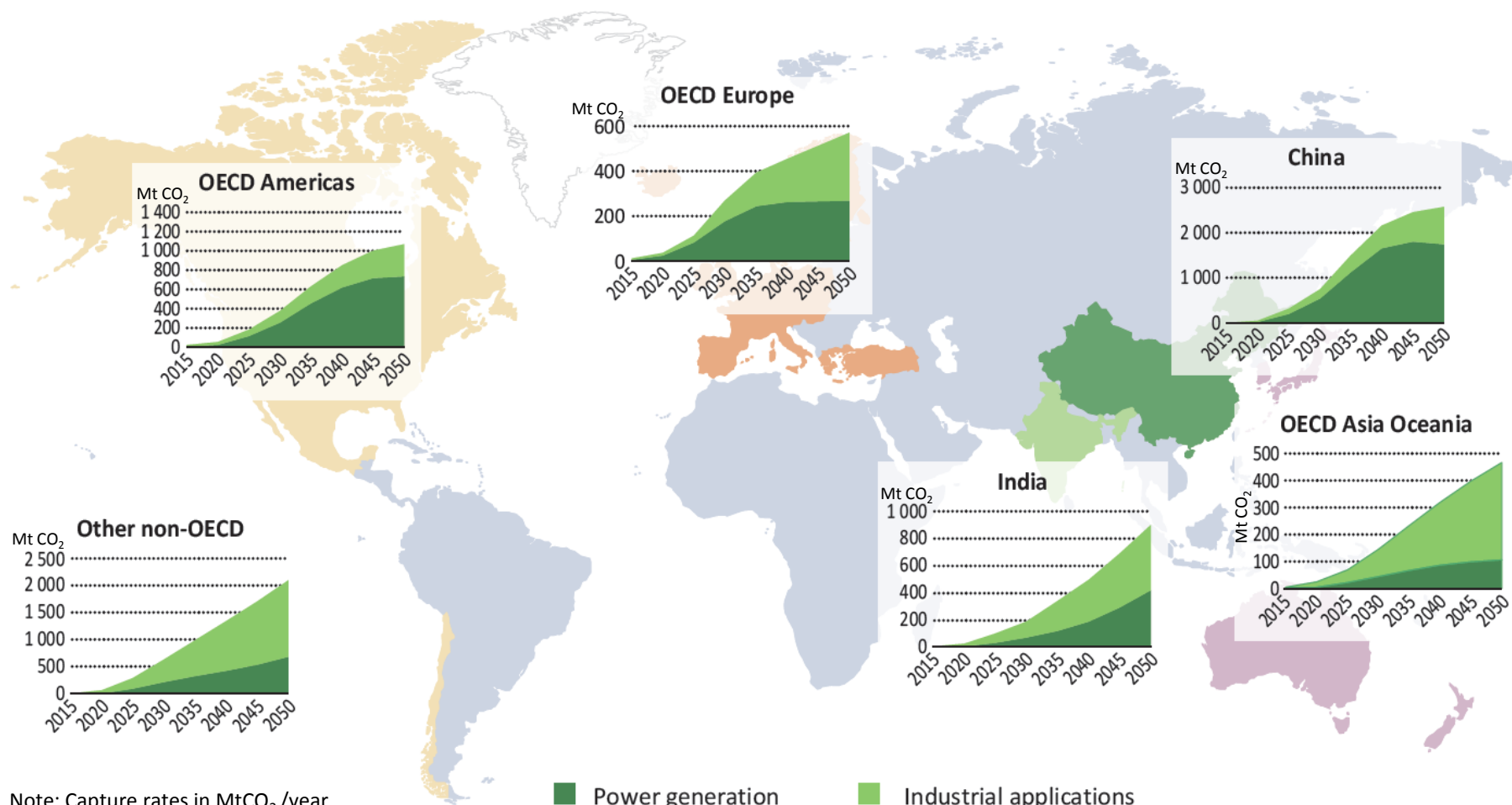
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*CCS must play a role if gas use should be high*

