Decoupling
GDP and GHG, CO_2, energy consumption

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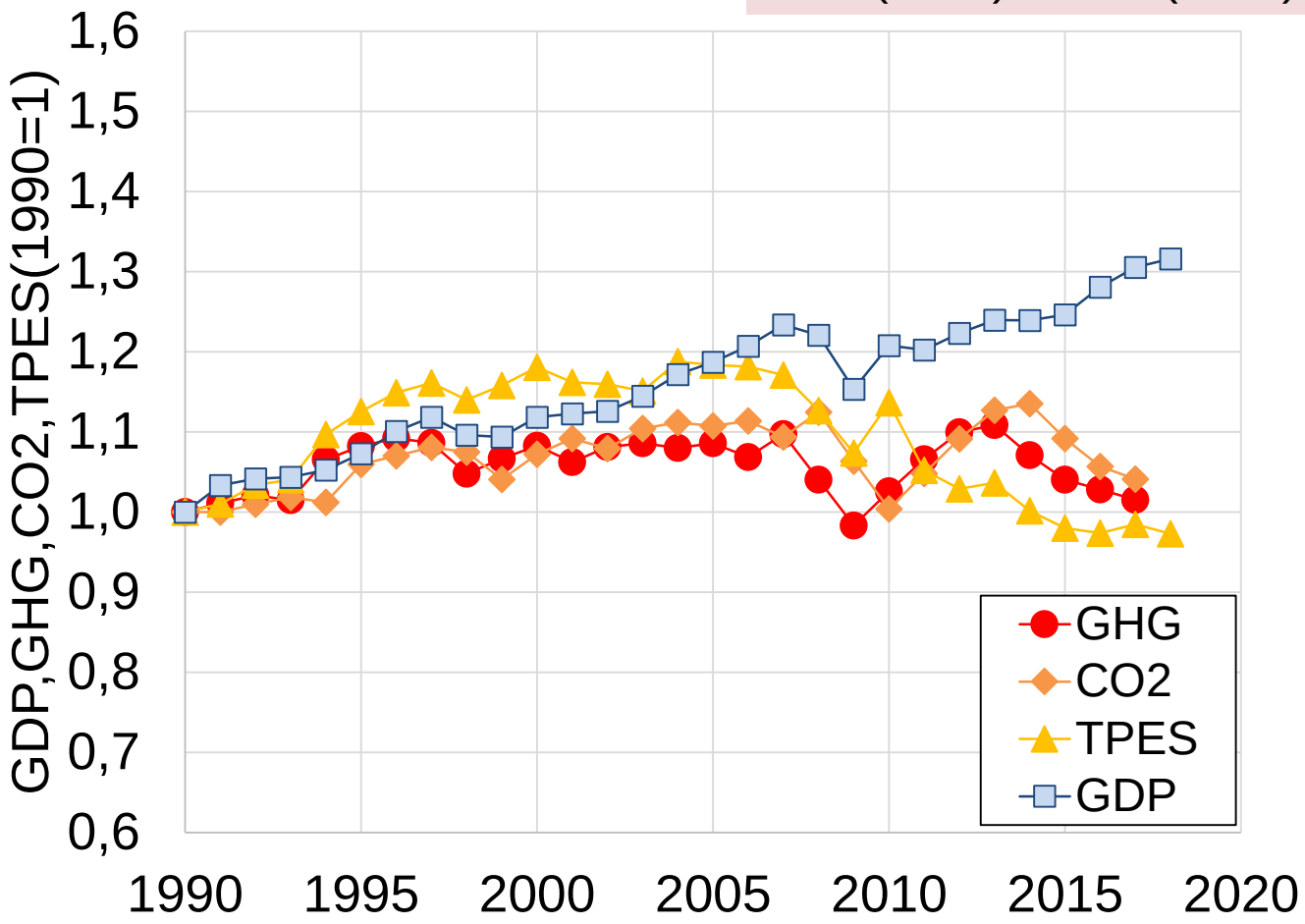
AIST

Contents

- Decoupling: GDP growth and GHG, CO_2, energy
- Background (1) total energy
- Background (2) electricity generation
- Background (3) energy saving
- climate measure and GDP, jobs

Japan

Nuclear power plant generation share
24% (1990)→26% (2010)→3% (2017)



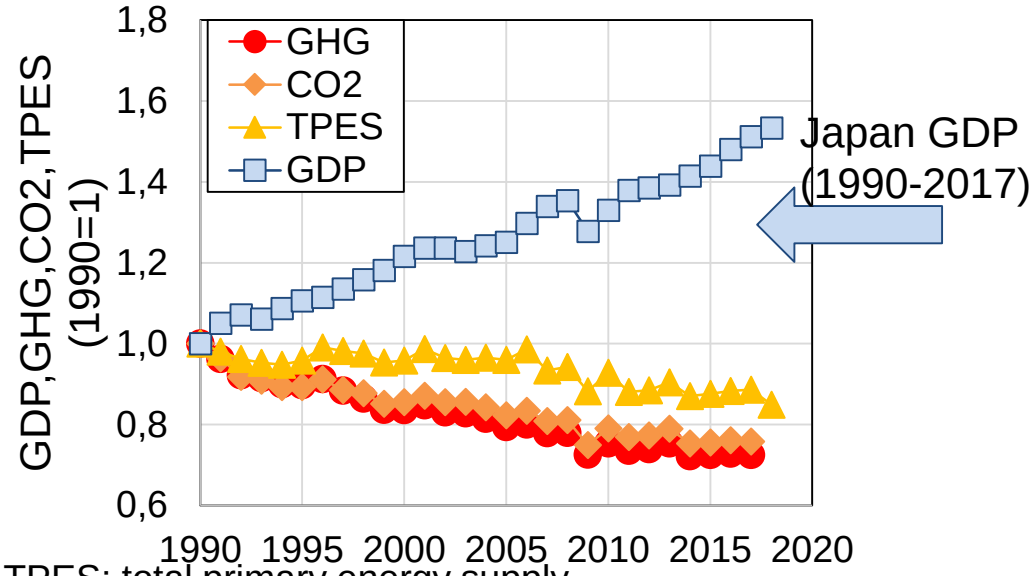
TPES: total primary energy supply

Data UNFCCC inventory submission, IEA world energy balances etc.

Developed countries decoupling: GDP growth & GHG, CO2, energy consumption

Germany

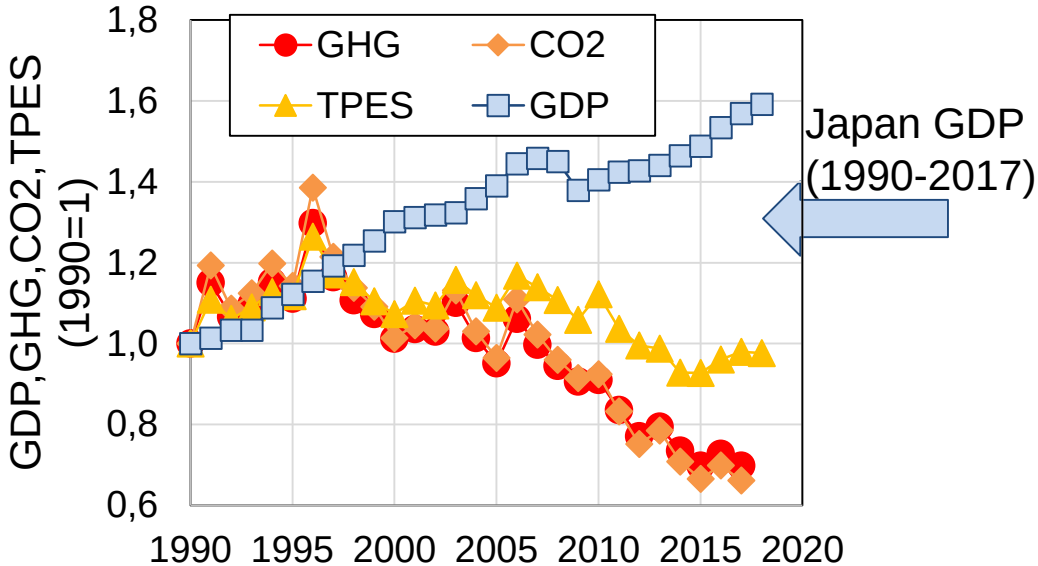
Nuclear ratio down
28% (1990)→12% (2017)



