

The outlook for electricity in Western Europe

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Outline of Presentation

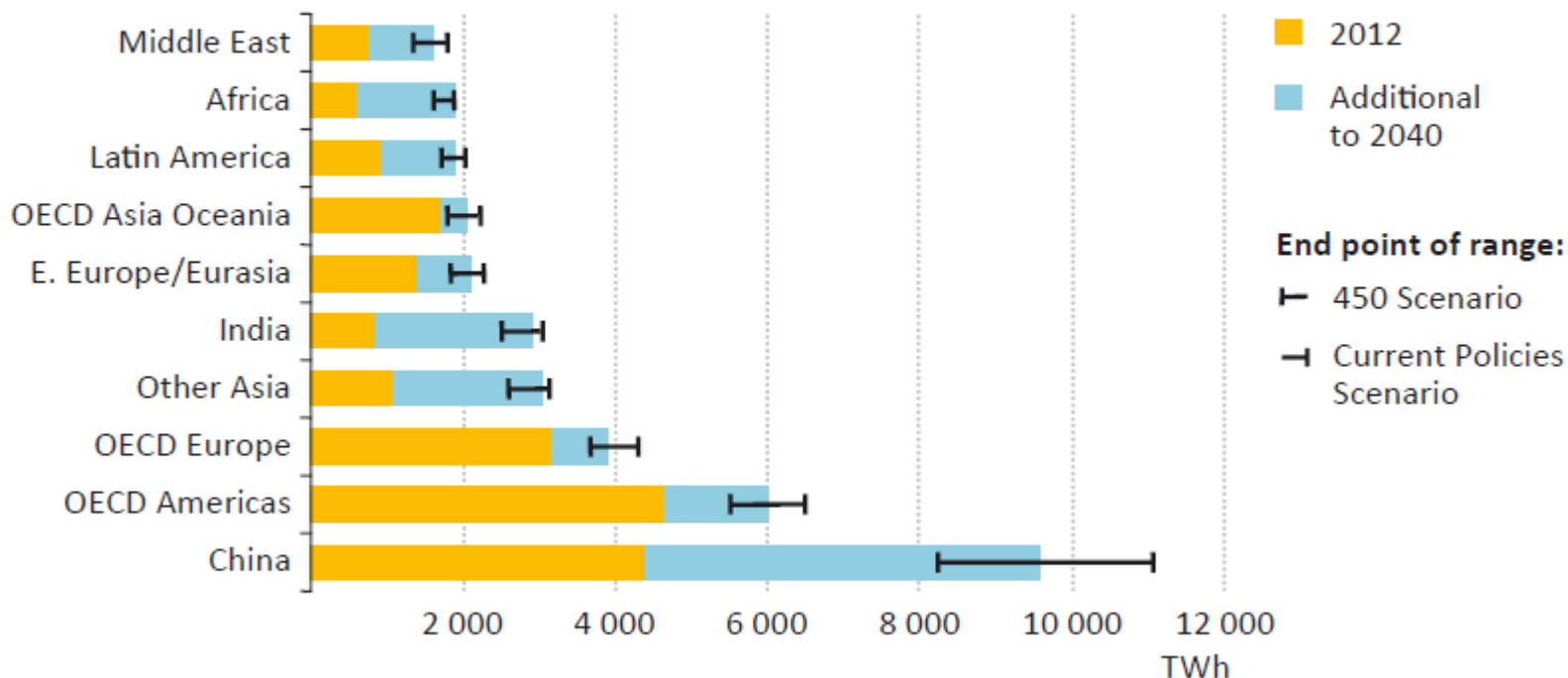
- 1. The outlook for demand**
 - I. OECD versus Non-OECD**
 - II. The changing shape of demand**
- 2. The outlook for supply**
 - I. The rise of renewables**
- 3. The outlook for electricity prices**
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1. The outlook for demand

Demand growth to 2040

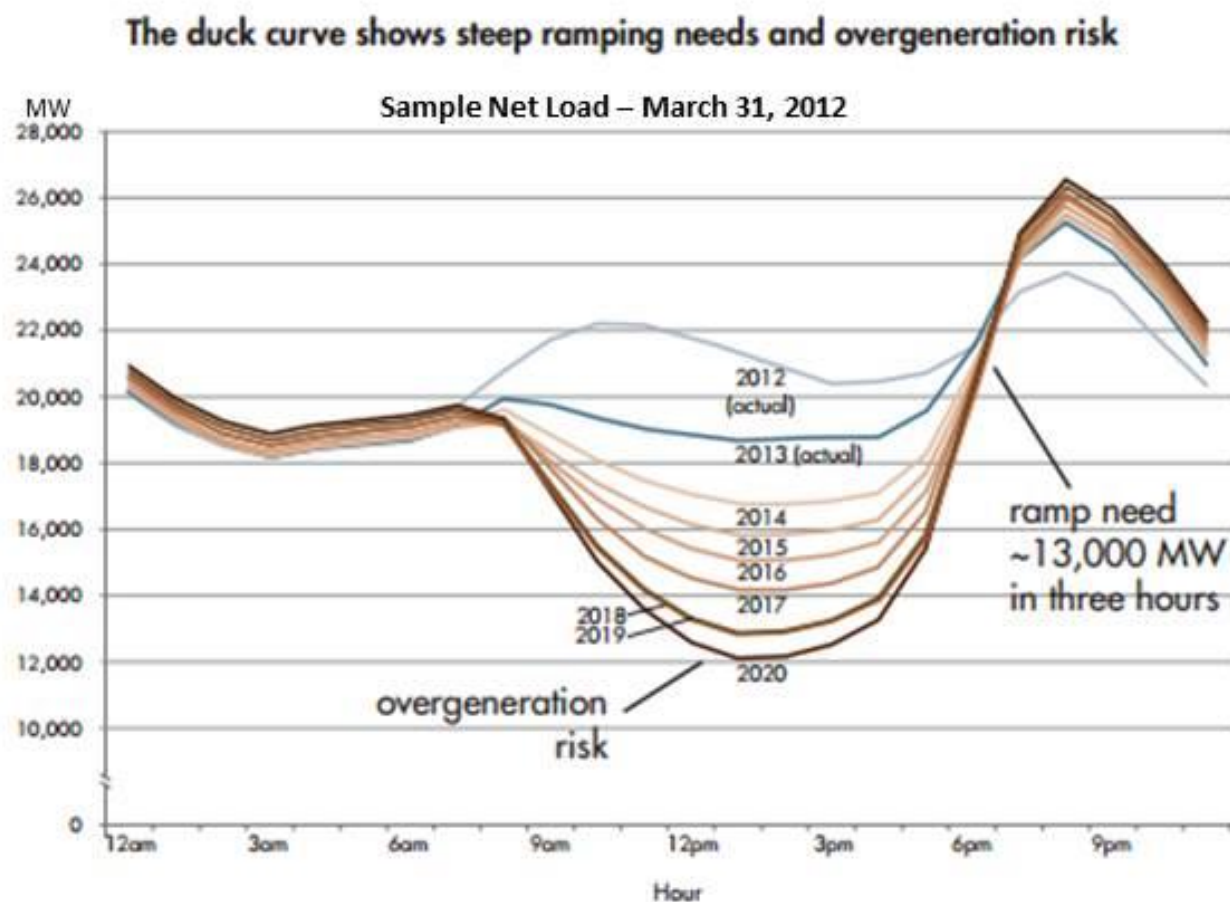
- **Globally, expected to be 2.1 % p.a.**
- **But slower in OECD economies**

