Renewables in the power mix"

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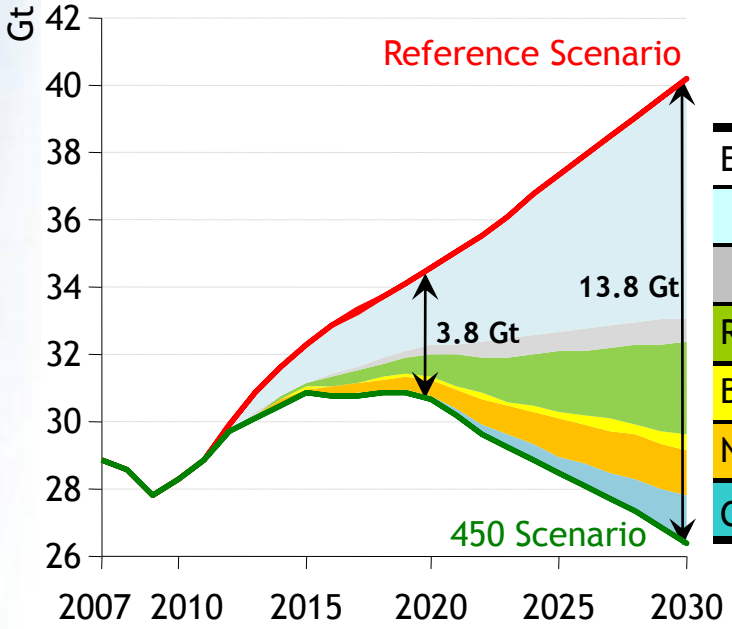
World abatement of energy-related CO_2 emissions in the 450 Scenario