# The CCS infant must grow quickly

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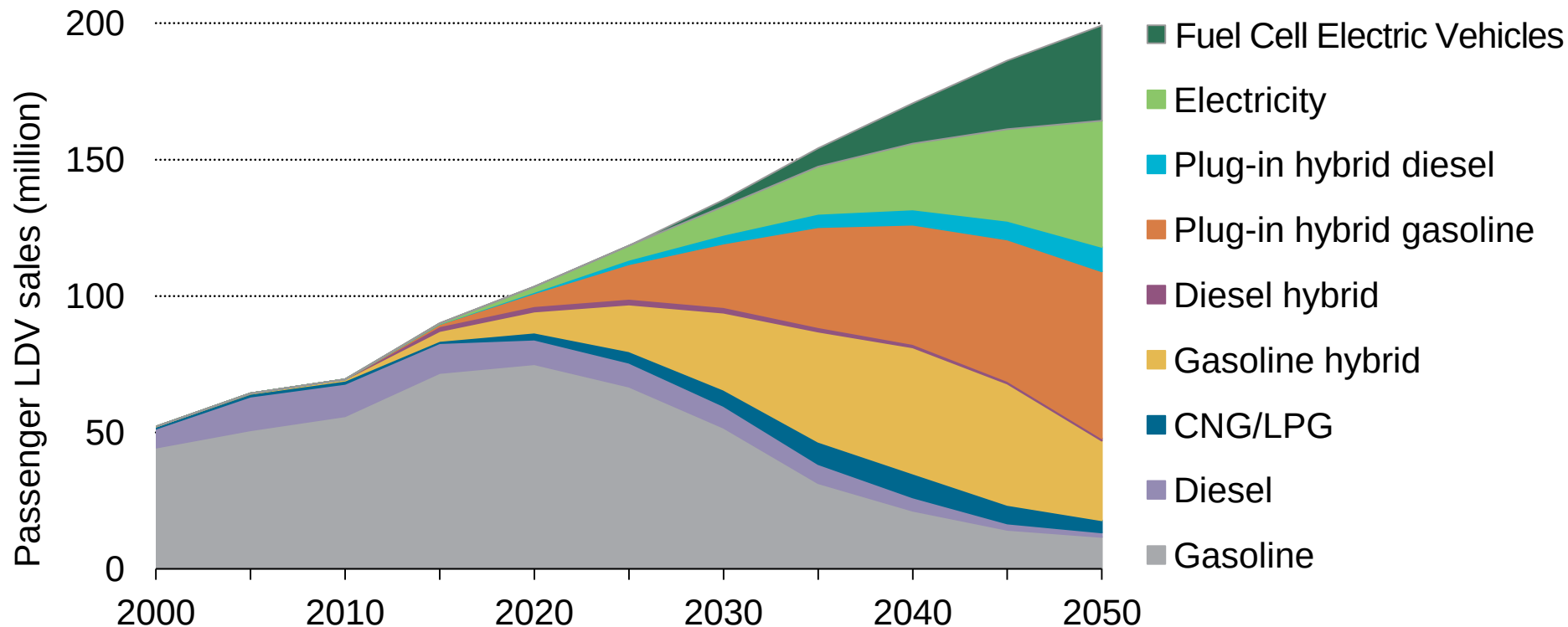


Note: Capture rates in MtCO<sub>2</sub>/year

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# Electric vehicles need to come of age

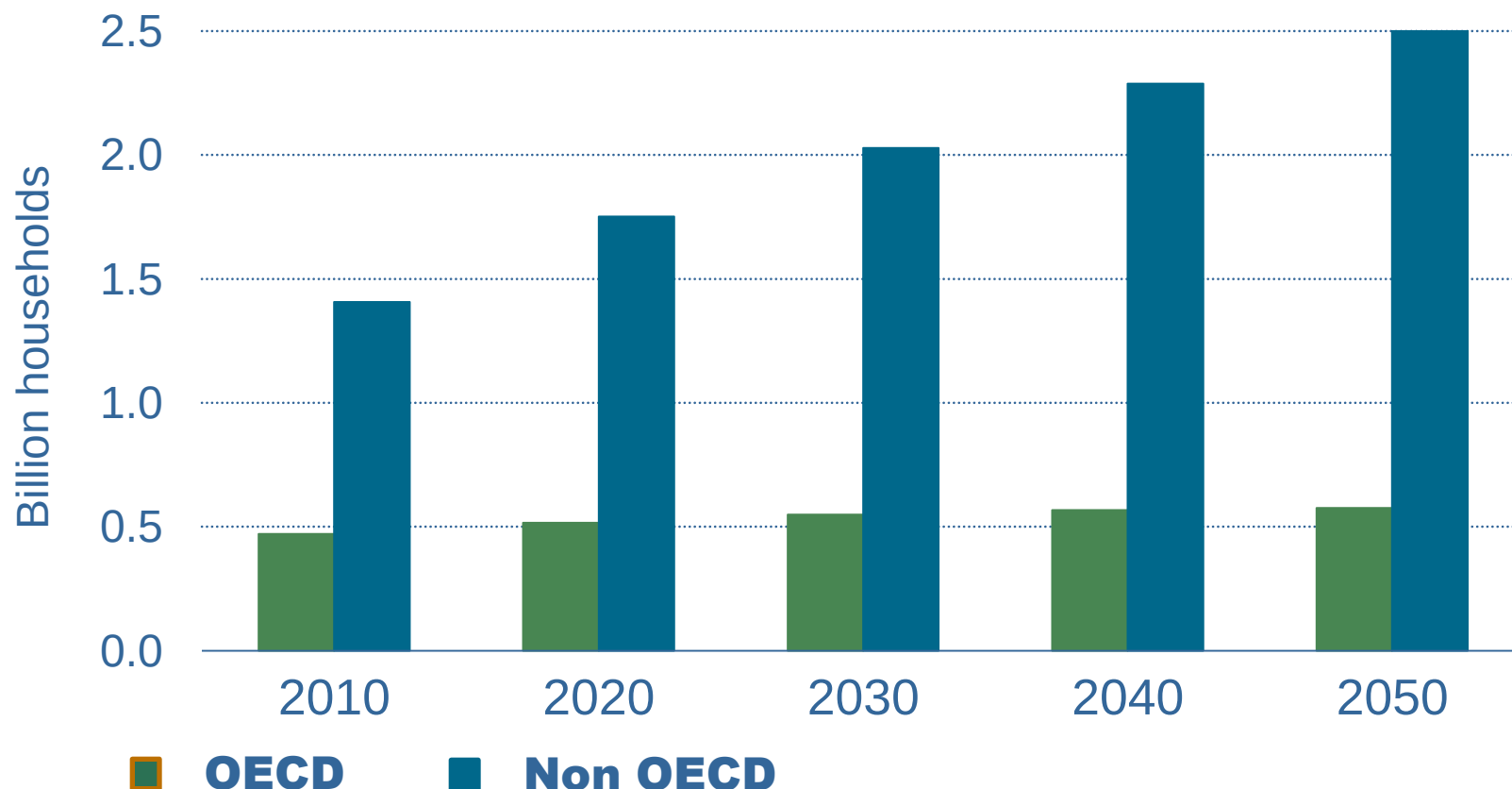
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*More than 90% of new light duty vehicles need to be propelled by an electric motor in 2050*

