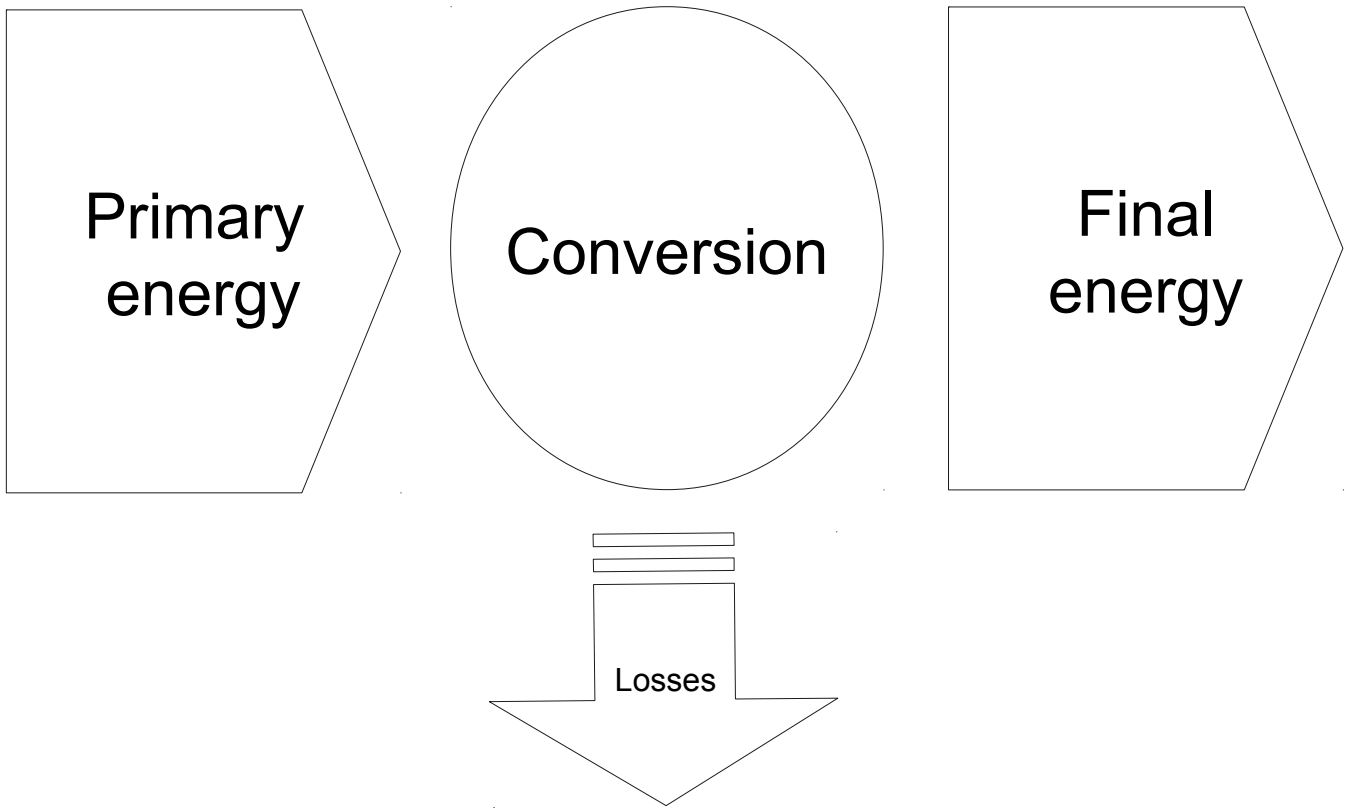
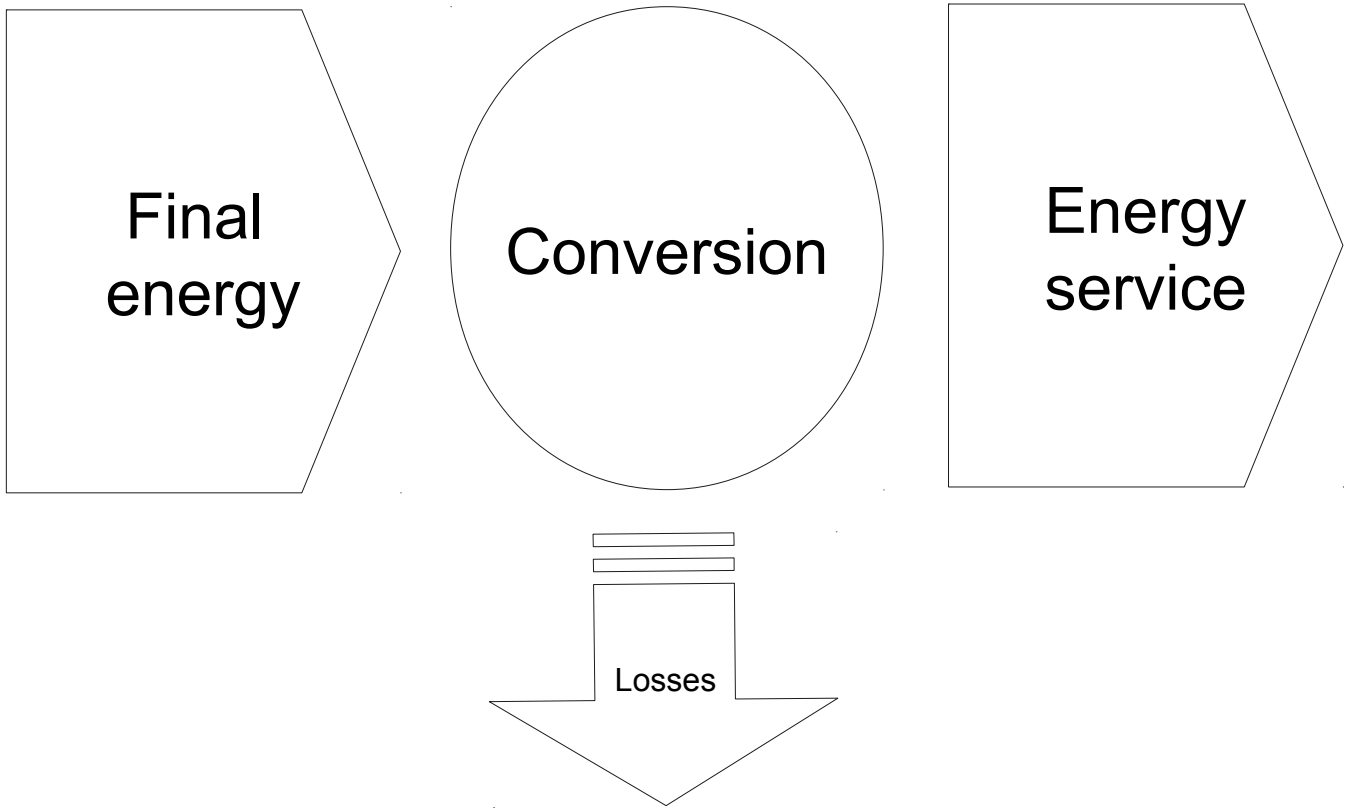
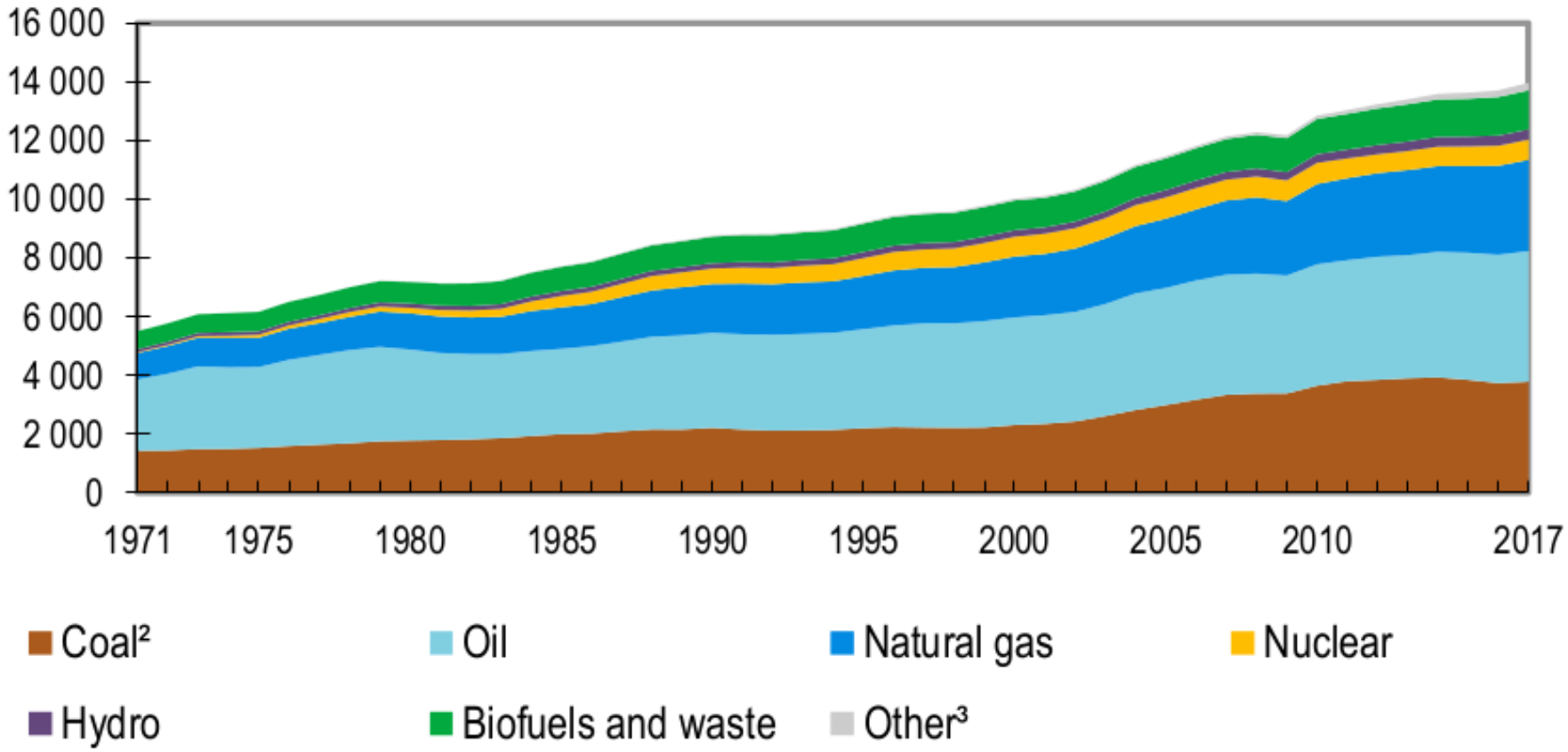
World energy supply and demand, policy drivers, the global role of energy efficiency


Primary energy
Conversion
Final energy
Losses

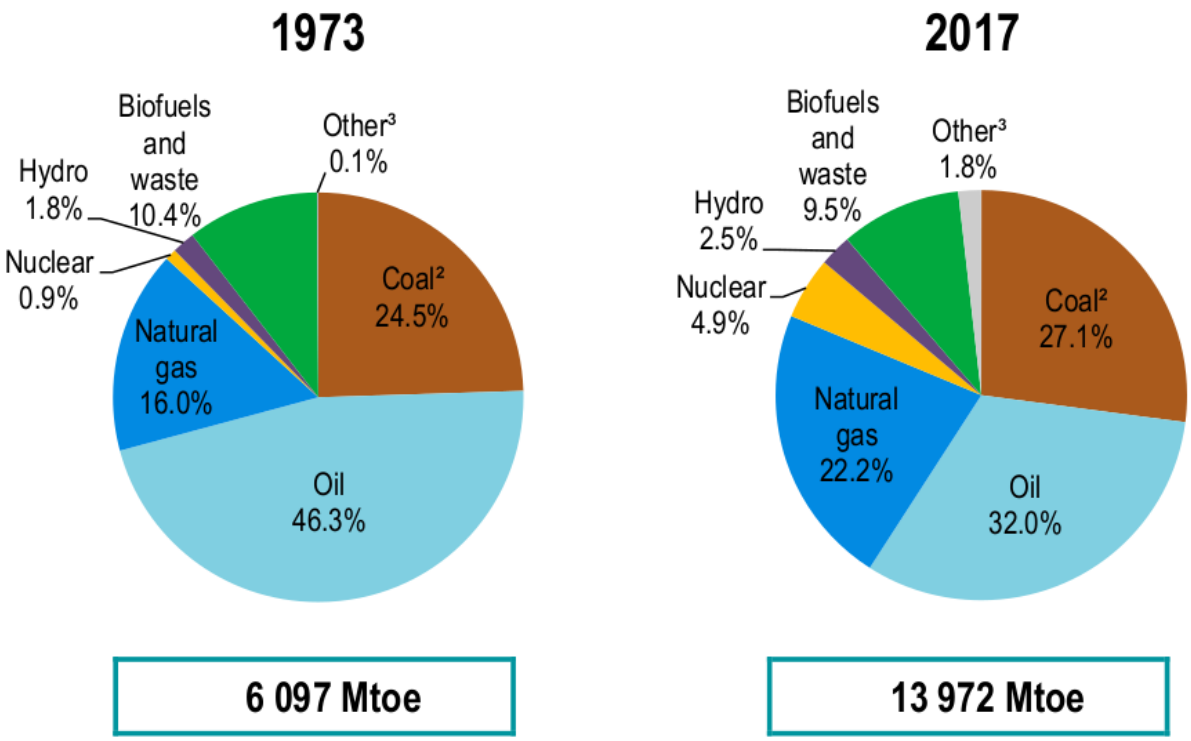

Final energy
Conversion
Energy service
Losses

World[1] TPES from 1971 to 2017 by source (Mtoe)



Source:IEA 2019

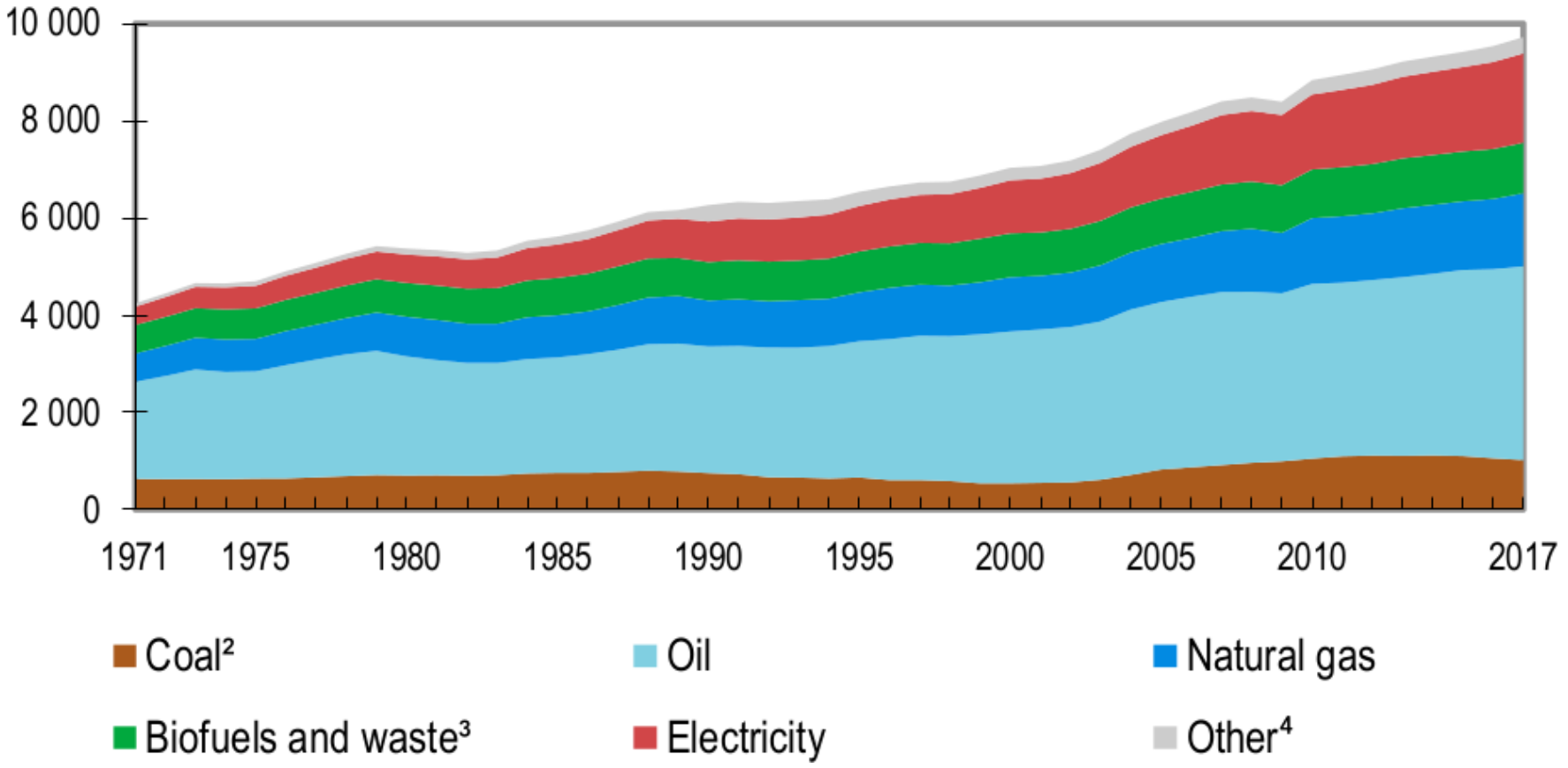
1973 and 2017 source shares of TPES



1. World includes international aviation and international marine bunkers.
2. In these graphs, peat and oil shale are aggregated with coal.
3. Includes geothermal, solar, wind, tide/wave/ocean, heat and other sources.

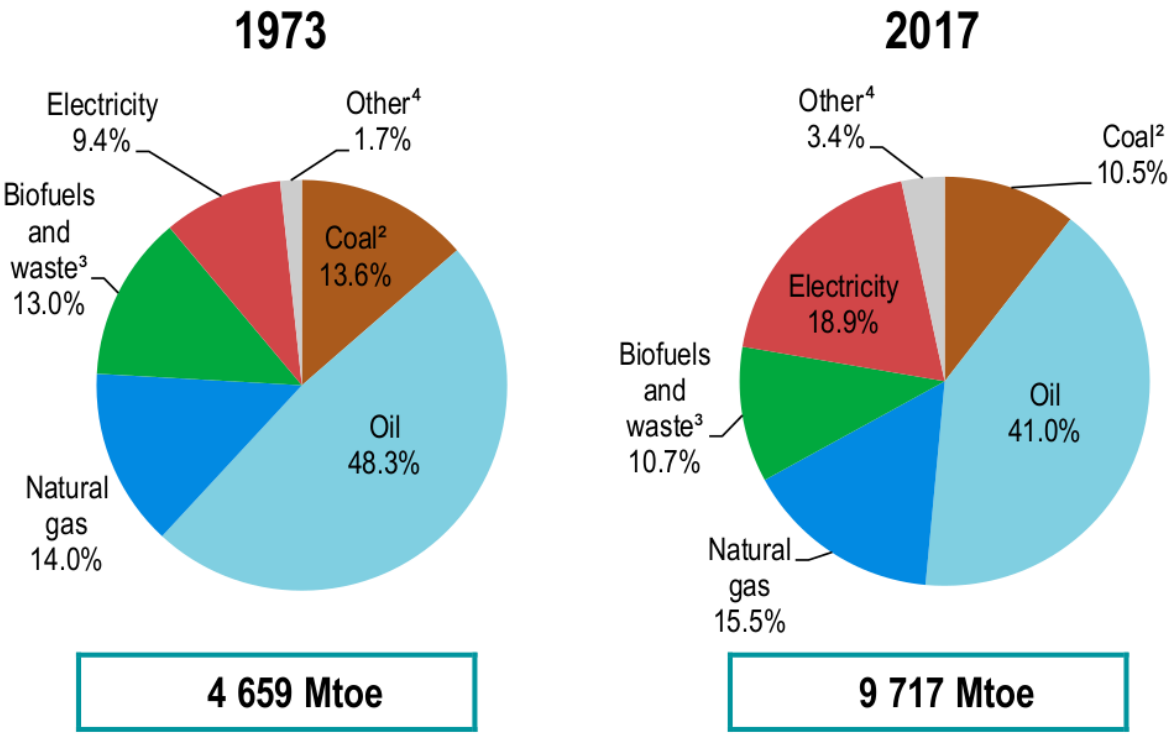
Source:IEA 2019

World[1] TFC from 1971 to 2017 by source (Mtoe)