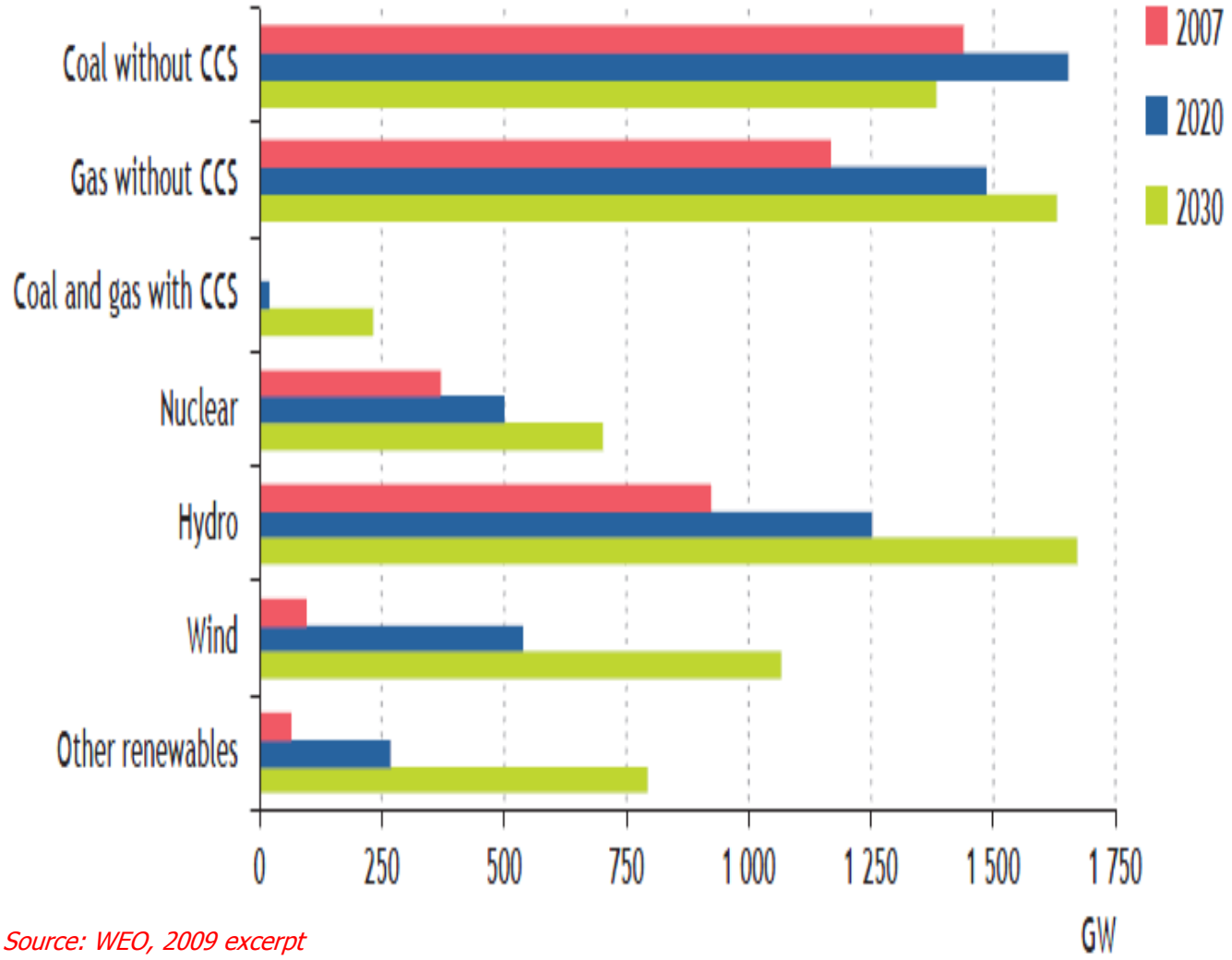


Share of abatement %	2020	2030
Efficiency	65	57
End-use	*59*	*52*
Power plants	*6*	*5*
Renewables	18	20
Biofuels	1	3
Nuclear	13	10
CCS	3	10

Source: WEO, 2009 excerpt

Efficiency measures account for two-thirds of the 3.8 Gt of abatement in 2020, with renewables contributing close to one-fifth

World power generation capacity in the 450 scenario :Renewable increase their shares

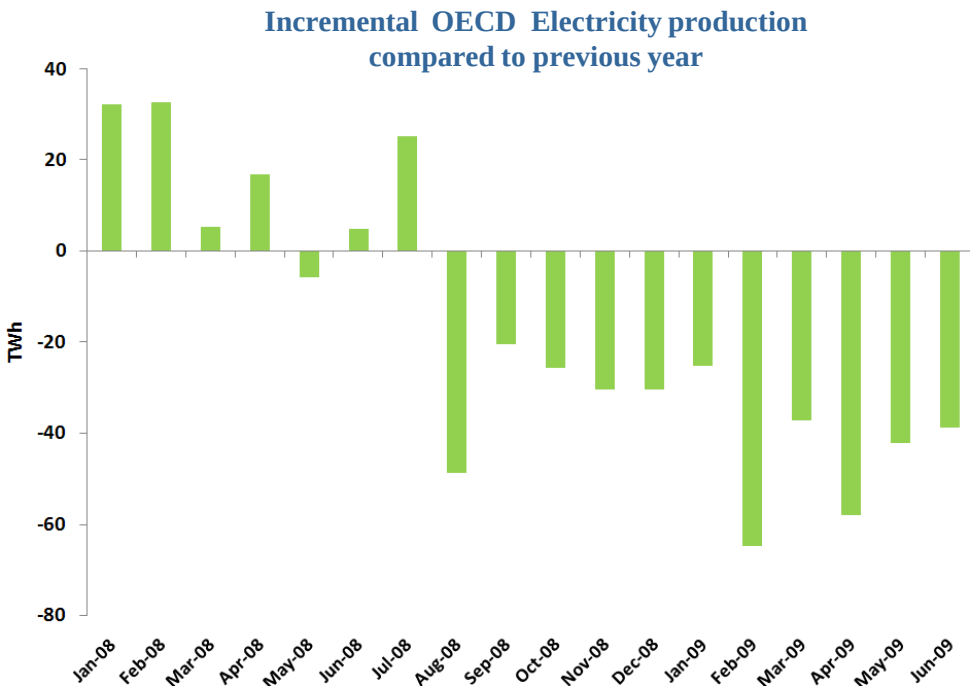


Source: WEO, 2009 excerpt

Investing in a World of Uncertainties

- Uncertainties about future energy demand and gas import requirements
- Uncertainties about the development of various electricity technologies
- Regulatory uncertainties especially on CO_2 prices
- Financial uncertainties