# Building sector challenges differ

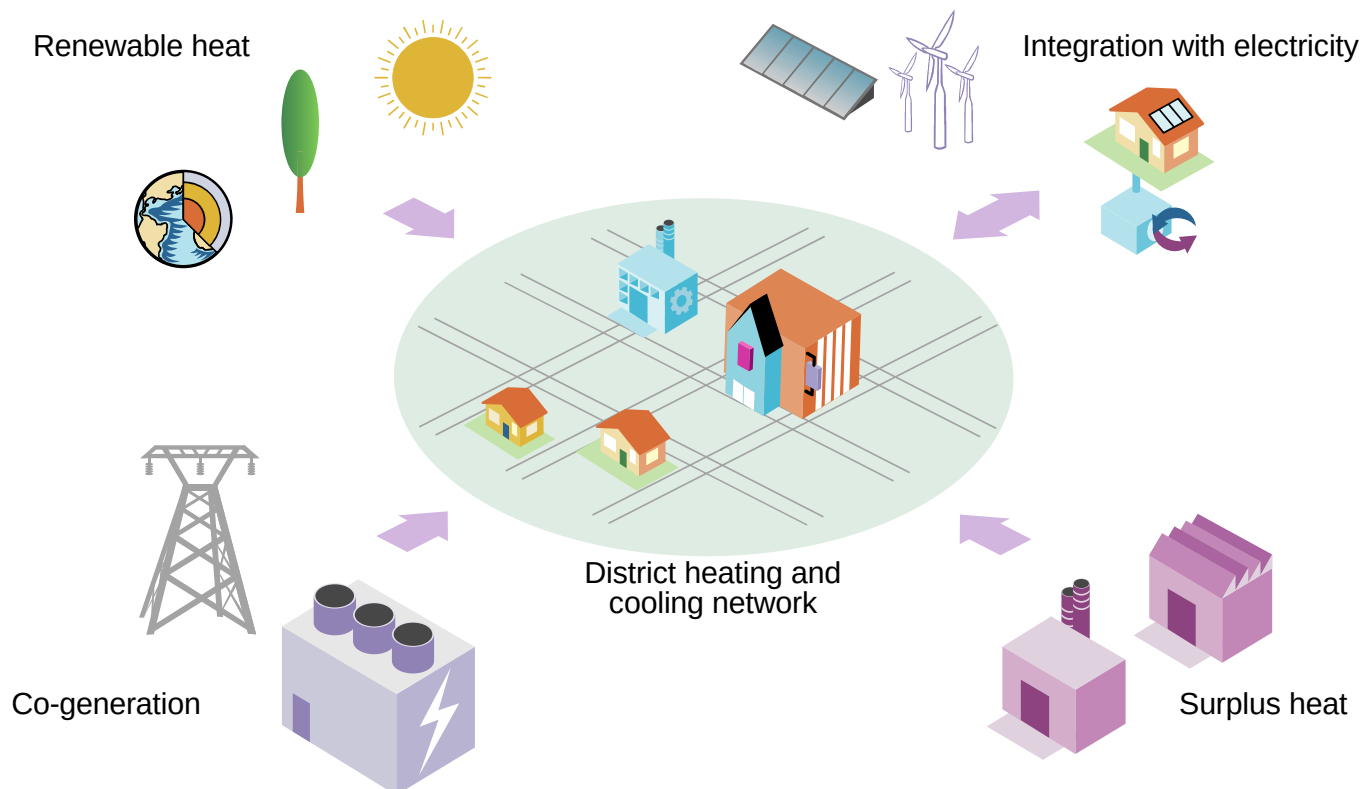
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*75% of current buildings in OECD will still be standing in 2050*