Source:IEA 2019

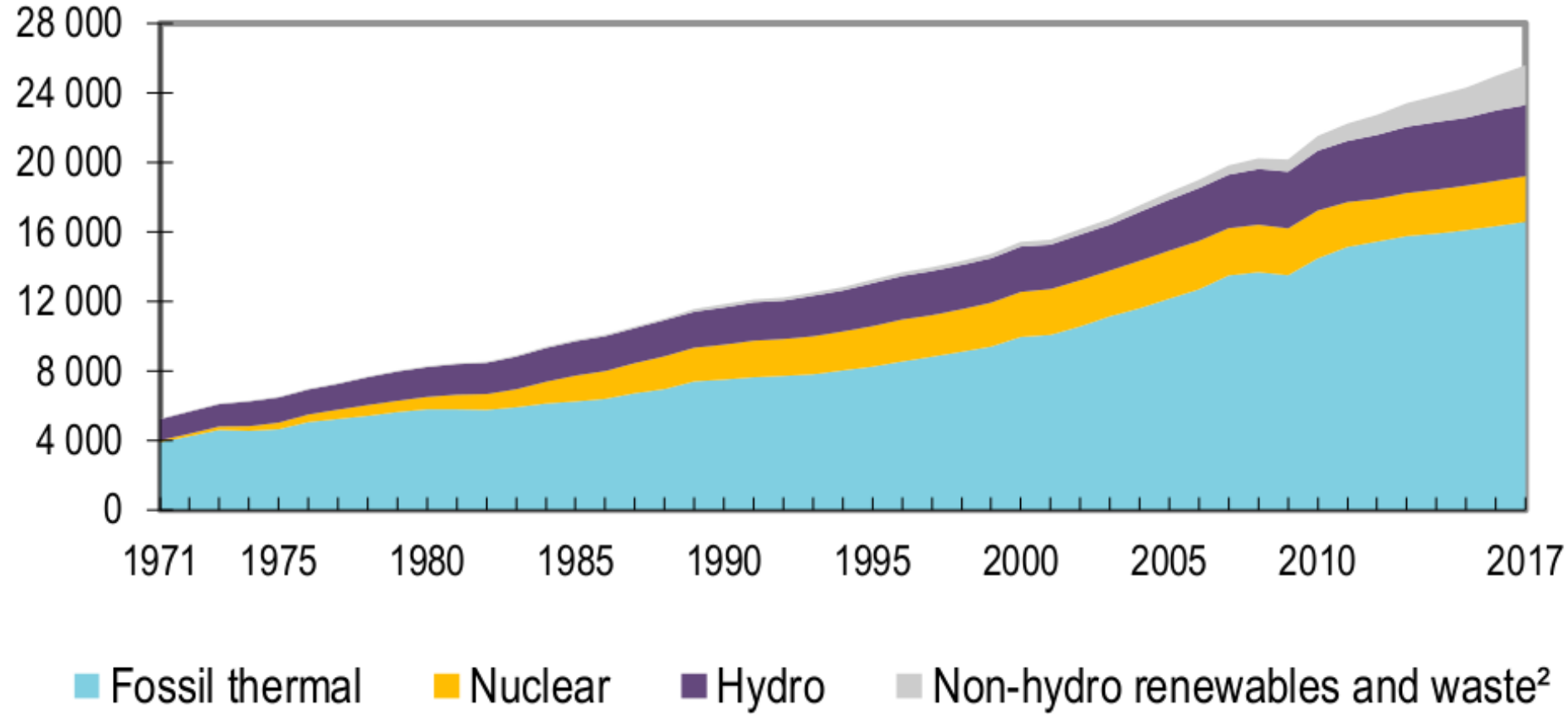
1973 and 2017 source shares of TFC



1. World includes international aviation and international marine bunkers.
2. In these graphs, peat and oil shale are aggregated with coal.
3. Data for biofuels and waste final consumption have been estimated for a number of countries.
4. Includes heat, solar thermal and geothermal.

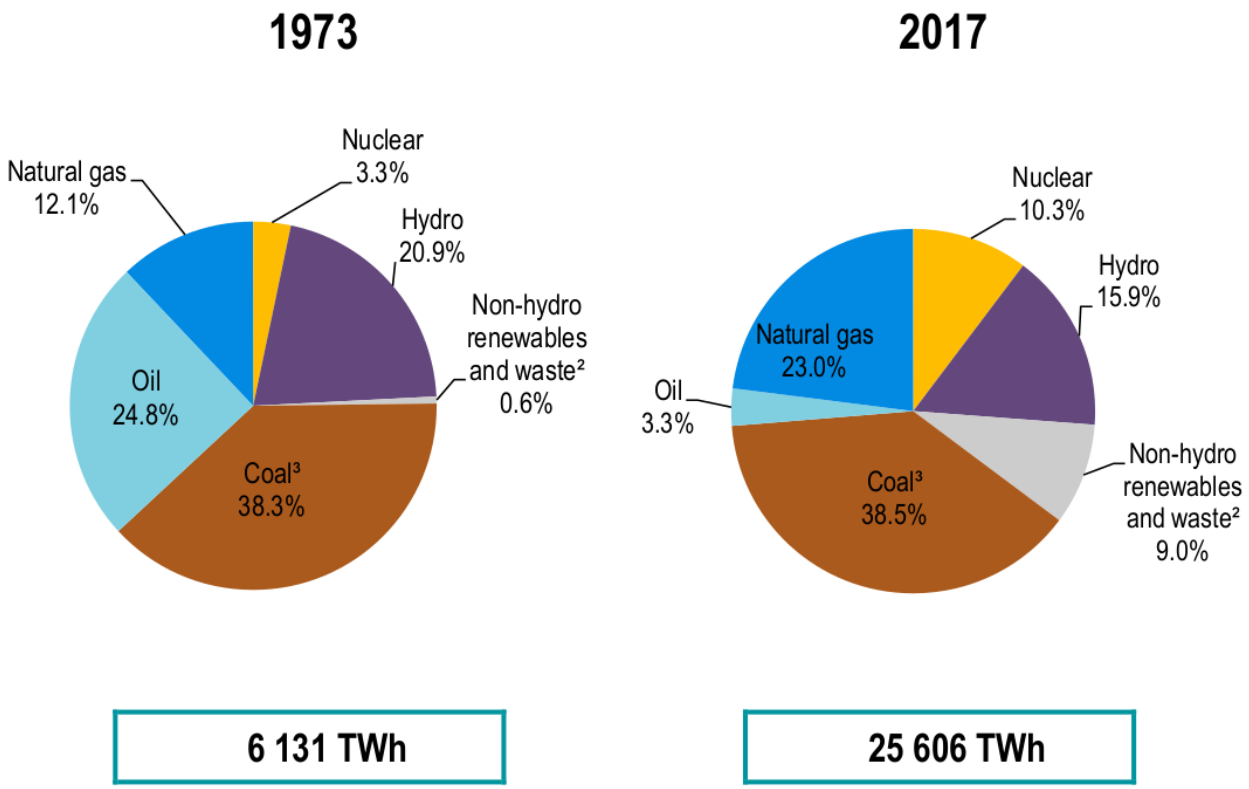
Source:IEA 2019

World electricity generation[1] from 1971 to 2017 by fuel (TWh)



Source:IEA 2019

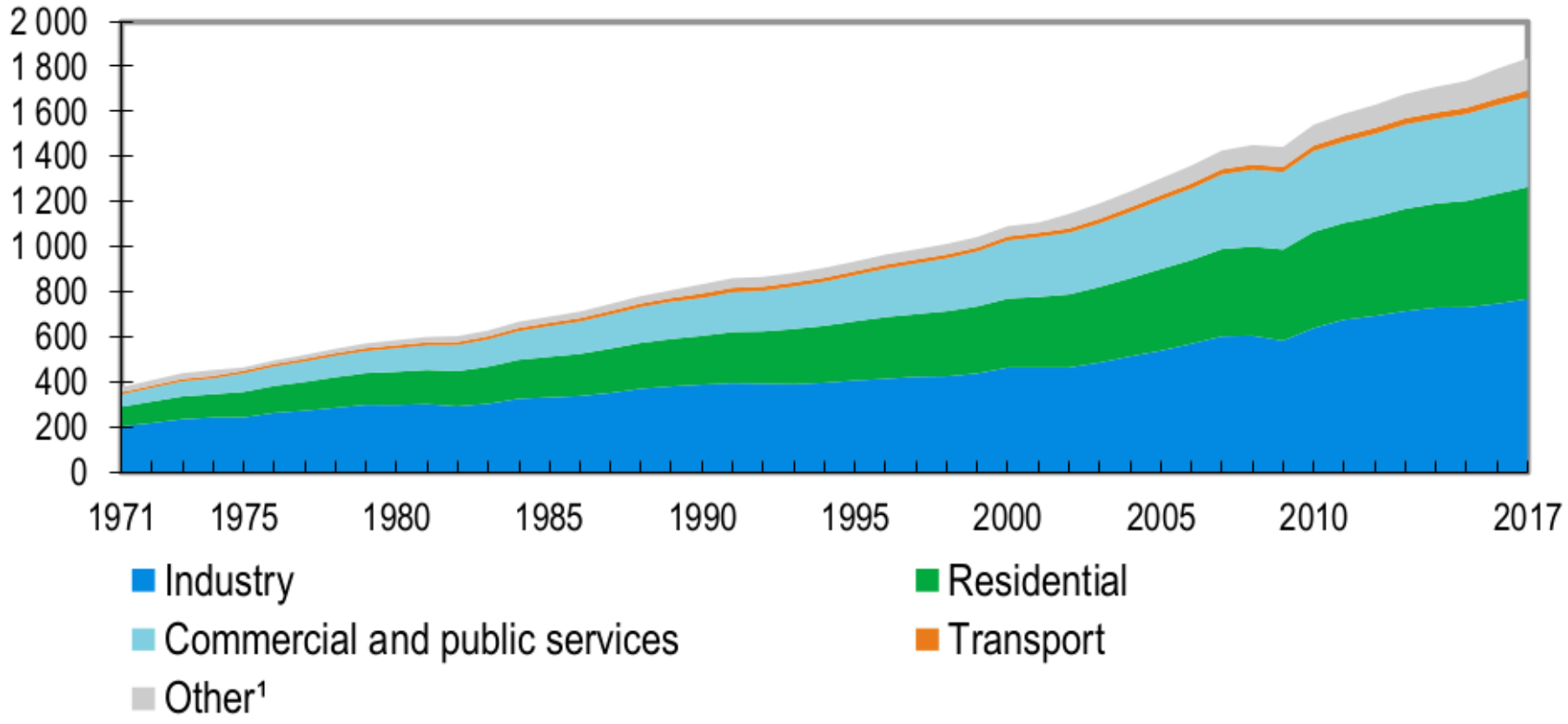
1973 and 2017 source shares of electricity generation[1]



1. Excludes electricity generation from pumped storage.
2. Includes geothermal, solar, wind, tide/wave/ocean, biofuels, waste, heat and other.
3. In these graphs, peat and oil shale are aggregated with coal.

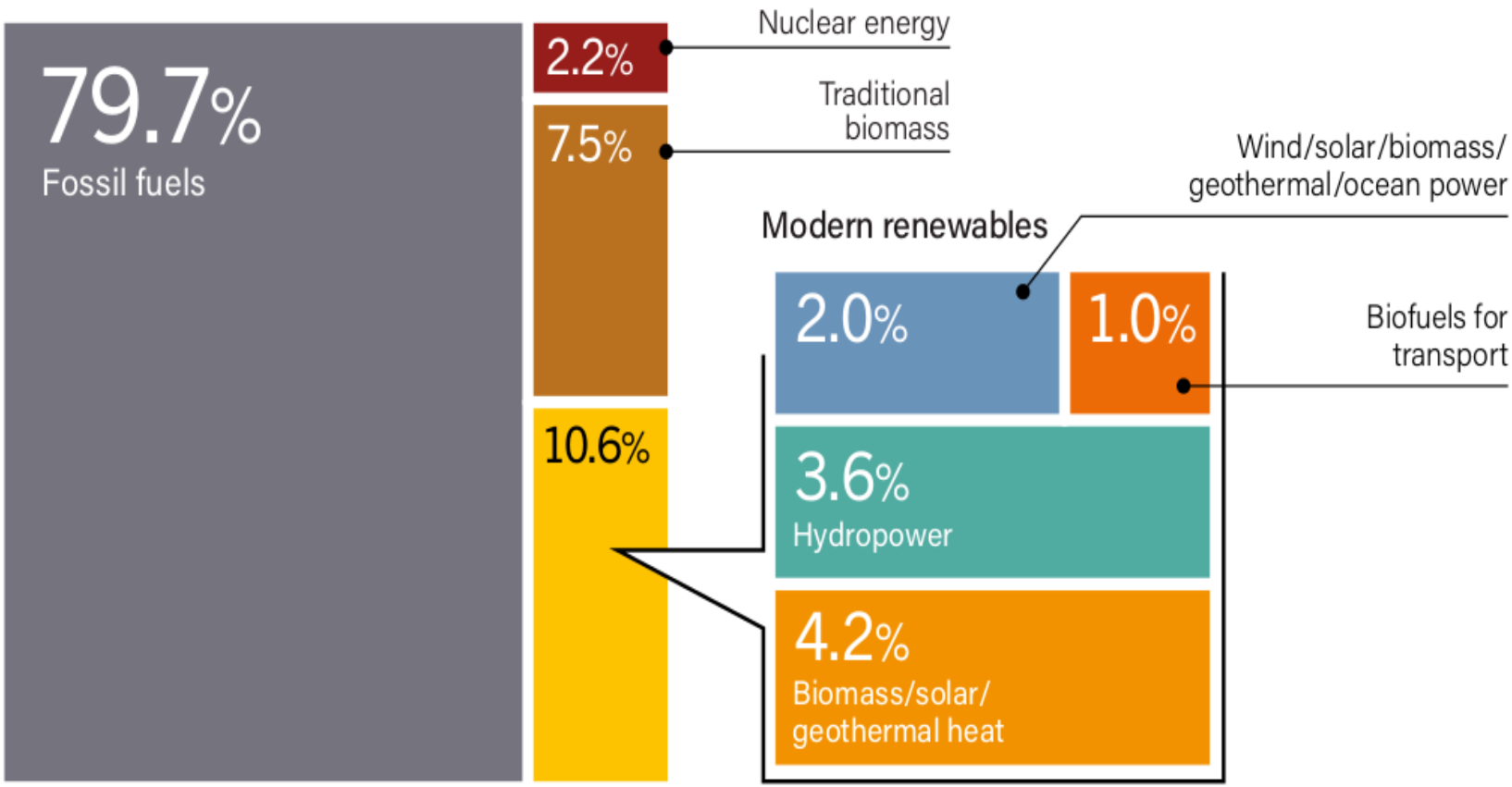
Source:IEA 2019

Electricity TFC from 1971 to 2017 by sector (Mtoe)

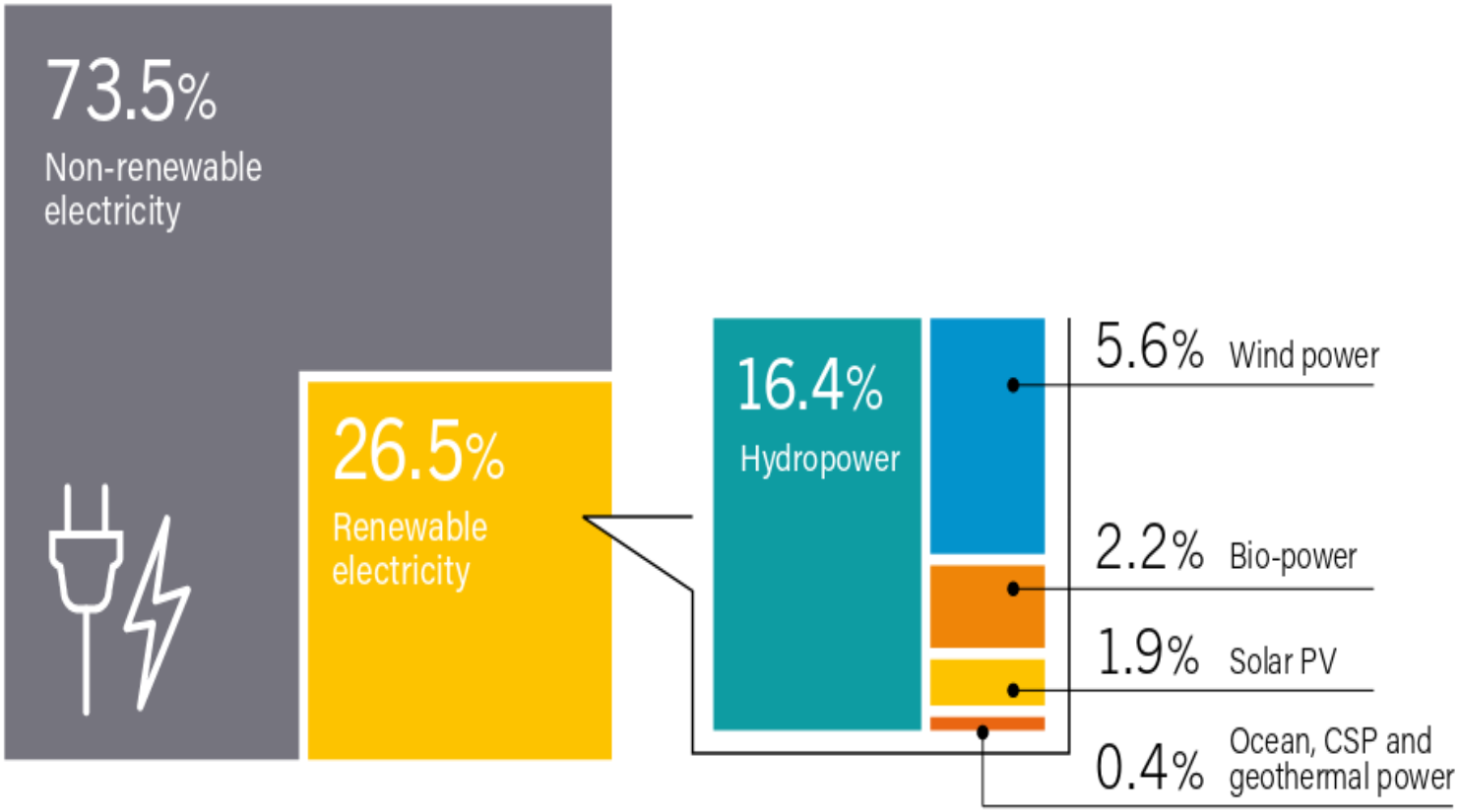


Source:IEA 2019

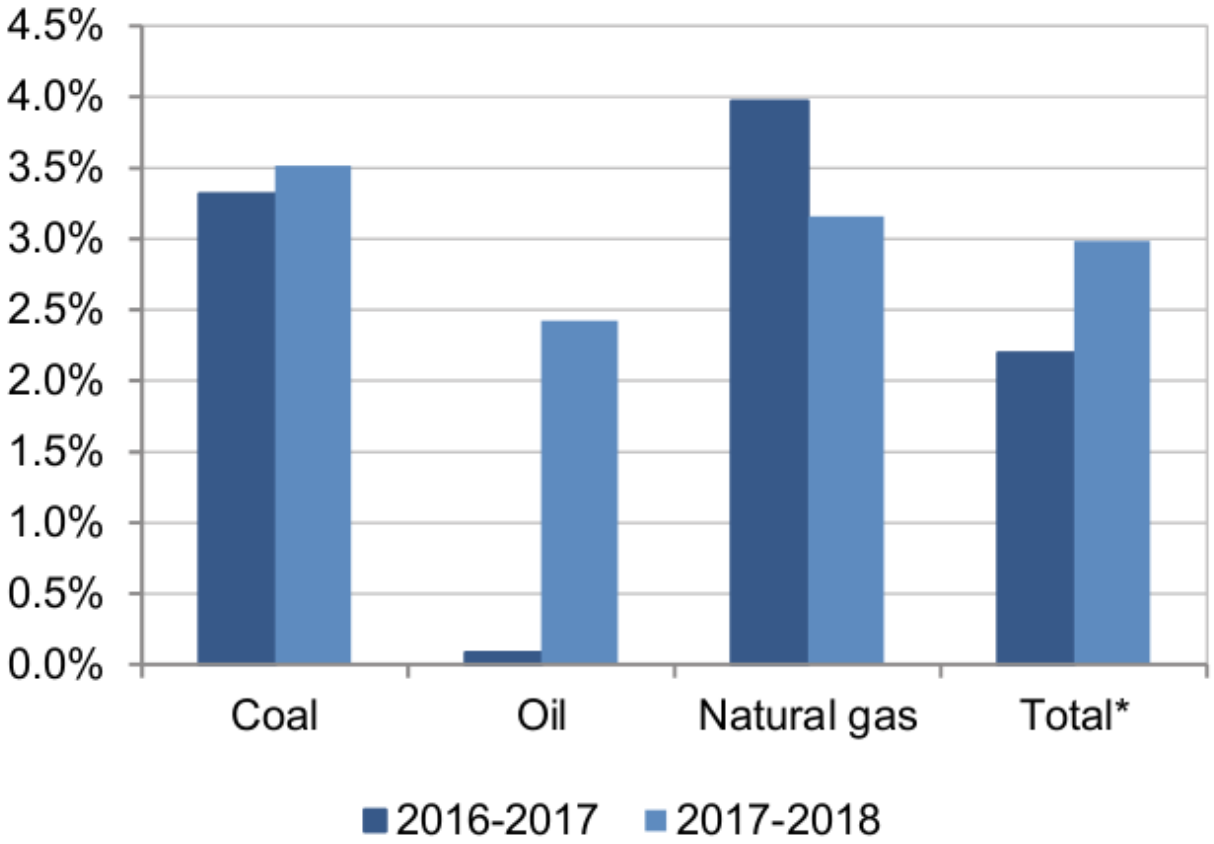
Renewable share of final energy consumption (2017)



