



**International  
Energy Agency**  
Secure  
Sustainable  
Together

# **Integrating Renewable Energy and Energy Efficiency**

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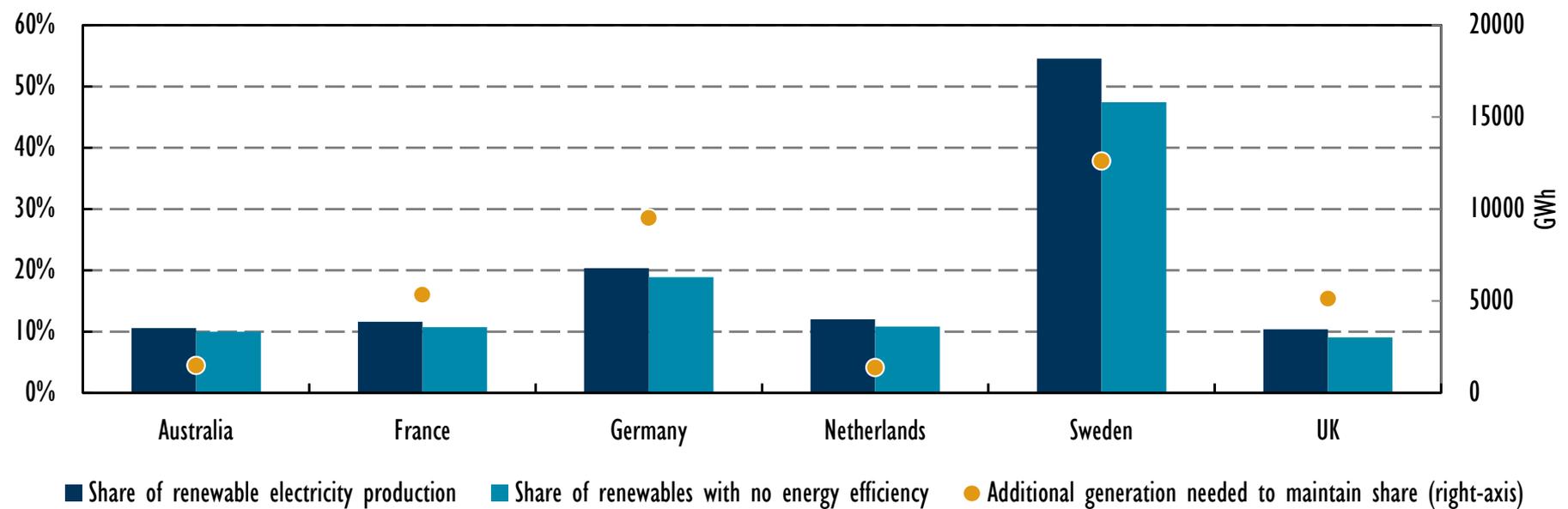
# The case for integrating energy efficiency and renewable energy

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- **Technical:** Efficiency another resource to address integration challenges of a low carbon grid
- **Economic:** Efficiency reduces the total system costs of moving to a renewable dominated grid
- **Market:** Negative prices, responsive load, will facilitate adding *more* renewables
- **Development:** Efficiency leveraged renewables are expanding electrification rates
- **Policy:** Efficiency and renewables policy often institutionally segregated creating inefficiencies
- **Efficiency and renewables core to the sustainable energy transition**