Figure 6.1 ▶ Electricity demand by region in the New Policies Scenario



Source: IEA, World Energy Outlook 2014, New Policies Scenario

The changing shape of demand: the duck curve



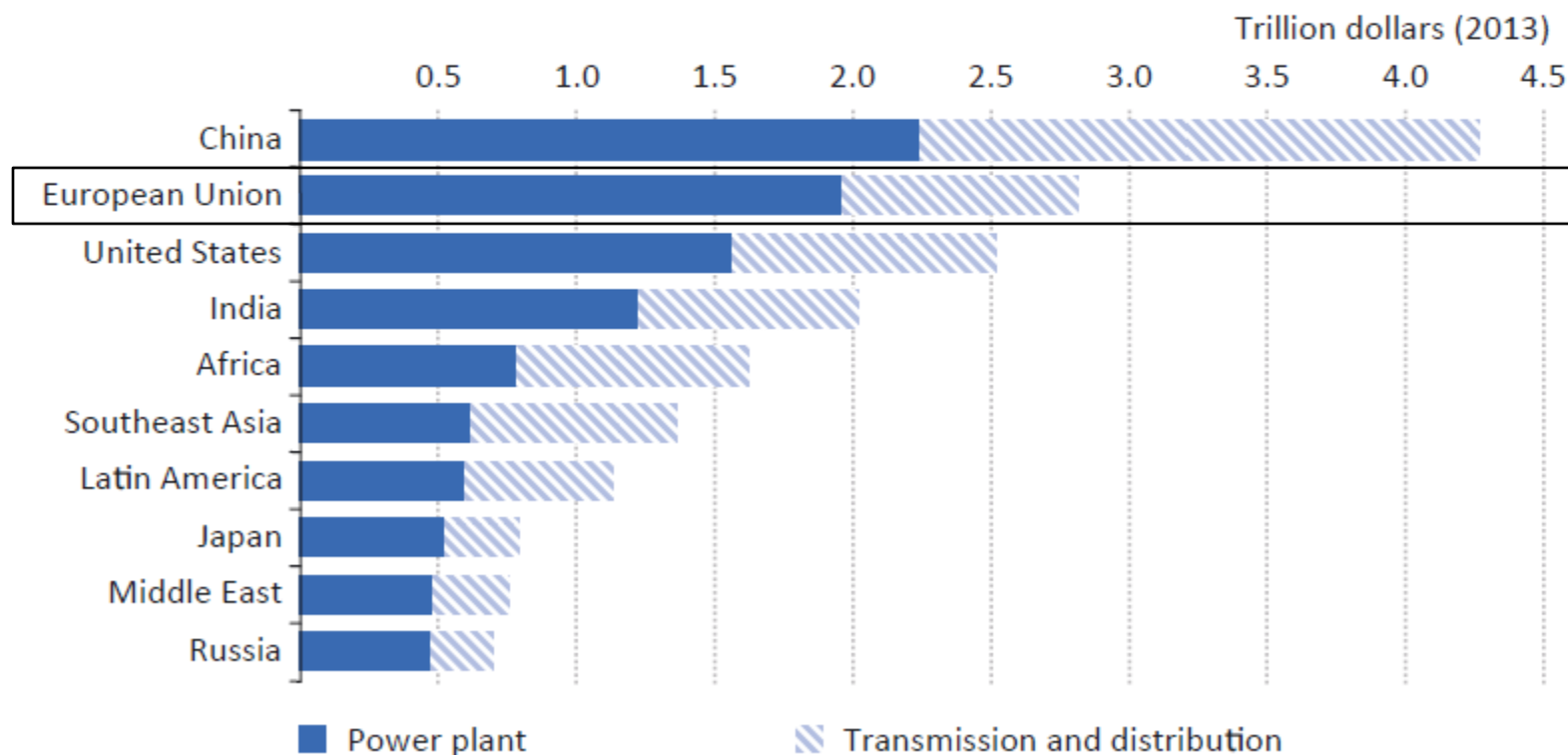
(from the California Independent System Operator)

Source: Regulatory Assistance Project

2. The outlook for supply

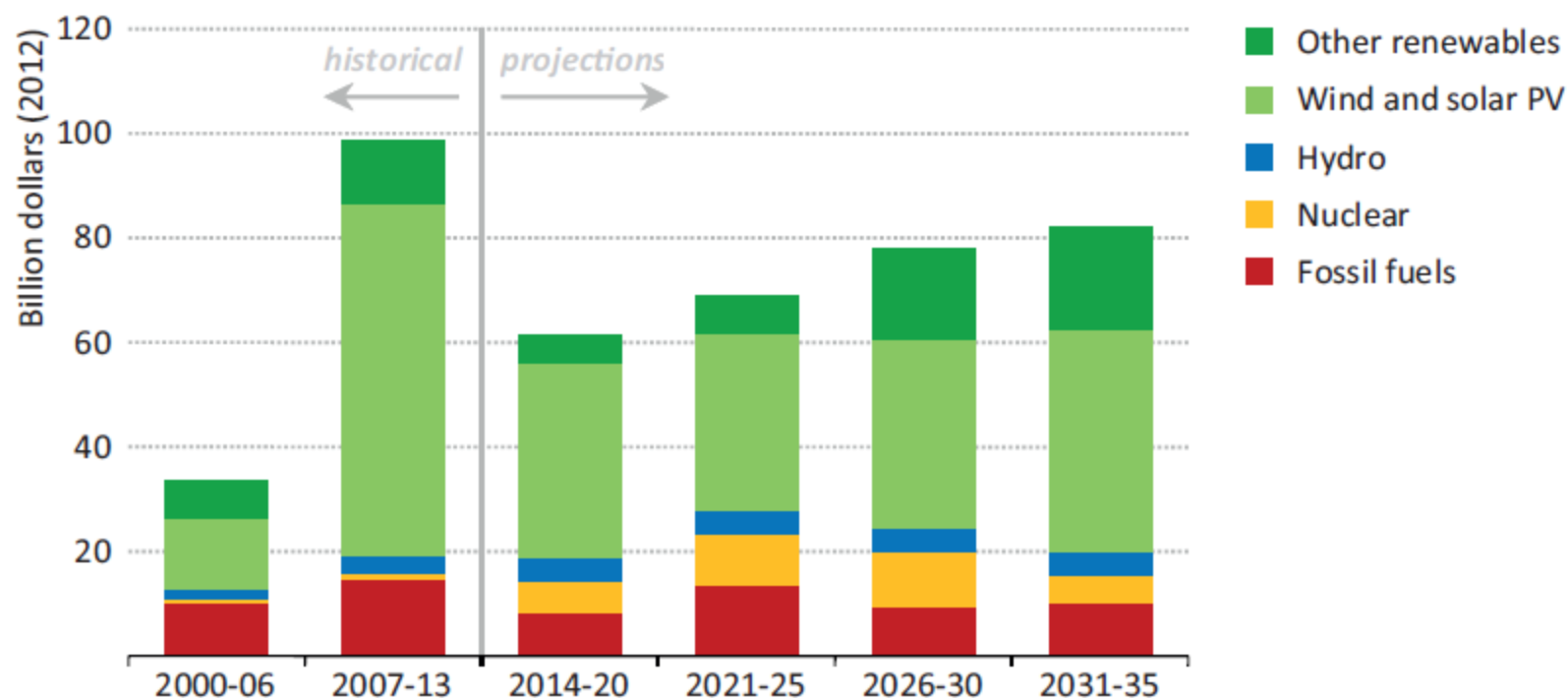
Europe will see significant investment

Figure 6.12 ▶ Cumulative global power sector investment by type and selected region in the New Policies Scenario, 2014-2040