Renewable share of electricity production (2017)

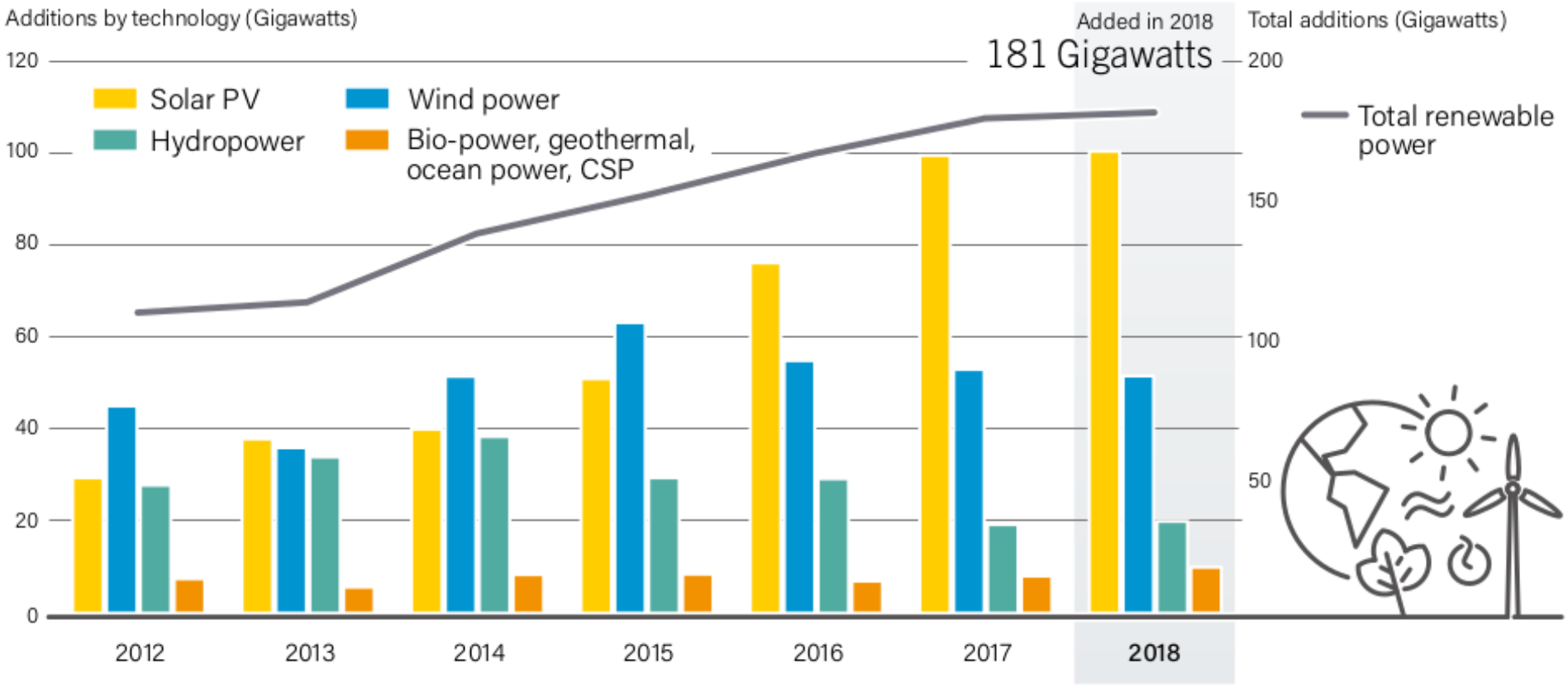


Annual average change in global fossil fuels production by fuel



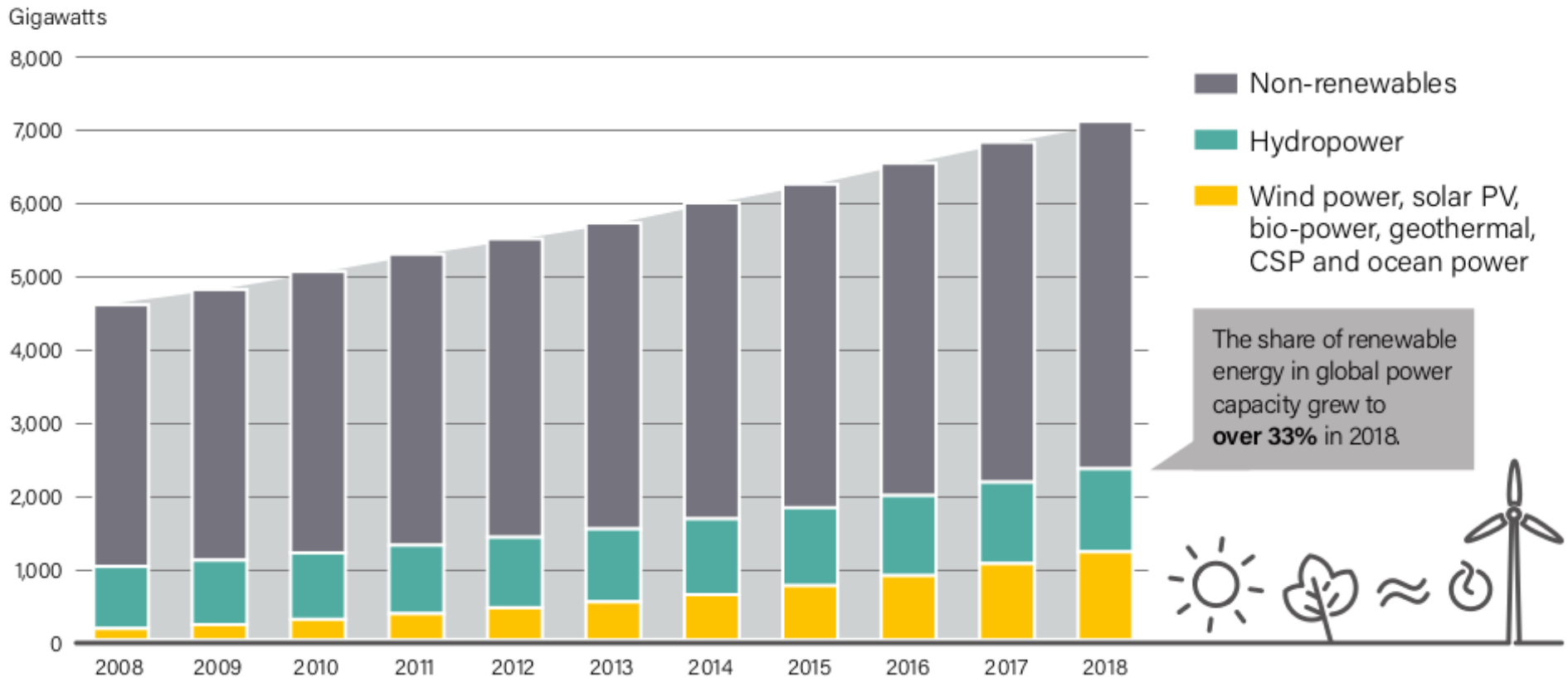
Source:IEA 2019

Annual Additions of Renewable Power Capacity, by Technology and Total, 2012-2018



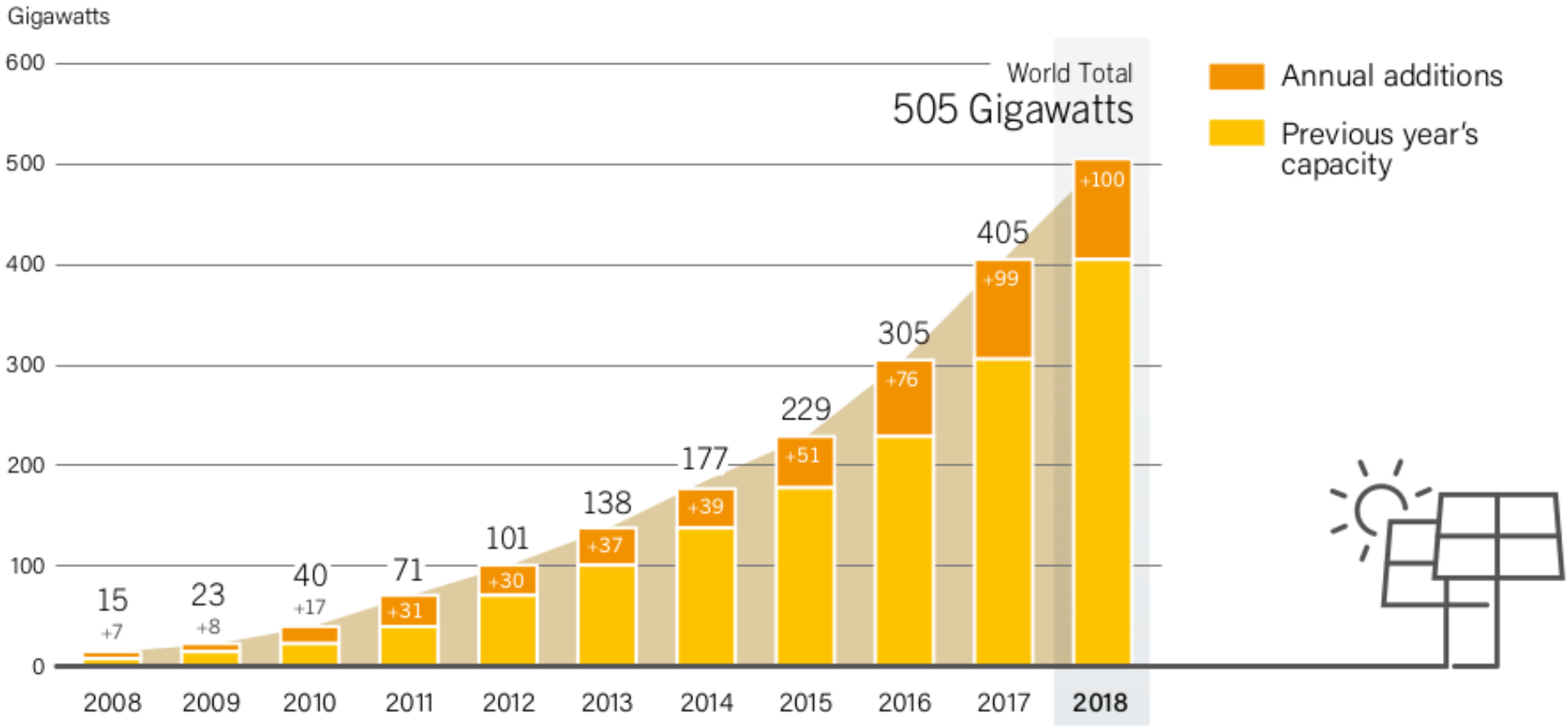
Source:REN 2019

Global Power Generating Capacity, by Source, 2008-2018



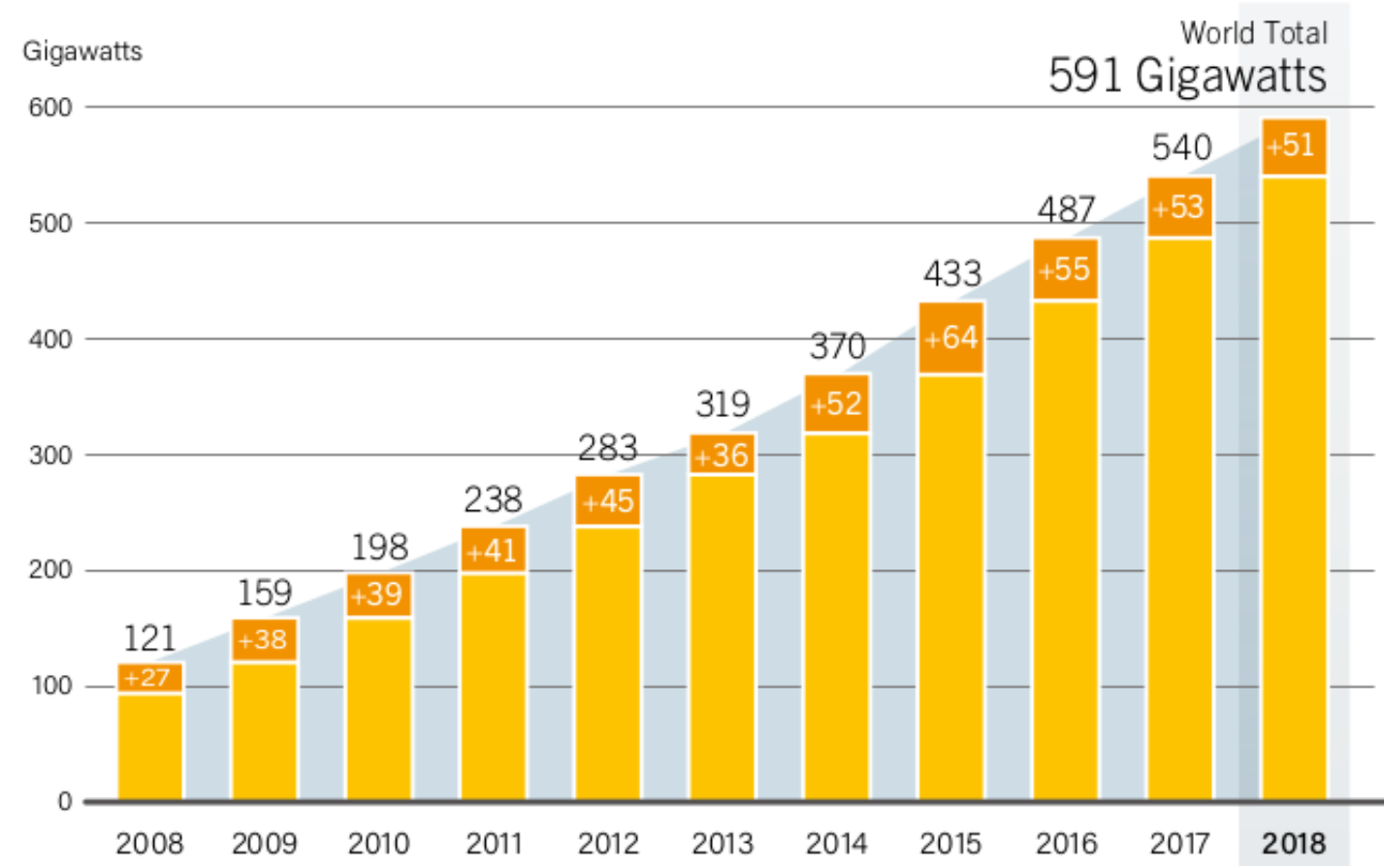
Source:REN 2019

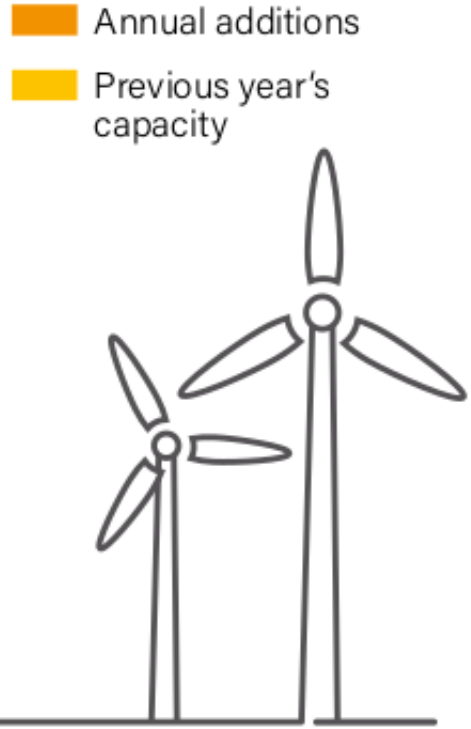
Solar PV Global Capacity and Annual Additions, 2008-2018