# Efficiency increases the share of renewable energy

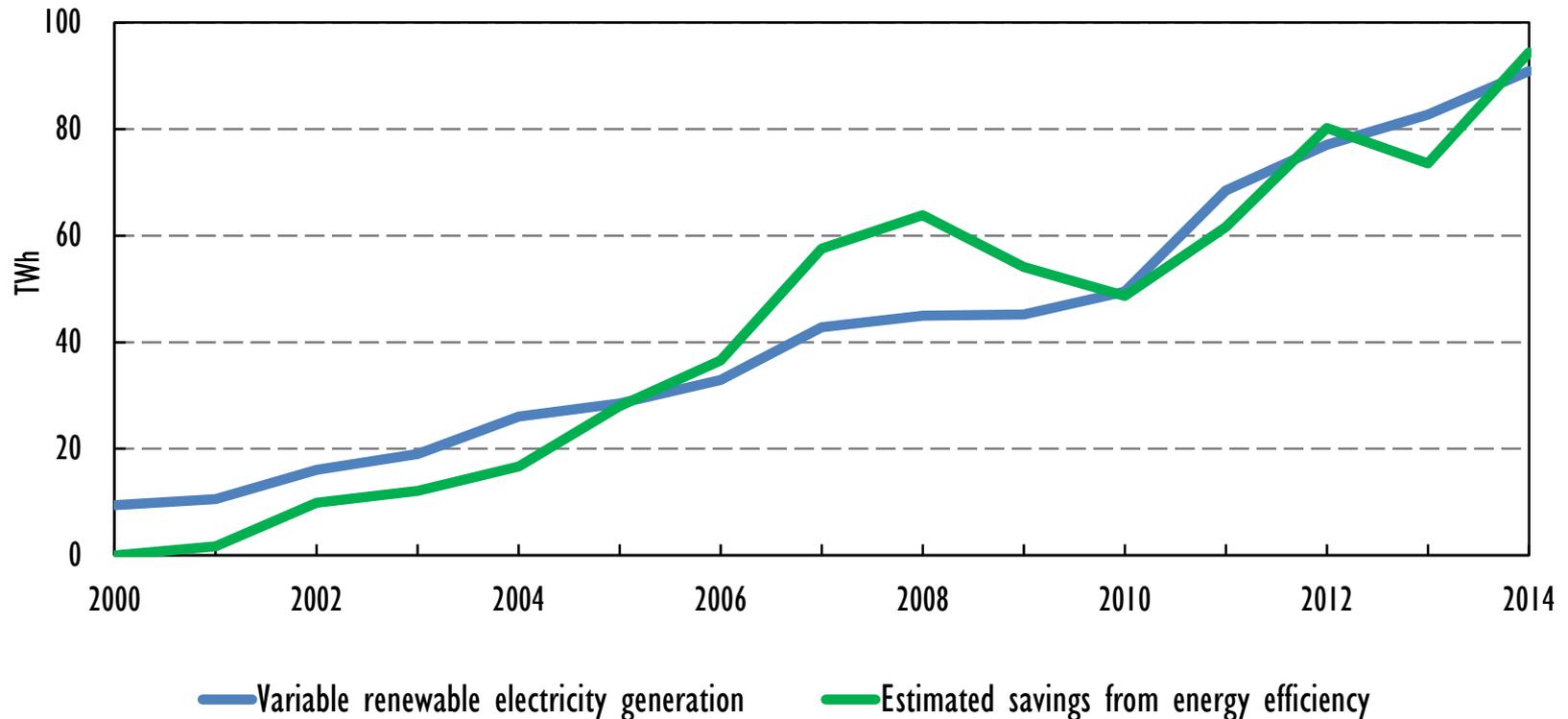
Actual share of renewable electricity generation and adjusted share in the absence of energy efficiency improvements since 2001



➤ **Additional 5 GW in Sweden and 6 GW in Germany of VRE to maintain current share without efficiency improvements**