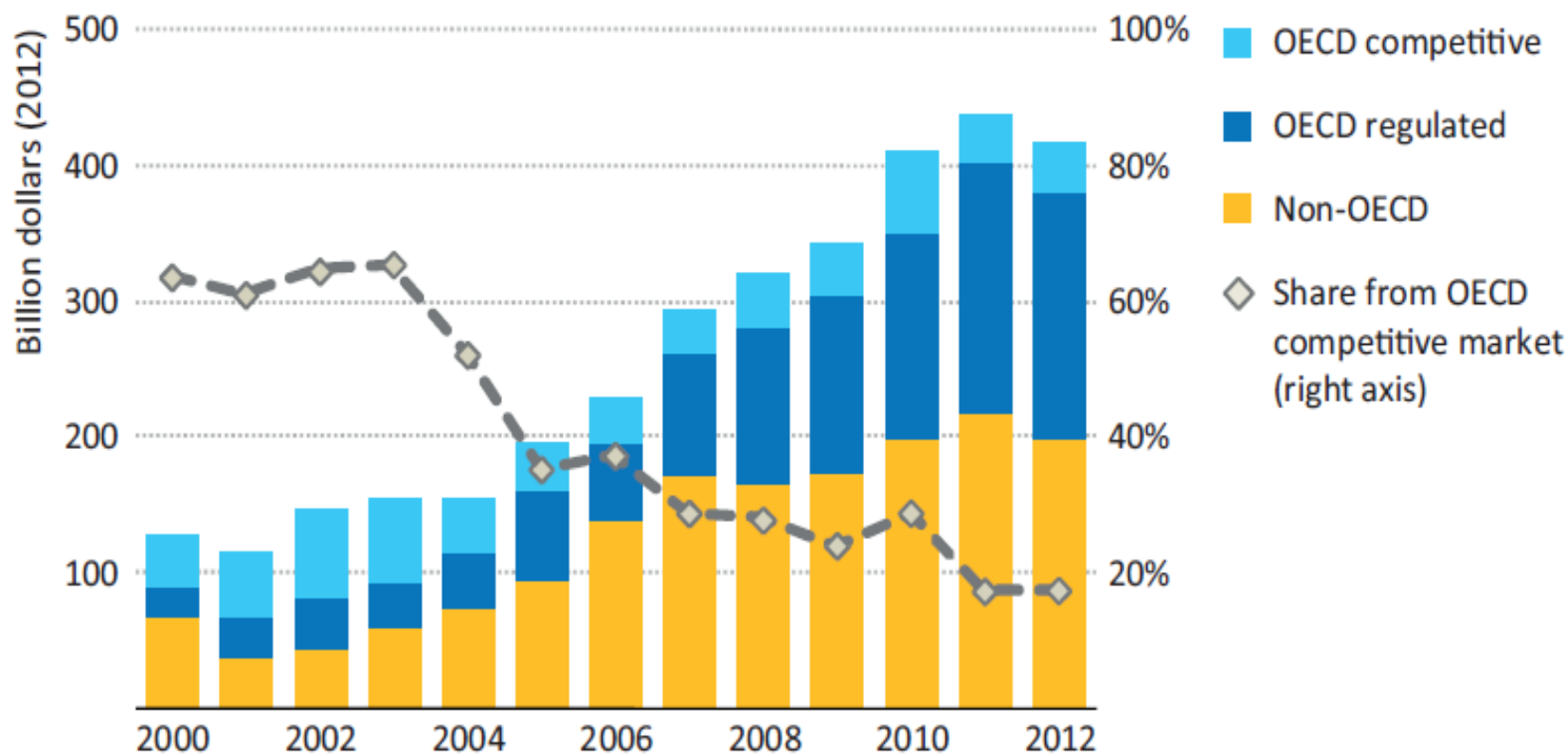
Source: IEA, World Energy Outlook 2014

Most investment will be in renewables



Source: IEA, World Energy Outlook Investment Report

Competitive markets are not driving investment



Source: IEA, World Energy Outlook Investment Report

What will drive investment?

■ How much generation?

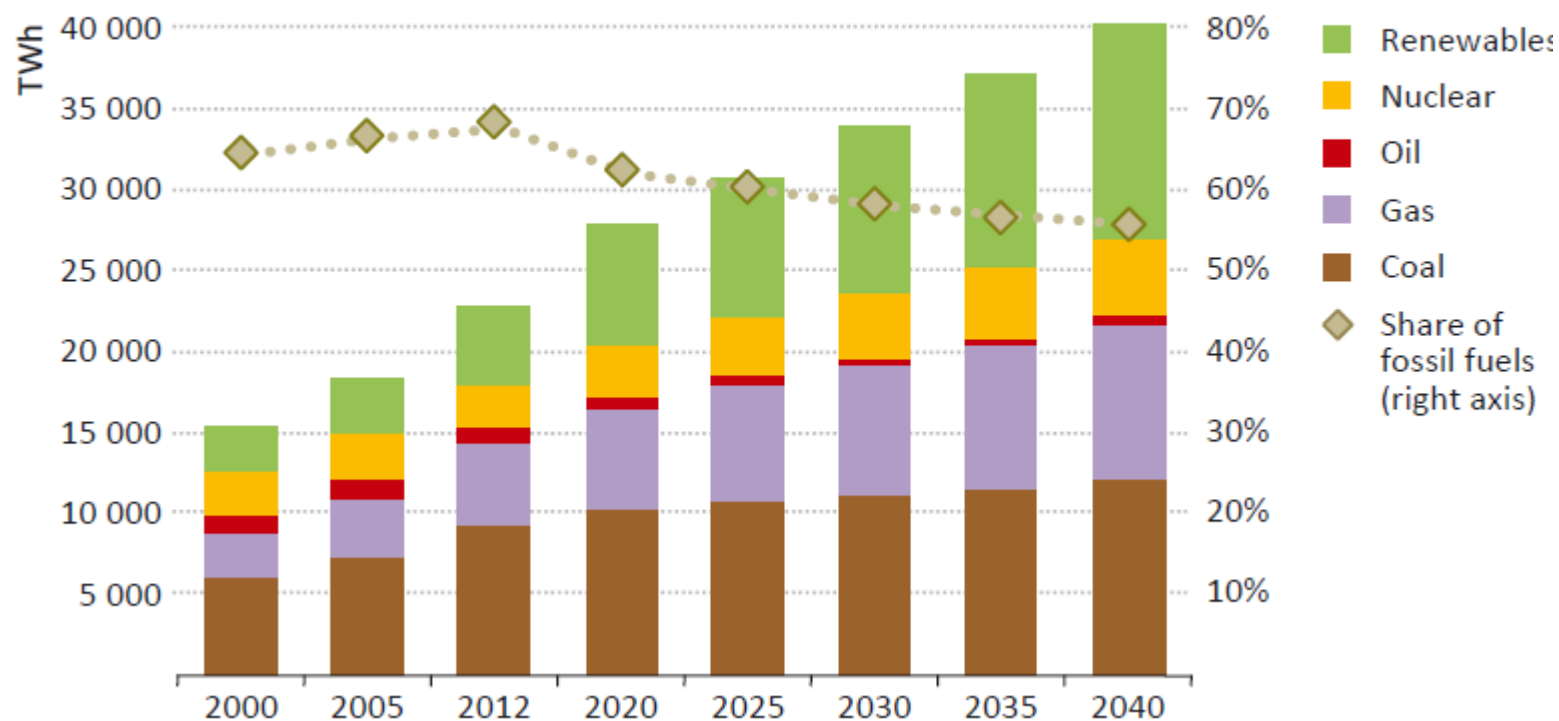
- Demand will play a limited role (slow growth)
- Replacement of existing generation (retirements)

■ What kind of generation?