TPES: total primary energy supply

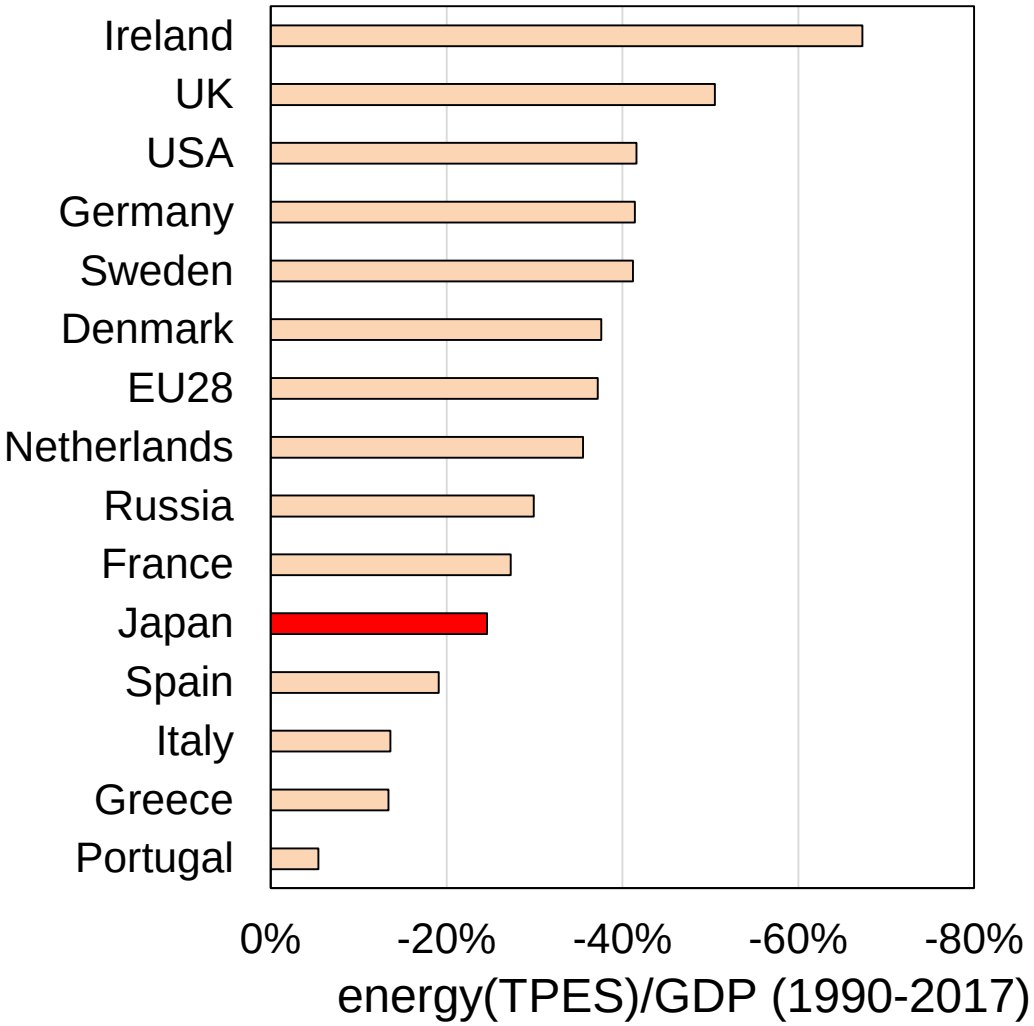
Denmark

no nuclear power plant

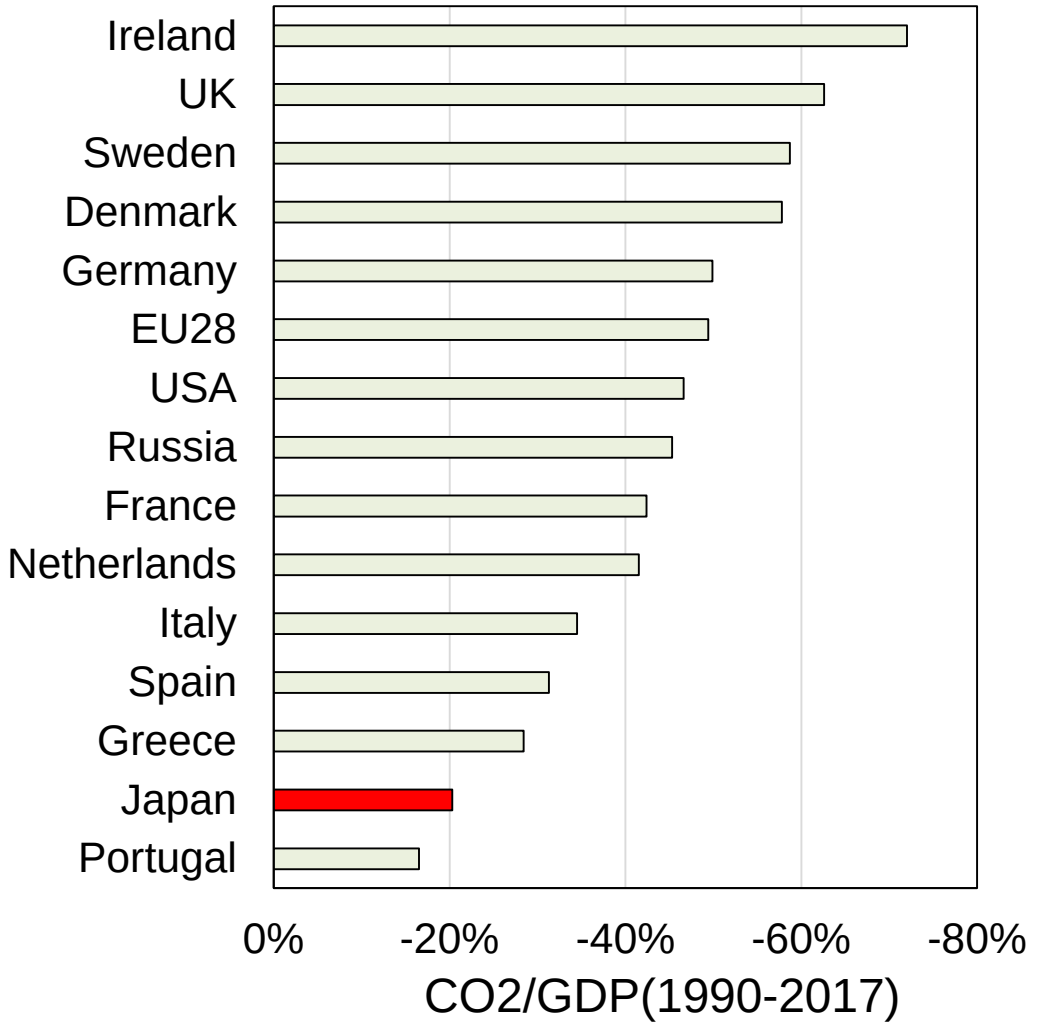


Data UNFCCC inventory submission, IEA world energy balances etc.

Energy/GDP (1990-2017)



CO2/GDP (1990-2017)

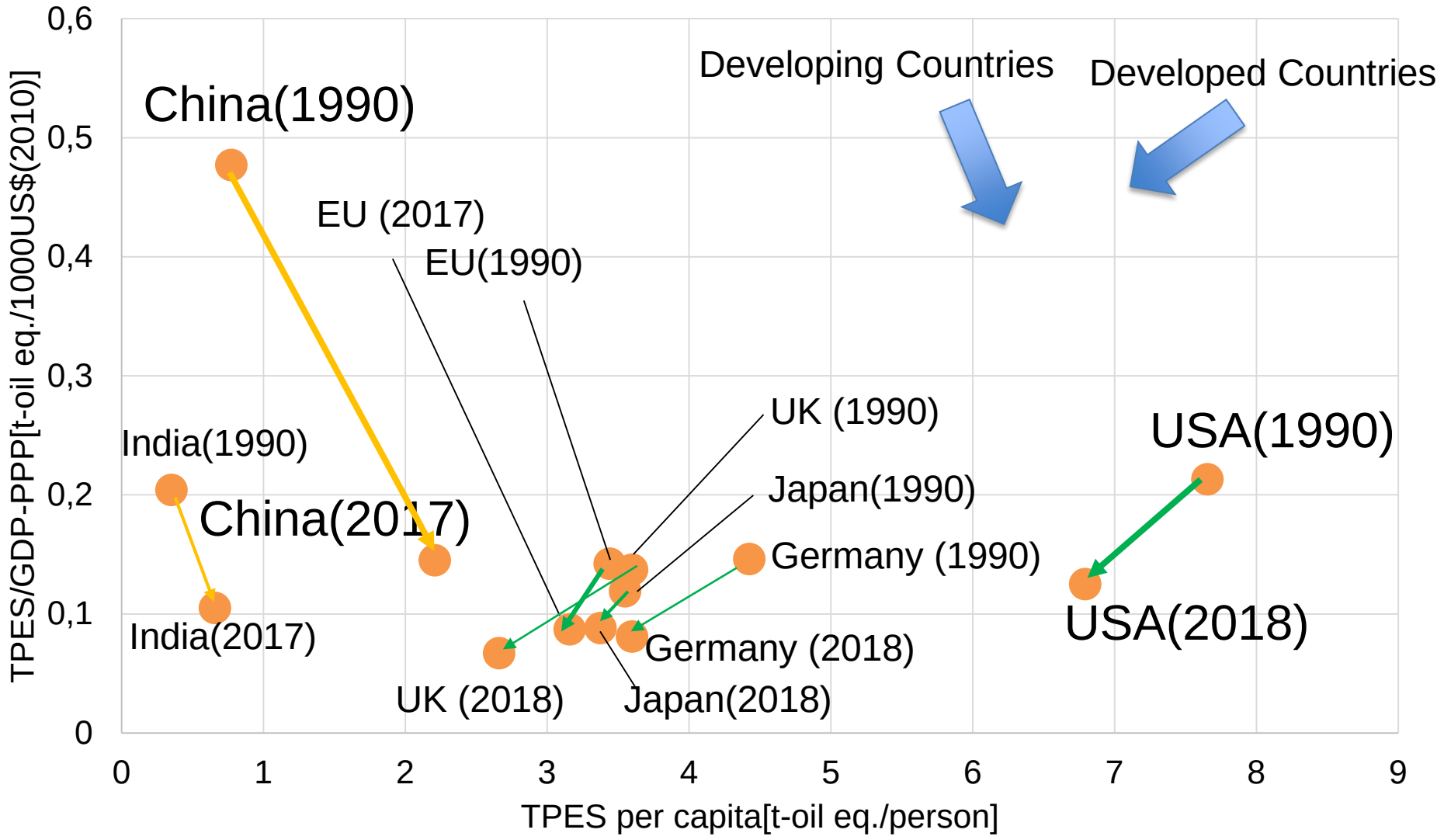


TPES: total primary energy supply

Data IEA world energy balances 2019

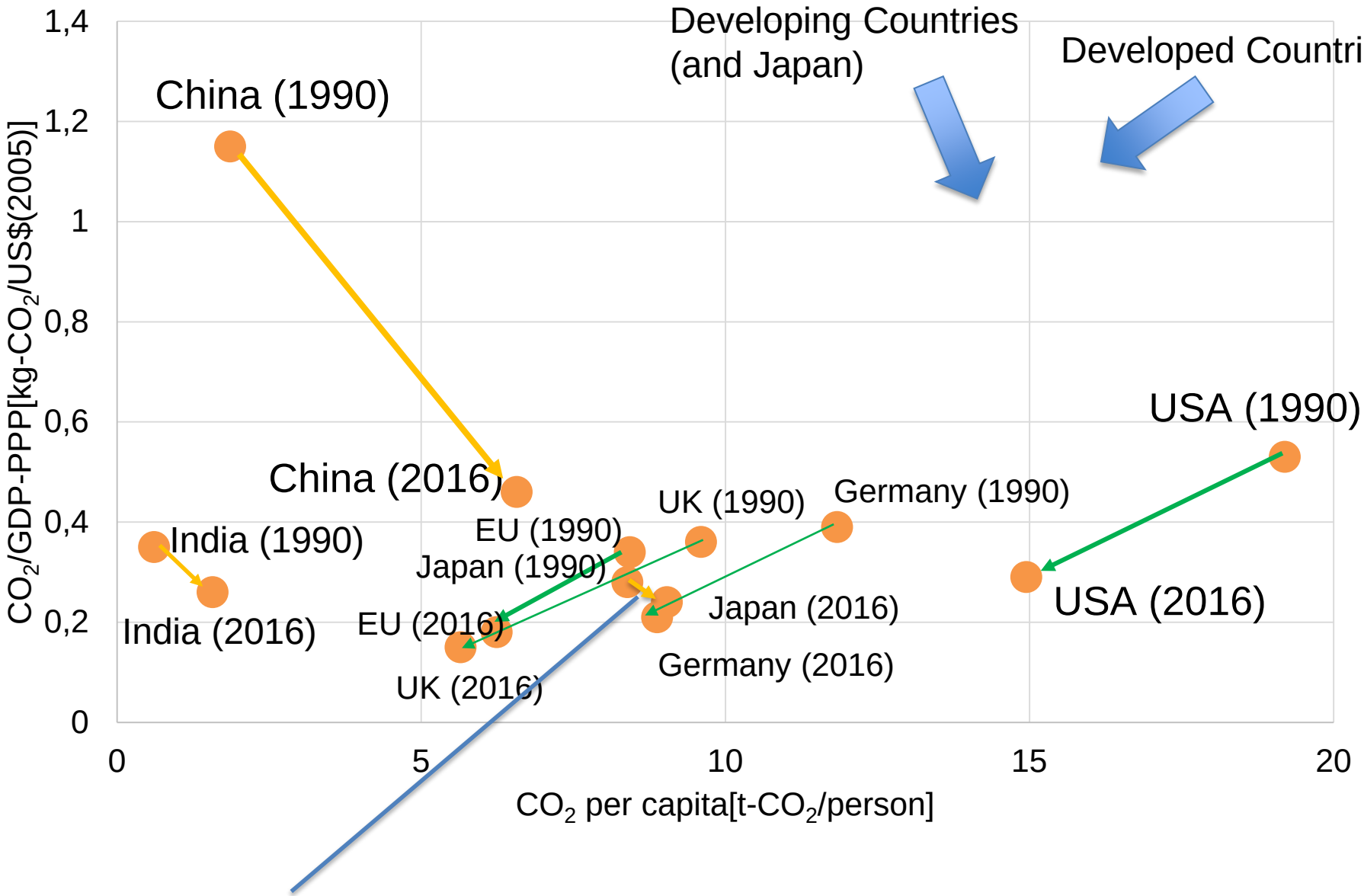
Data UNFCCC inventory submission, IEA world energy balances 2019

Energy change (1990-2018)