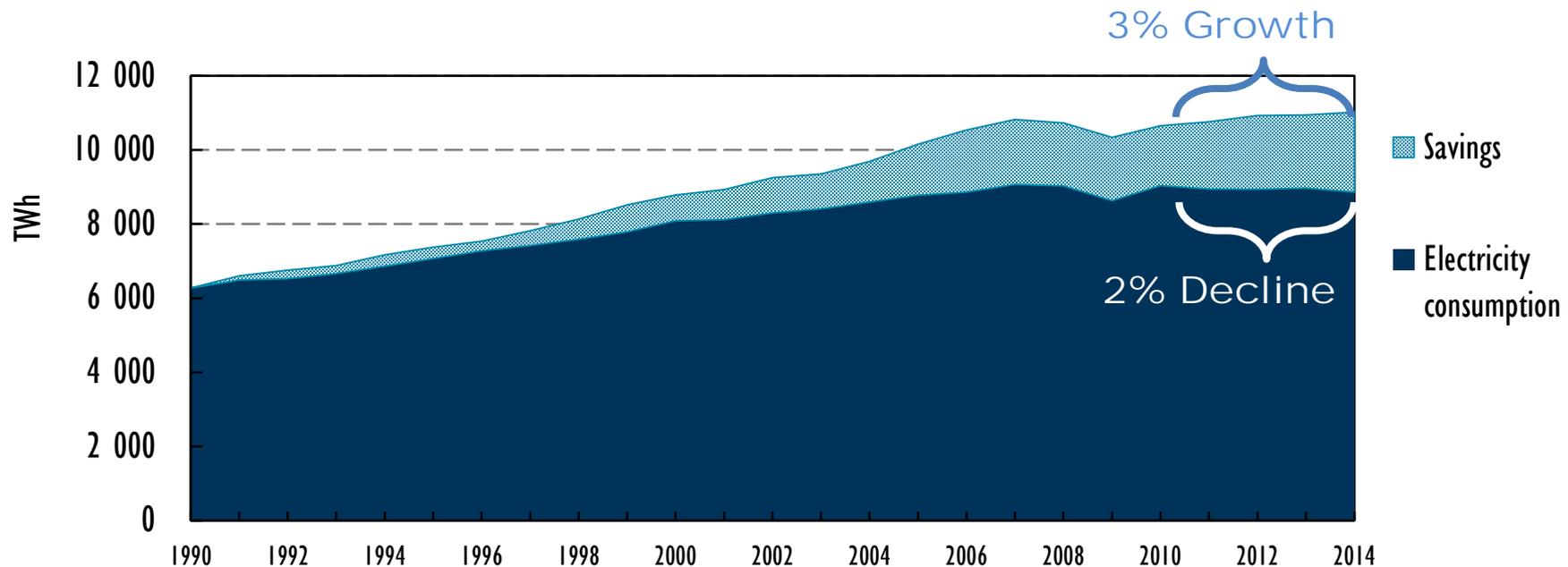
# Germany's twin clean fuels

- In 2014, Germany's annual electricity savings from **energy efficiency improvements** made since 2000 equaled the power generated by **variable renewable energy**.



# Energy efficiency investments have helped stall the growth of electricity demand in OECD countries

**IEA countries saved 2 200 TWh in 2014 from energy efficiency improvements since 1990, 24% of total electricity demand,**

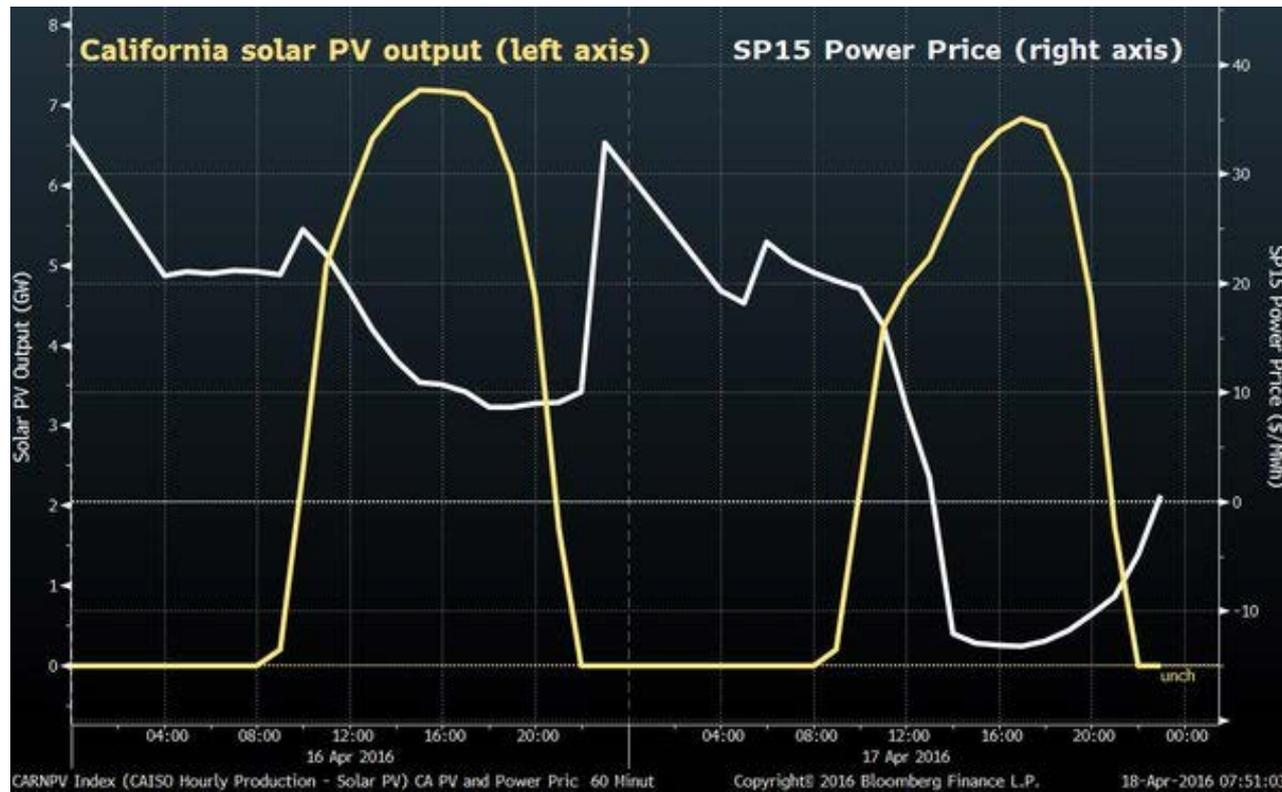


**Hypothetical savings in electricity consumption from energy efficiency improvements in IEA countries, 1990-2014**

- **Low growth is pushing various energy utilities to shift from traditional generation to sale of energy efficiency services**