- Cost of generation
 - ◆ Renewables will continue to get cheaper
 - ◆ The future of natural gas and coal prices is uncertain
- Global (and EU) climate policies
 - ◆ New climate agreement in 2015?
- National policies
 - ◆ Security of supply
 - ◆ Support for renewables, nuclear

The rise of renewables

Figure 6.8 ▶ World electricity generation by source in the New Policies Scenario

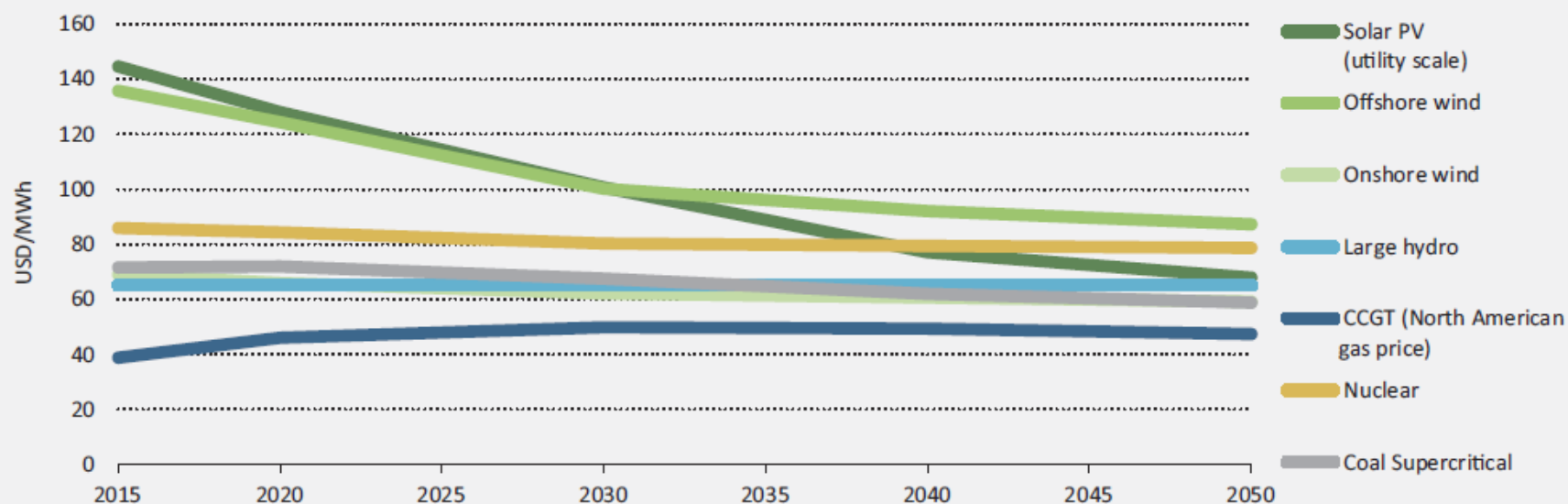


Source: IEA, World Energy Outlook Investment Report

Cost convergence of renewables

Figure 8.1

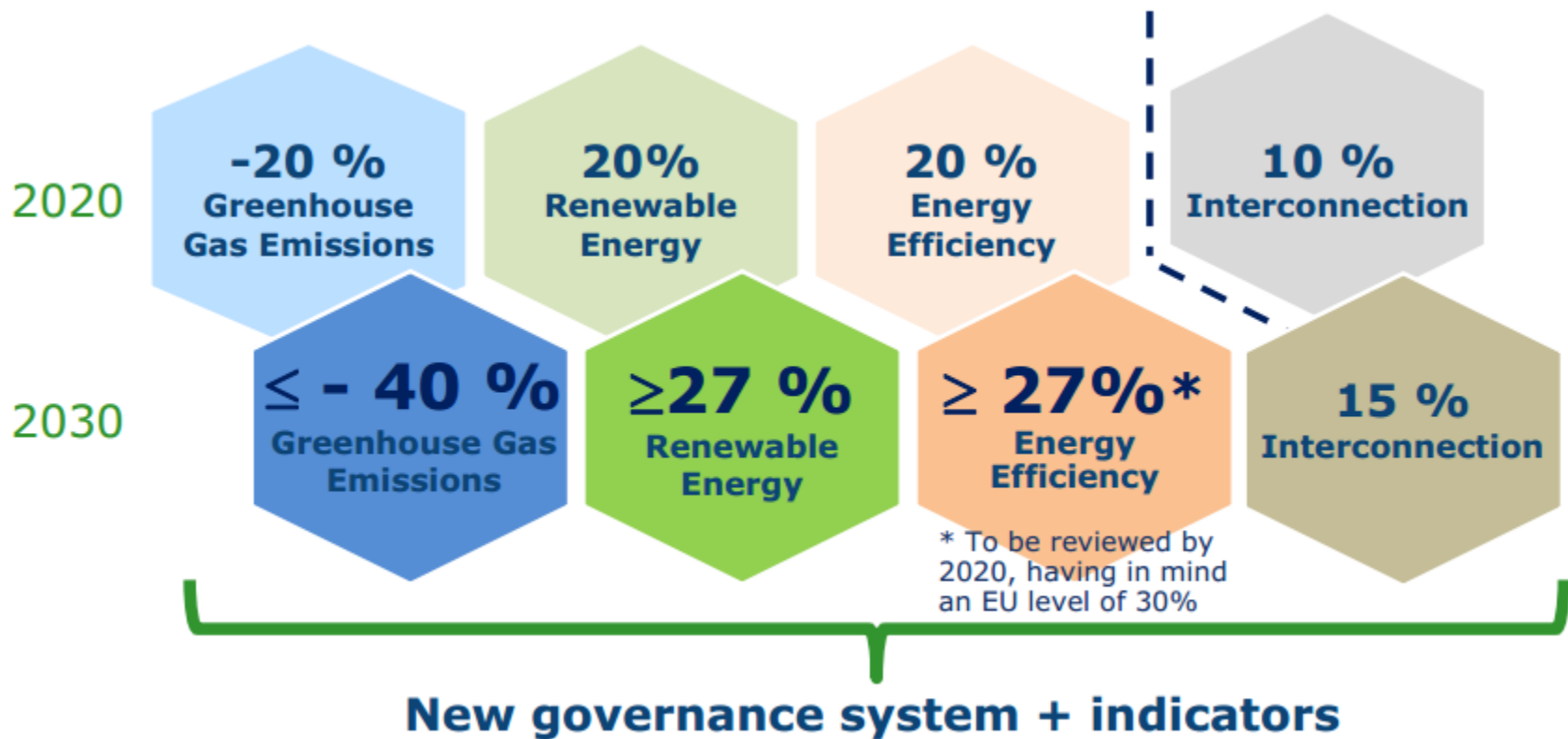
ETP's LCOE excluding a carbon price



Notes: unless otherwise noted, material in all figures and graphs in this chapter derive from IEA data and analysis. PV = photovoltaic. CCGT = combined-cycle gas turbine. MWh = megawatt hour. Figures and data that appear in this report can be downloaded from www.iea.org/etp2014.