Data: IEA world energy balances 2019

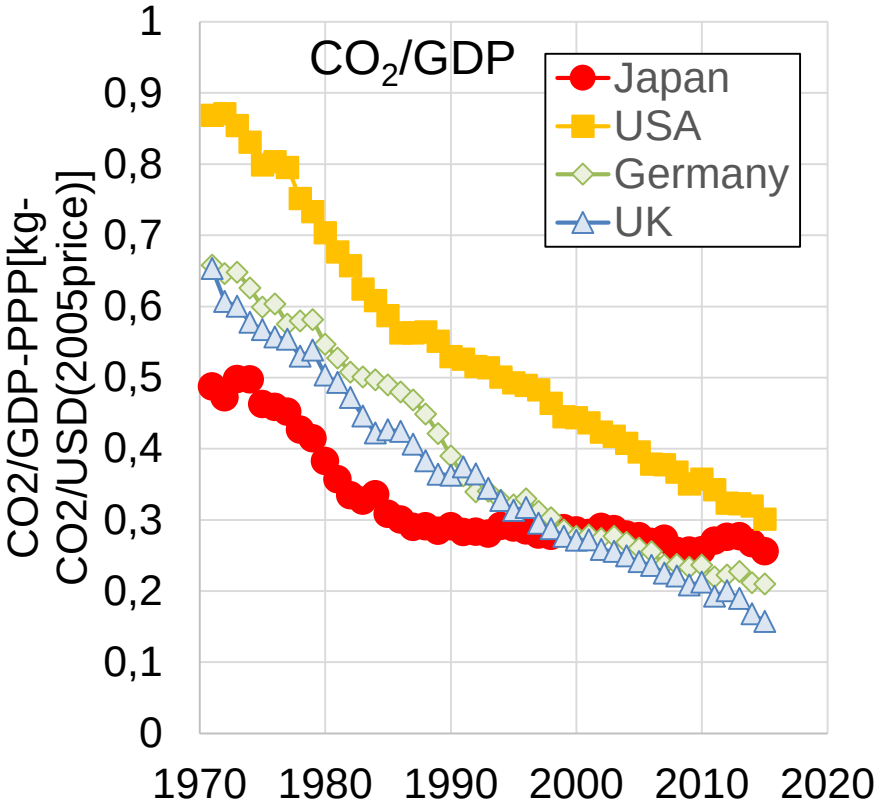
CO_2 change 1990-2016

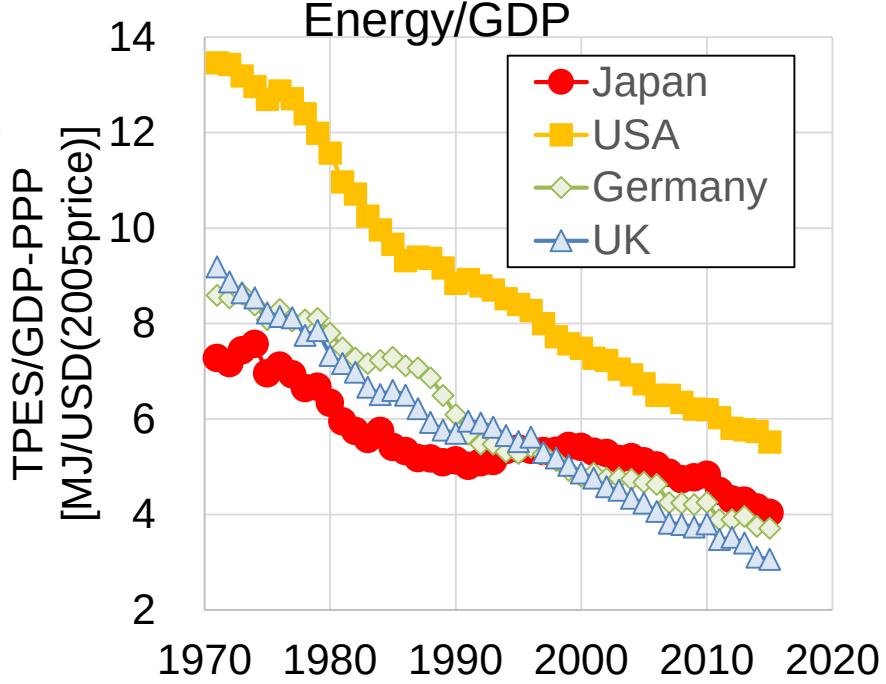


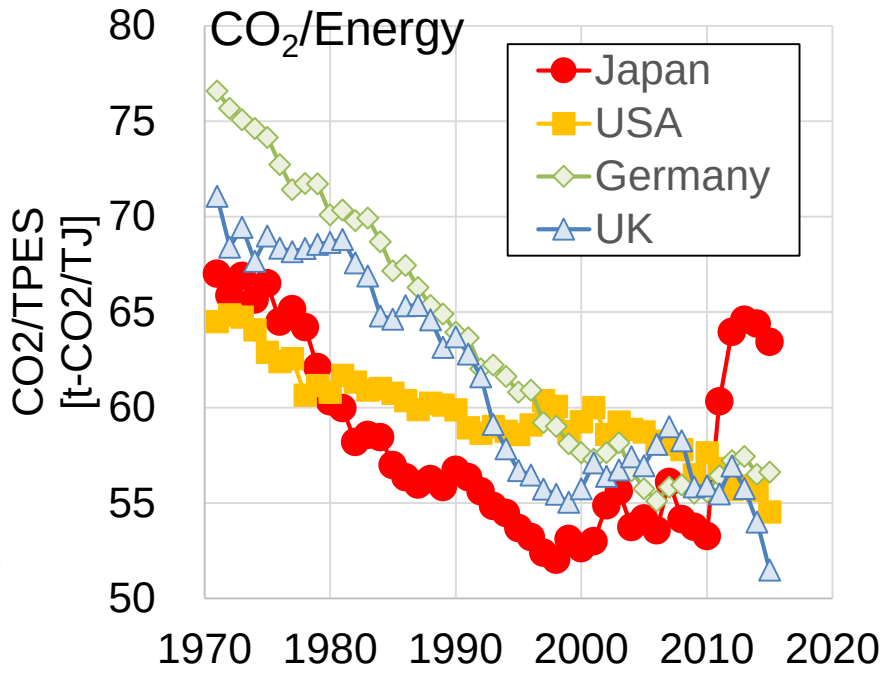
Japan: CO2 per capita increasing

Data IEA CO2 emission from fuel combustion highlight

CO_2/GDP

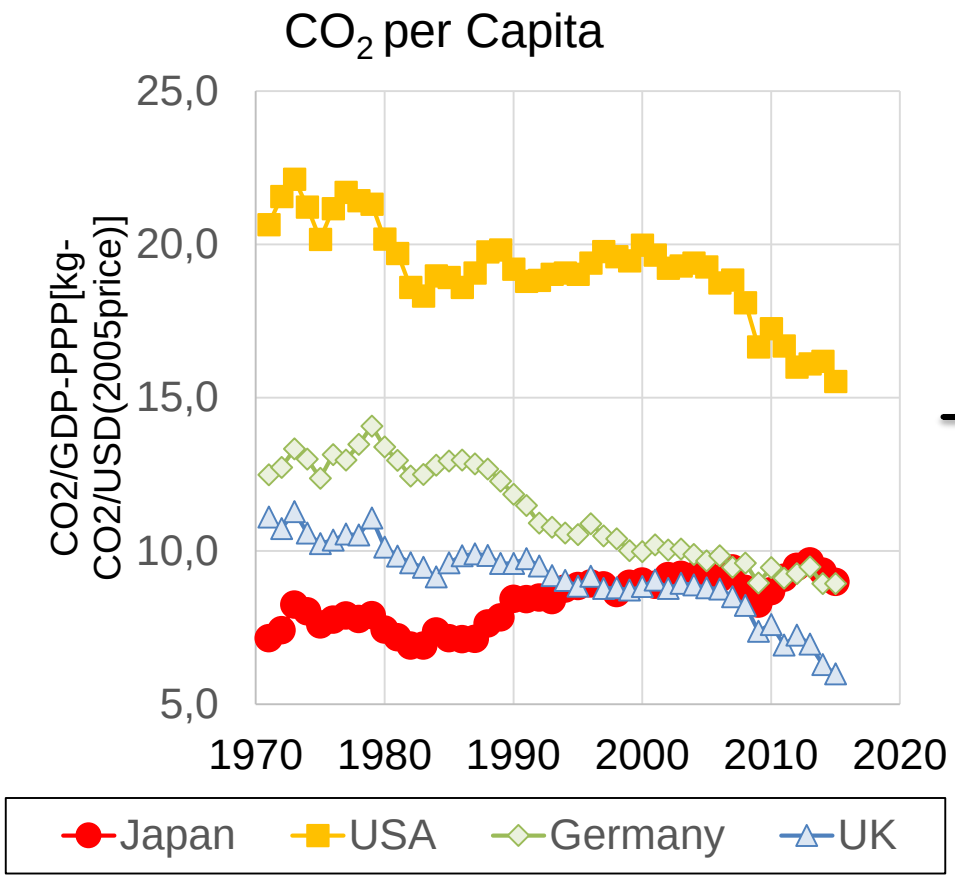


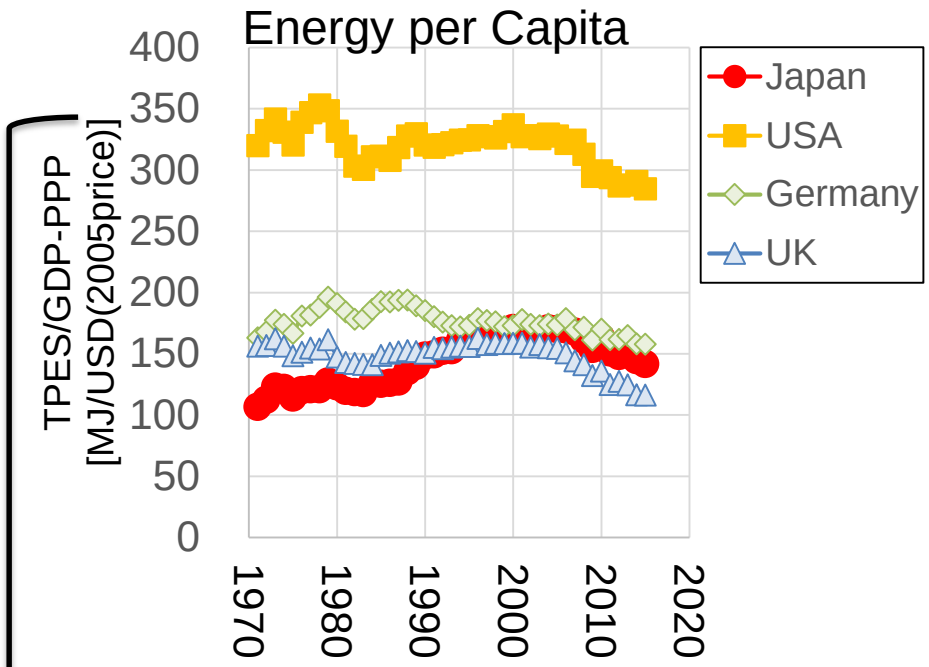


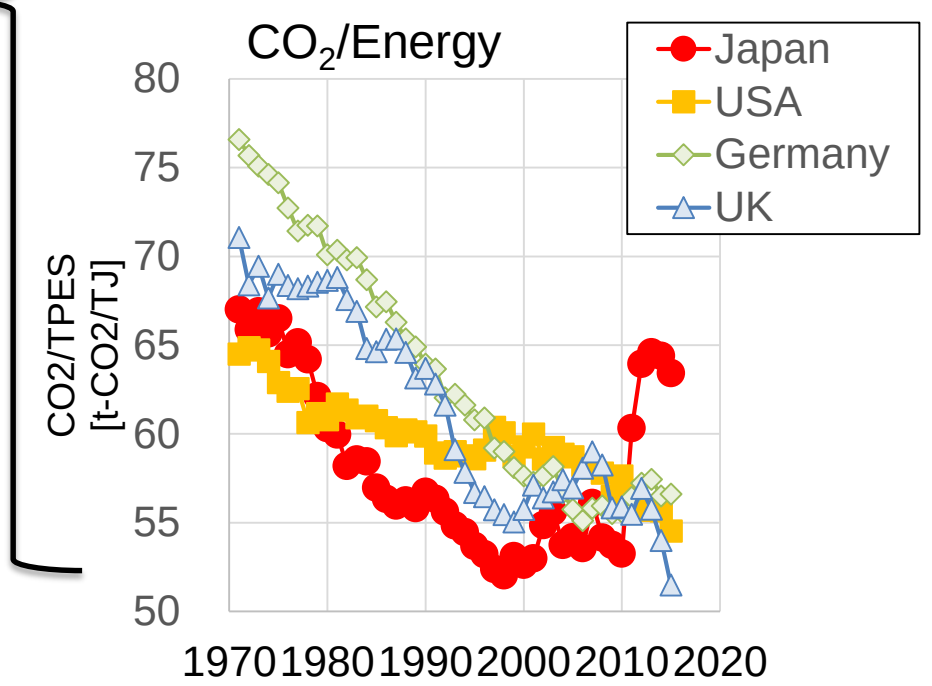


Data IEA CO2 emission from fuel combustion highlight