# Heating & Cooling: huge potential

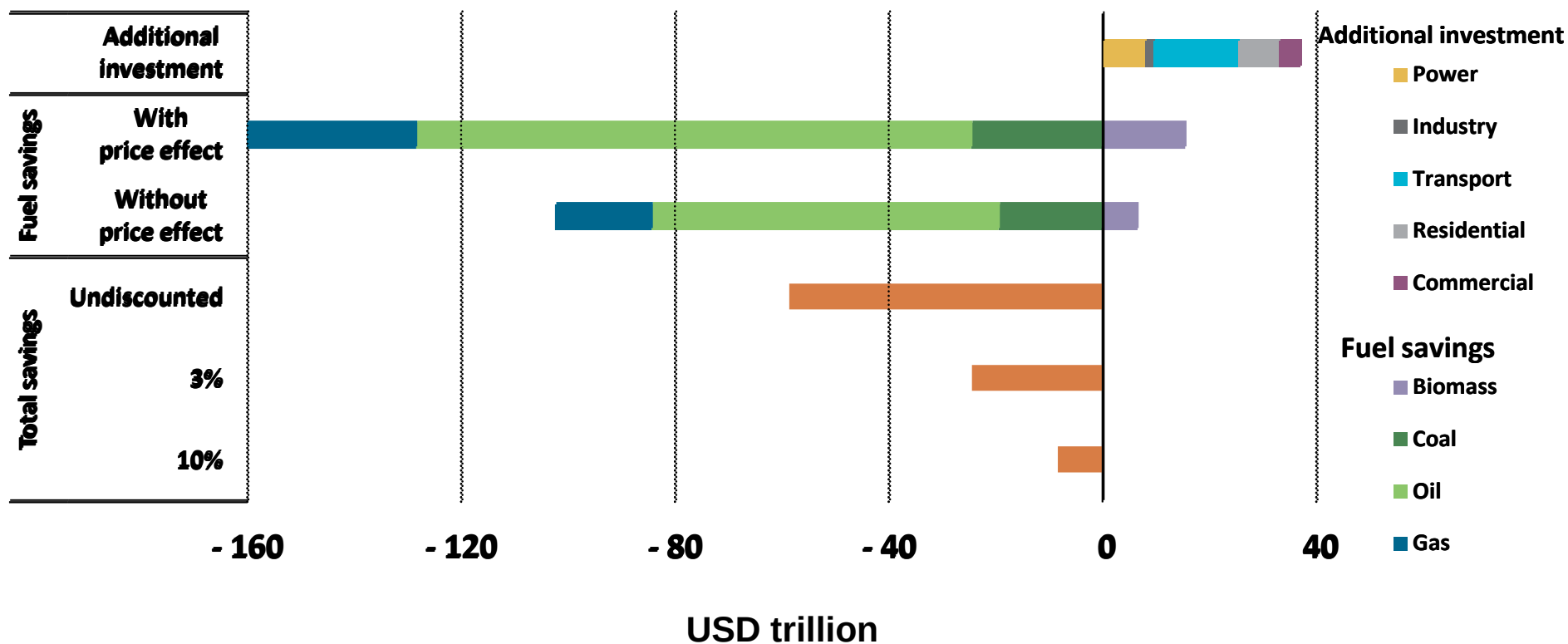
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*Heating and cooling account for 46% of global energy use.  
Their huge potential for cutting CO<sub>2</sub> emissions is often neglected.*

# Clean energy investment pays off

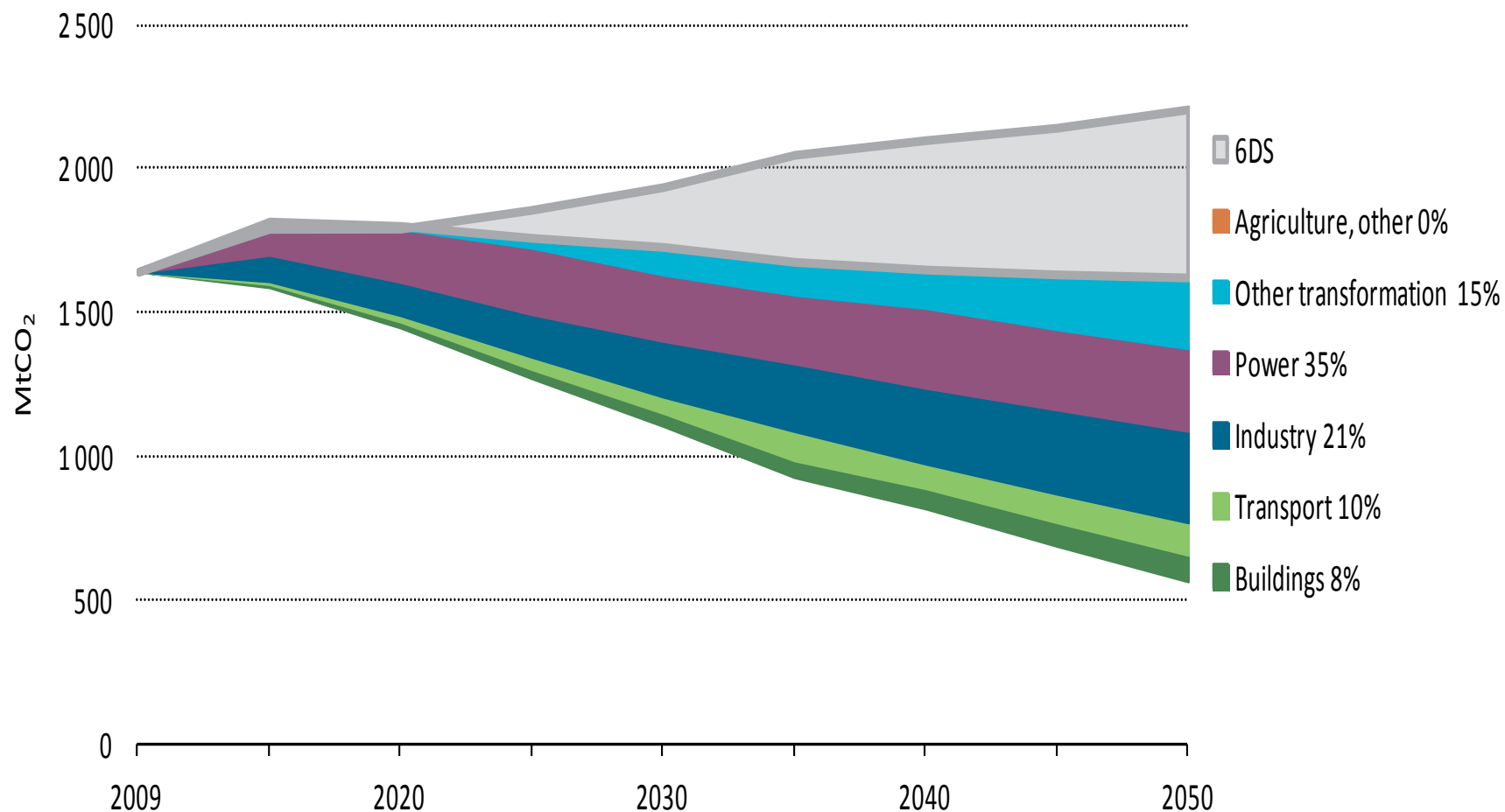
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*Every additional dollar invested in clean energy can generate 3 dollars in return.*