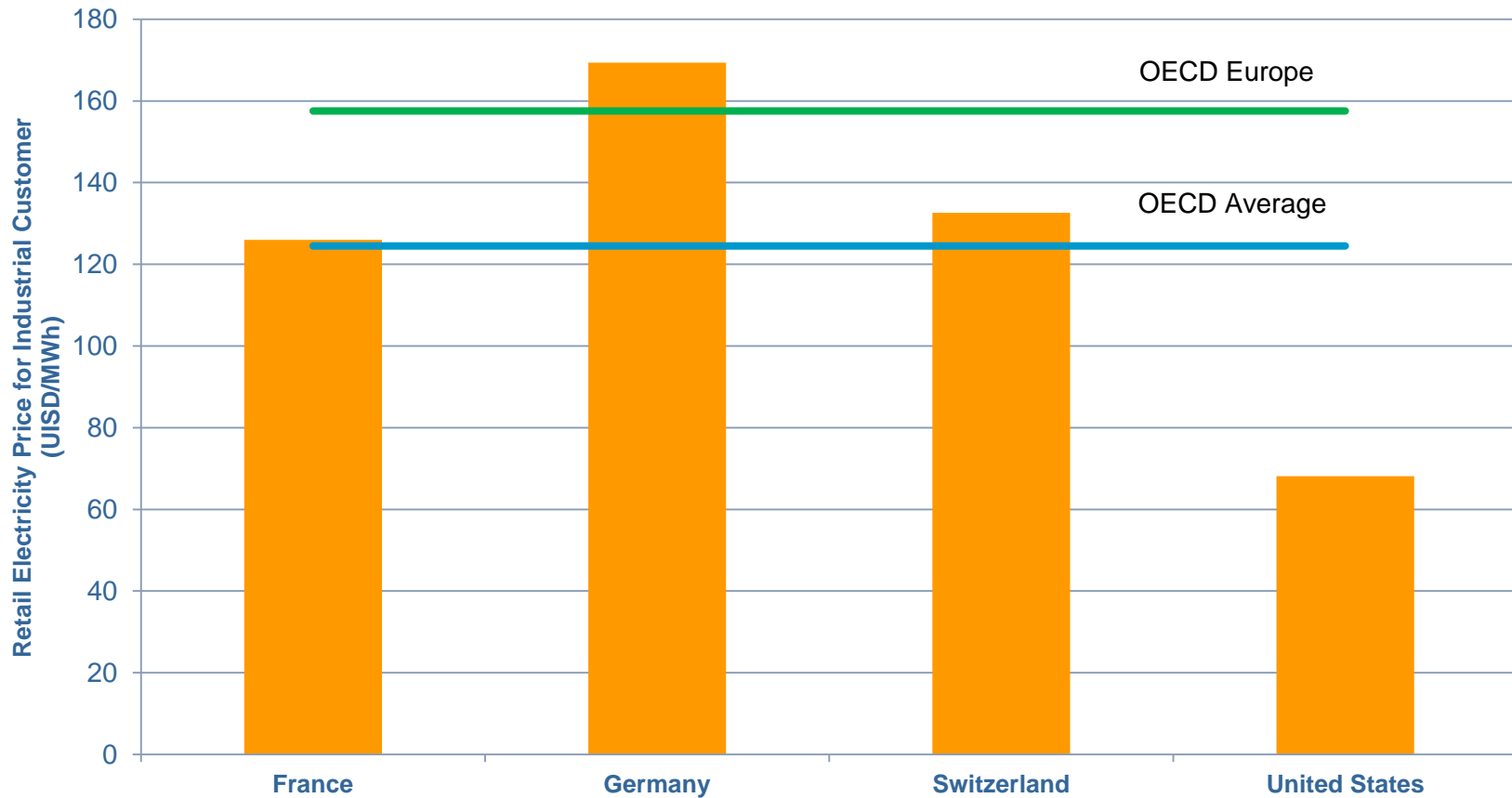
Source: IEA, Energy Technology Perspectives 2014