CO_2 per capita



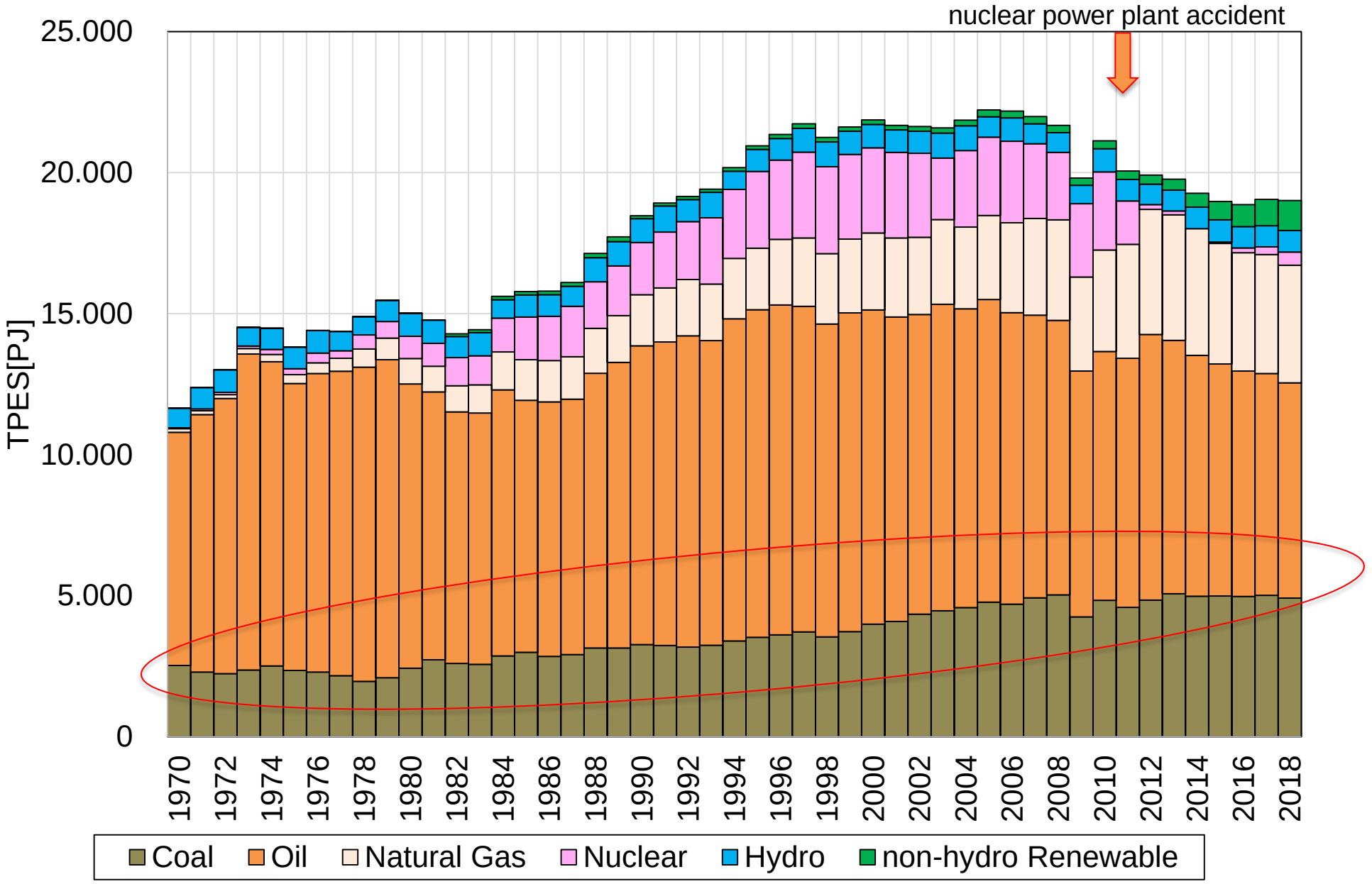




Data IEA CO2 emissions from fuel combustion highlight

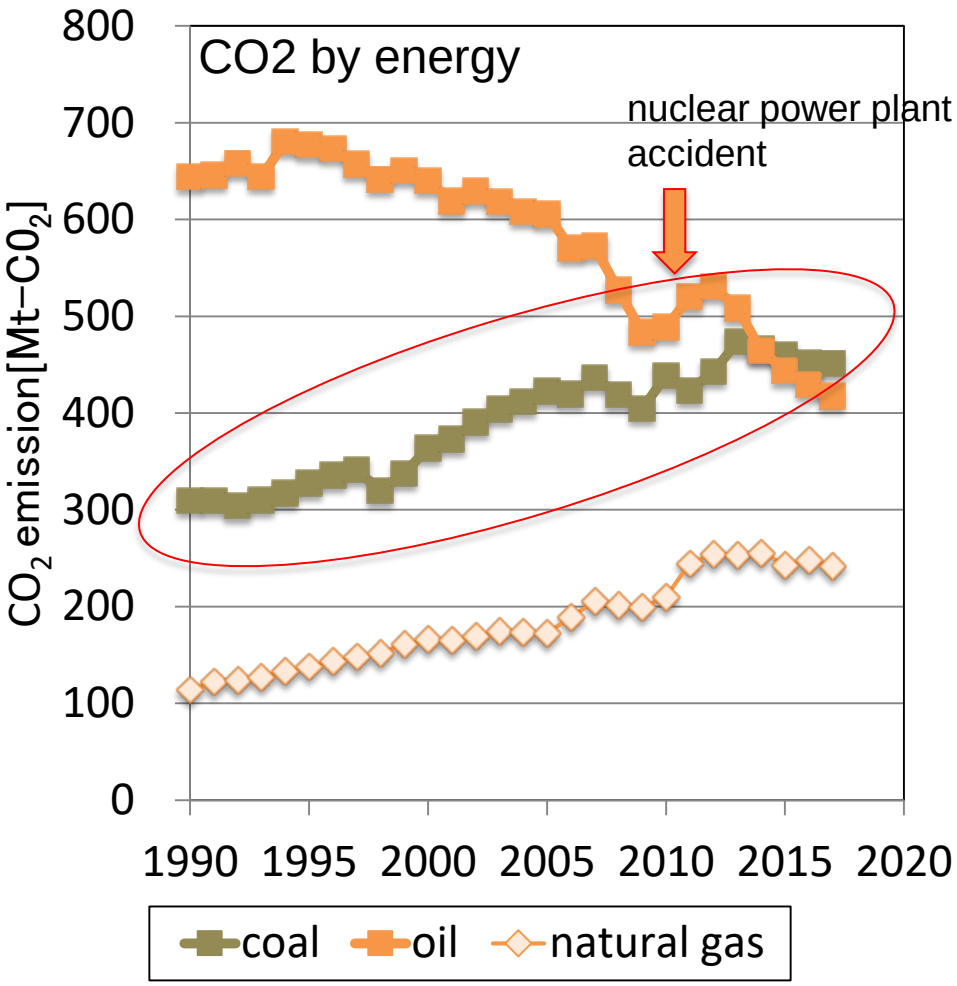
Background (1)
total energy

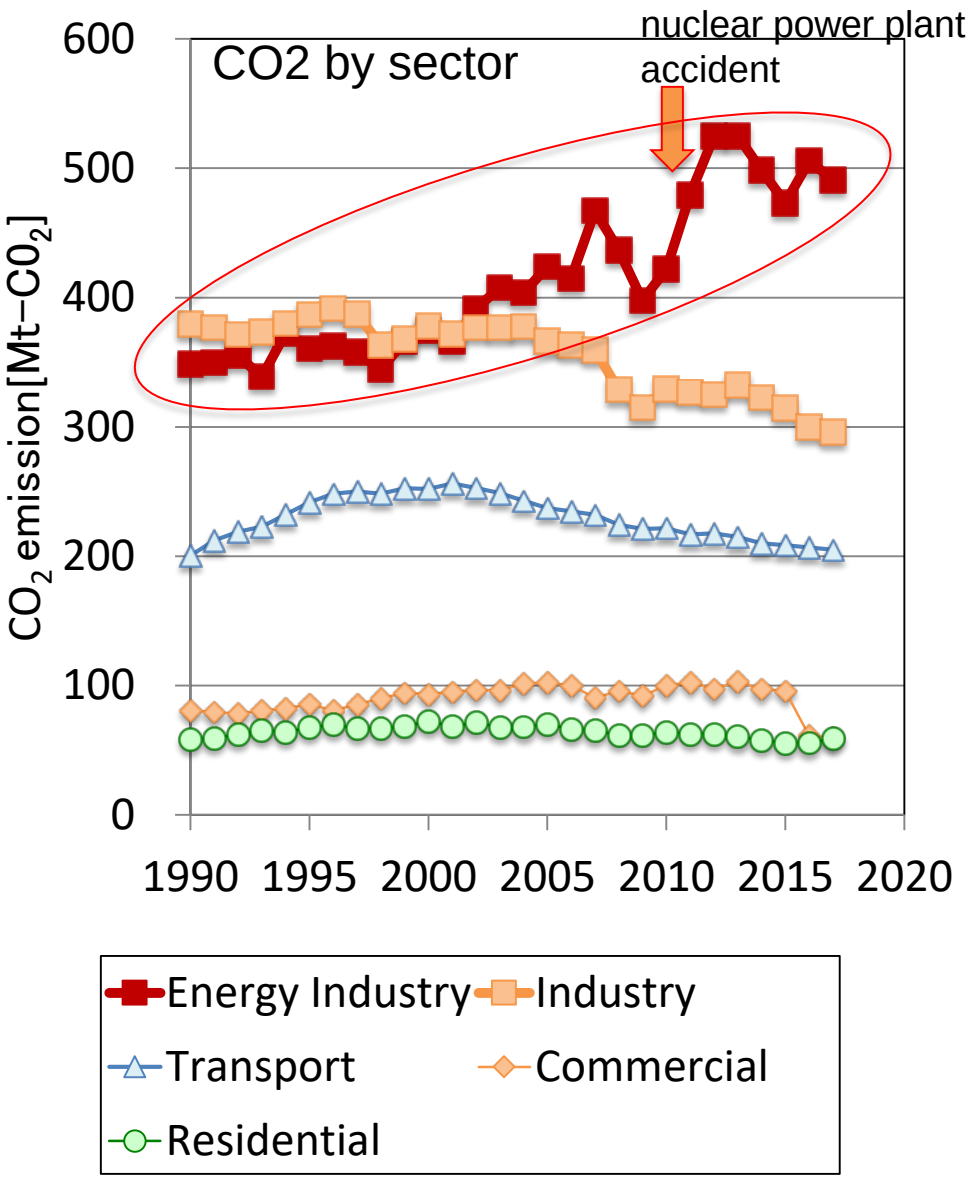
Primary energy supply in Japan (1970-2018)



Data: BP Statistical Review of World Energy 2019

CO_2 emission by energy and sector in Japan

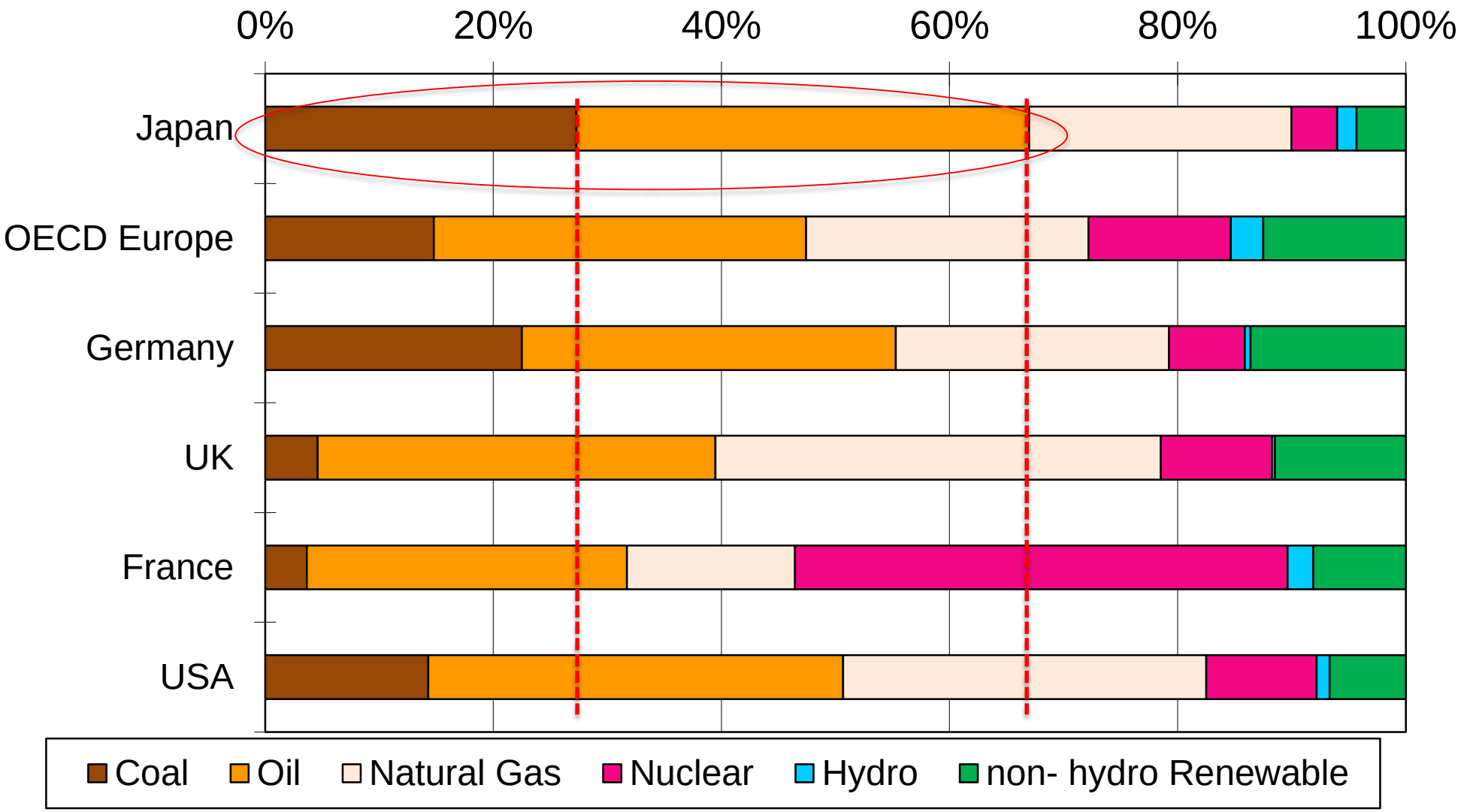




Energy Industry: Electricity, oil refinery, etc.