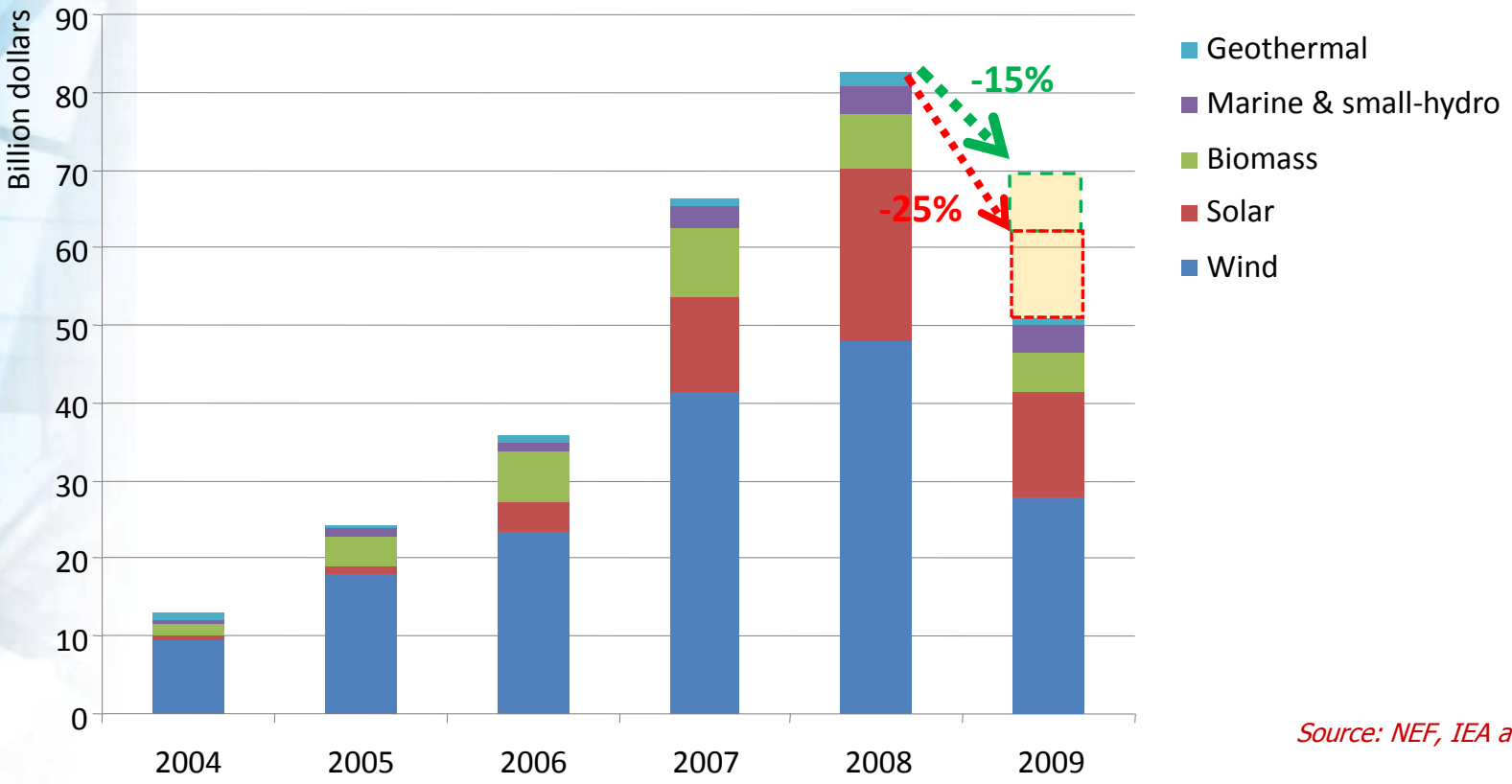
Electricity demand in OECD countries



Source: WEO 2008

Electricity generation in OECD countries has declined by 5.2% over the first 6 months compared to the same period last year