EU 2030 Framework for Climate and Energy



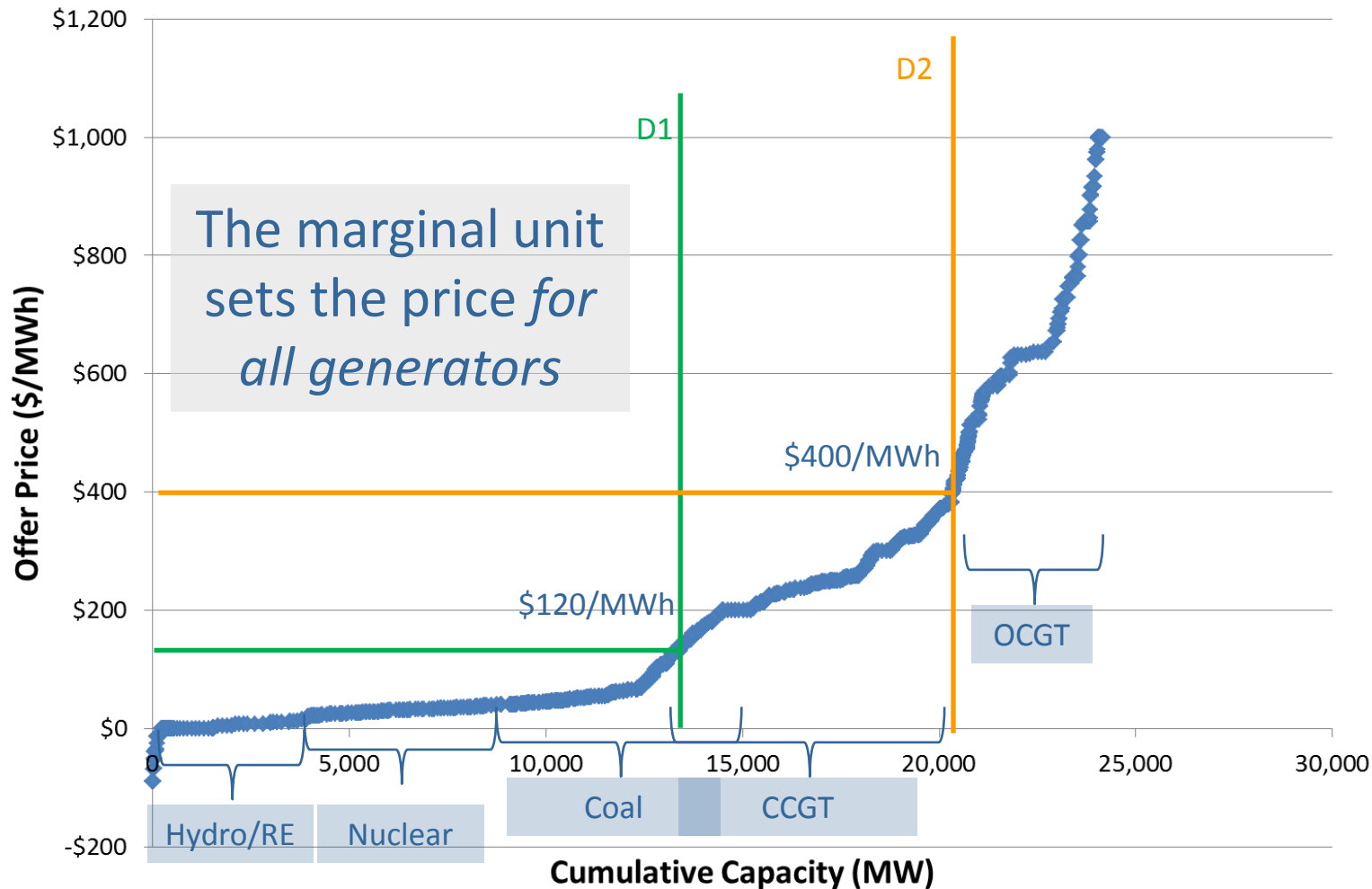
3. The outlook for electricity prices

Retail prices for industrial customers, 2013

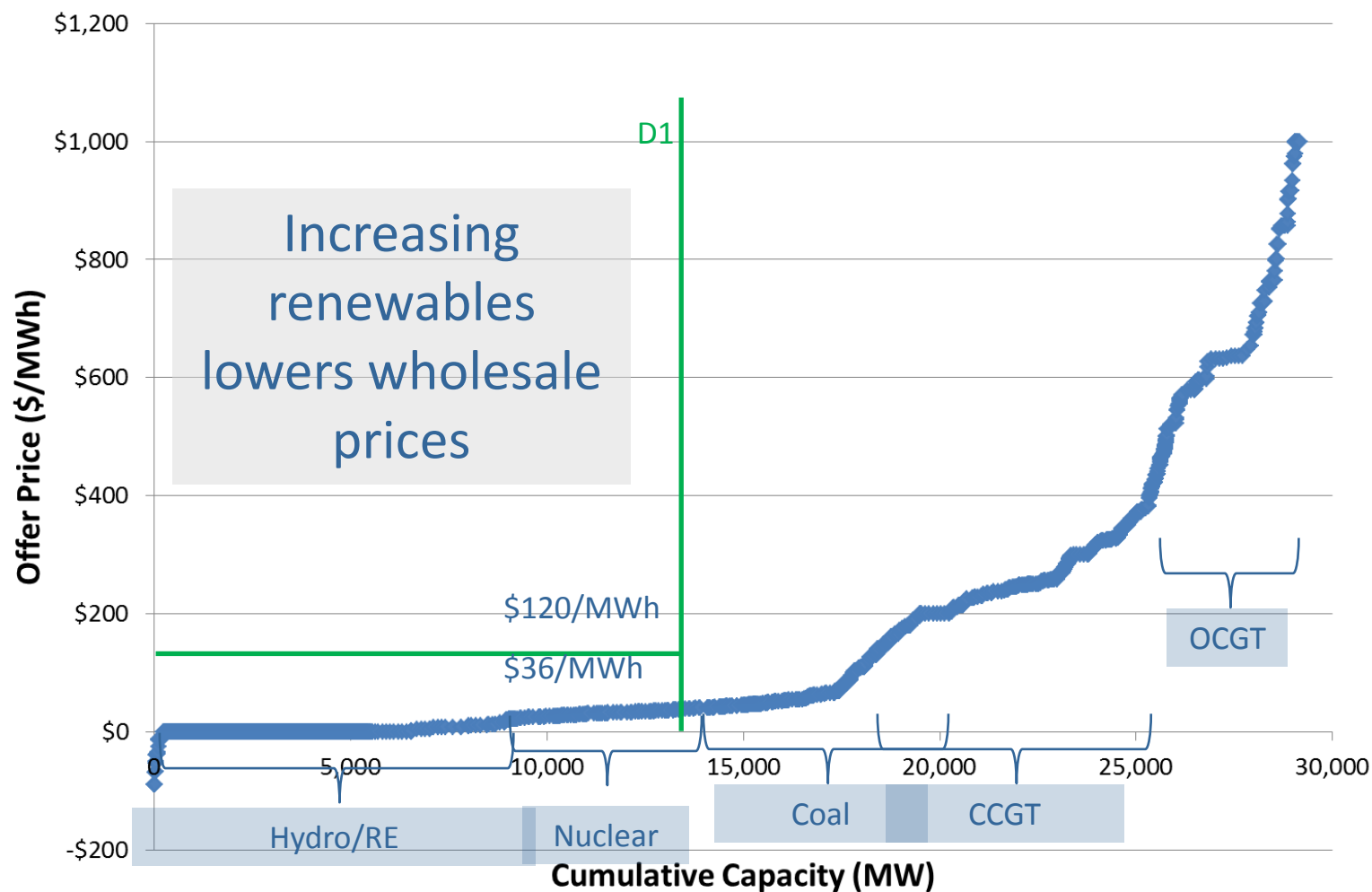


Source: IEA statistics

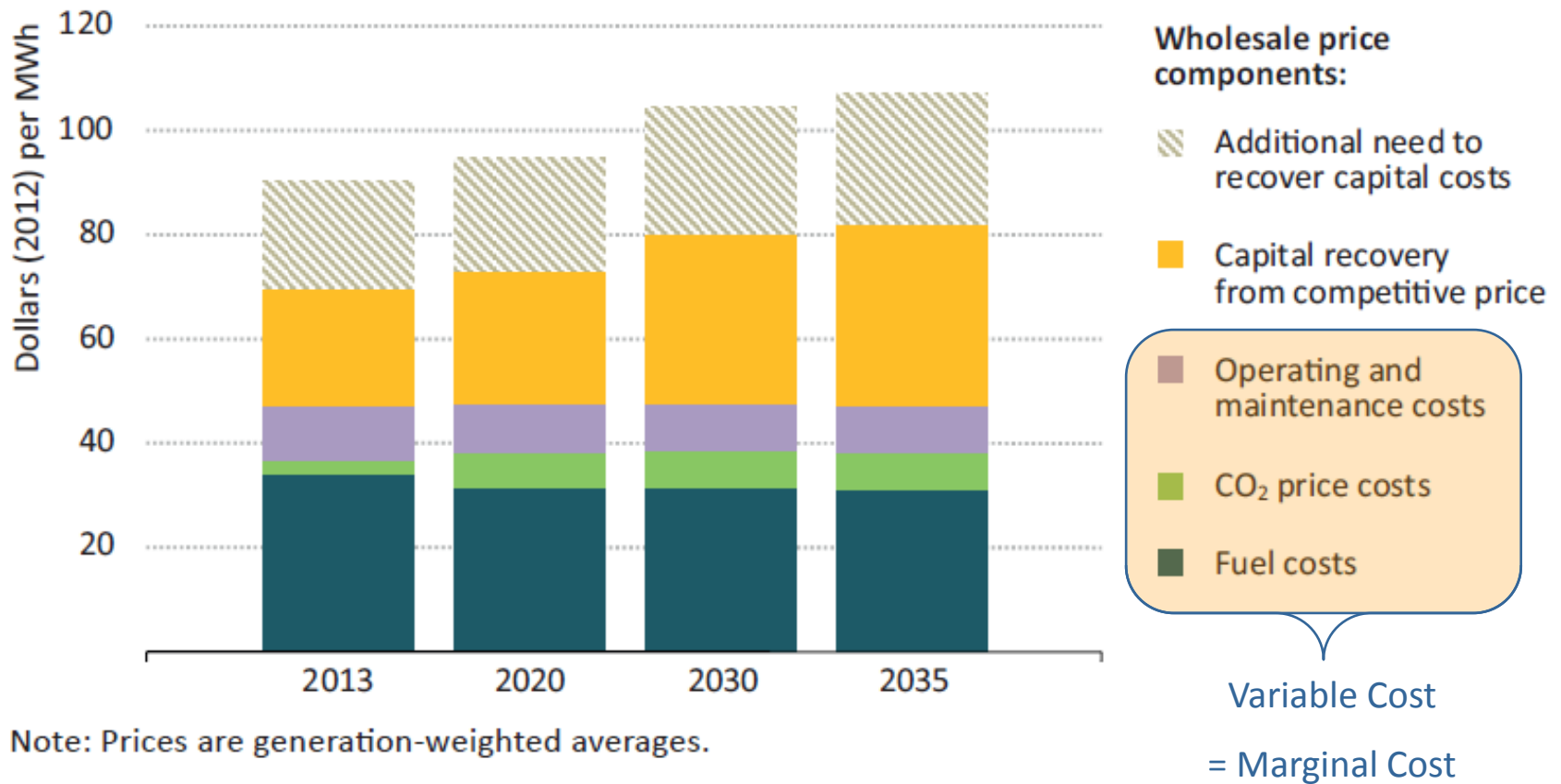
A brief aside on price formation in wholesale power markets