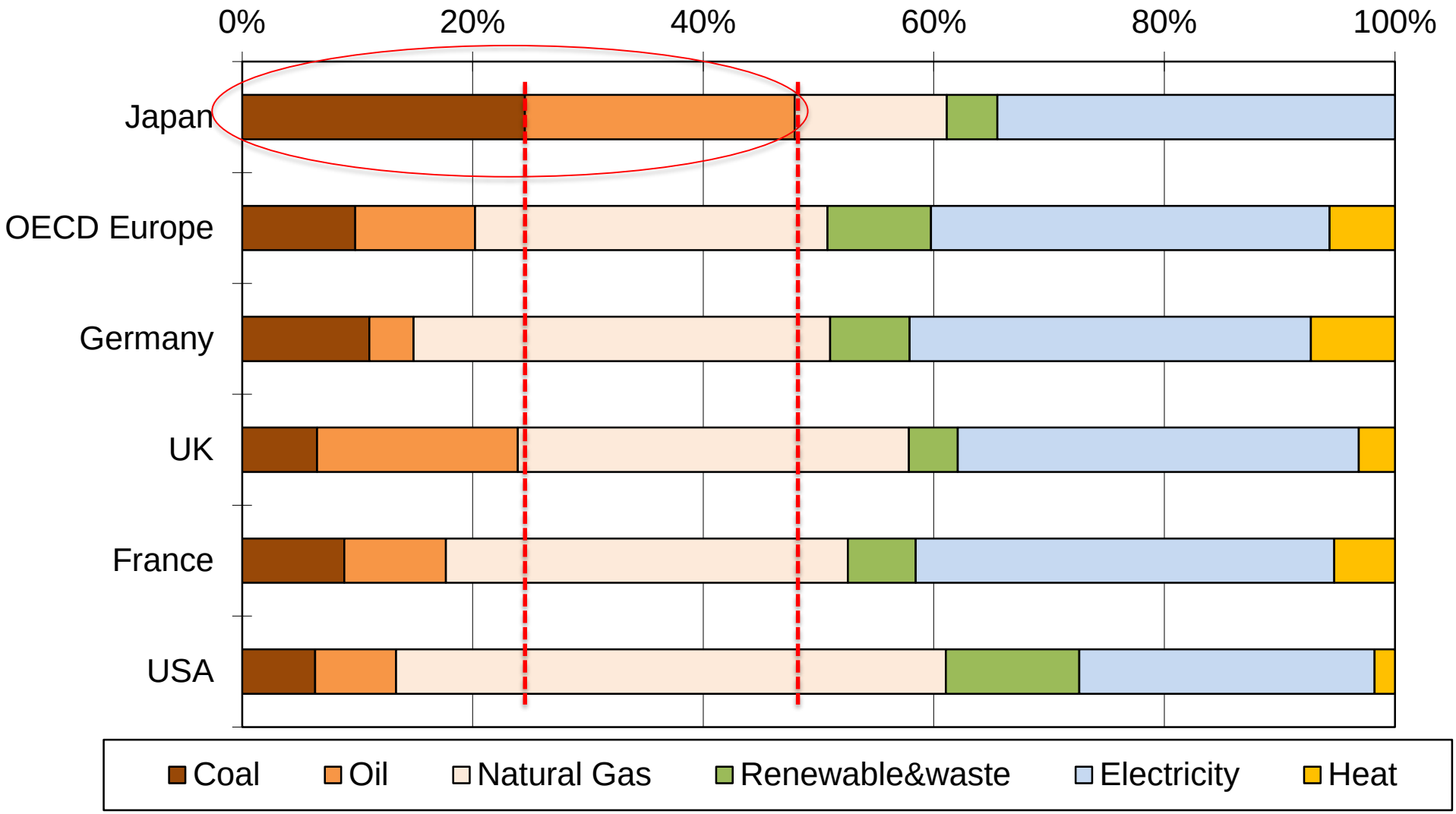
環境省「温室効果ガス排出インベントリ」より作成

Total primary energy supply ratio (2018)



DATA: IEA World energy balances 2019

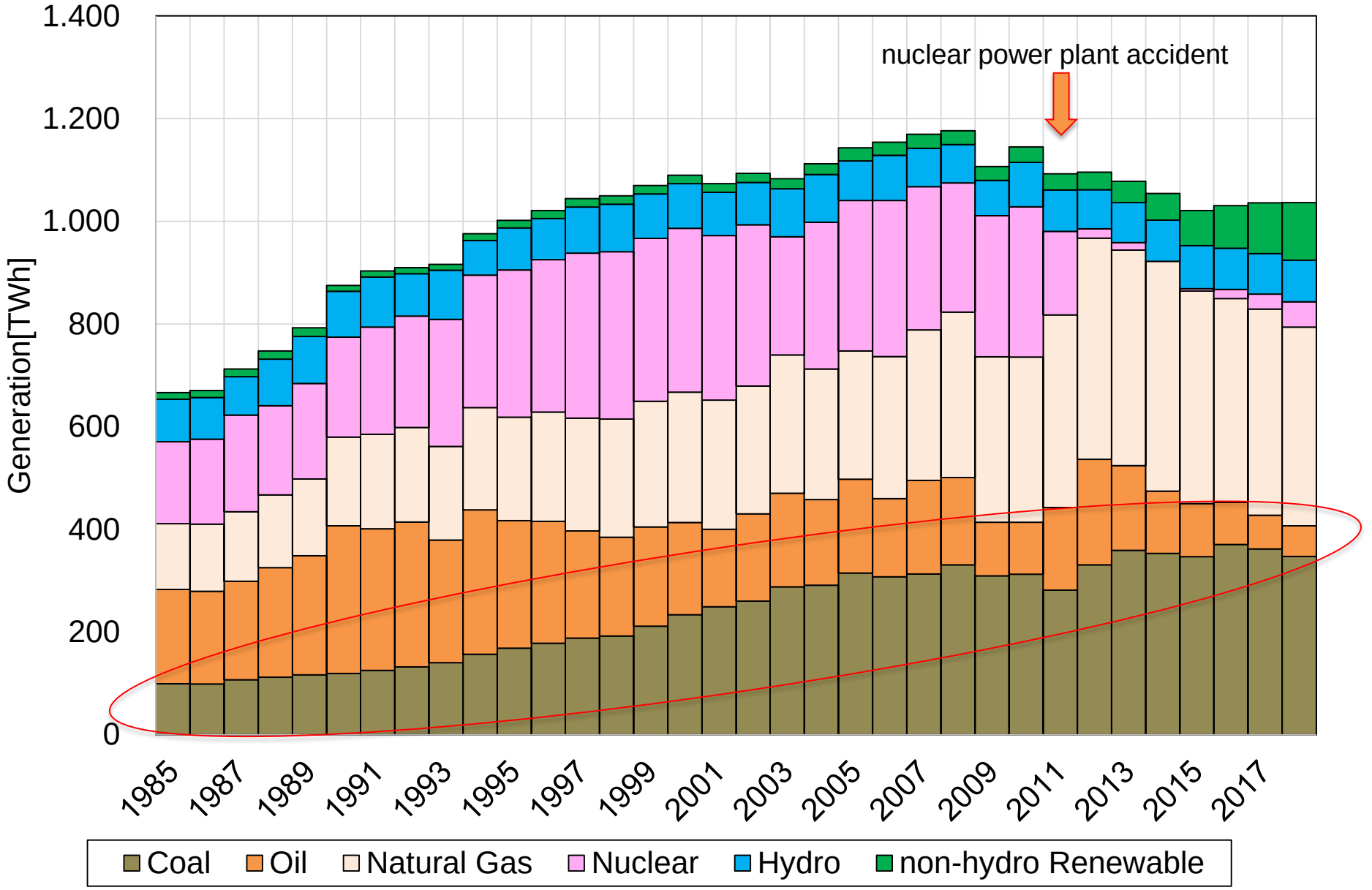
Industry energy ratio (2017)



DATA: IEA World energy balances 2019

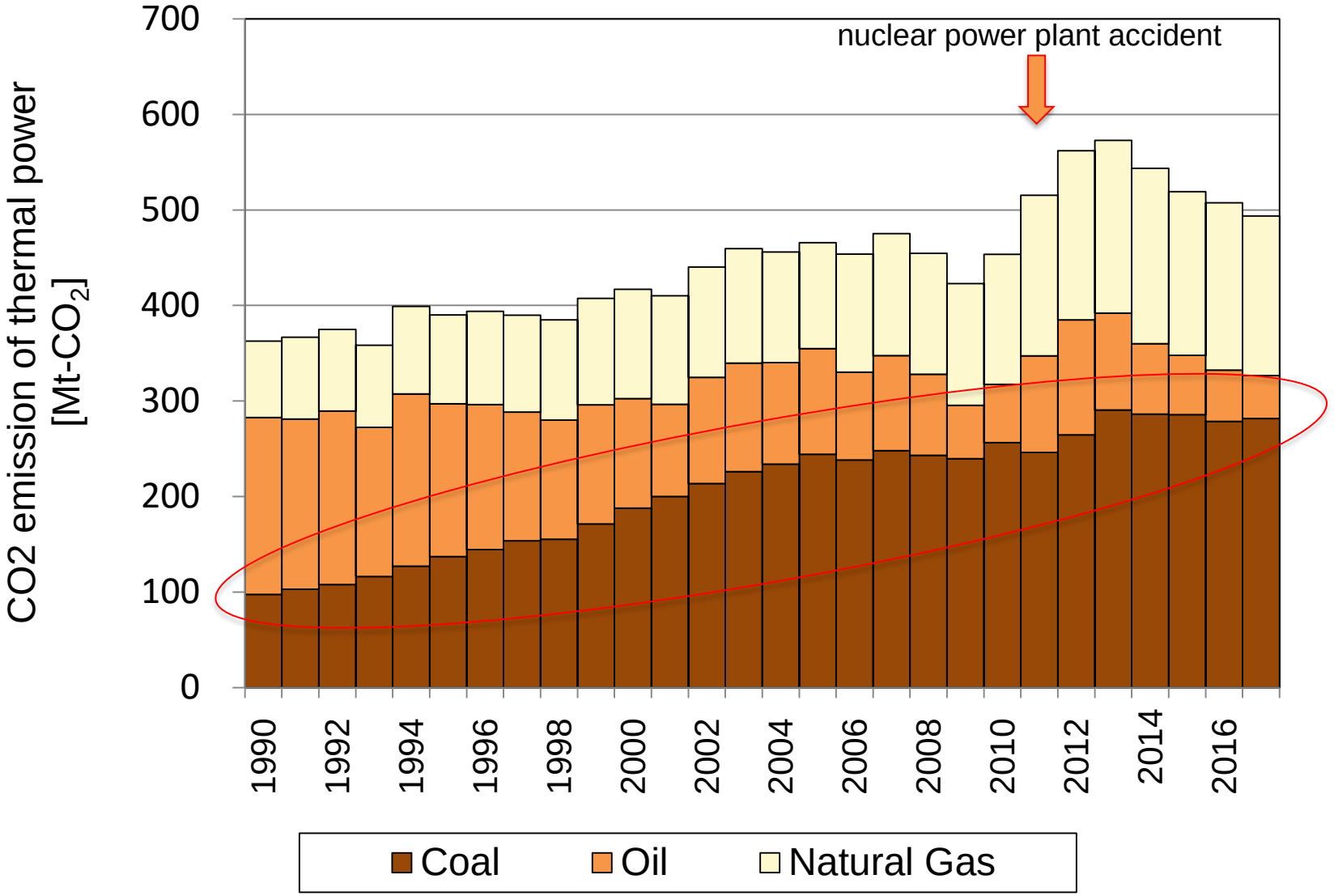
Background (2)
Electricity carbon intensity

Electricity Generation in Japan (1985-2018)

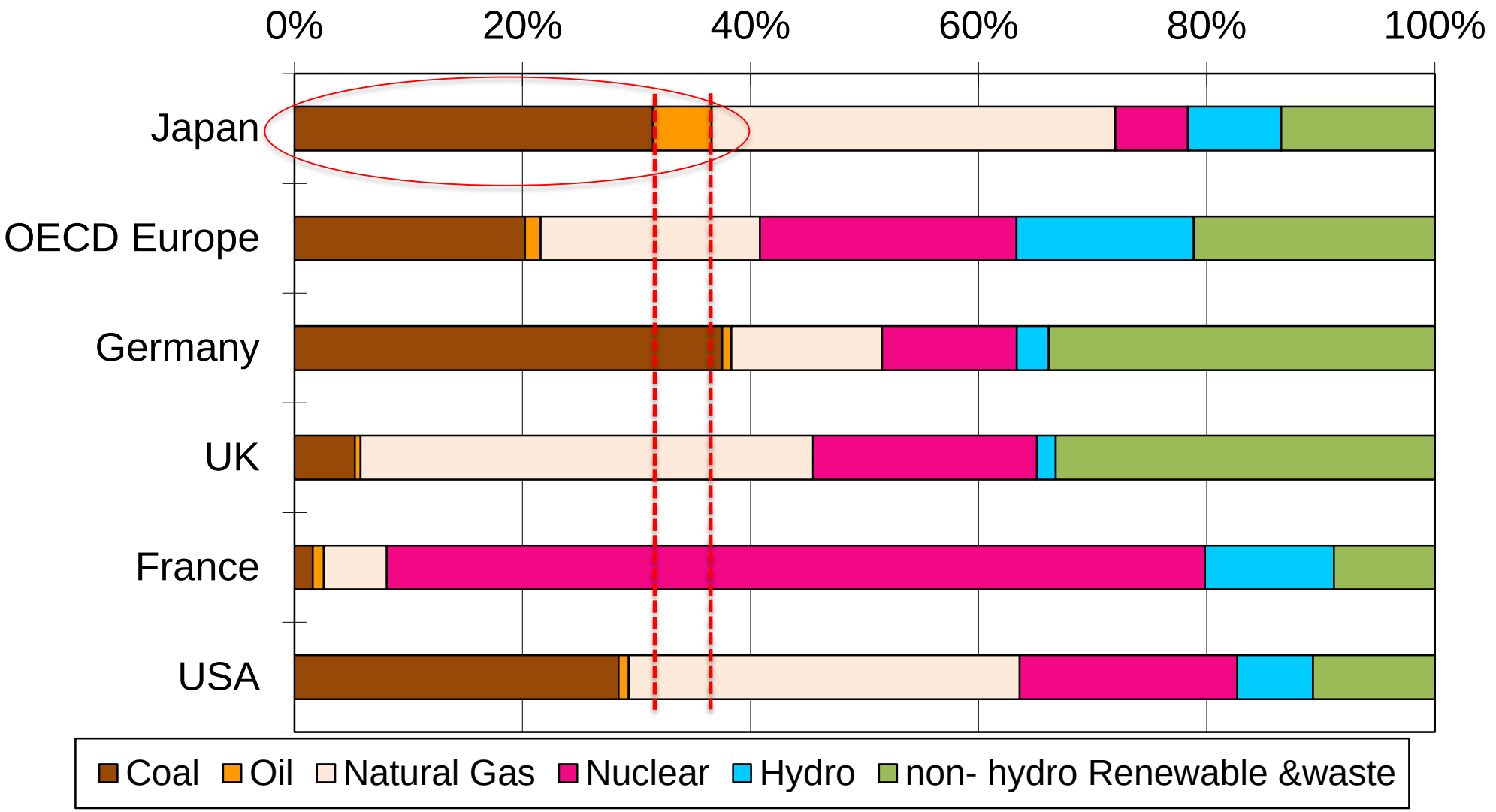


Data: BP Statistical Review of World Energy 2019

CO_2 emission from thermal power in Japan (1990-2017)