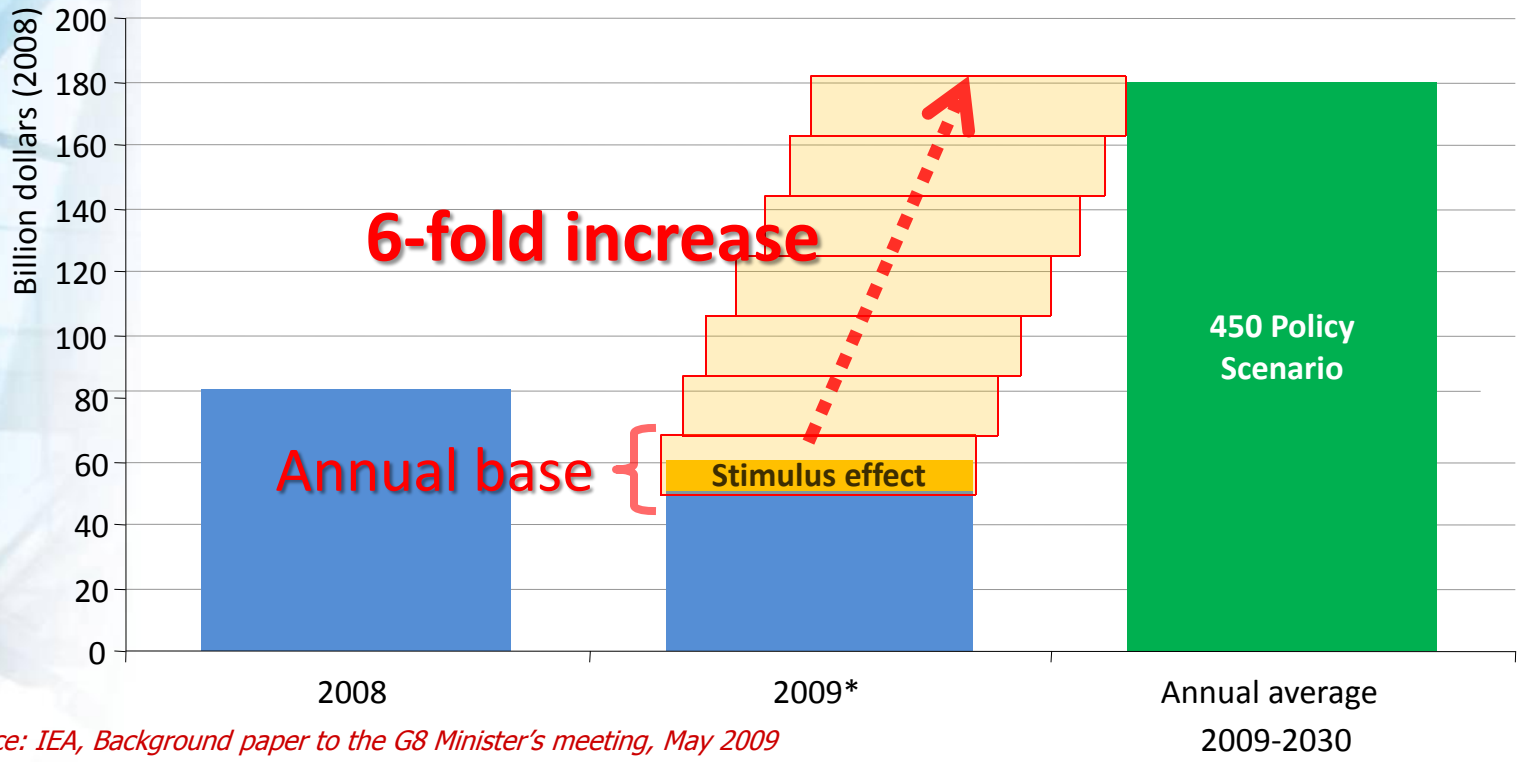
Asset financing for new build renewable assets