The impact of renewables



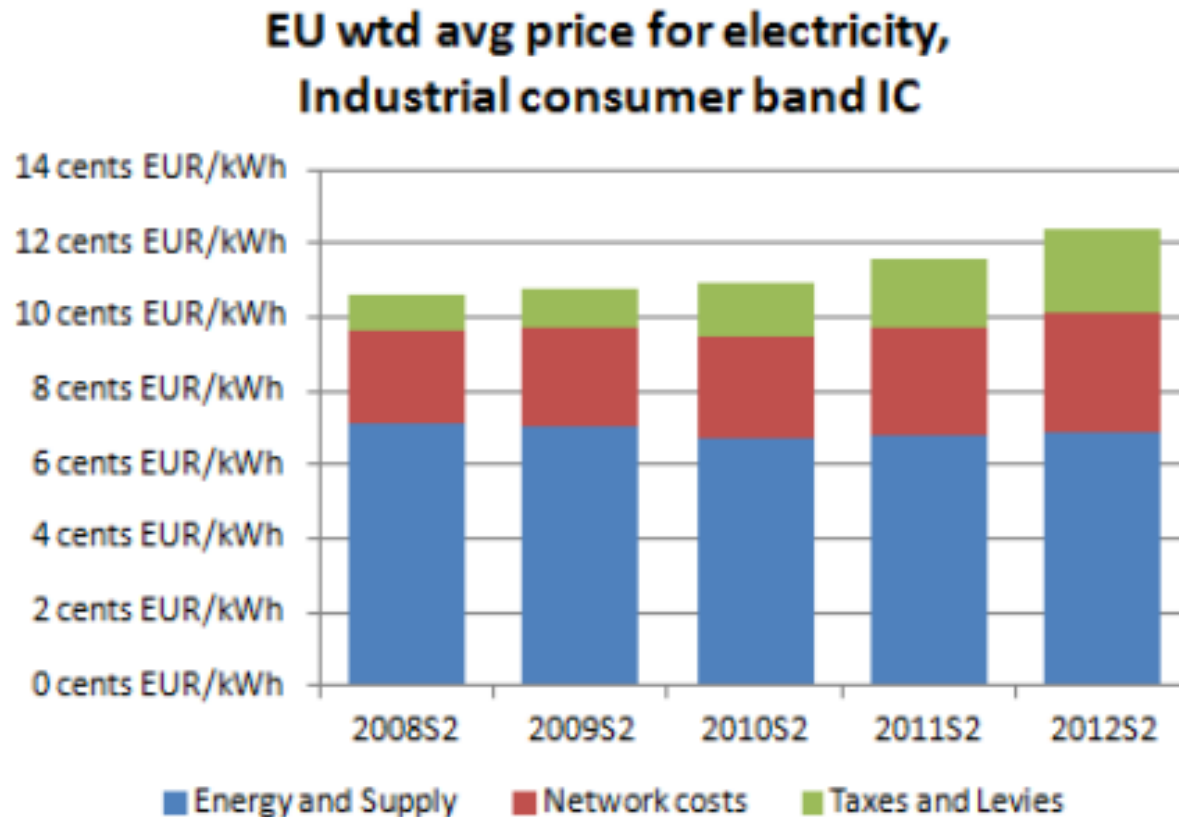
Investors are unable to recover costs



Source: IEA, World Energy Outlook Investment Report

The components of electricity prices

- Lower wholesale prices more than offset by other costs



Prices: going up

- **Wholesale prices in EU are projected to increase by 50%, on average, by 2040**
 - **Current prices average around 70 USD/MWh**
 - ◆ Not high enough to recover fixed costs
 - **To recover the cost of needed investment, prices will need to rise to around 100 USD/MWh by 2030, and 110 USD/MWh by 2040**
 - ◆ Prices in EU will be higher, on average, than in other OECD countries, because of the relatively high investment needs
- **This is highly dependent on the future of EU renewable policies and wholesale market reforms**

Annex

Energy intensity decoupling from GDP growth

■ Global Demand:

● 2012 = 19 562

● 2030 = 26 761

◆ 37% growth

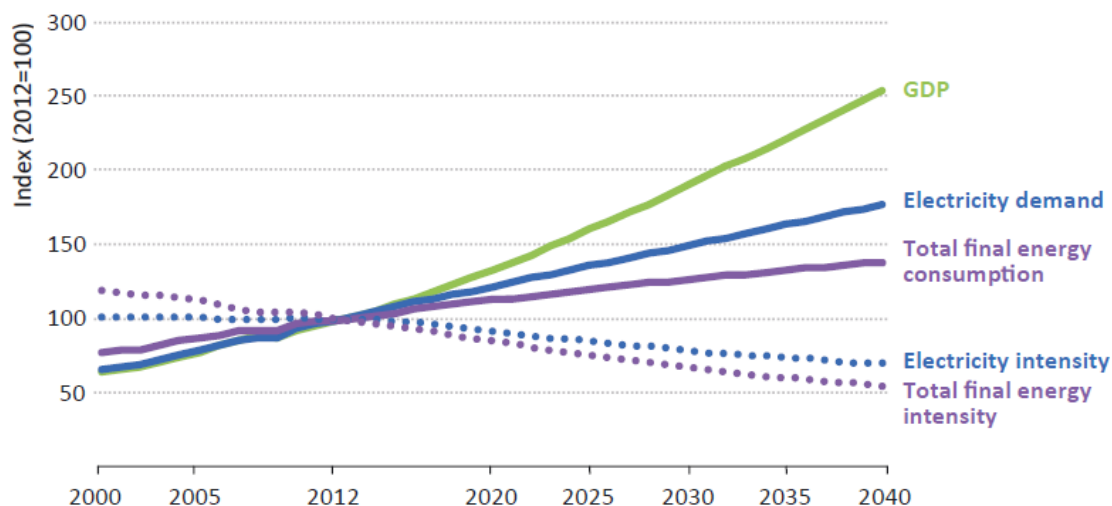
■ EU demand:

● 2012 = 3 188 TWh

● 2030 = 3 529 TWh

◆ 11% growth

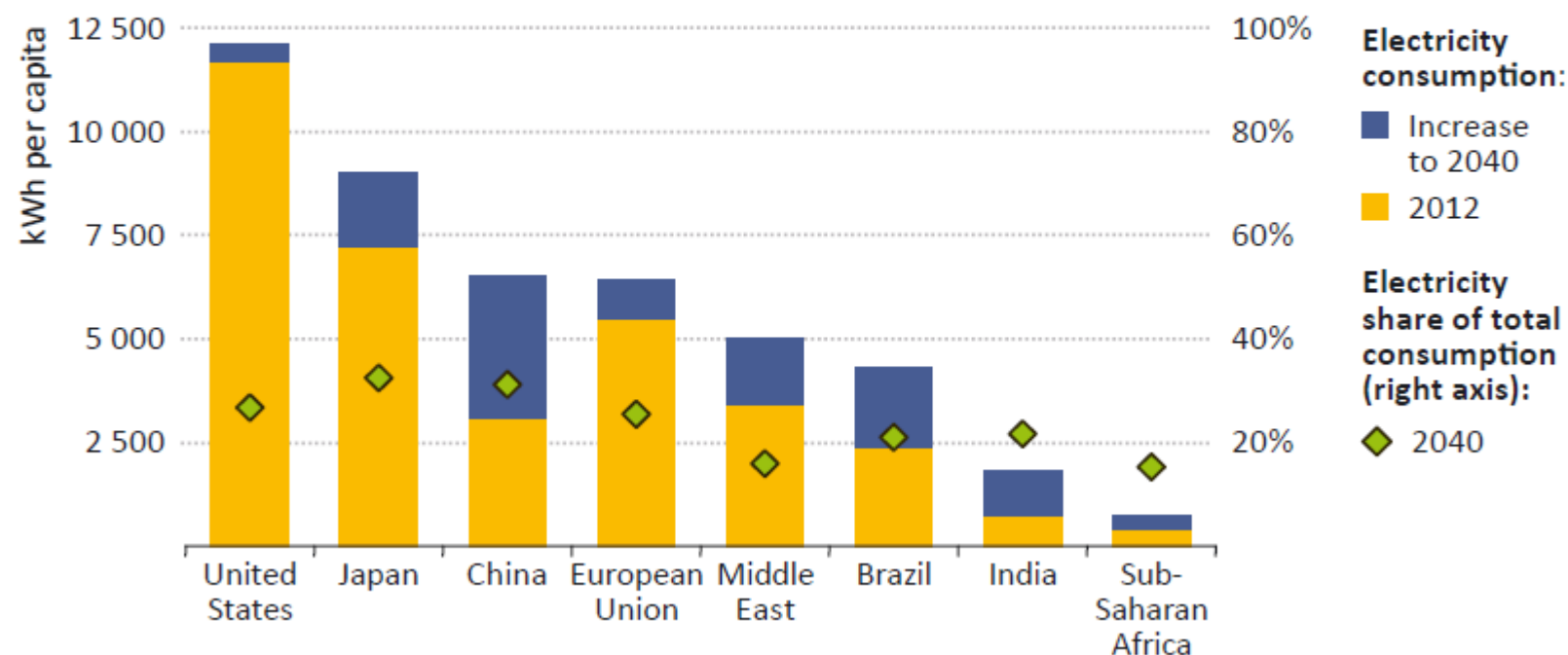
Figure 6.2 ▷ World electricity and total final energy intensity in the New Policies Scenario



Note: Intensity is calculated as electricity or final energy consumption per dollar of real GDP in PPP terms.

