



## **POWER CHOICES**

# **Pathways to carbon-neutral electricity in Europe by 2050**

Hans ten Berge  
Secretary General

**COP15 side bar event  
Copenhagen, 14 December 2009**



# **EURELECTRIC CEO Declaration**

*18 March 2009*

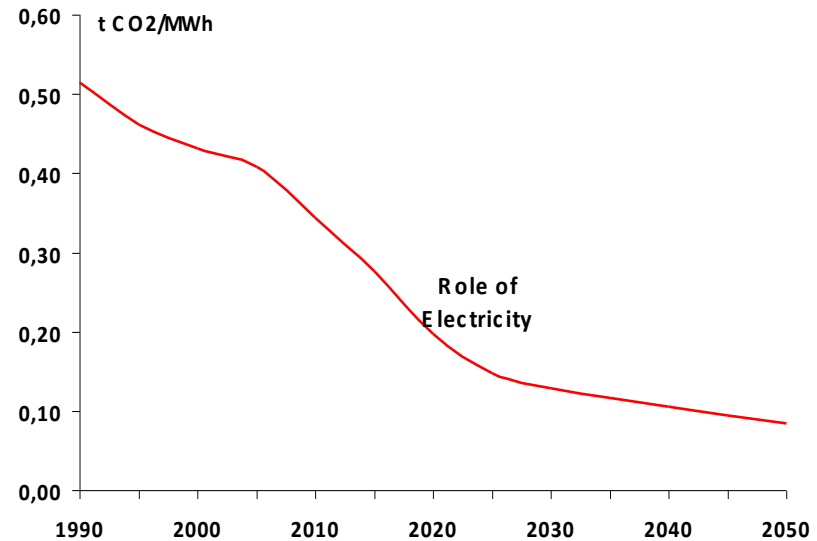


- 1. Carbon-neutral power in Europe by 2050**
- 2. Cost-efficient, reliable supply through an integrated market**
- 3. Energy efficiency & electricity use as solutions to mitigate climate change**



## Background: EURELECTRIC studies

**2007 - Role of Electricity:**  
EU 50% reduction target.  
CO<sub>2</sub> from power reduces  
from 0.45 to 0.10t CO<sub>2</sub>/MWh



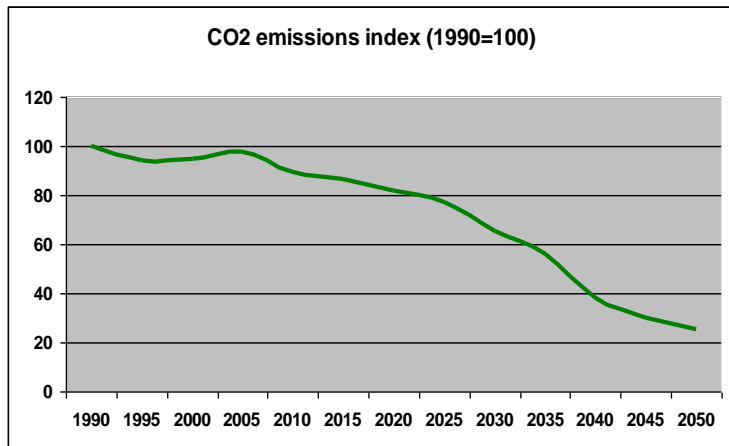
### 2009 - Power Choices:

- Review the 2007 study, aiming at **carbon-neutral power by 2050** under an EU target of -75% GHGs
- Investigate needed technology development, costs & regulatory framework