Source: NEF, IEA analysis

Renewable energy investment has declined due to lower fossil-fuel prices and the financial crisis – But economic stimulus packages should begin to help reverse this trend

Global investment in renewable power generation

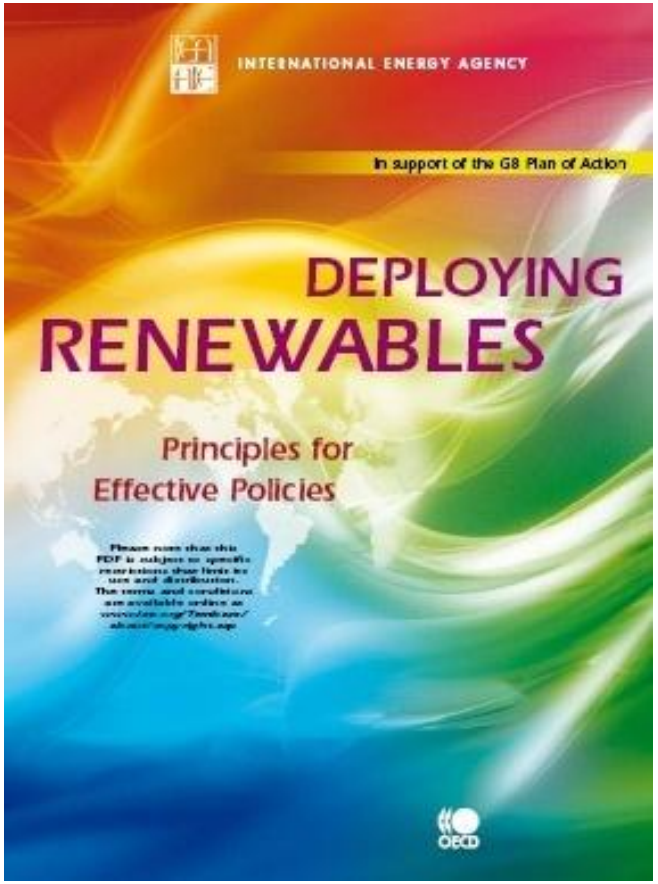


Source: IEA, Background paper to the G8 Minister's meeting, May 2009

To achieve the 450 Policy Scenario, governments would need 6-fold increase in level of total renewables investment triggered by their policy frameworks and incentives.

Principles of good policy design

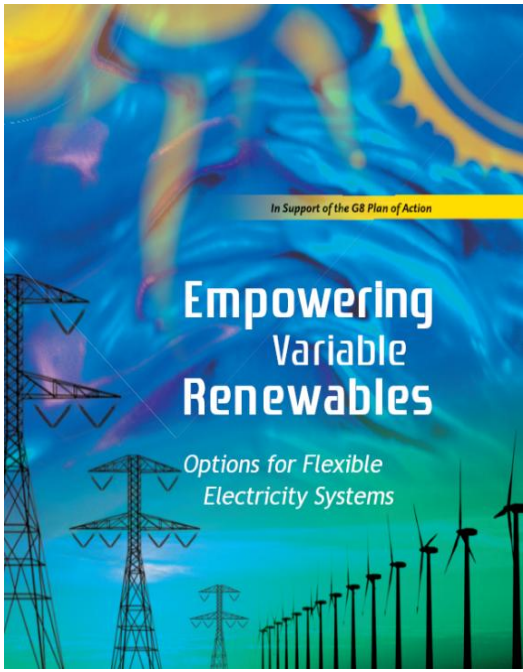
- Address non-economic barriers
- Predictable and transparent
- Transitional
- Tailored to suit technology maturity
- System friendly