# Russia's CO<sub>2</sub> emissions need to drop dramatically

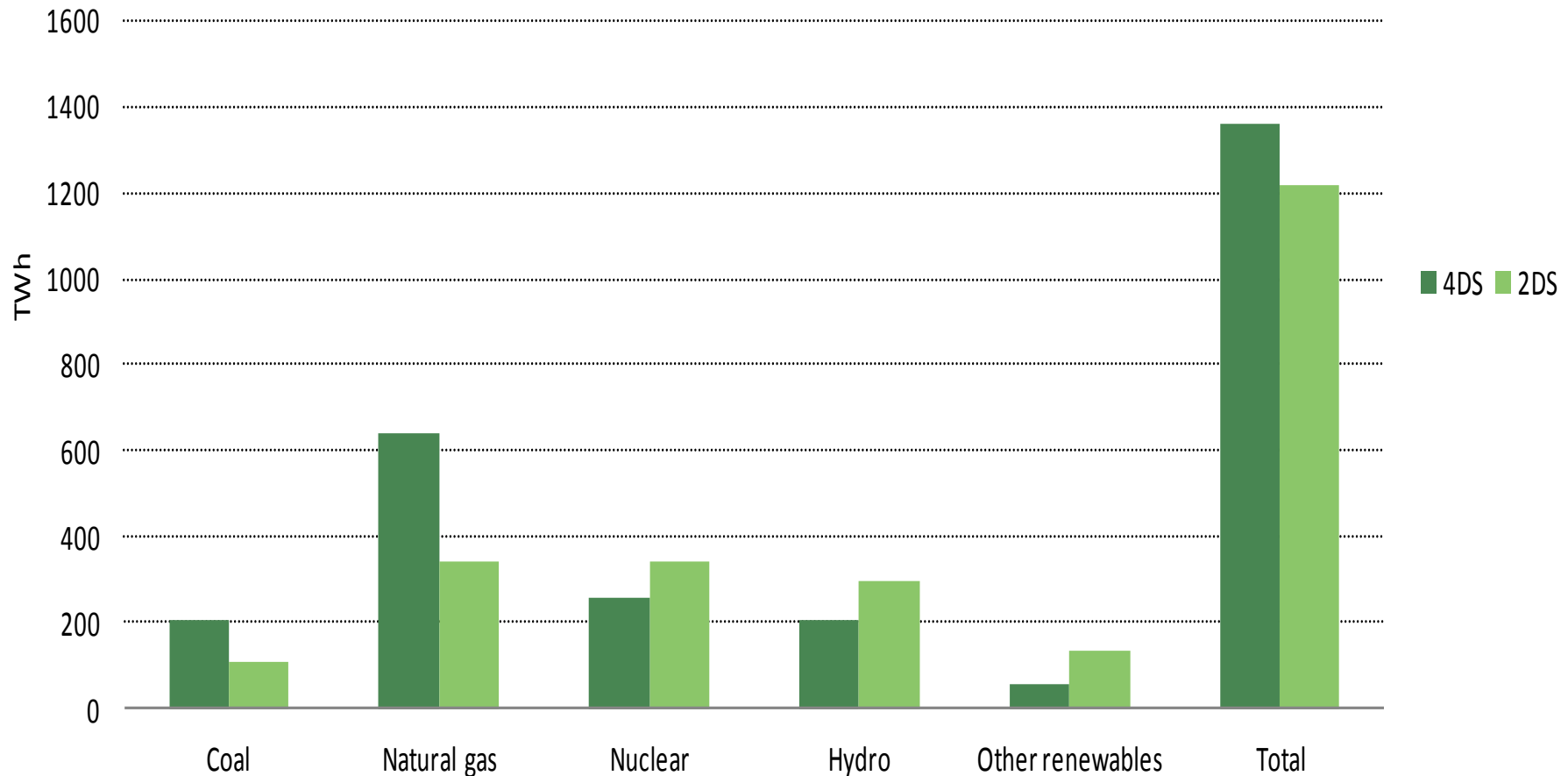
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- The power and industry sectors account for over half of the reductions relative to the 2DS