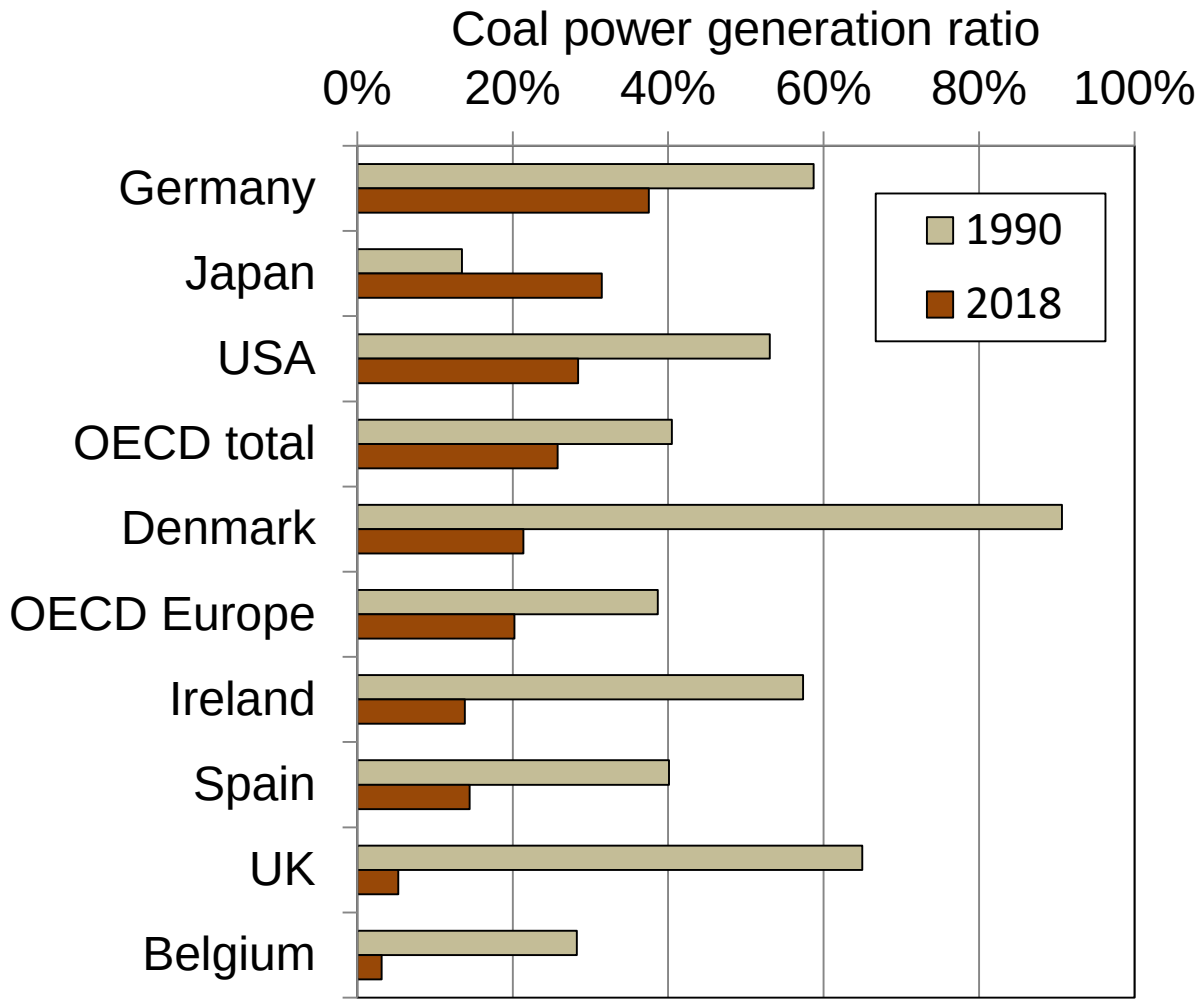


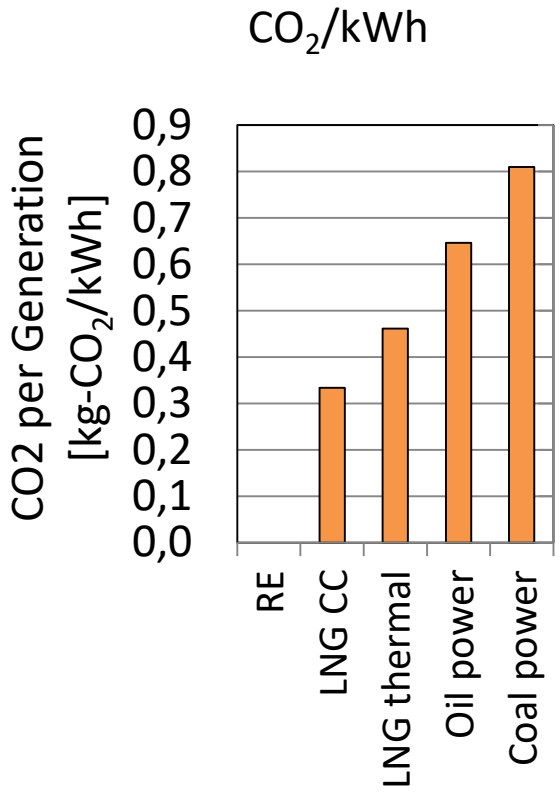
Electricity generation ratio (2018)



DATA: IEA World energy balances 2019

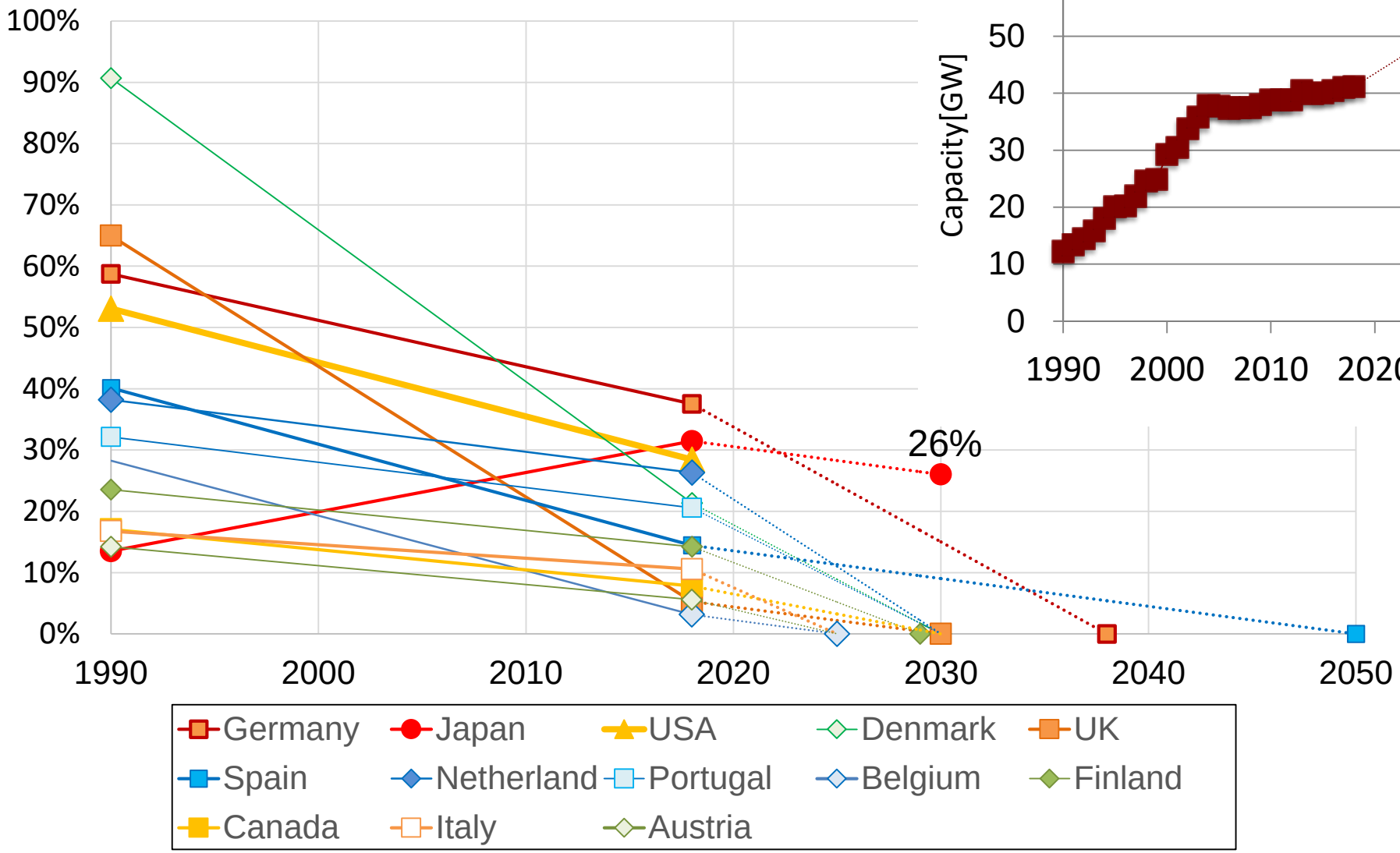
Coal power generation ratio (1990-2018)