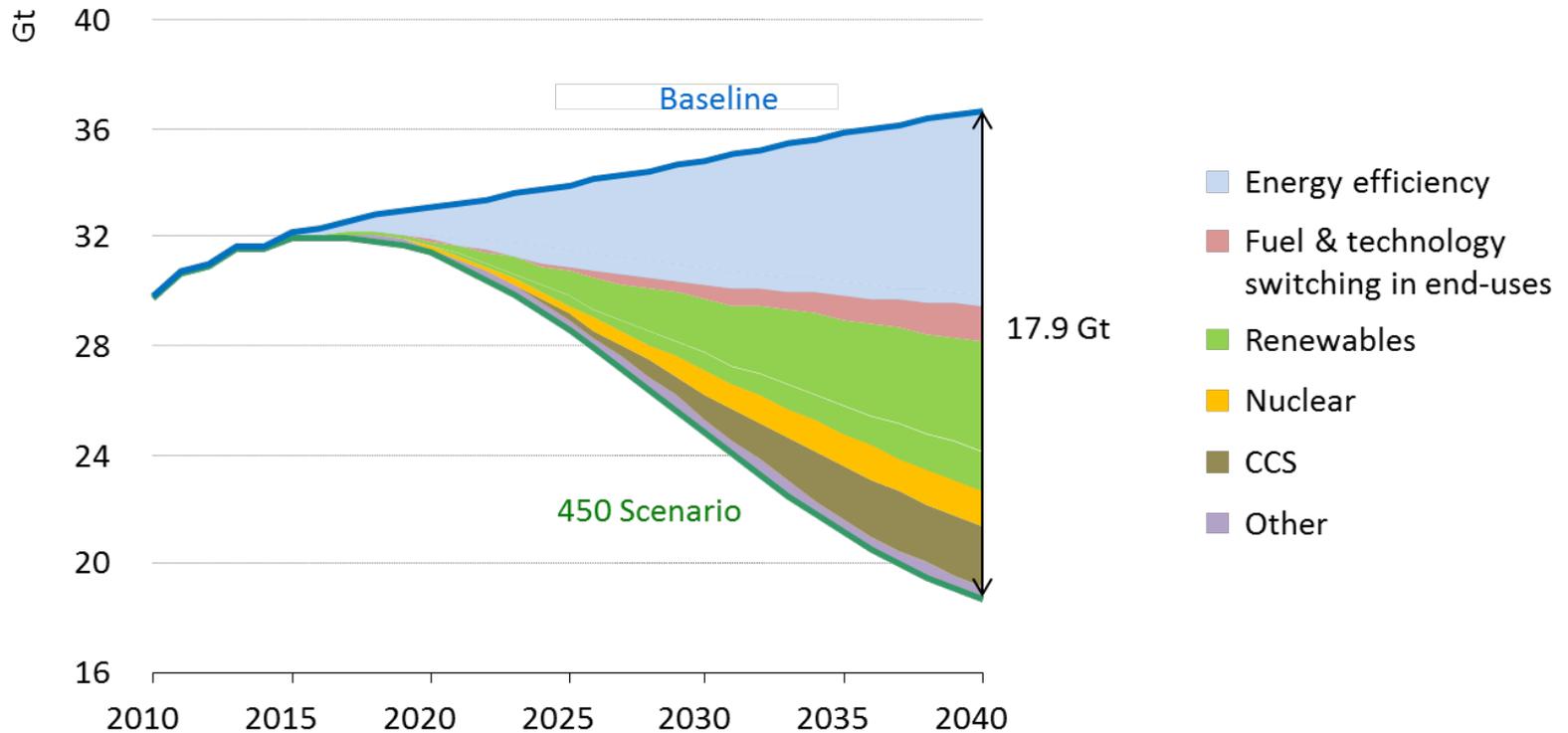
# Efficiency enables more renewables additions

- If baseload is dying, efficiency is a critical balancing resource to reduce volatility
- But our concept of efficiency will change to locational and temporal impacts rather than permanent long-term reductions



# Energy Efficiency and Renewables key to reaching less than 2°C

- We need to ensure that RE, EE and broader energy market policies are pulling in the same direction.



***Energy efficiency and Renewables do the heavy lifting > 2/3s***

- Messages from the Forum:
  - Singularly focused policy can lead to over investment in (stranded) assets
  - The integration challenge needs both efficiency and renewables
  - Energy access is being amplified with super efficiency and low cost renewables
  - Technology-enhanced markets are the resource for efficiency and renewables
  - For policy makers: Proceed but with caution



- **Developing our work program now**
- **Evaluating efficiency within grid integration work**
- ***Energy Efficiency in Emerging Economies*** programme particularly in **South East Asia and Indonesia**
- **Market based instruments for EE and integration of with RE markets**