Europe is already quite efficient

Figure 6.3 ▶ Annual electricity consumption per capita and share of electricity in total final energy consumption by selected region in the New Policies Scenario

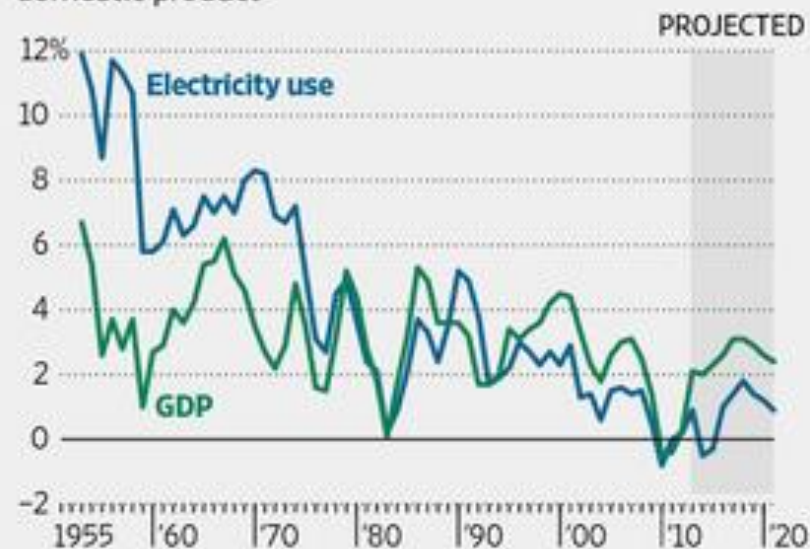


Electricity and economic growth have decoupled

Energy Lag

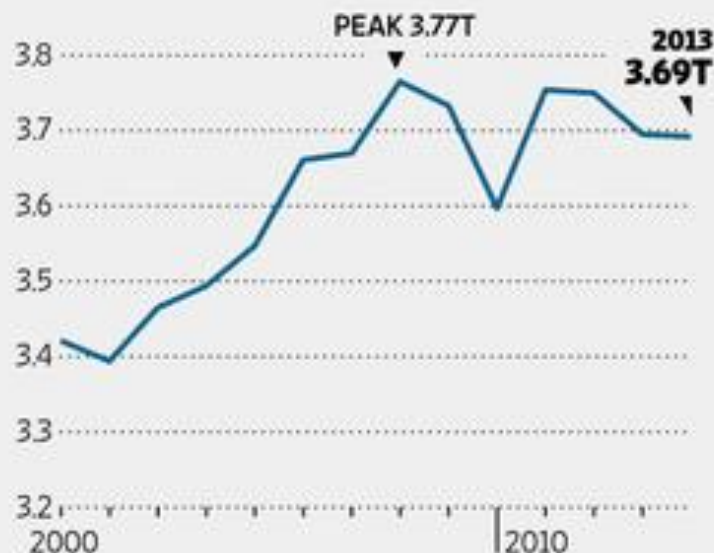
Electricity use no longer follows overall economic conditions including GDP, as technological advances, government regulation and other changes have prompted Americans to use less electric energy.

Change in U.S. electricity use and gross domestic product



Source: U.S. Energy Information Administration

Electricity retail sales in trillion kilowatt-hours



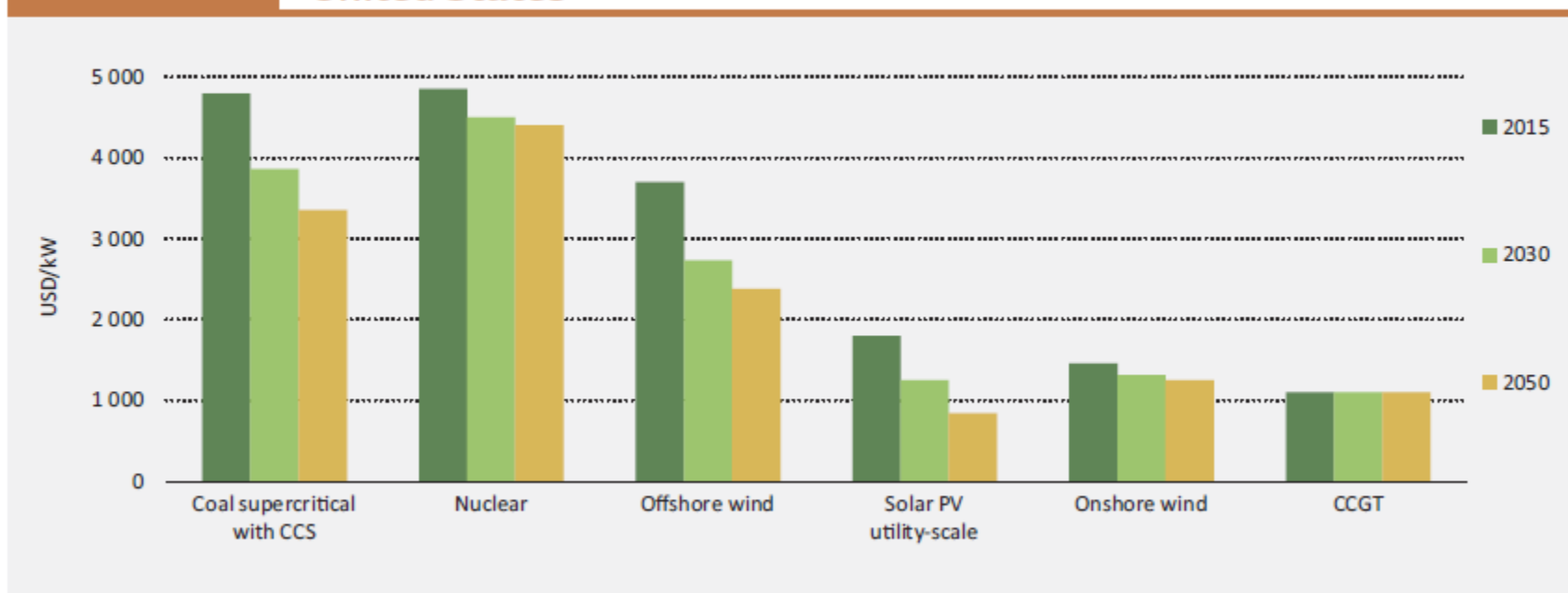
The Wall Street Journal

Source: The Wall Street Journal, "Electric Utilities Get No Jolt From Gadgets, Improving Economy", July 28, 2014

Low-carbon technologies are capital intensive

Figure 8.2

ETP assumptions on investment cost per kW of installed capacity, United States



Source: Energy Technology Perspectives 2014