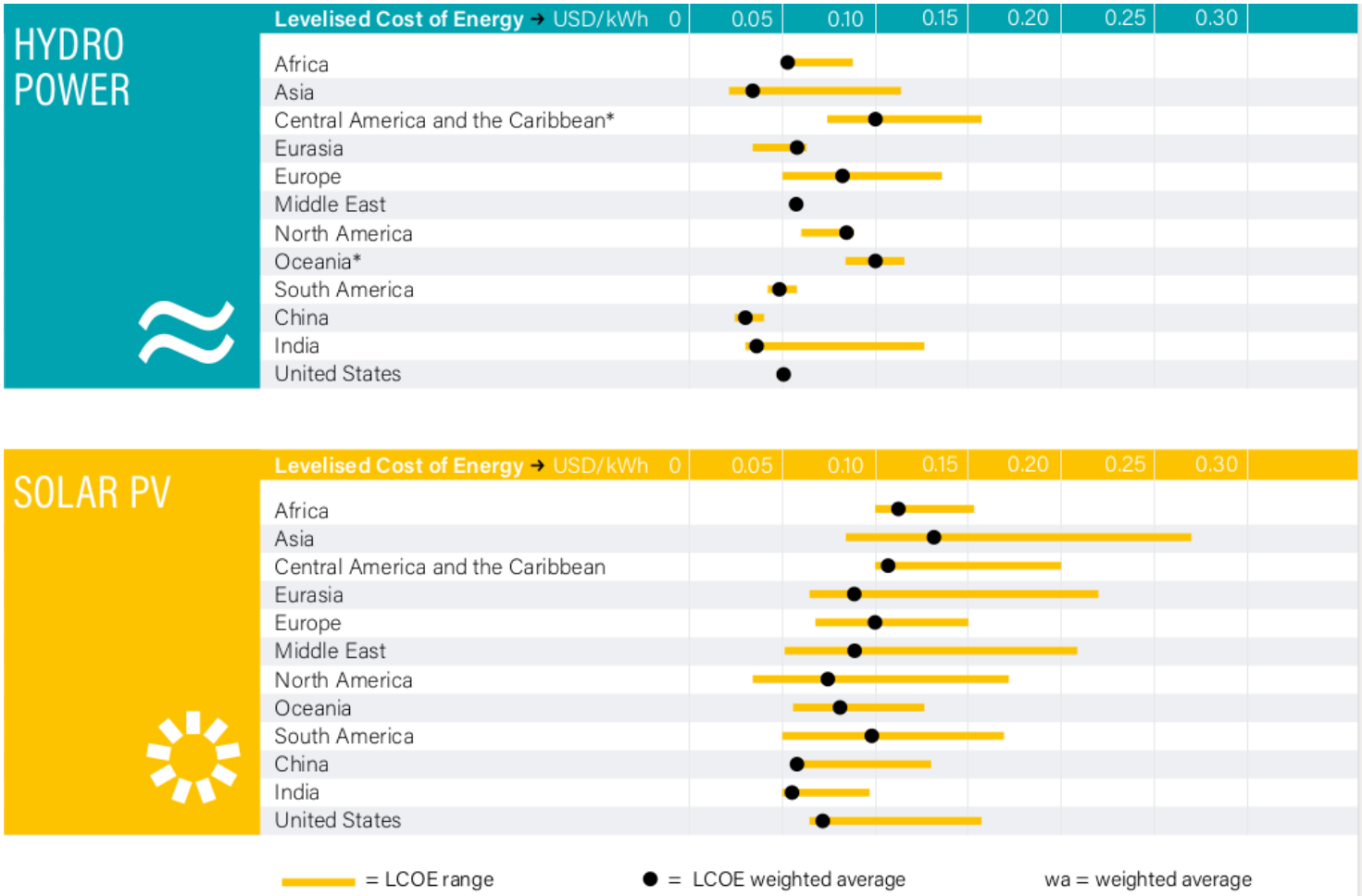
Source:REN 2019

Wind Power Global Capacity and Annual Additions, 2008-2018

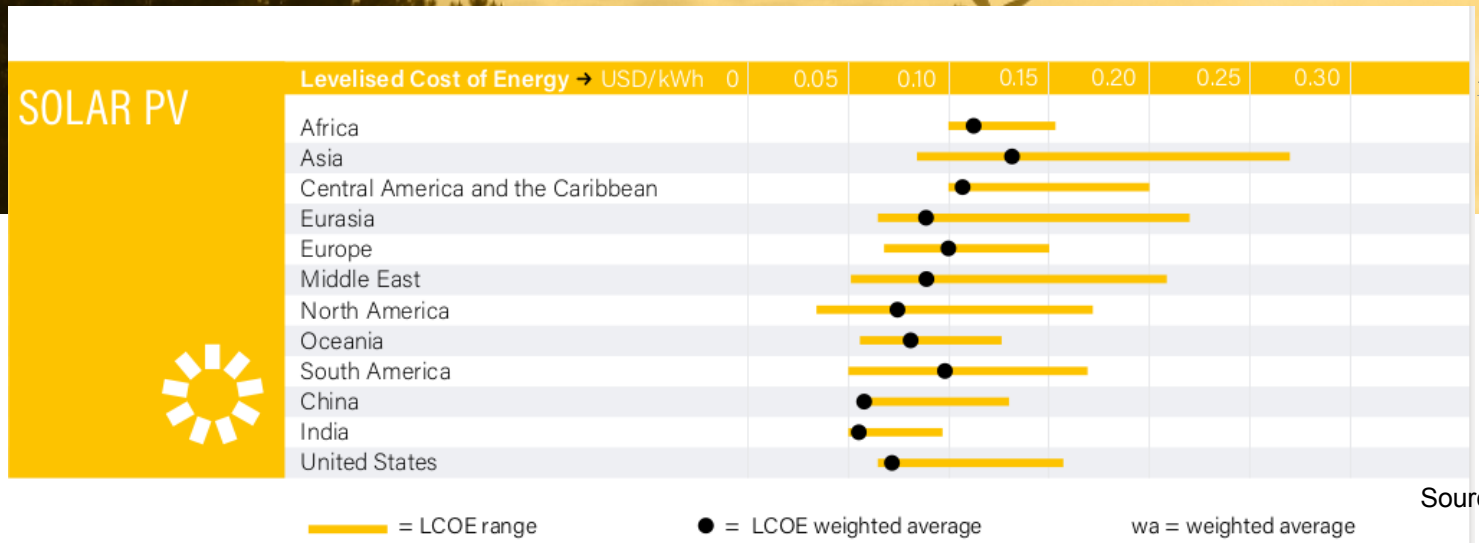




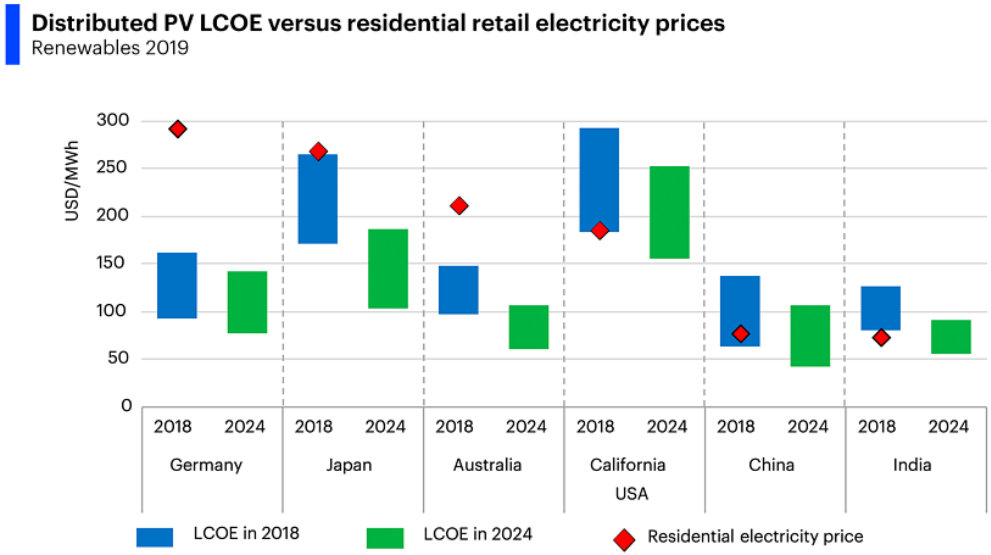
Source:REN 2019



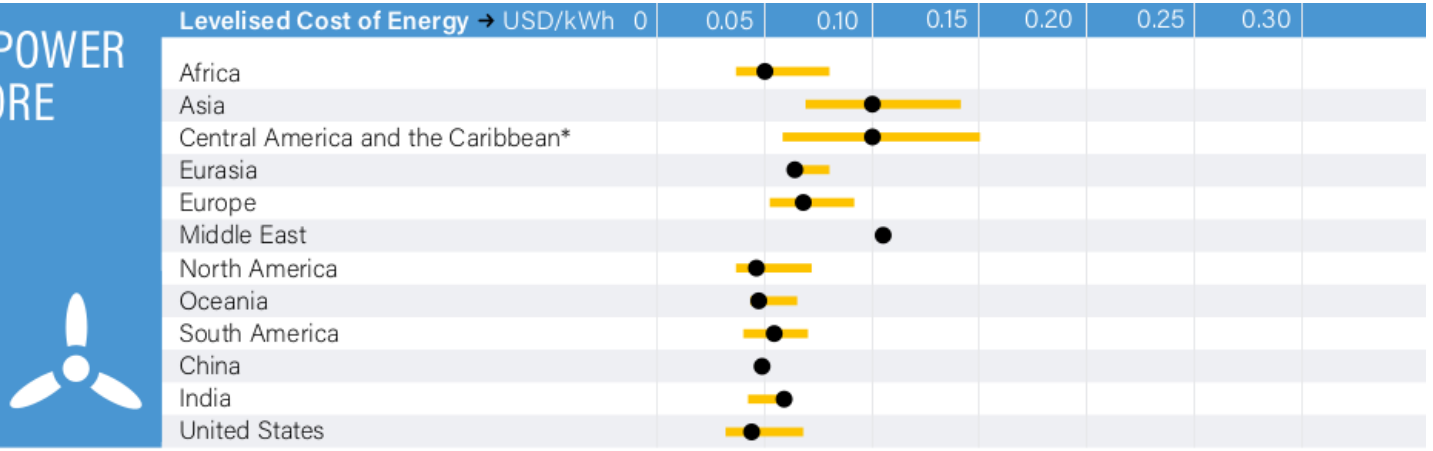
Source:REN 2019



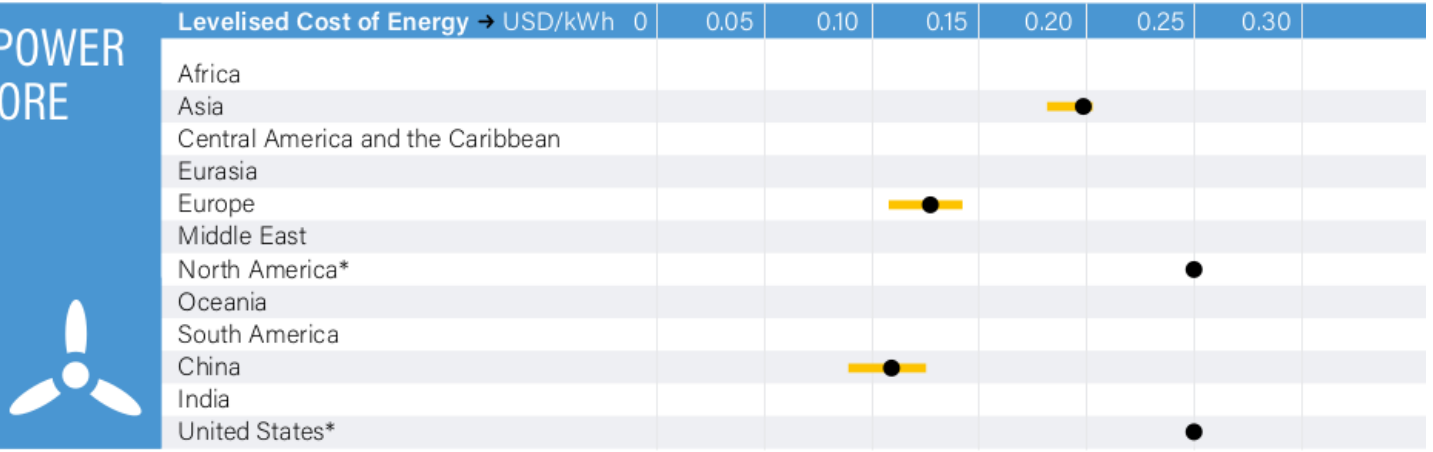
Source:REN 2019



WIND POWER ONSHORE

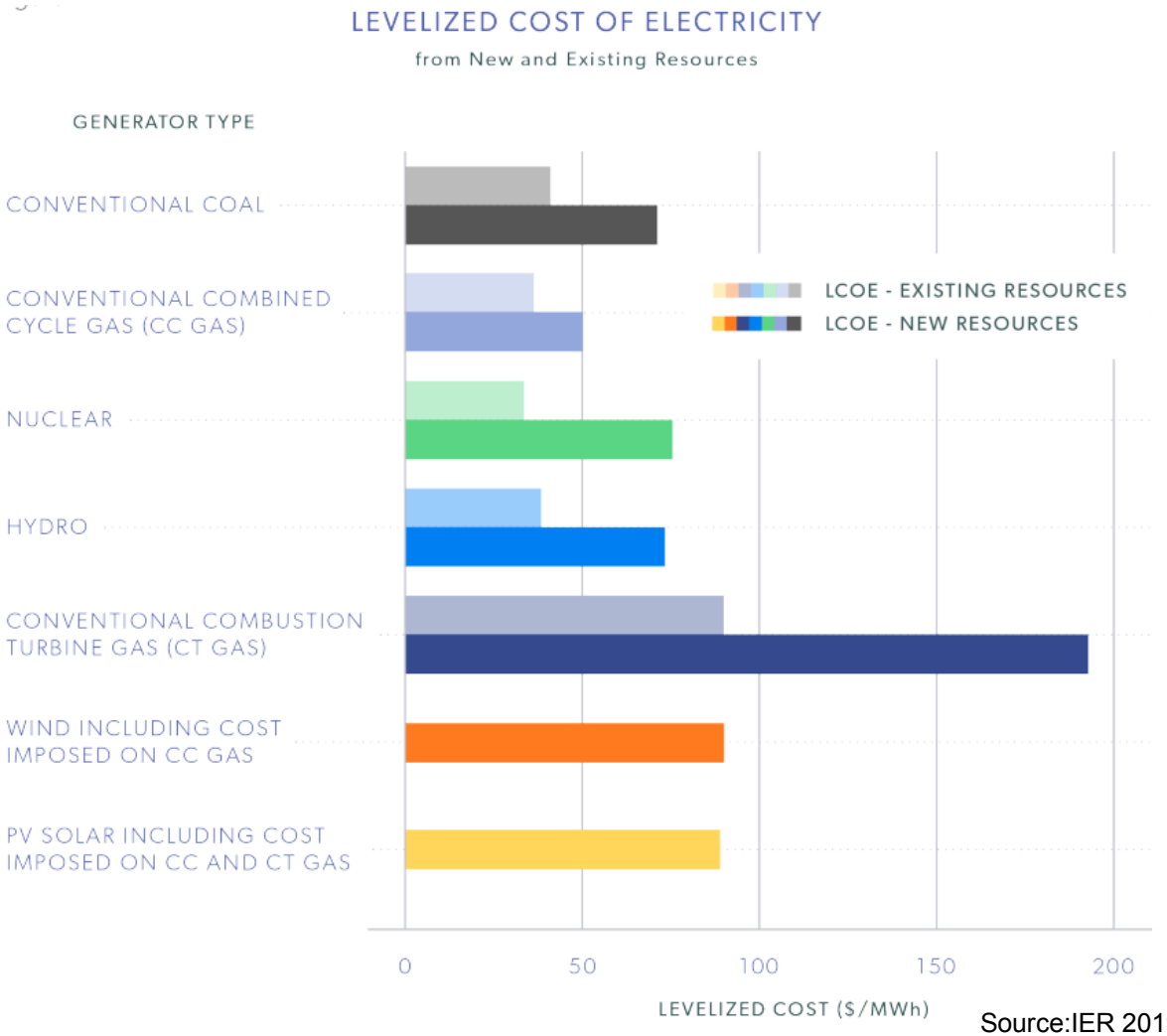


WIND POWER OFFSHORE



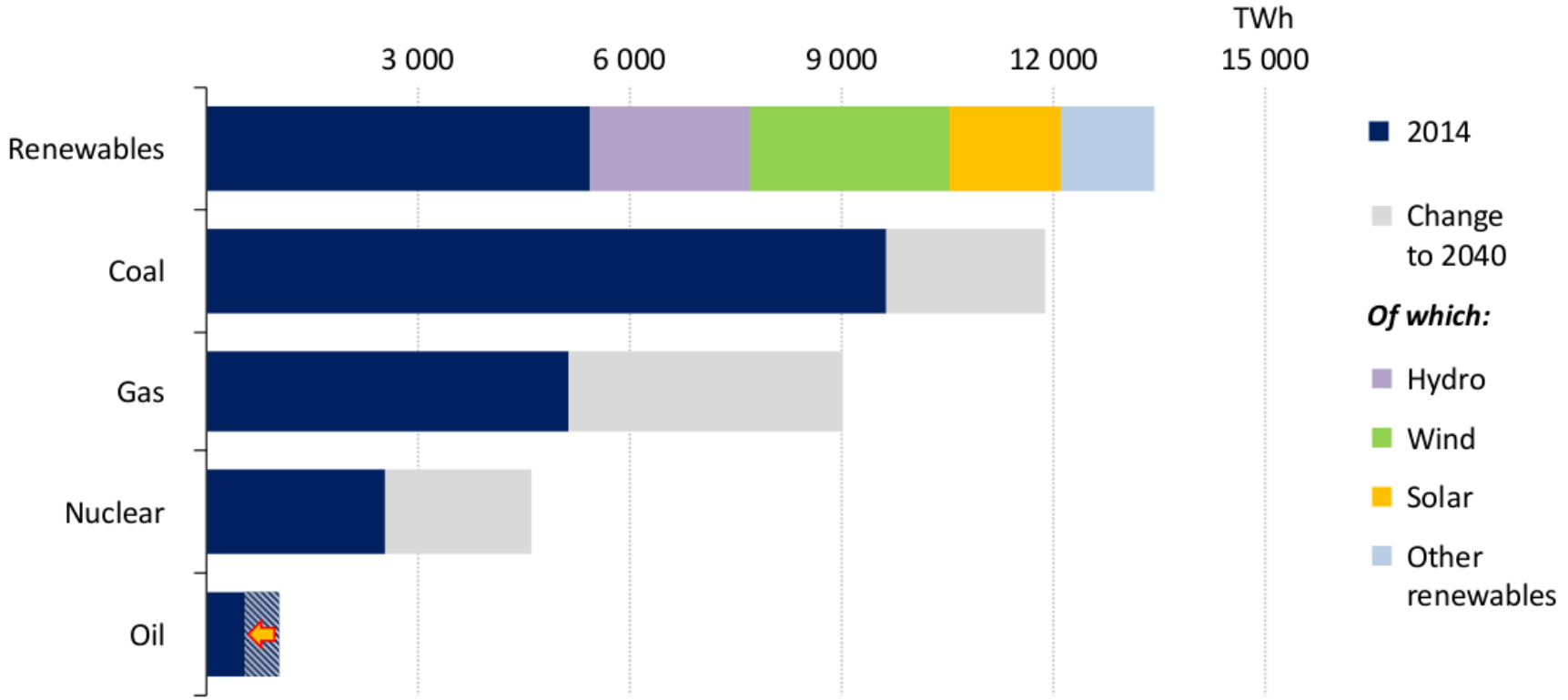
Source:REN 2019

A different perspective...



Source:IER 2019

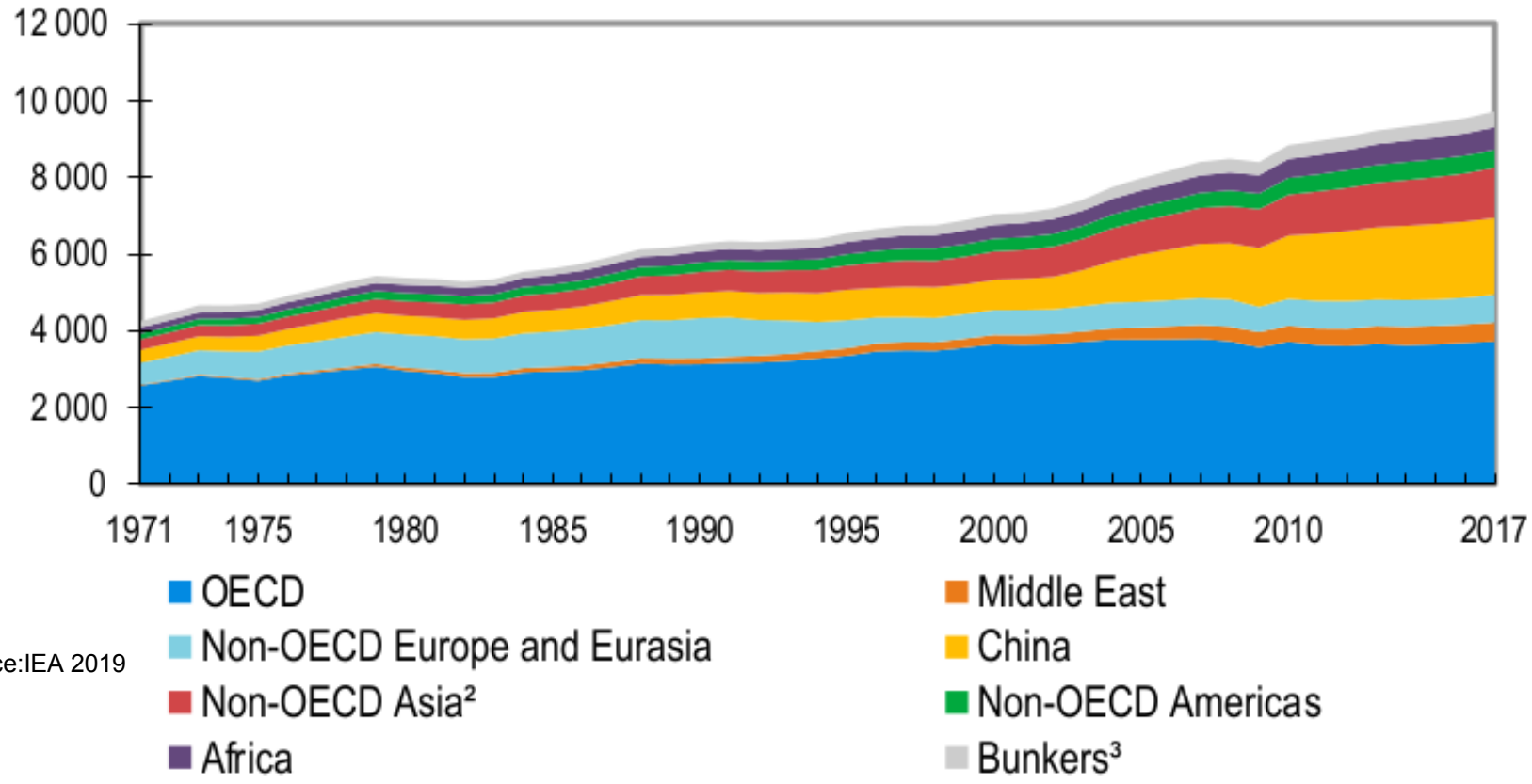
Global electricity generation by source



Driven by continued policy support, renewables account for half of additional global generation, overtaking coal around 2030 to become the largest power source

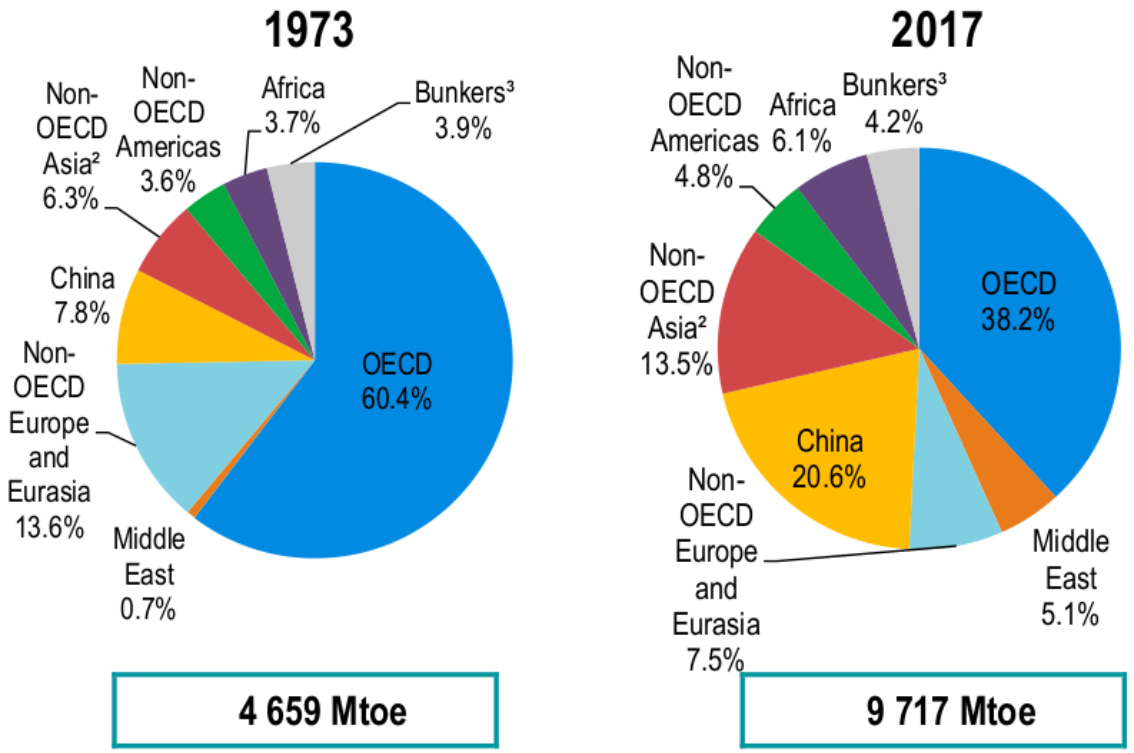
Source:IEA 2016

World TFC[1] from 1971 to 2017 by region (Mtoe)