# Fossil-fuel based electricity generation drops by almost half in Russia by 2030

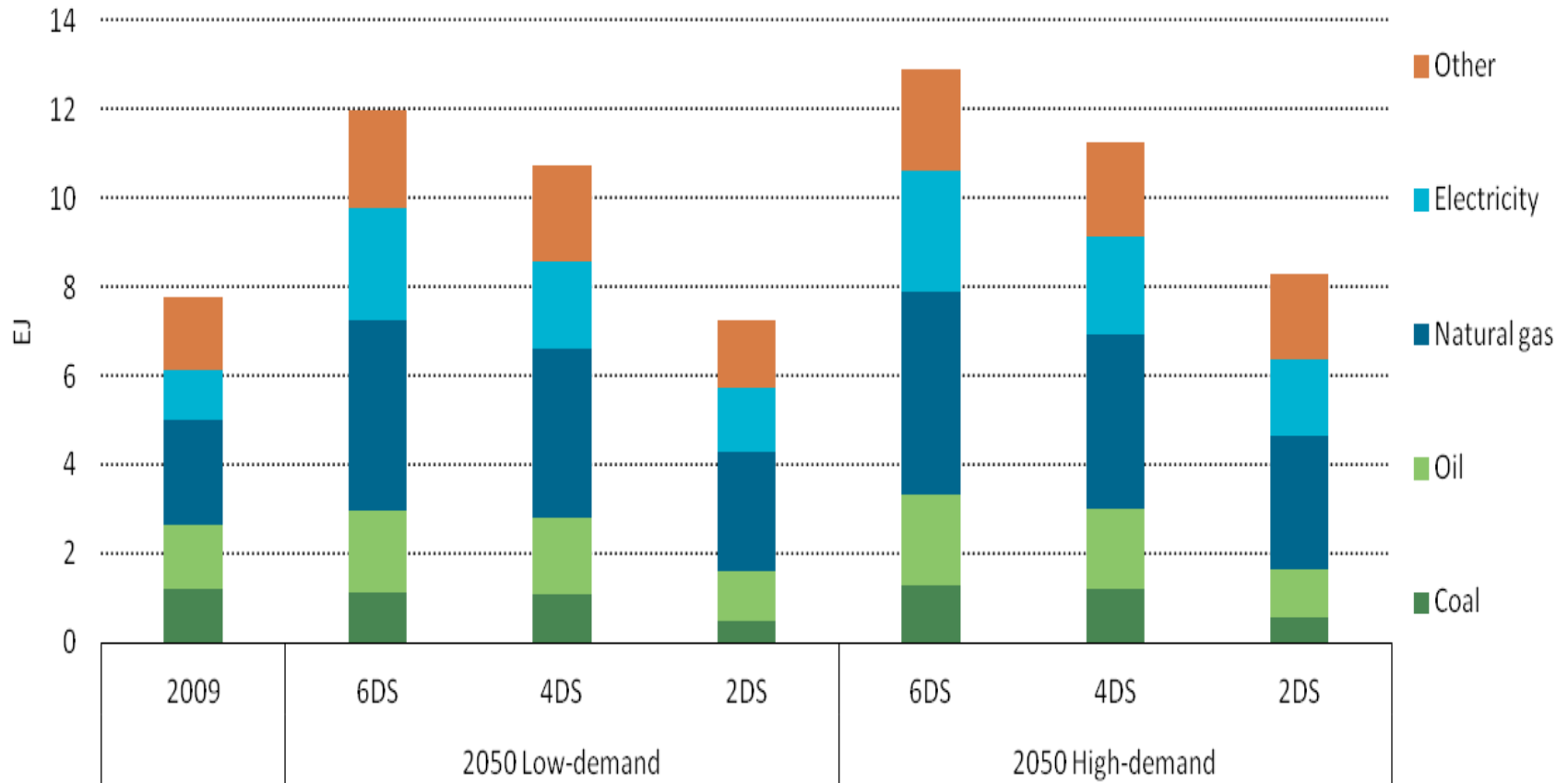
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- Increased electricity generation from nuclear and renewables is the key for Russia to get on track