Data: IEA World Energy Balances 2019

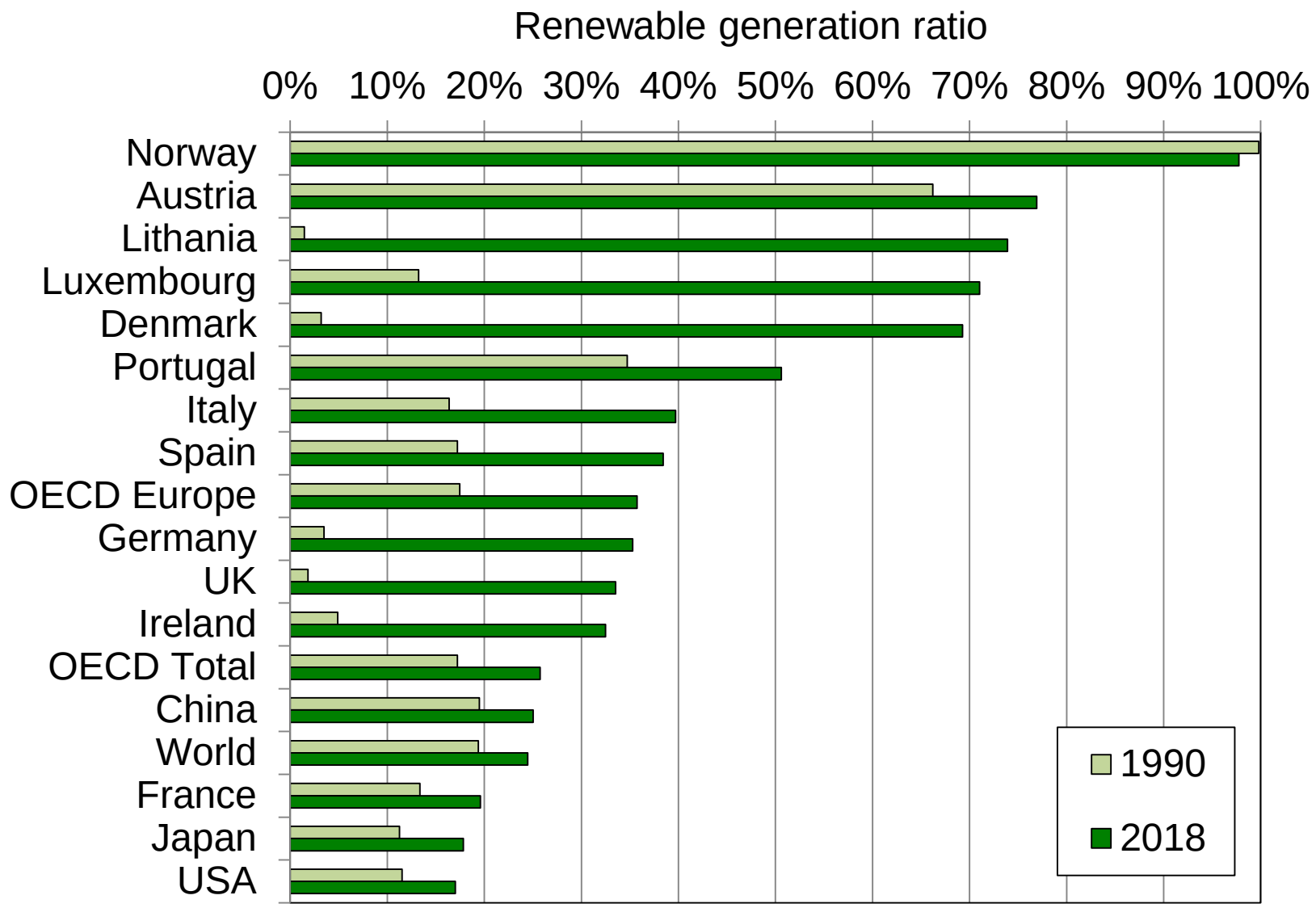
Coal power generation ratio



Spain; no coal exit period, but 2050 RE 100% target in electricity

Data: IEA World Energy Balances 2019

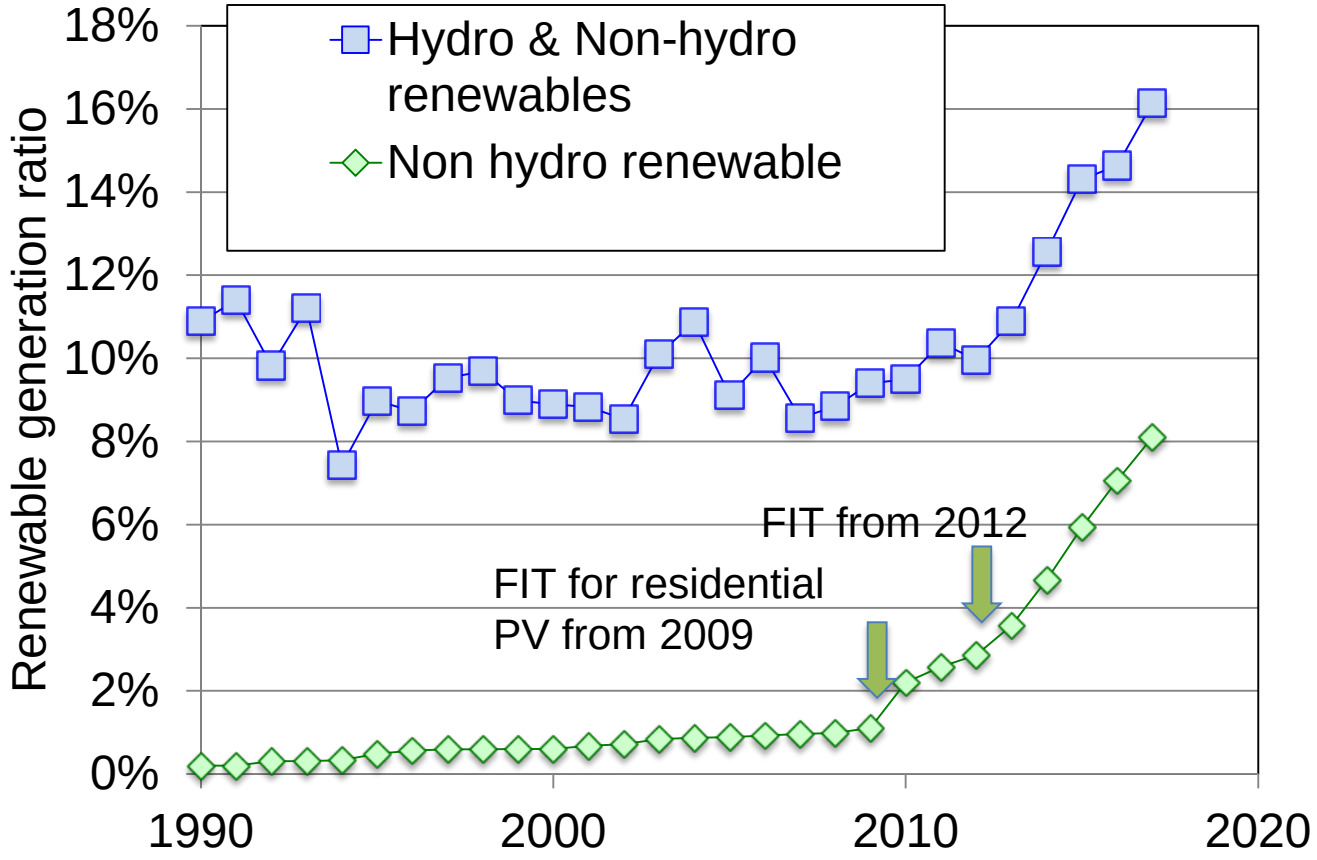
Renewable generation ratio(1990-2018)



World, China; 2017

Data: IEA World Energy Balances 2019

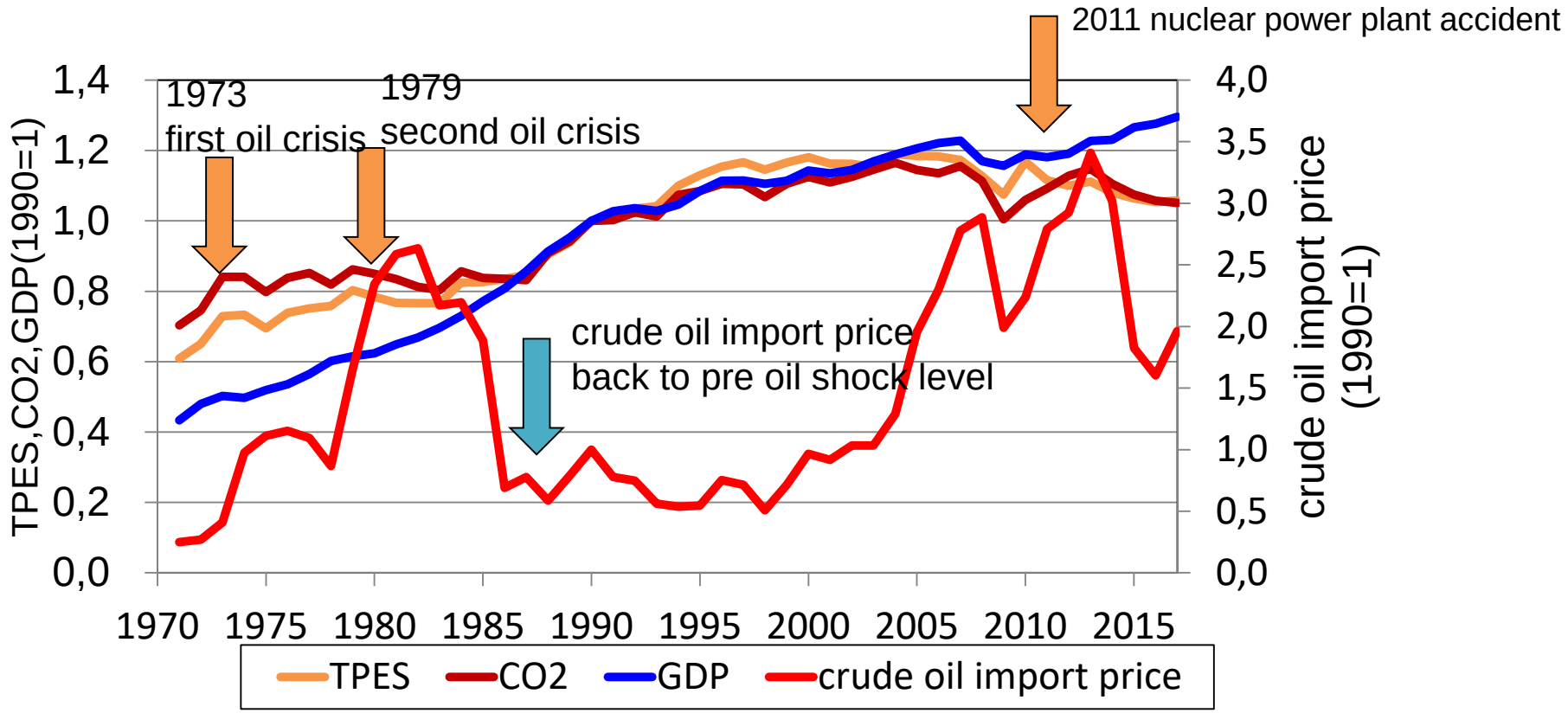
Renewable generation ratio (1990-2017)



Data: METI total energy statistics

Background (3)
energy saving

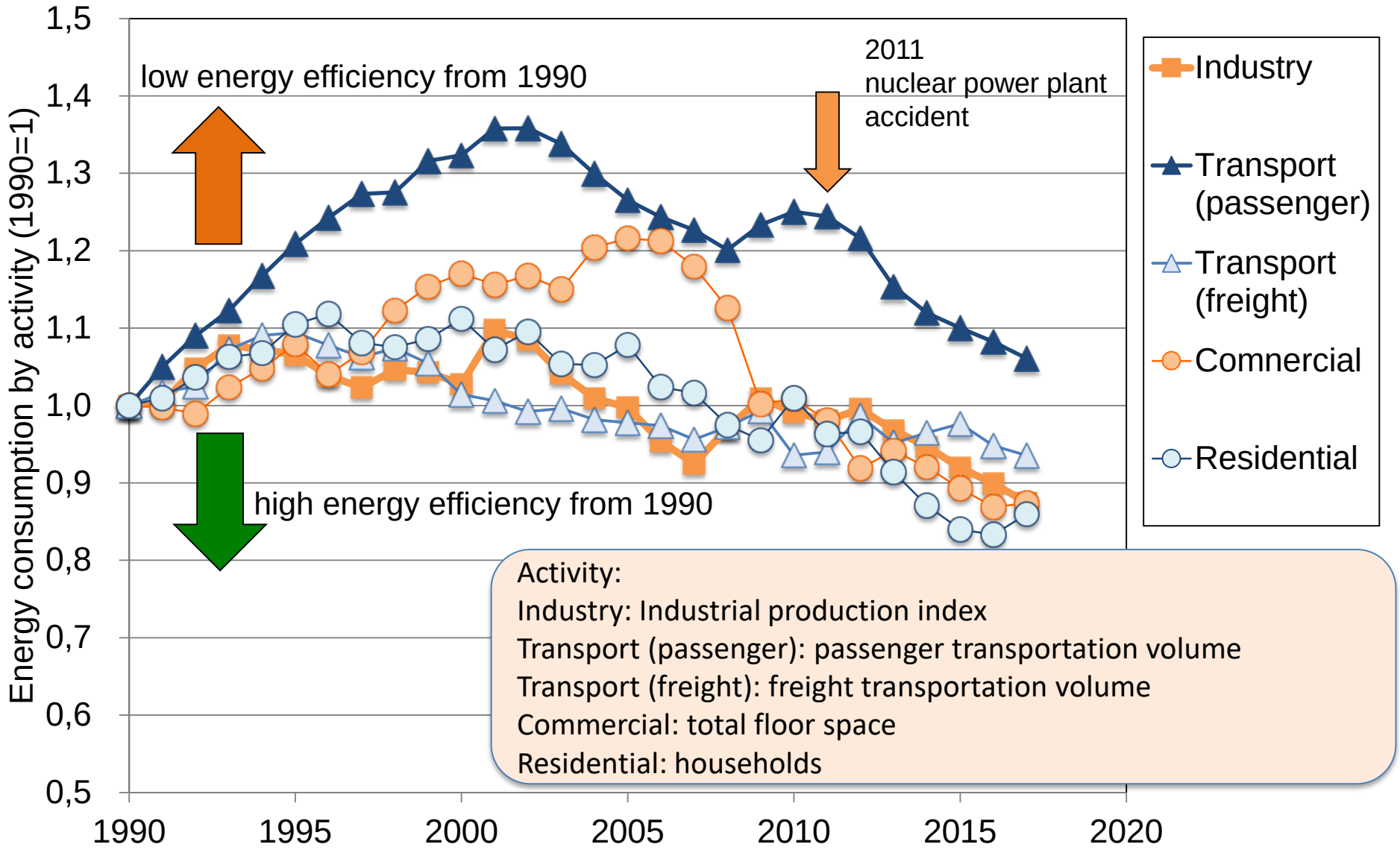
Crude oil import price and energy, CO_2, GDP in Japan



- oil price high(1973-1985):GDP growth with energy saving and CO2 emission reduction measures
- oil price low(after 1986):GDP growth with energy and CO2 growth.