Source:IEA 2019

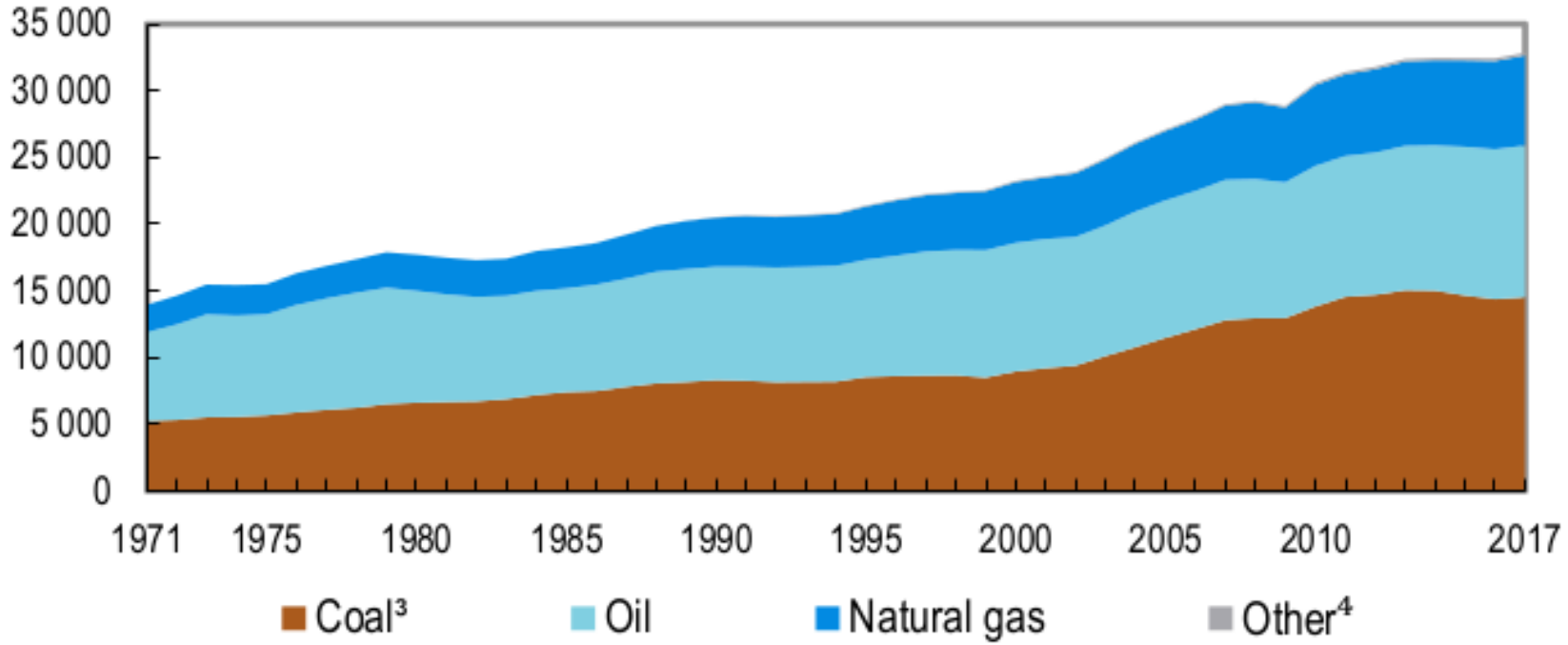
1973 and 2017 regional shares of TFC[1]



1. Data for biofuels and waste final consumption have been estimated for a number of countries.
2. Non-OECD Asia excludes China.
3. Includes international aviation and international marine bunkers.

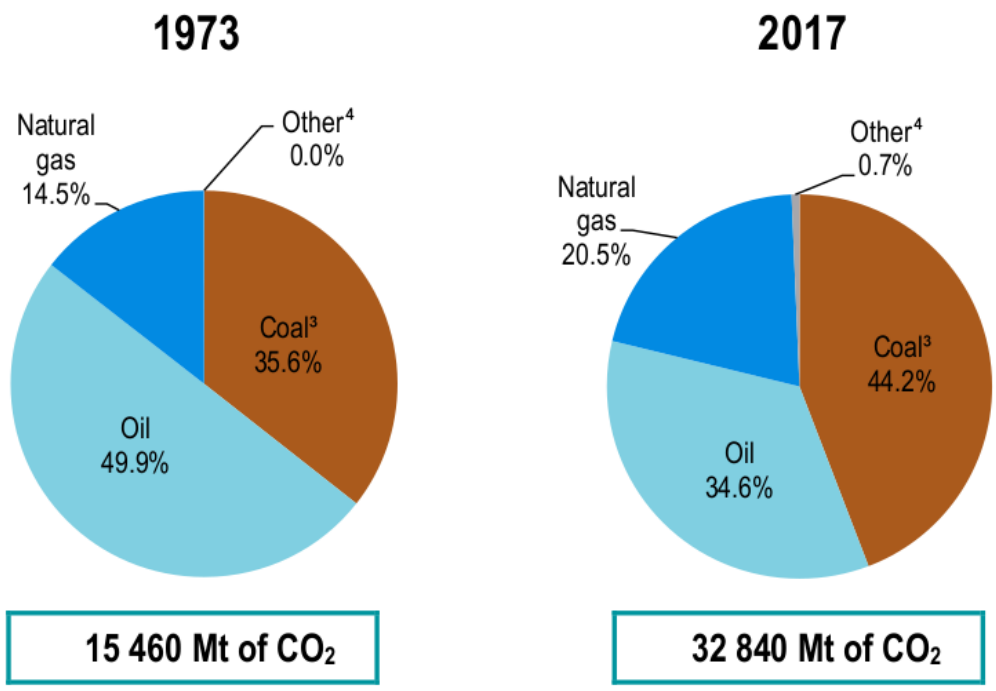
Source:IEA 2019

World[1] CO_2 emissions from fuel combustion[2] from 1971 to 2017 by fuel (Mt of CO_2)



Source:IEA 2019

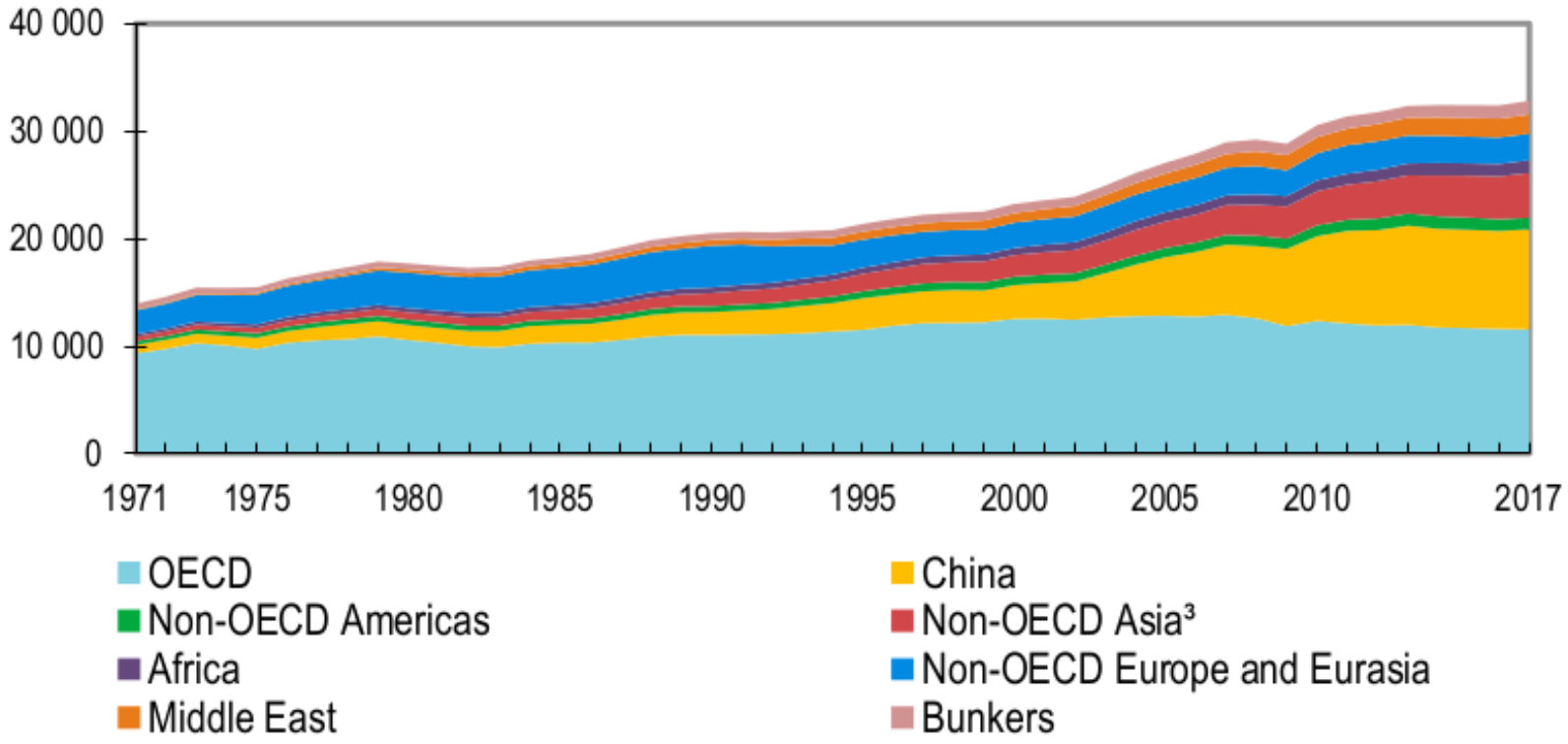
1973 and 2017 fuel shares of CO_2 emissions from fuel combustion[2]



1. World includes international aviation and international marine bunkers.
2. CO_2 emissions from fuel combustion are based on the IEA World Energy Balances and on the 2006 IPCC Guidelines, and exclude emissions from non-energy.
3. In these graphs, peat and oil shale are aggregated with coal.
4. Includes industrial waste and non-renewable municipal waste.

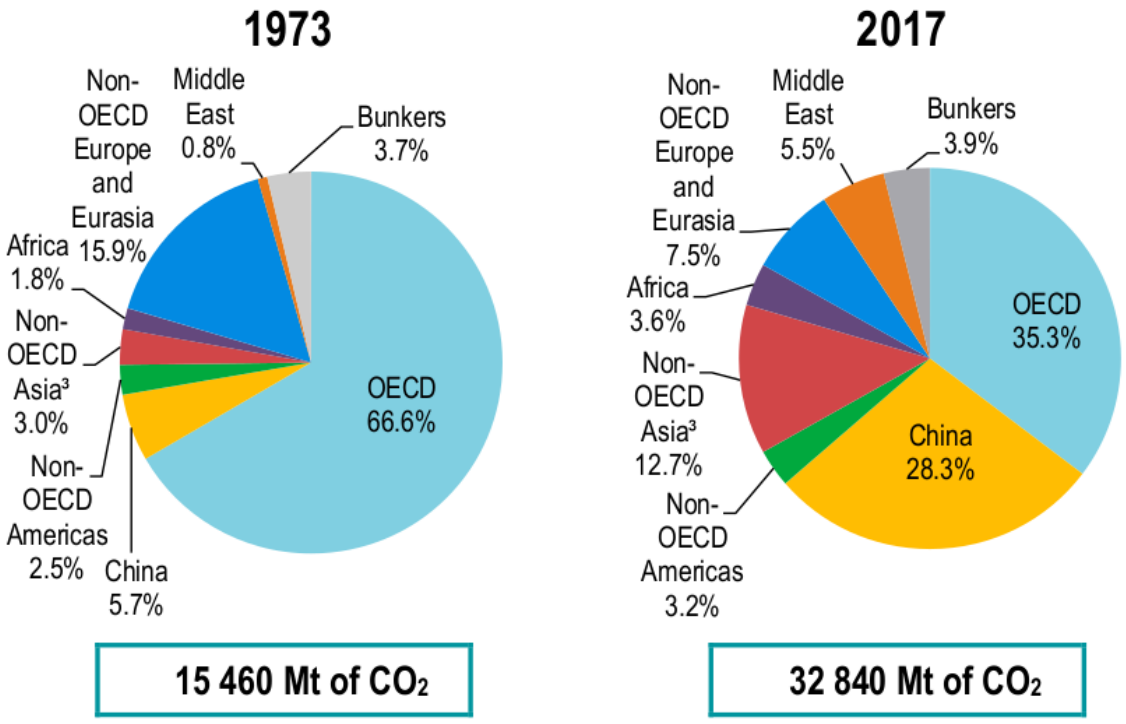
Source:IEA 2019

World[1] CO_2 emissions from fuel combustion[2] from 1971 to 2017 by region (Mt of CO_2)



Source:IEA 2019

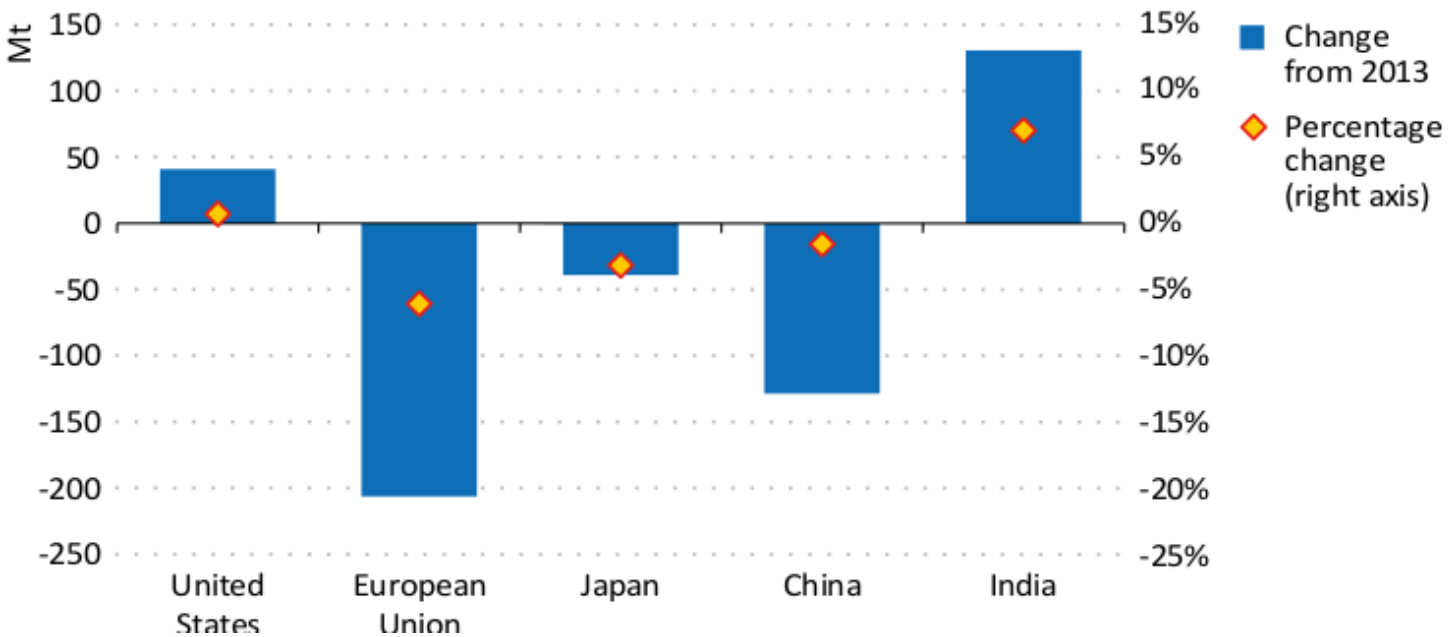
1973 and 2017 regional shares of CO_2 emissions from fuel combustion[2]



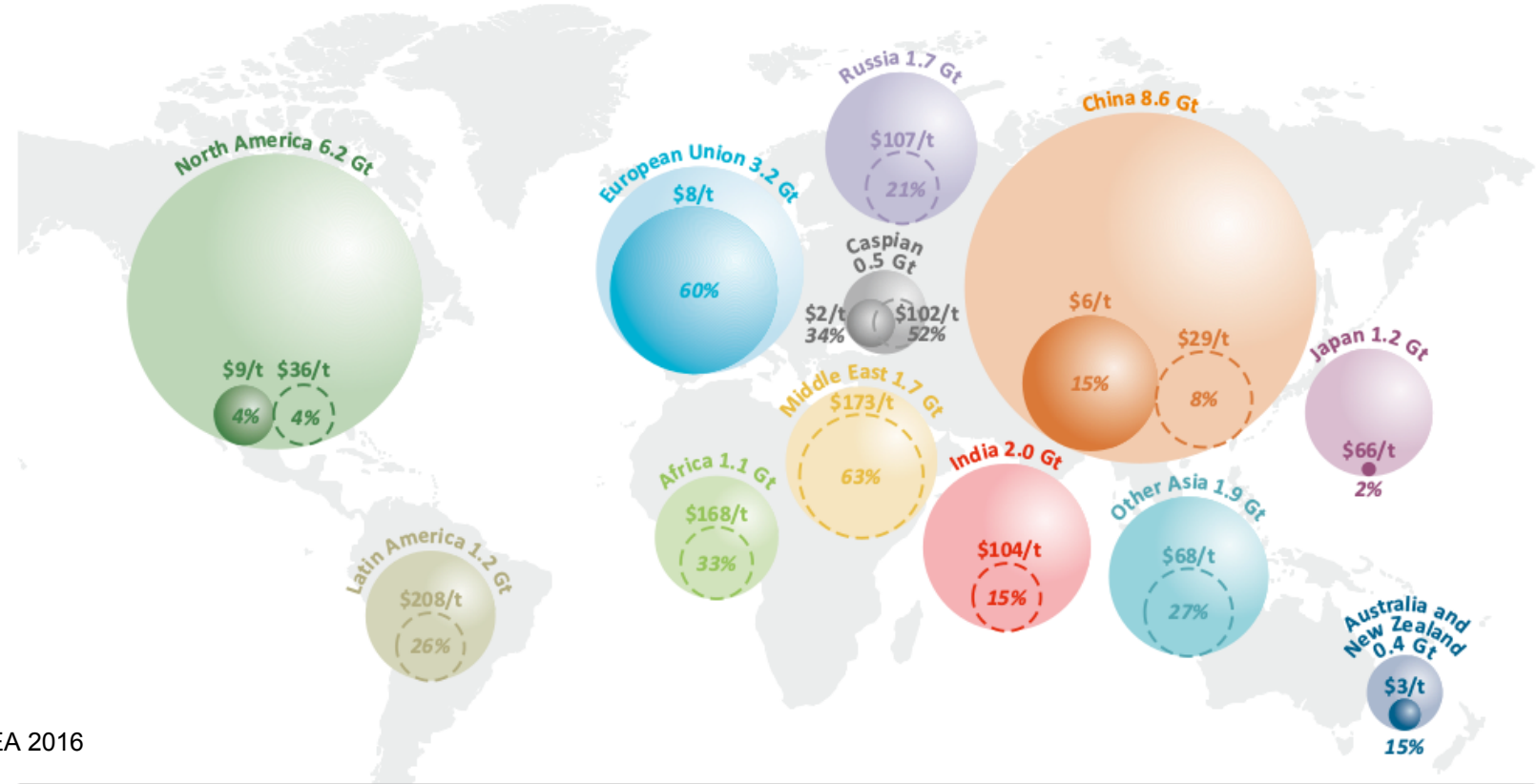
1. World includes international aviation and marine bunkers, which are shown together as Bunkers.
2. CO_2 emissions from fuel combustion are based on the IEA World Energy Balances and on the 2006 IPCC Guidelines, and exclude emissions from non-energy.
3. Non-OECD Asia excludes China.