# Huge efficiency potential in industry

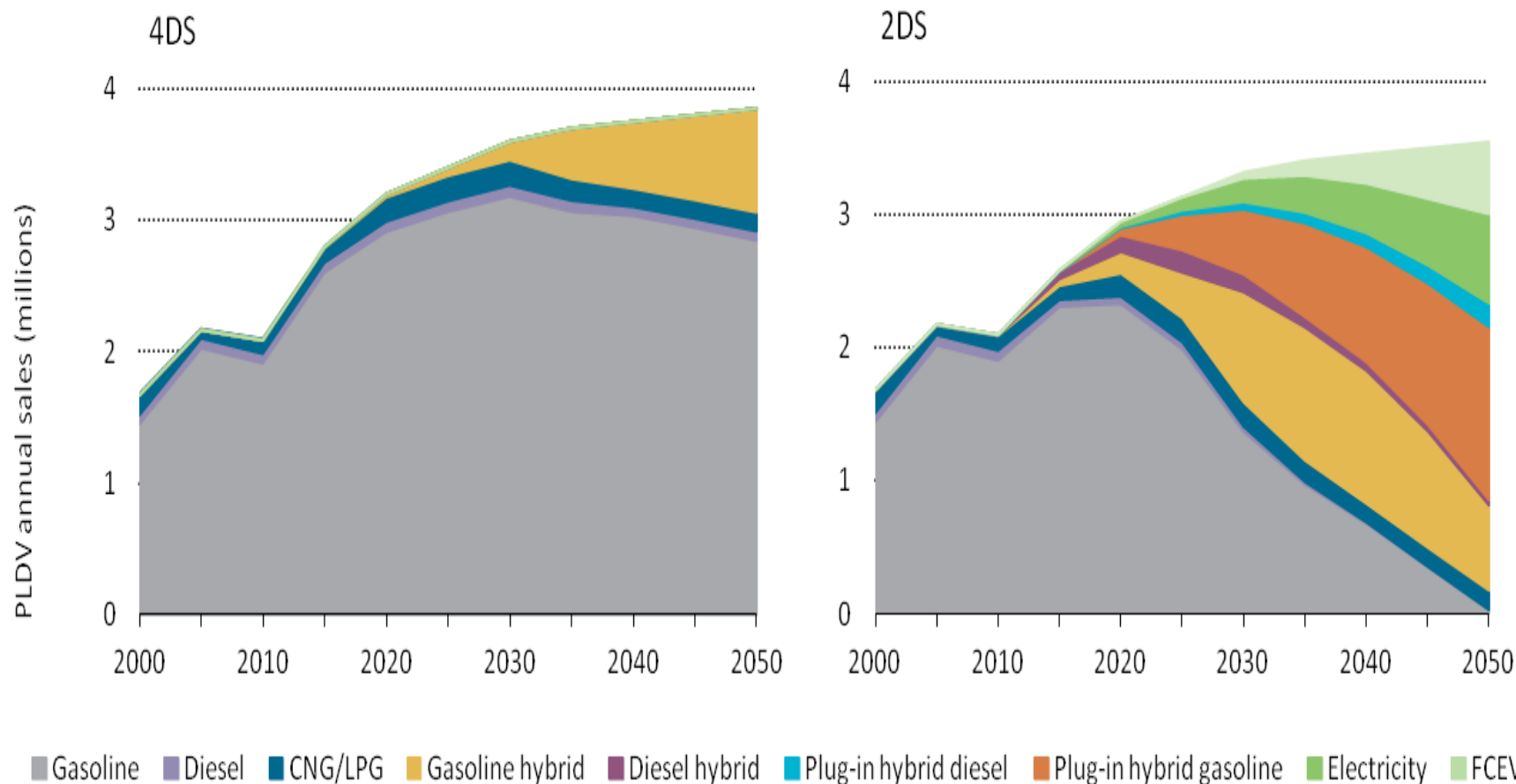
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- Energy efficiency measures through BATs brings 50% of the CO<sub>2</sub> reductions
- A fuel mix dominated by natural gas is also key

# Electrifying Russian transport

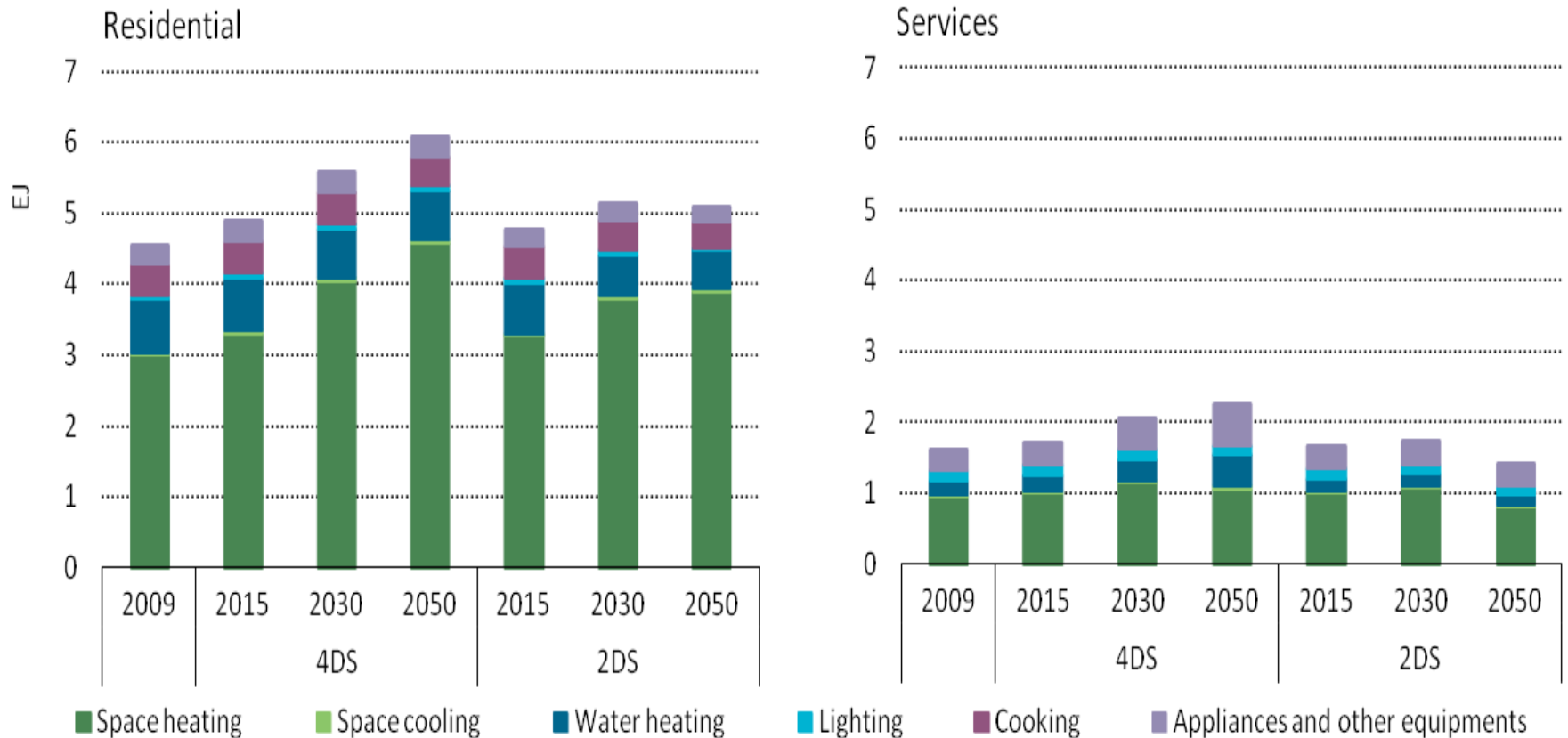
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*Hybrid, plug-in hybrid or battery electric vehicles will be key to increasing vehicle efficiency in Russia*