*+ **International policy framework** for negotiation in Copenhagen*

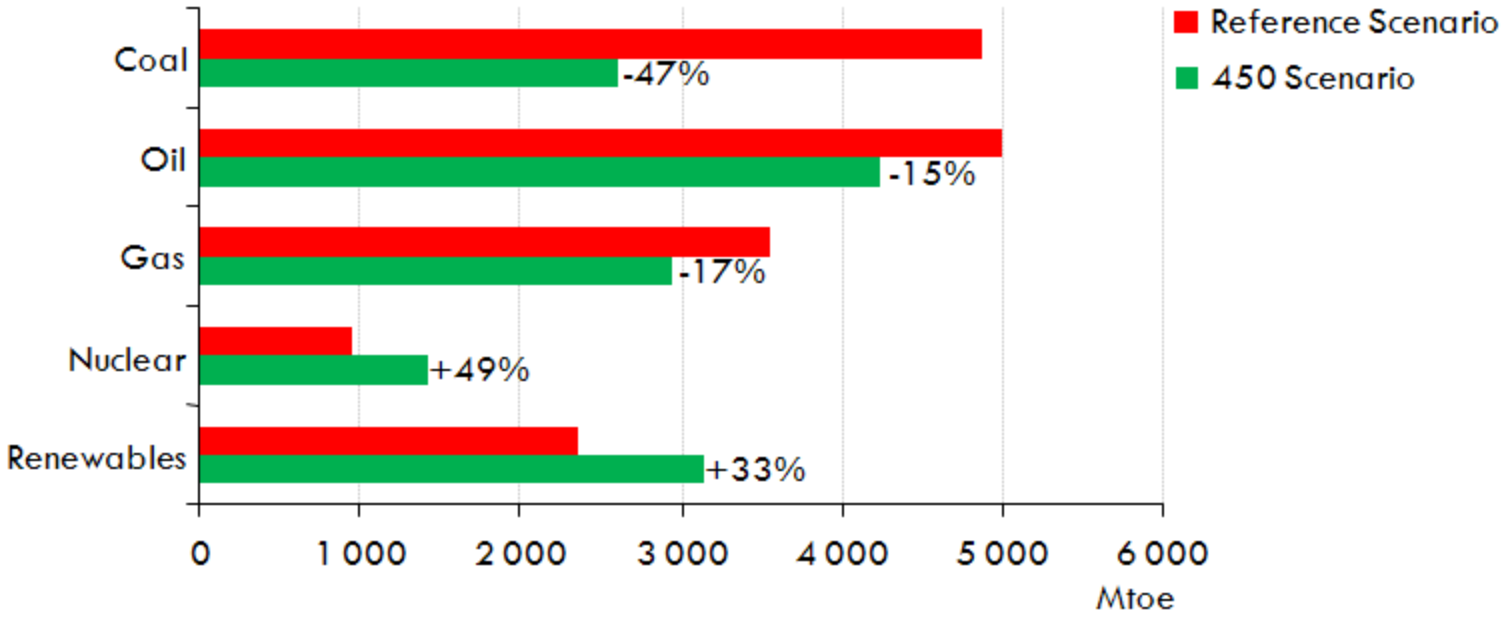
More supply variability requires more system flexibility

- Large scale integration of renewable generation is achievable at a cost, but require investments in transmission and co-ordinated planning (sharing, interconnection)



- Maximum variable renewables share (wind, PV, wave, tidal) depends on power system & market flexibility
  - Flexibility resource is made up of dispatchable interconnection, storage
- As shares increase, more flexibility is needed
  - Step 1: More efficient use of existing flexibility: particularly via larger, more liquid markets
  - Step 2: Additional capacity (and not just generation, also storage, networks, Demand Side Management)

But renewables are not the silver bullet…



Source: WEO 2009 excerpt

Key Messages

- **Deep emission cuts are technically achievable but an 'energy revolution' is needed**
  - Developing Countries must be part of the solution
  - Barriers: public opposition; financing needs; slow capital stock turnover; timeliness of technology development
- **For energy security and climate change mitigation**
  - Must invest in low carbon technologies: CCS, renewables, nuclear and energy efficiency must all be embraced
- **The economic & financial crisis has sharply reduced investment all the way down the energy supply chain, from production to end use**
  - This will have far-reaching effects on energy security, climate change and energy poverty
  - The current crisis is an opportunity to place a **Clean Energy New Deal** at the heart of economic stimulus packages everywhere