Source:IEA 2019

Change in energy-related CO_2 emissions by selected region, 2013-2014



Energy-related CO_2 emissions in selected regions, 2014



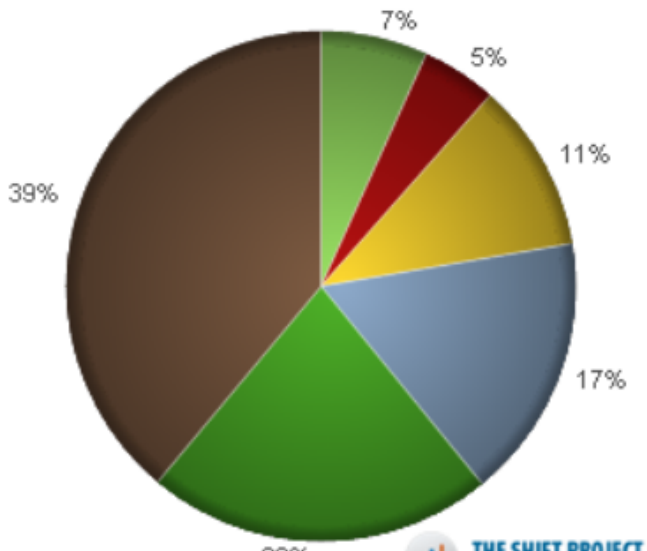
Source:IEA 2016

Notes: The implicit CO_2 subsidy is calculated as the ratio of the economic value of those subsidies to the CO_2 emissions released from subsidised energy consumption. ETS = emissions trading scheme.

CO2 prices on the EU-ETS

World Electricity Production from All Energy Sources in 2014 (TWh)

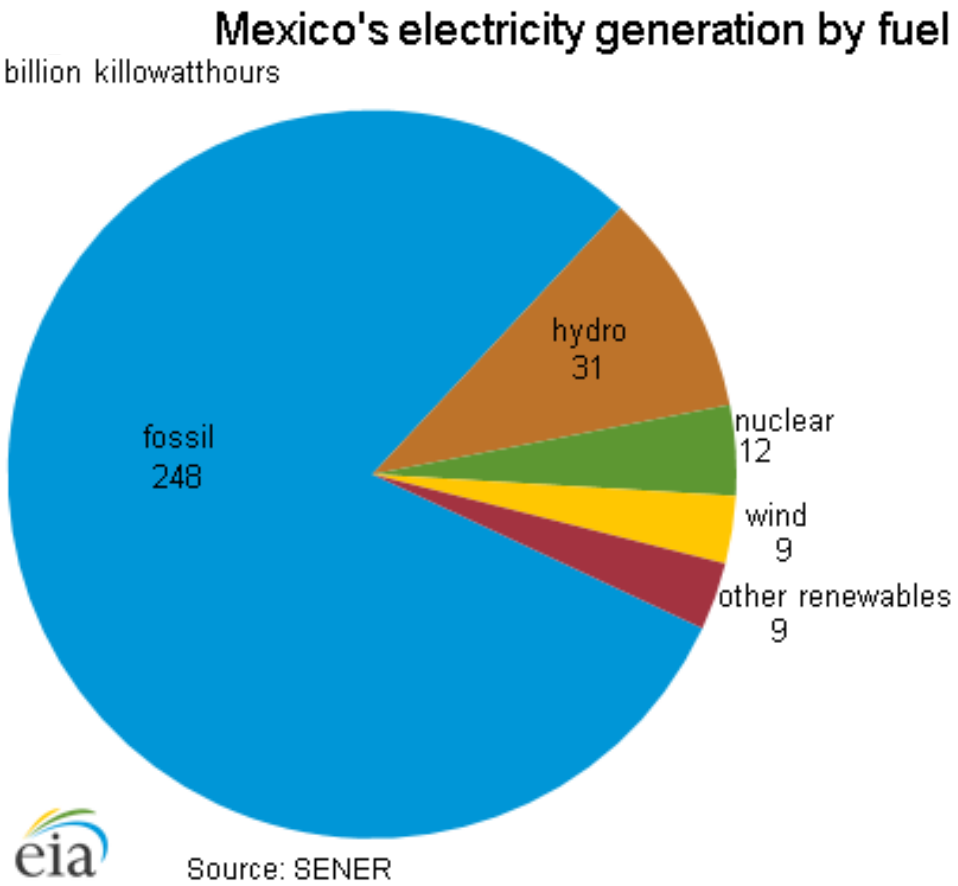
Electricity Source	TWh
Others	1 520
Oil	1 068
Nuclear	2 417
Hydroelectric	3 769
Gas	4 933
Coal	8 726



Total = 22433 TWh

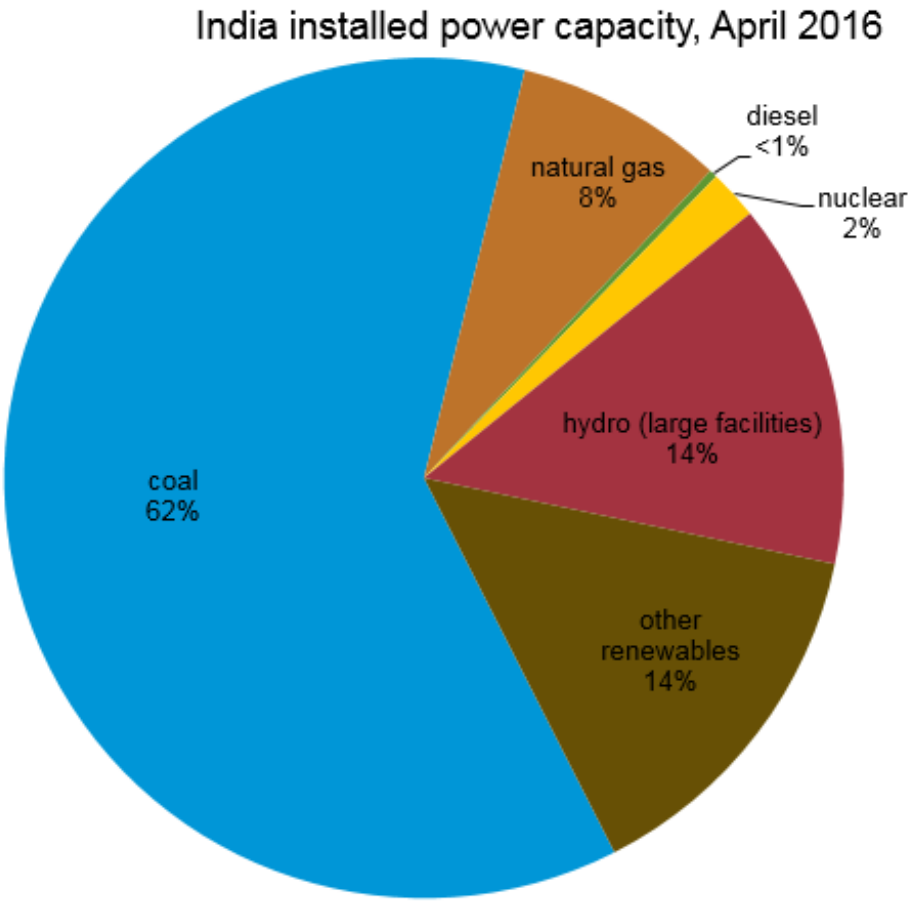
THE SHIFT PROJECT DATA PORTAL
Browse Energy and Climate Data

Mexico



https://www.eia.gov/beta/international/

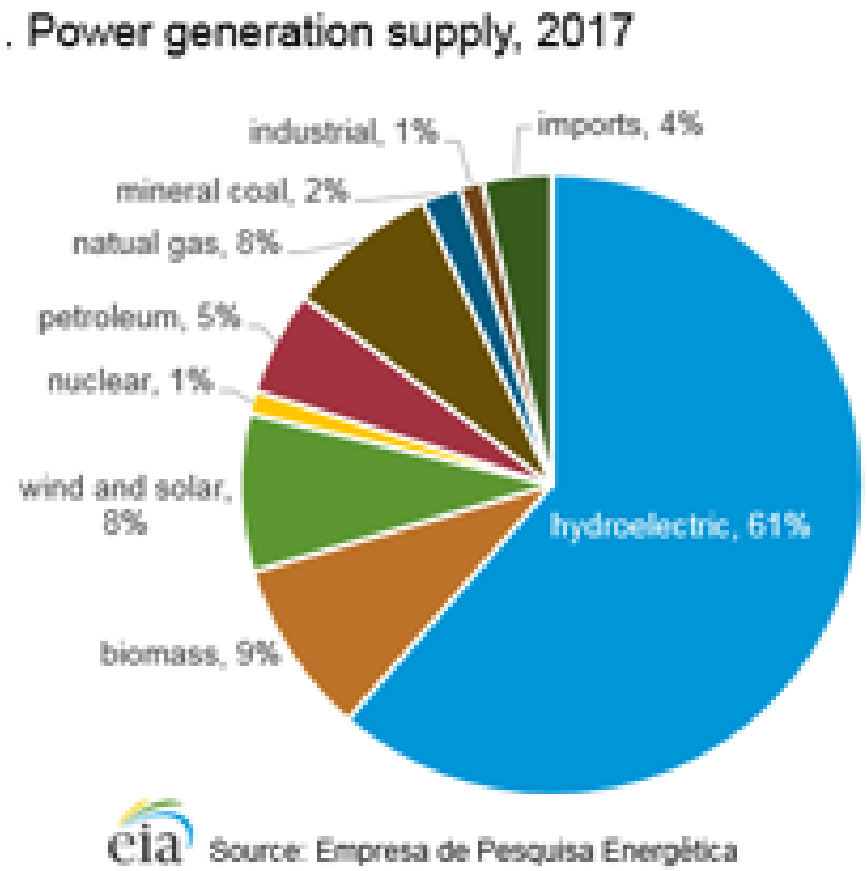
India



Note: Includes utility-based power facilities, not captive power plants (about 47 GW). Shares do not add to 100% because of rounding. Small hydro facilities included in other renewables category.
Source: U.S. Energy Information Administration, India's Central Electricity Authority, International Energy Agency.