# Limiting buildings' energy use

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- Effective implementation of energy efficiency policies critical
- Large-scale refurbishment of ageing buildings to stringent code levels

# Russia's room to manoeuvre

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- ETP 2012 projects a very different path for Russia
- High average age of infrastructure brings opportunity
- Creation of Russian Technology Platforms
- Presidential focus on innovation and modernisation
- Overall investment environment
- Regulatory framework needs to be completed
- IEA stands ready to work with Russia

# Sustainable future still in reach

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Are we on track to  
reach a clean  
energy future?

**NO** **X**

Can we get on  
track?

**YES** **✓**

Is a clean energy  
transition urgent?

**YES** **✓**

# Recommendations to Governments

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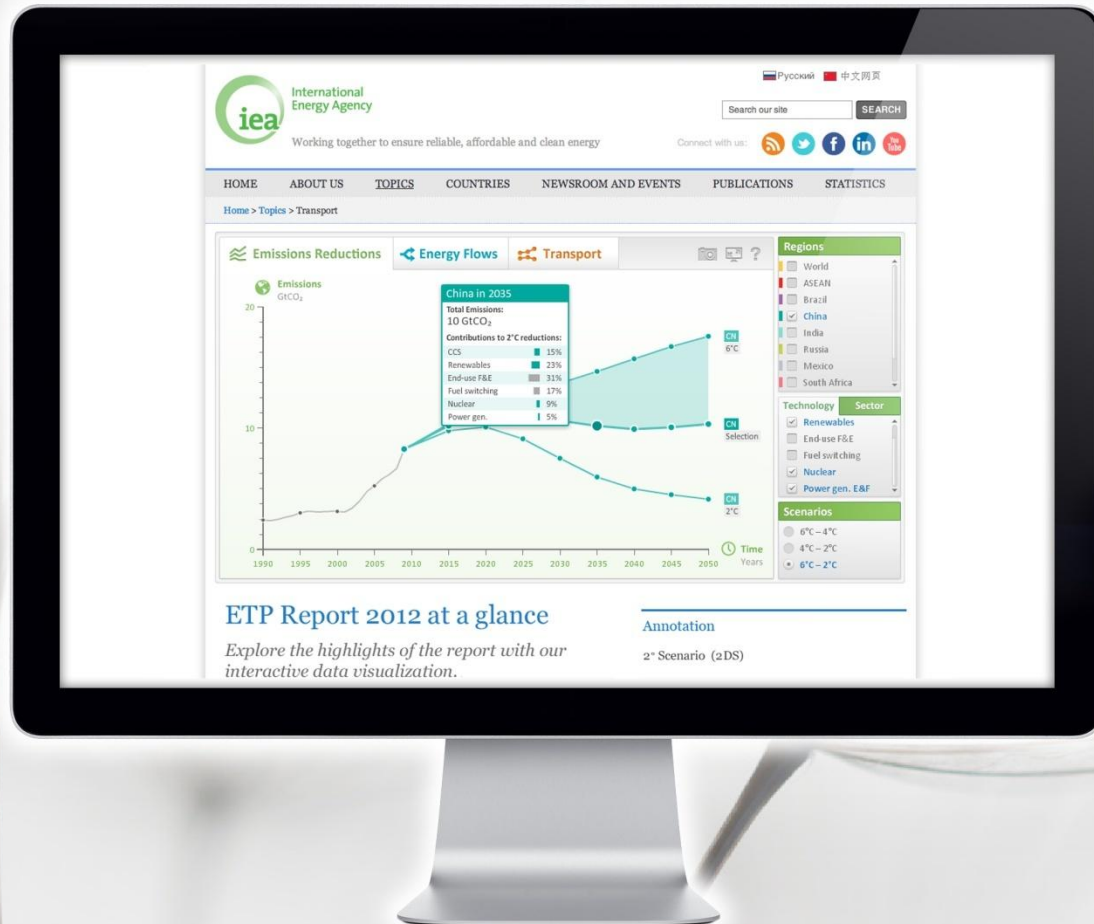
1. Create an investment climate of confidence in clean energy

2. Unlock the incredible potential of energy efficiency – “the hidden” fuel of the future

3. Accelerate innovation and public research, development and demonstration (RD&D)



# Explore the data behind *ETP*



[www.iea.org/etp](http://www.iea.org/etp)