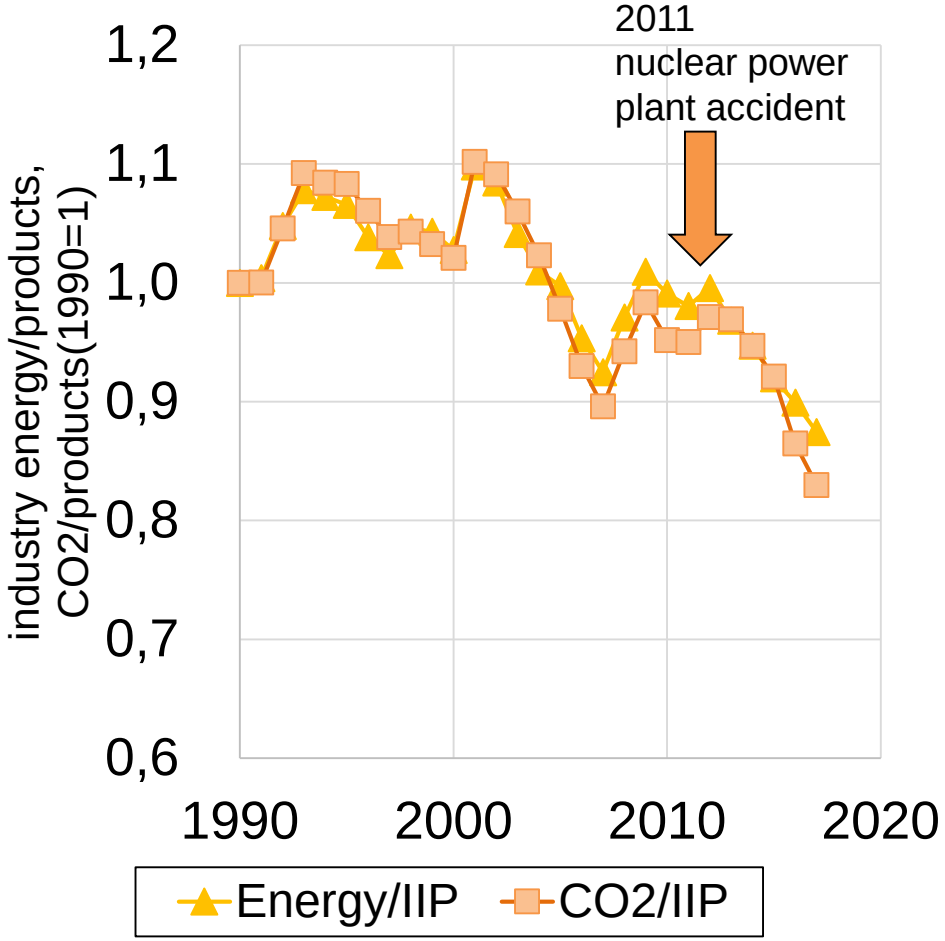
IEEJ「エネルギー経済統計要覧2019」より作成

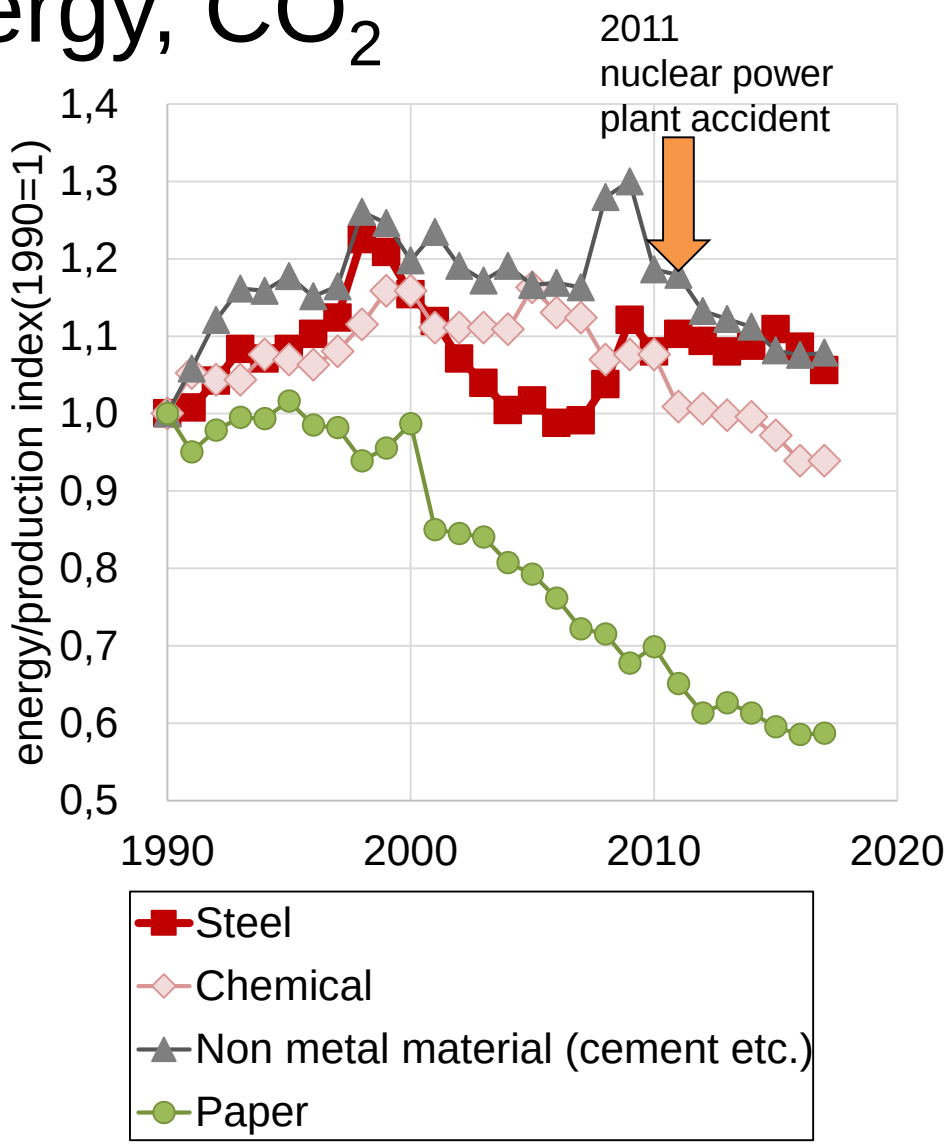
Energy consumption per activity in Japan (1990-2017)



Data: METI total energy statistics etc.

Industry sector (mainly manufacturing) production, energy, CO_2

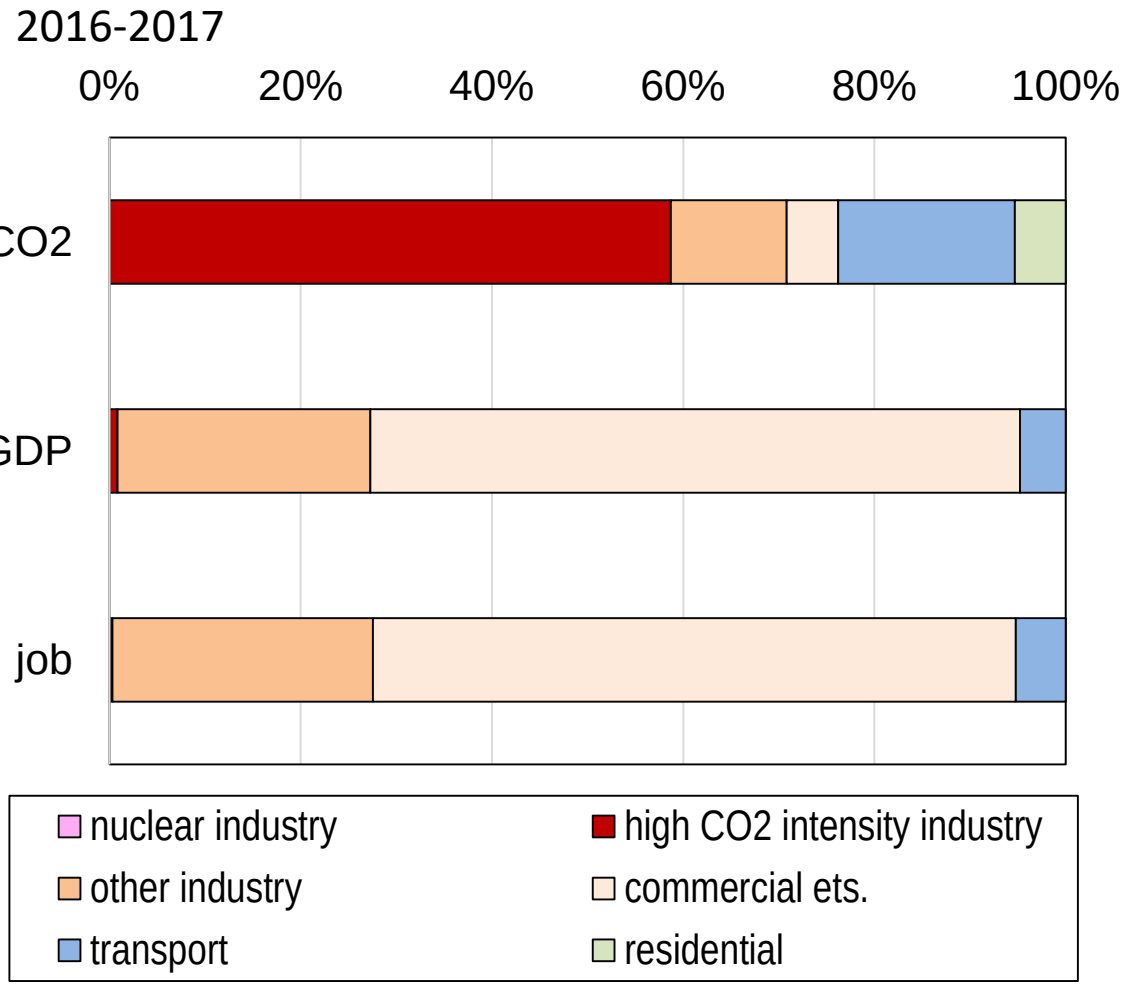


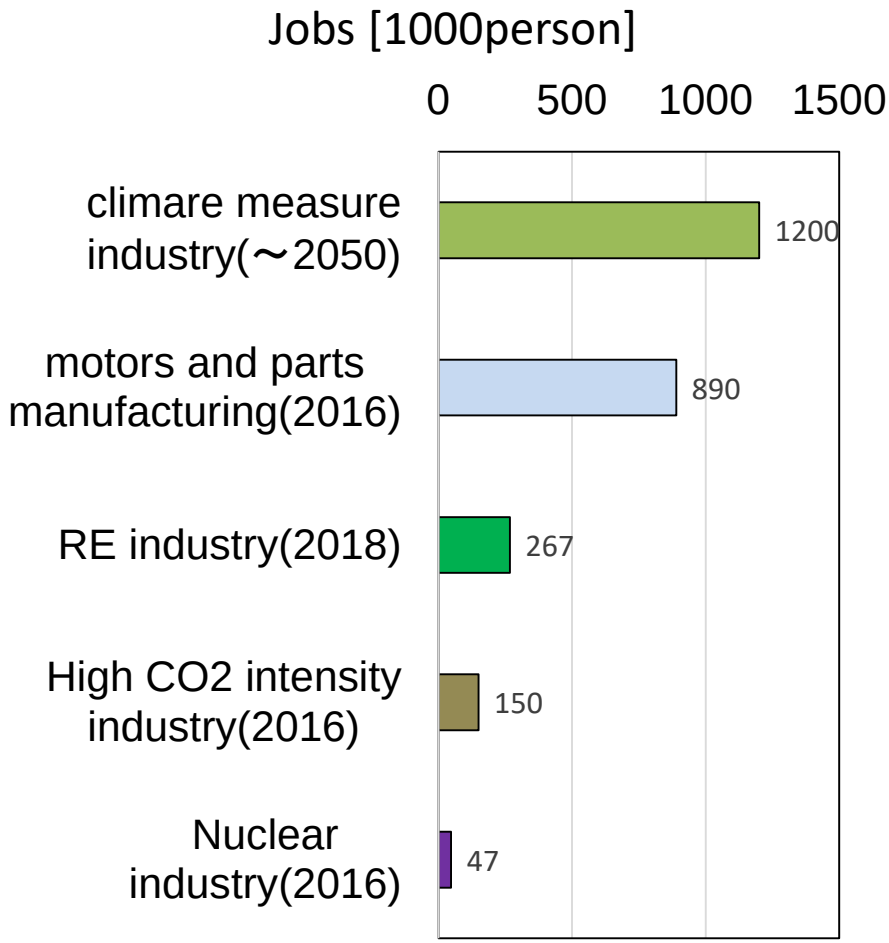


Data: METI total energy statistics
MOE GHG inventory

climate measures and economy, jobs

CO2, GDP, Jobs by sector in Japan





high CO2 intensity 6 industry:
(1)Thermal power plants, (2)Oil refineries, (3)Blast furnace steel, (4)Petrochemical and soda manufacturing, (5)Paper manufacturing, (6)Cement manufacturing, about 60% CO2 emission in Japan

Data: METI Industry statistic etc.

Conclusion

- Japan has small decoupling GDP growth and GHG, CO_2, energy before nuclear accident.
- Nuclear accident is not main CO_2 increasing reason.
- Coal increase from 1990 before nuclear accident, this is main issue of CO_2.
- Renewable and Energy saving don't increase effect until nuclear accident, this is second issue of CO_2.
- One of background is policy, this will be reported by the next presentation.