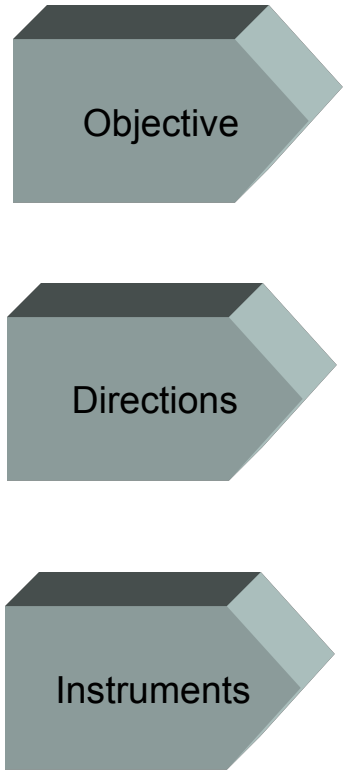
https://www.eia.gov/beta/international/

Brazil



https://www.eia.gov/beta/international/

Energy policy options



Energy policy options

Energy policy options

Objective

Security of supply

Energy policy options

Objective

Security of supply

Directions

Energy policy options

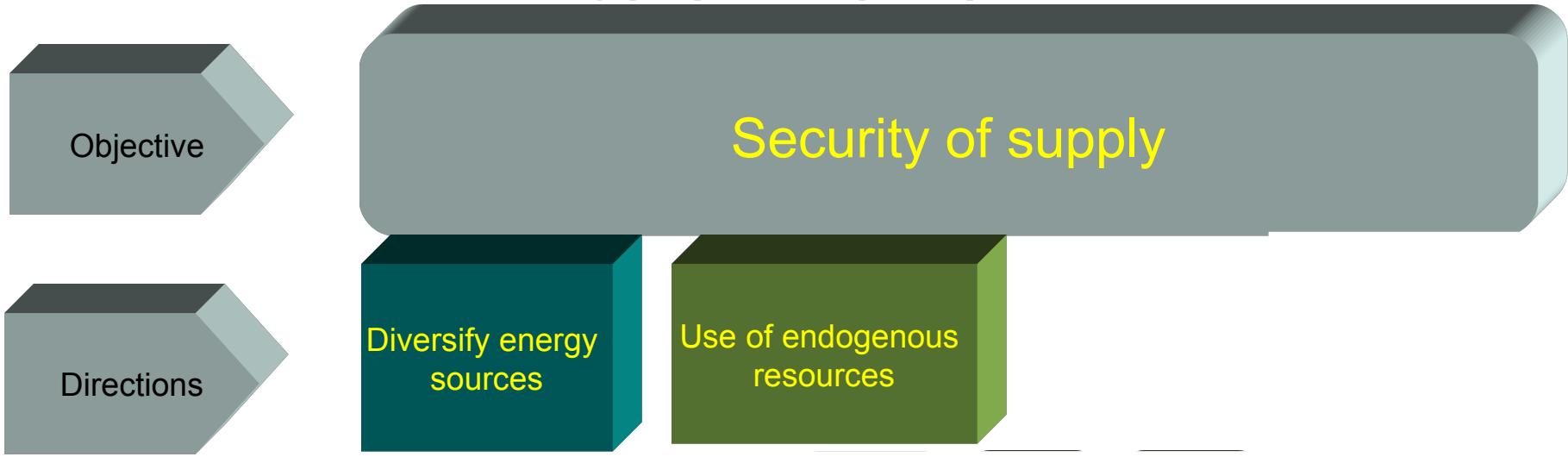
Objective

Security of supply

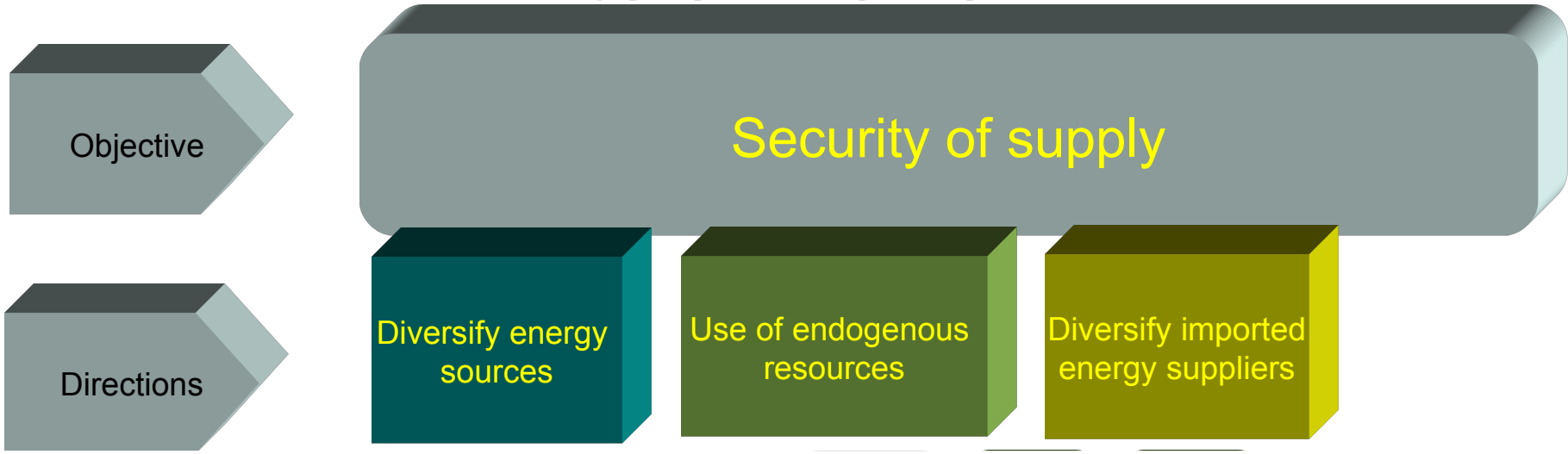
Directions

Diversify energy sources

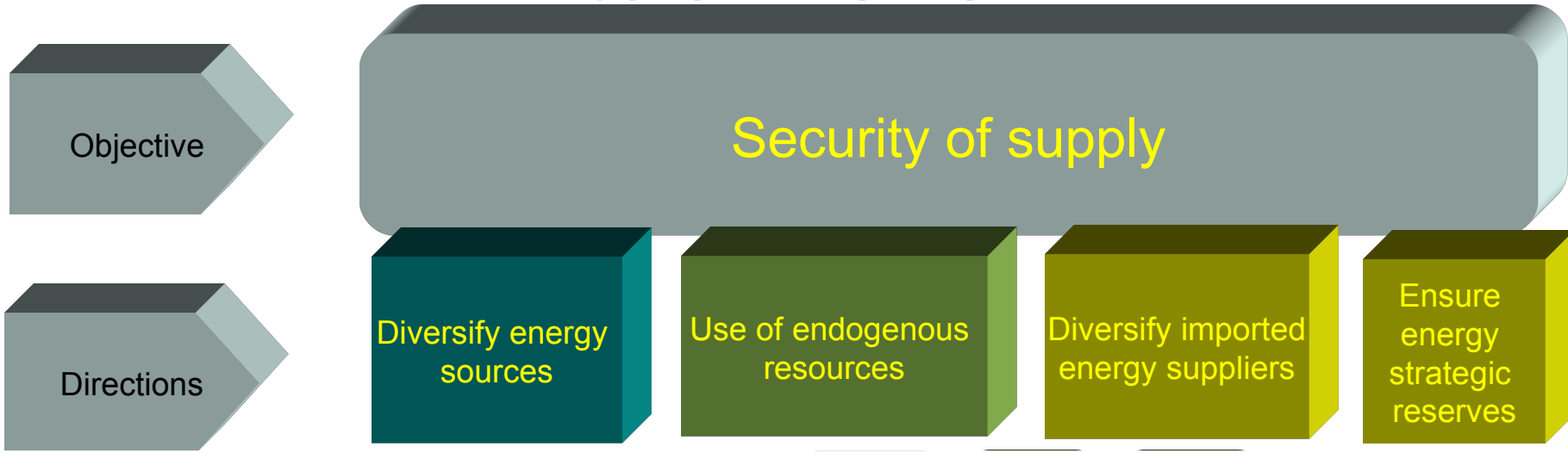
Energy policy options



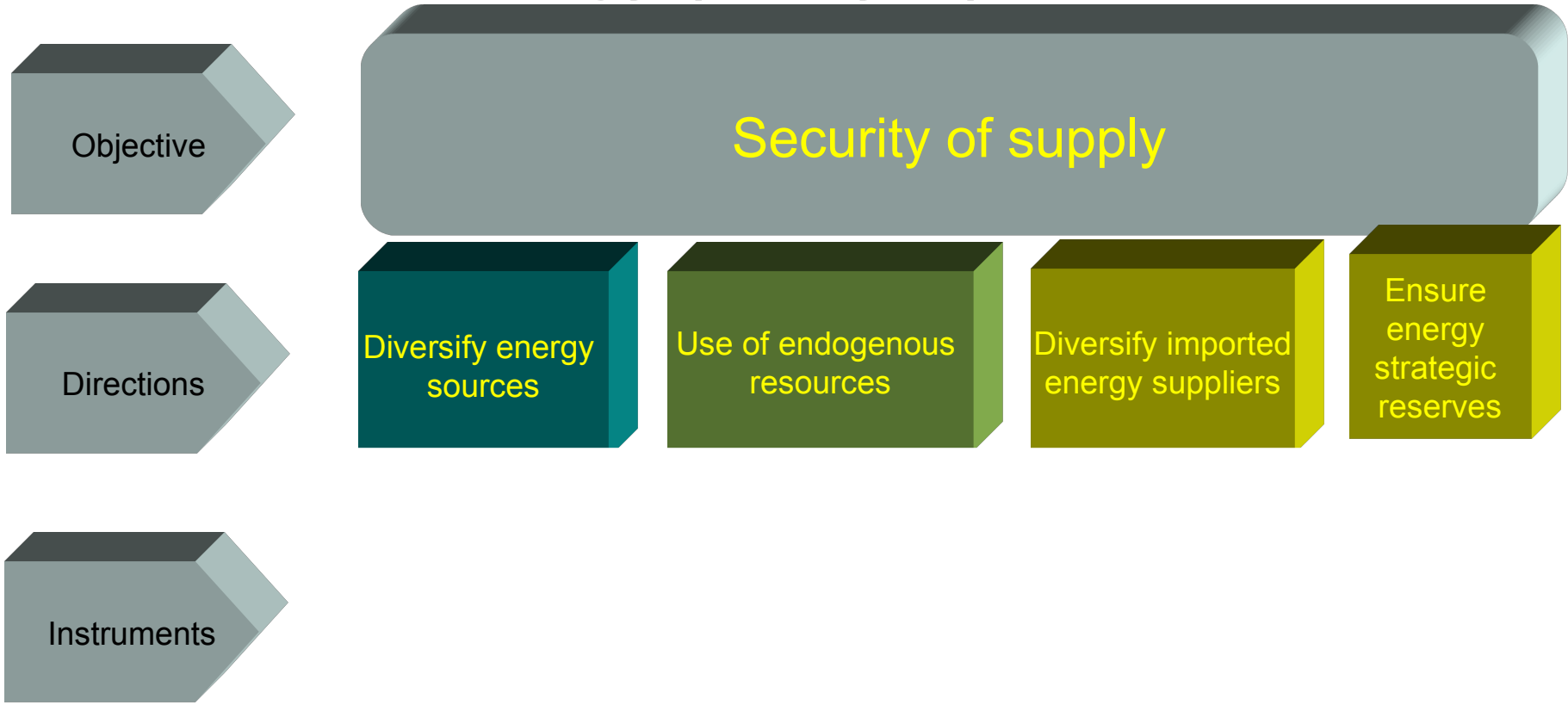
Energy policy options



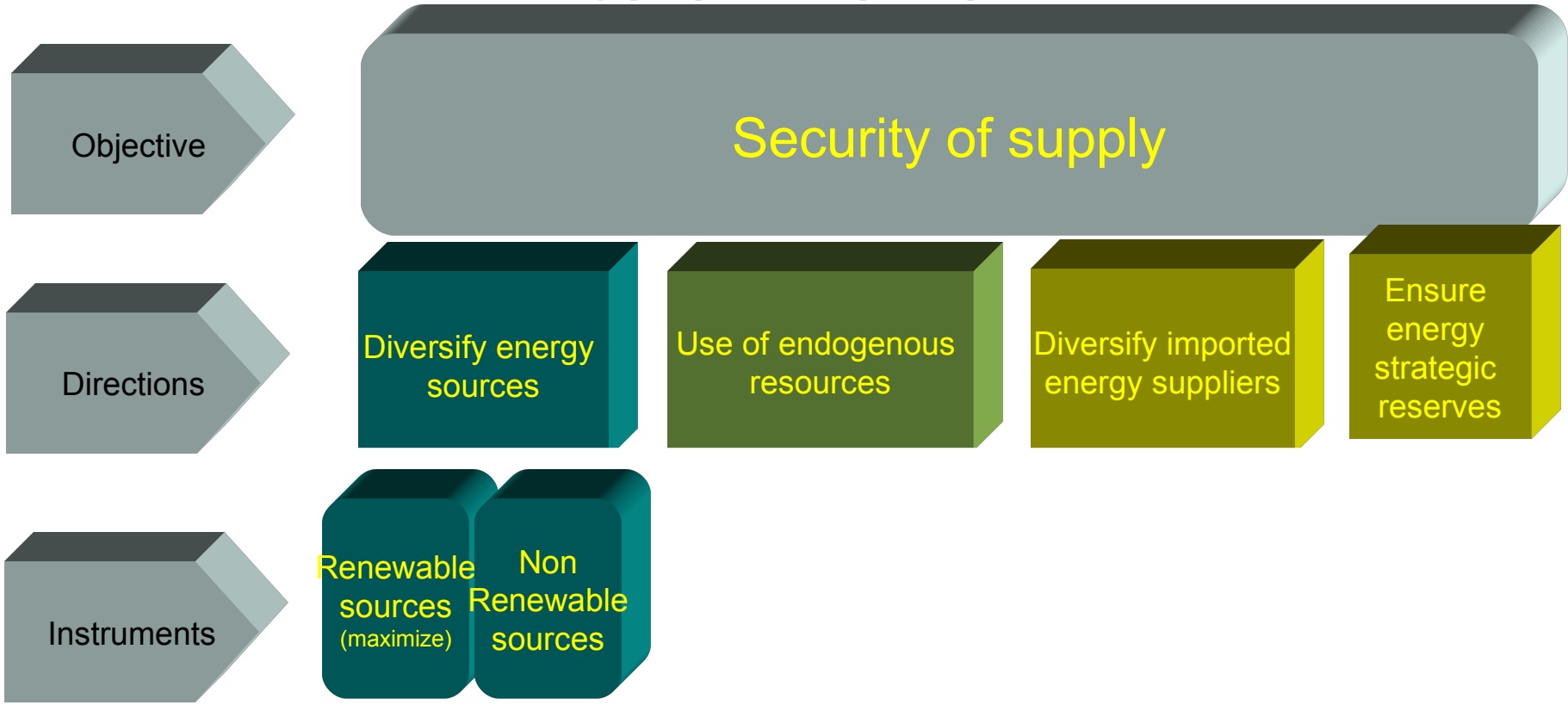
Energy policy options



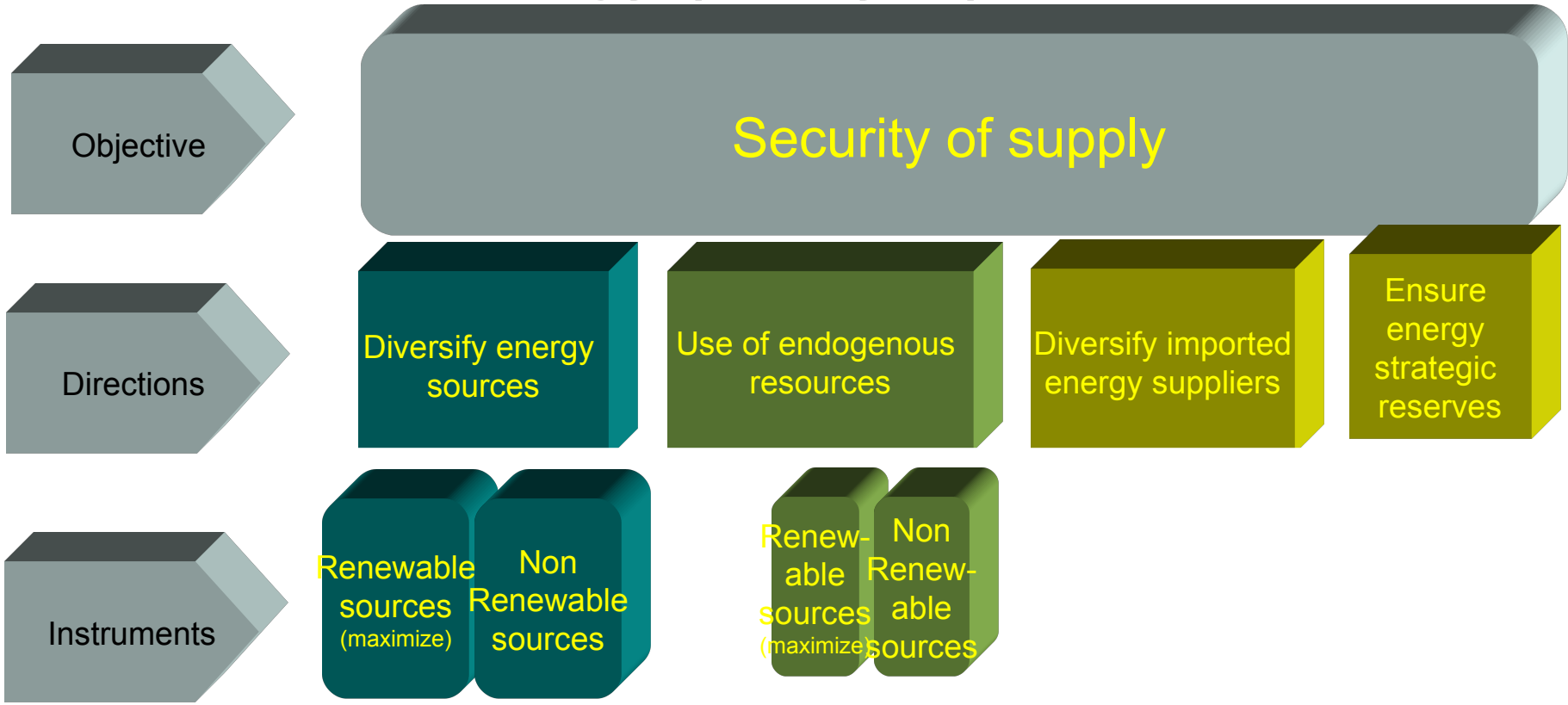
Energy policy options



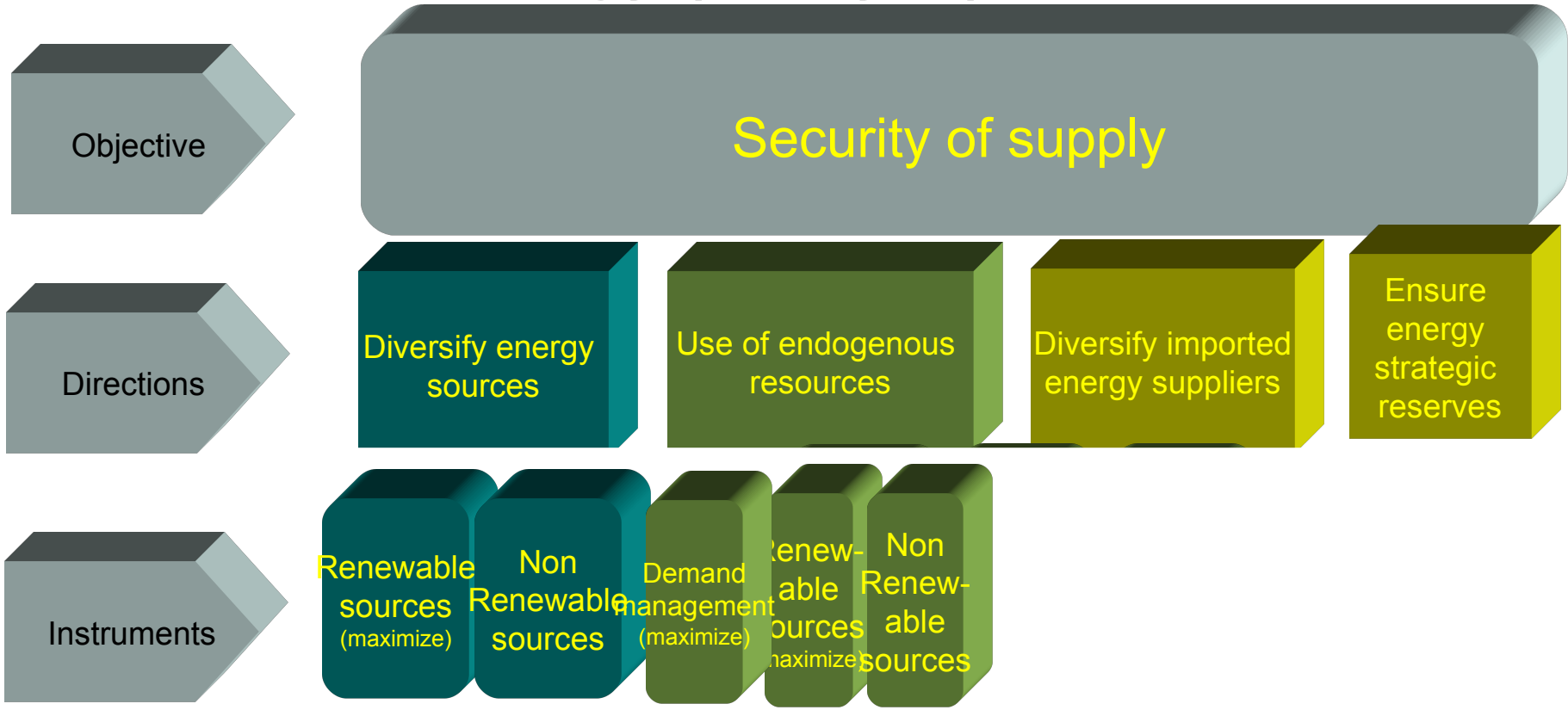
Energy policy options



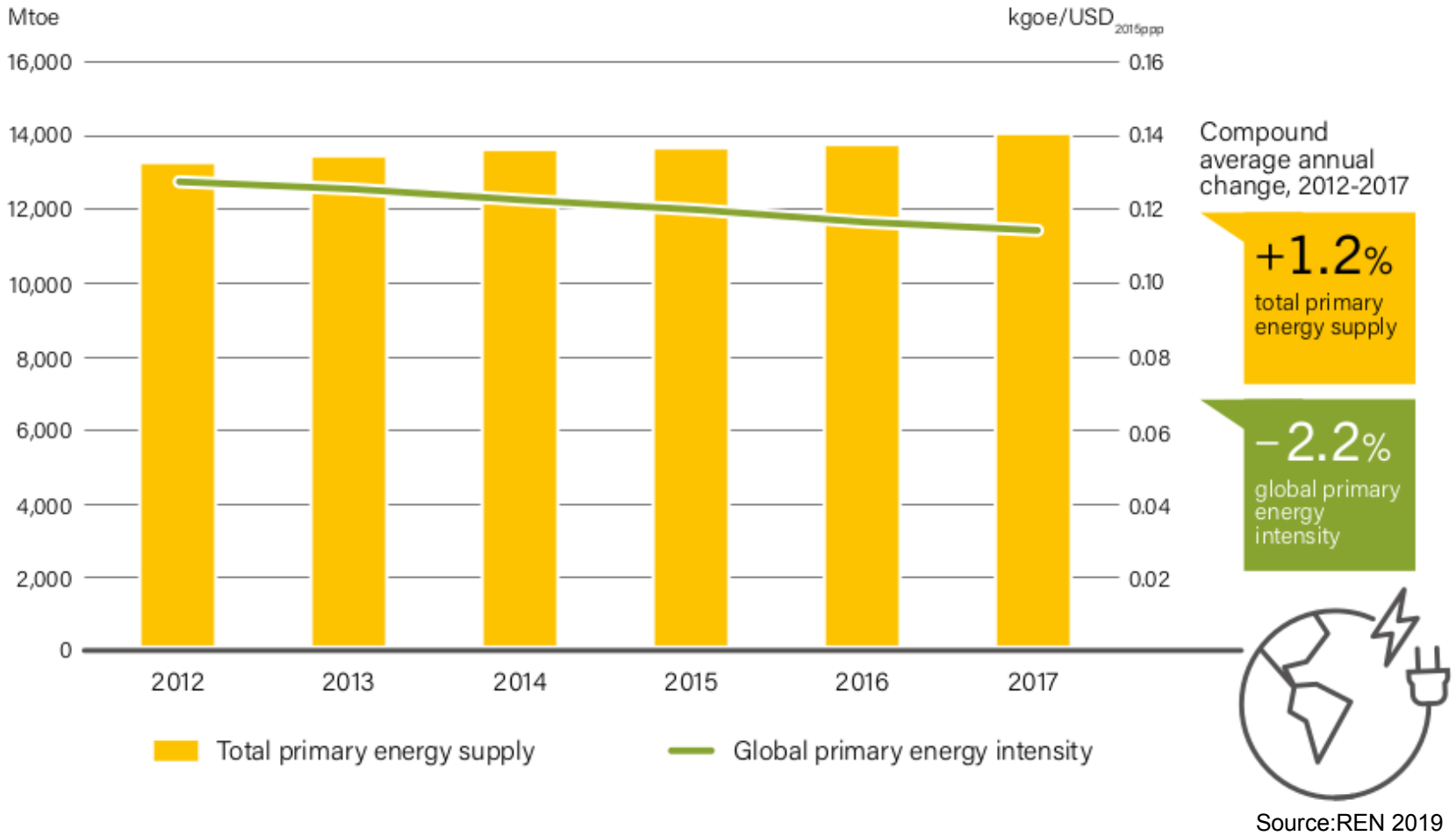
Energy policy options



Energy policy options

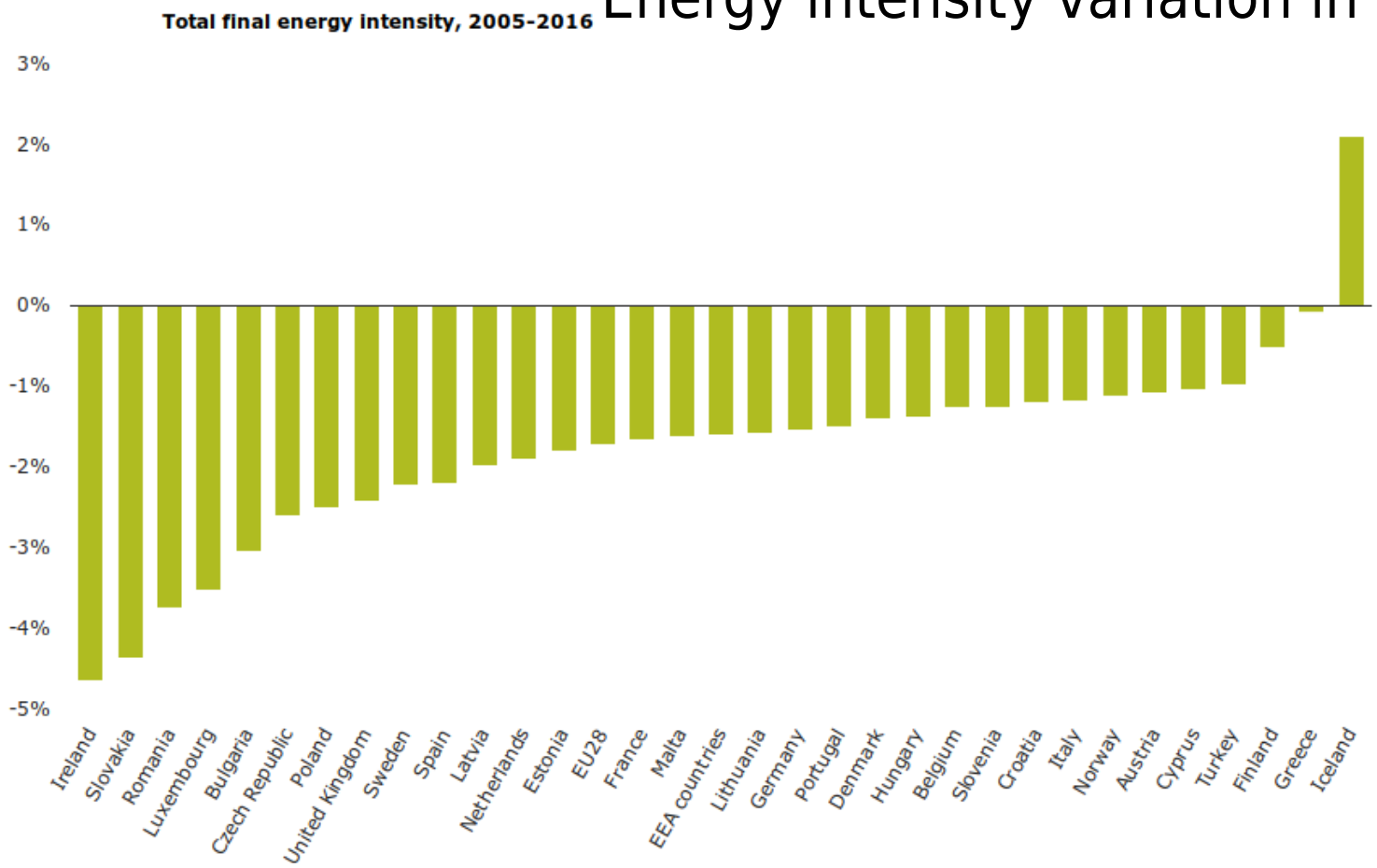


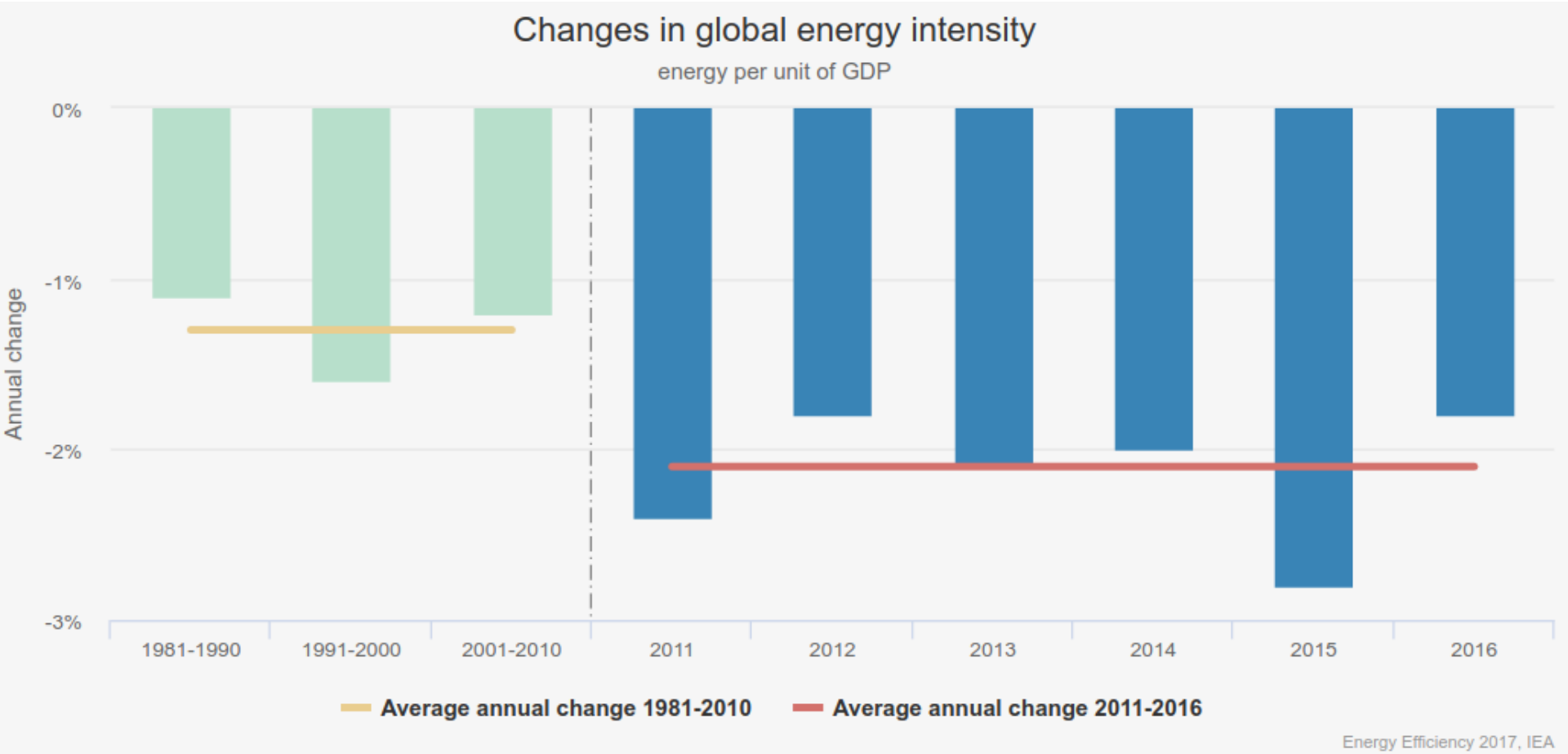
Global Primary Energy Intensity and Total Primary Energy Supply, 2012-2017



Source:REN 2019

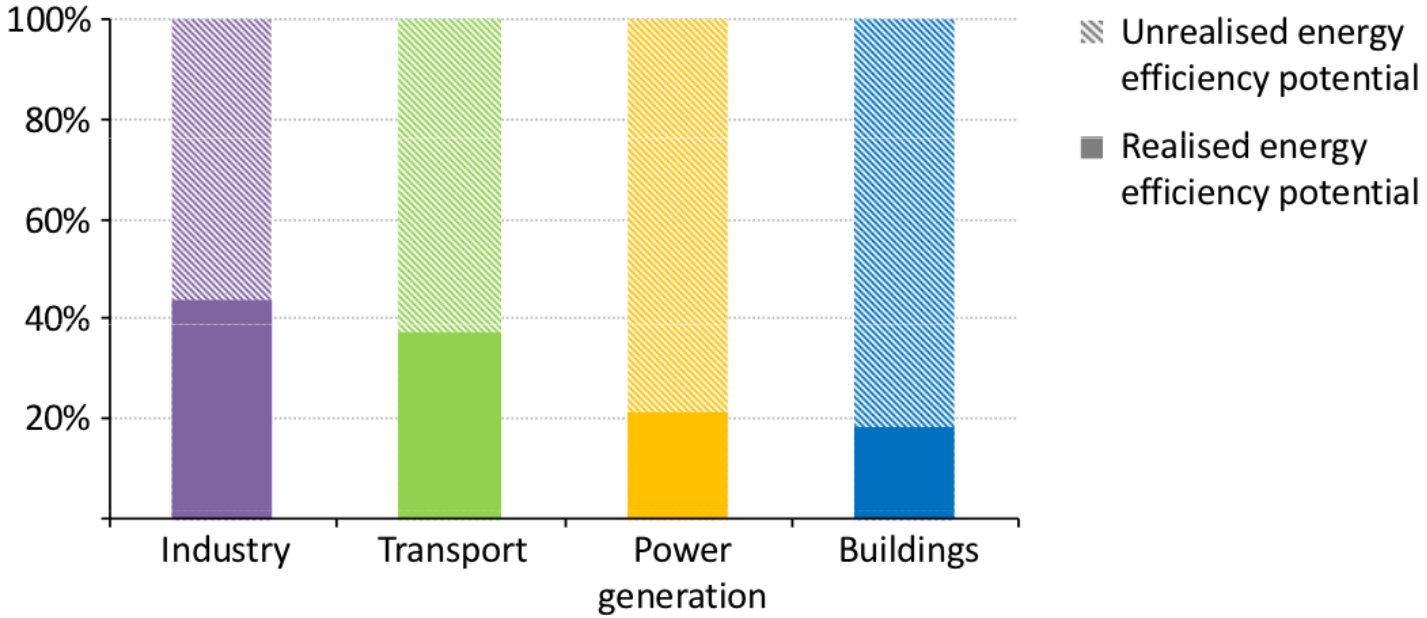
Energy intensity variation in the EU




Changes in global energy intensity
energy per unit of GDP
0%
-1%
-2%
-3%
Annual change
1981-1990
1991-2000
2001-2010
2011
2012
2013
2014
2015
2016
Average annual change 1981-2010
Average annual change 2011-2016
Energy Efficiency 2017, IEA

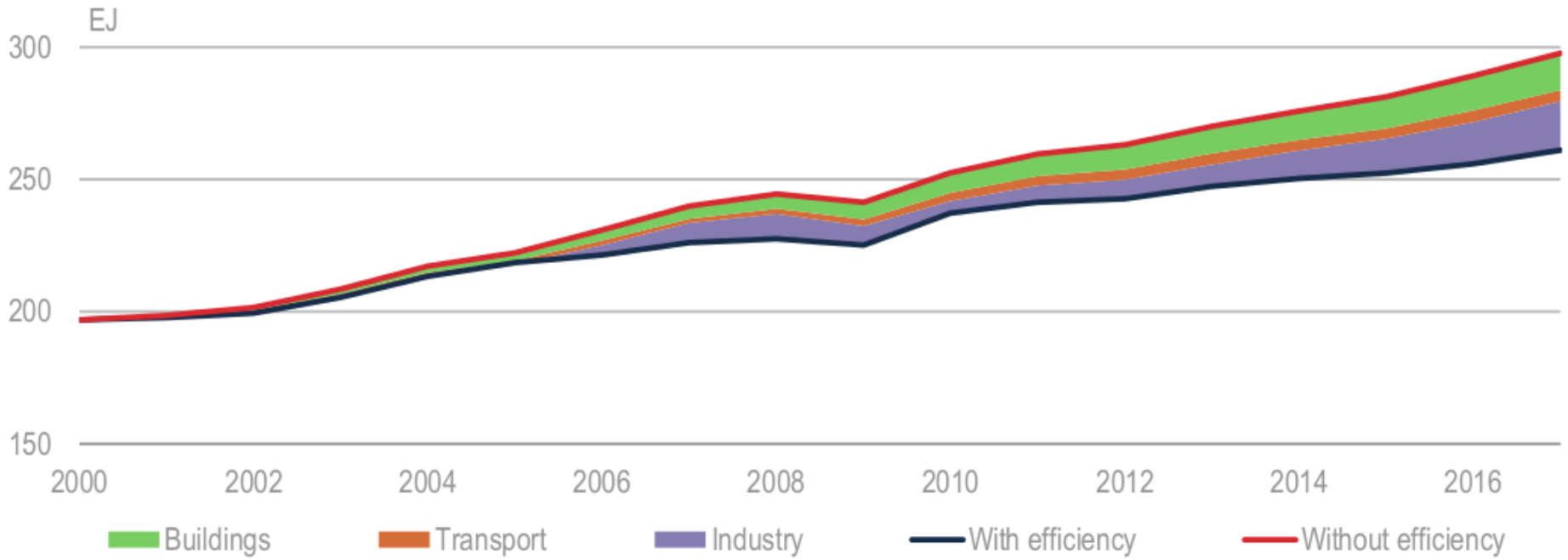
A big potential

Energy efficiency potential used by sector in the WEO 2012 New Policies Scenario



Two-thirds of the economic potential to improve energy efficiency remains untapped in the period to 2035

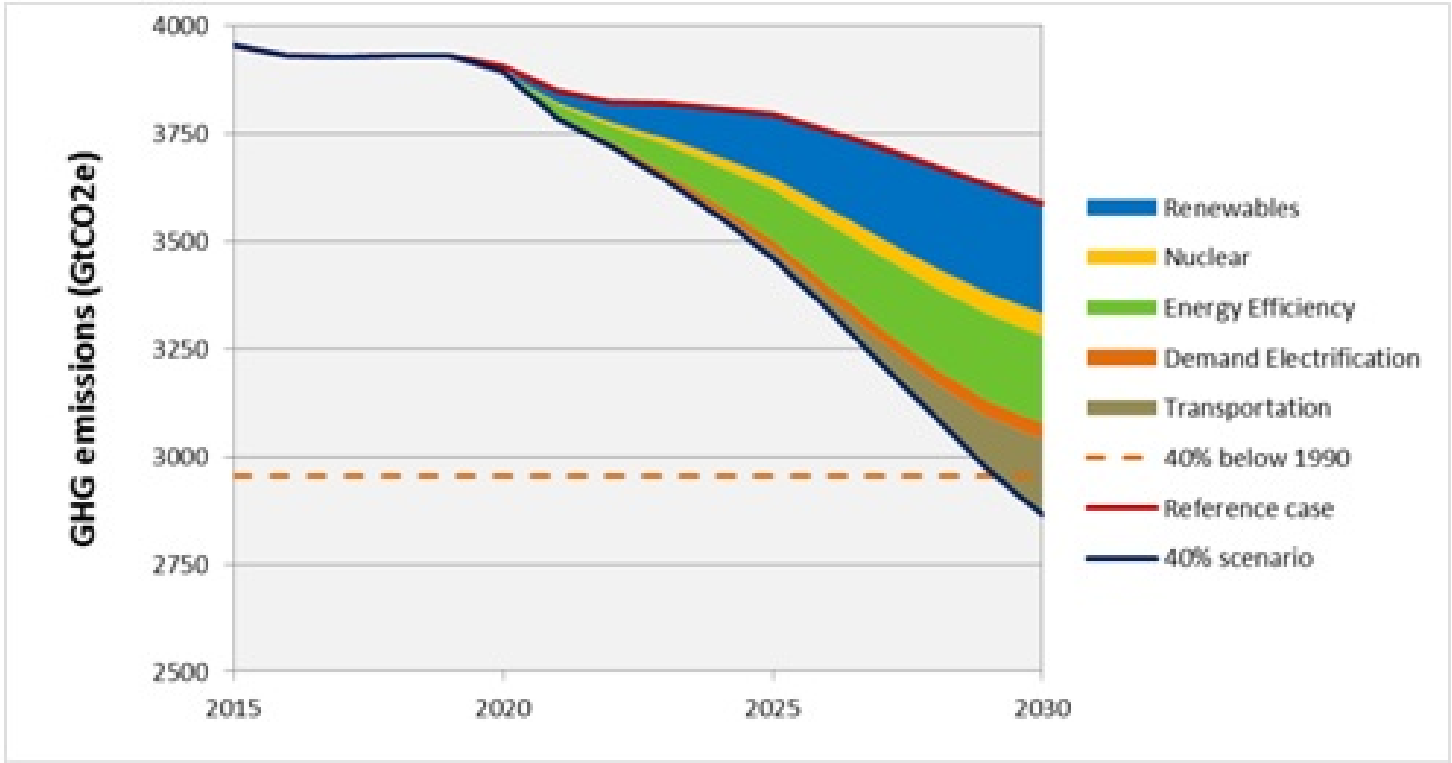
Energy use in IEA countries and other major economies with and without energy savings from efficiency improvements, by sector, 2000-17



Notes: Left axis starts at 150 EJ. Countries covered are IEA countries plus China, India, Brazil, Indonesia, Russian Federation, South Africa and Argentina. "Energy use" excludes non-energy use (i.e. feedstocks), energy supply and US freight transport (see Chapter 2).

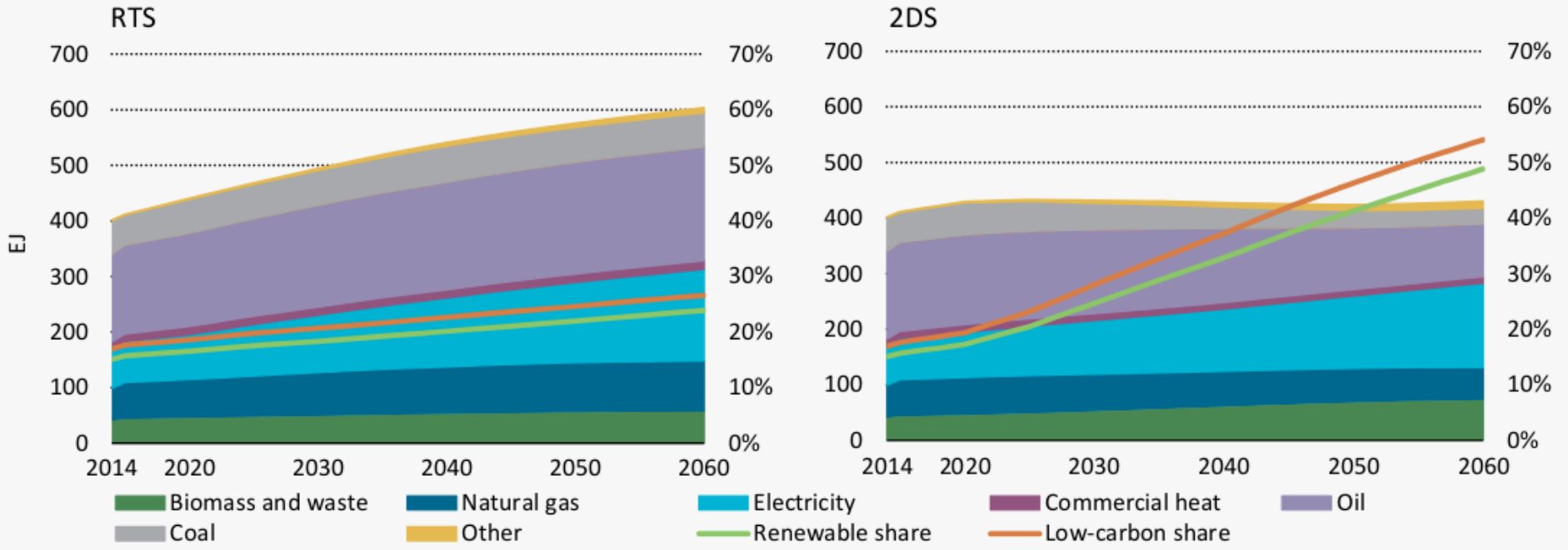
Source: IEA 2018

GHG emissions - EU target



Source: Enerdata 2019

Final energy demand in the RTS and 2DS, 2014–60

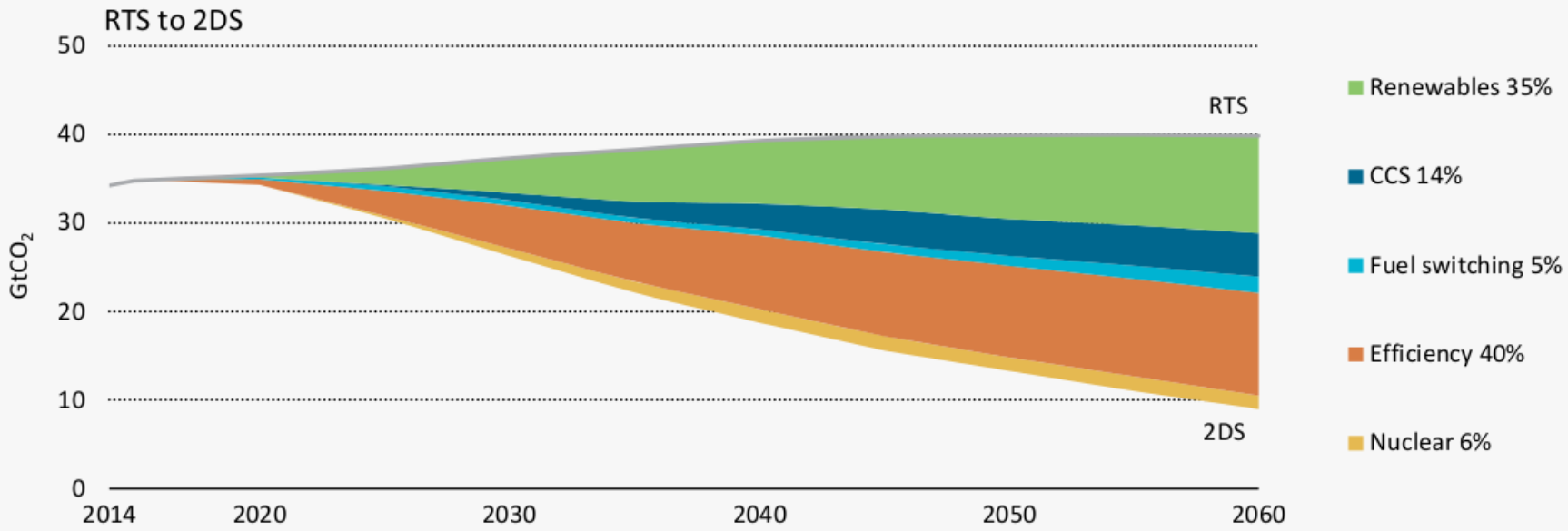


Key point *Growth in final energy demand in the 2DS is substantially lower than the RTS, and more than half of it is met by low-carbon sources by 2060 in the 2DS.*

Source:IEA 2017

Reference Technology Scenario (RTS)

Global CO_2 emissions reductions by technology area: RTS to 2DS

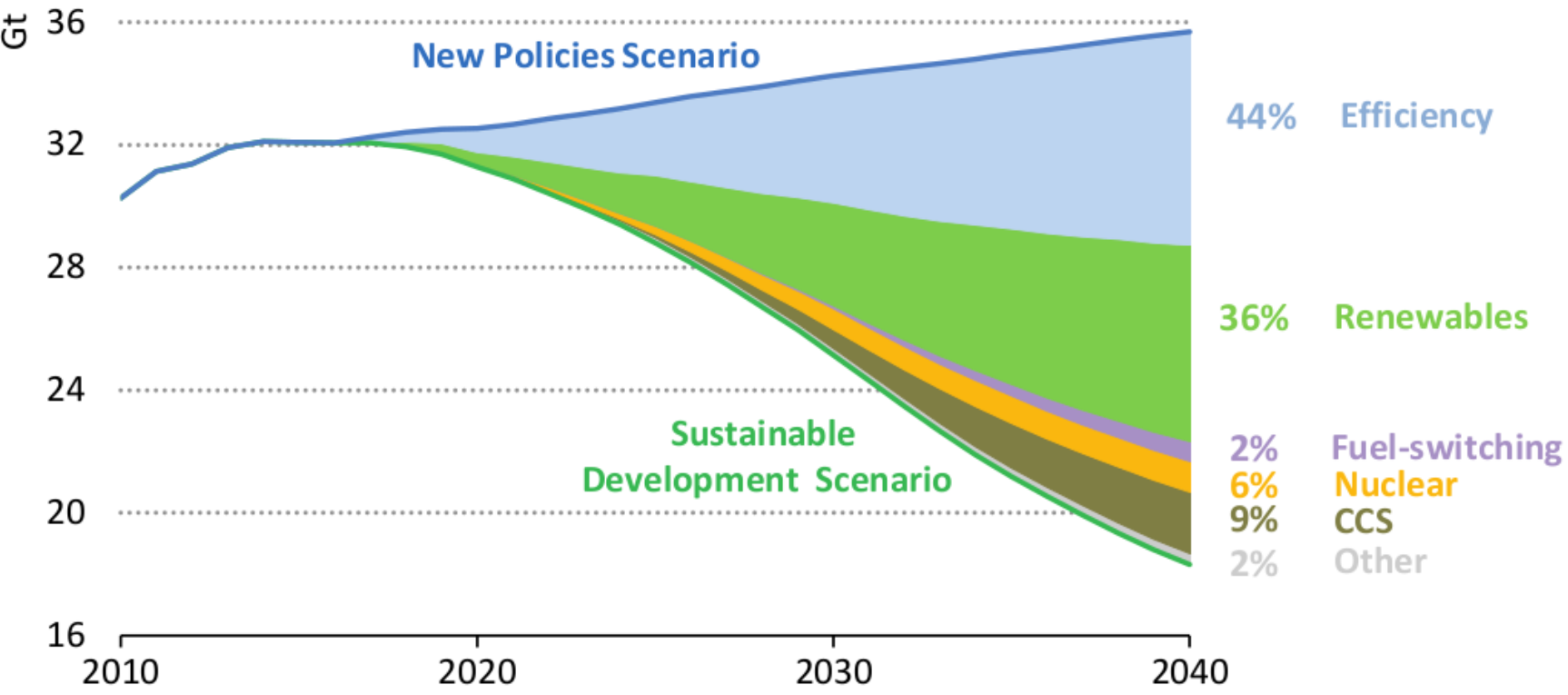


Note: CO_2 emissions include both energy-related CO_2 emissions and emissions from industrial processes.

Key point *Achieving the 2DS requires contributions from a diversified technology mix across all sectors.*

Source:IEA 2017

Global carbon dioxide (CO_2) emissions reductions in the WEO 2017 New Policies and Sustainable Development Scenarios



Source: IEA 2018