# Main assumptions for Power Choices scenario

## 75% GHG cut EU-wide

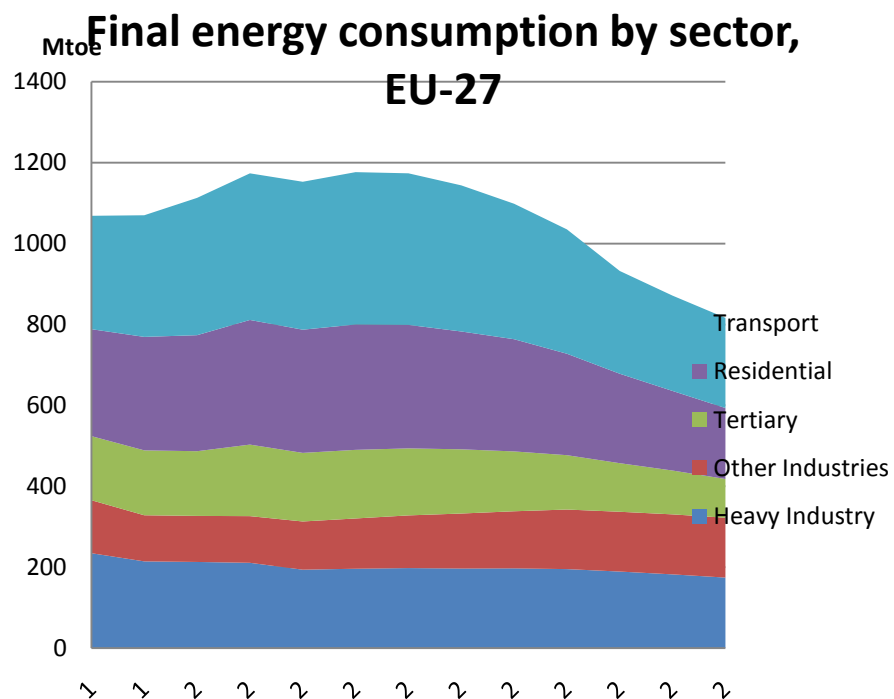


## *POWER CHOICES SCENARIO*

- 75% GHG cut across whole EU economy
- CO<sub>2</sub> price applied uniformly to all sectors
- Power becomes major transport fuel
- All power generation options available (with CCS commercially available as of 2025)
- Major policy push in energy efficiency
- No binding RES target post-2020
- CO<sub>2</sub> price is the only driver for low-carbon generation post 2030



## Decrease in energy demand



➔ **Paradigm shift to efficient electric technologies**

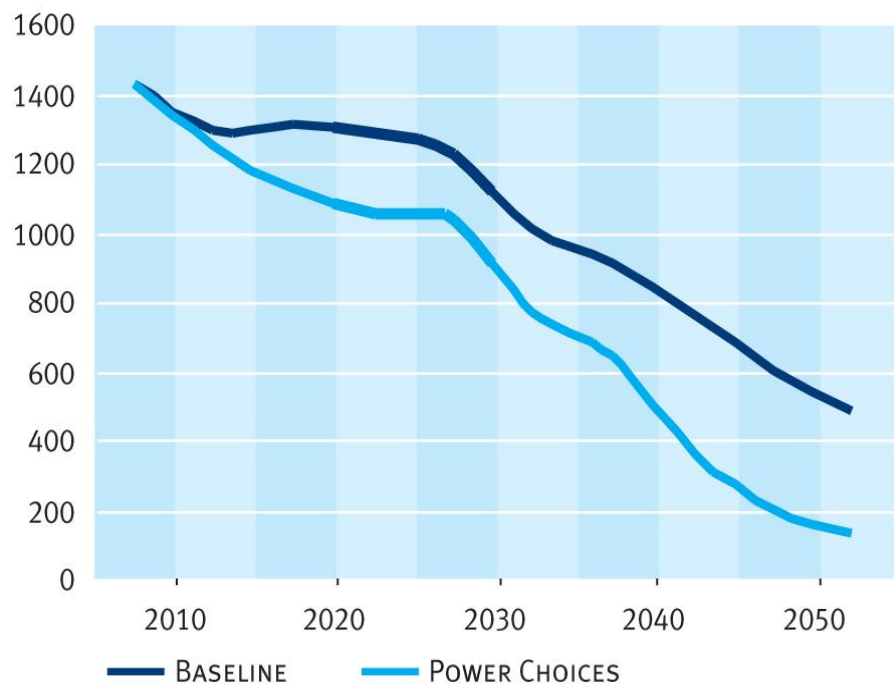
➔ **More electricity = less energy**





# Carbon emissions from power fall by 90%

CO<sub>2</sub> EMISSIONS (IN MT CO<sub>2</sub>)



Deep emission cuts  
take place between  
2025-2040.

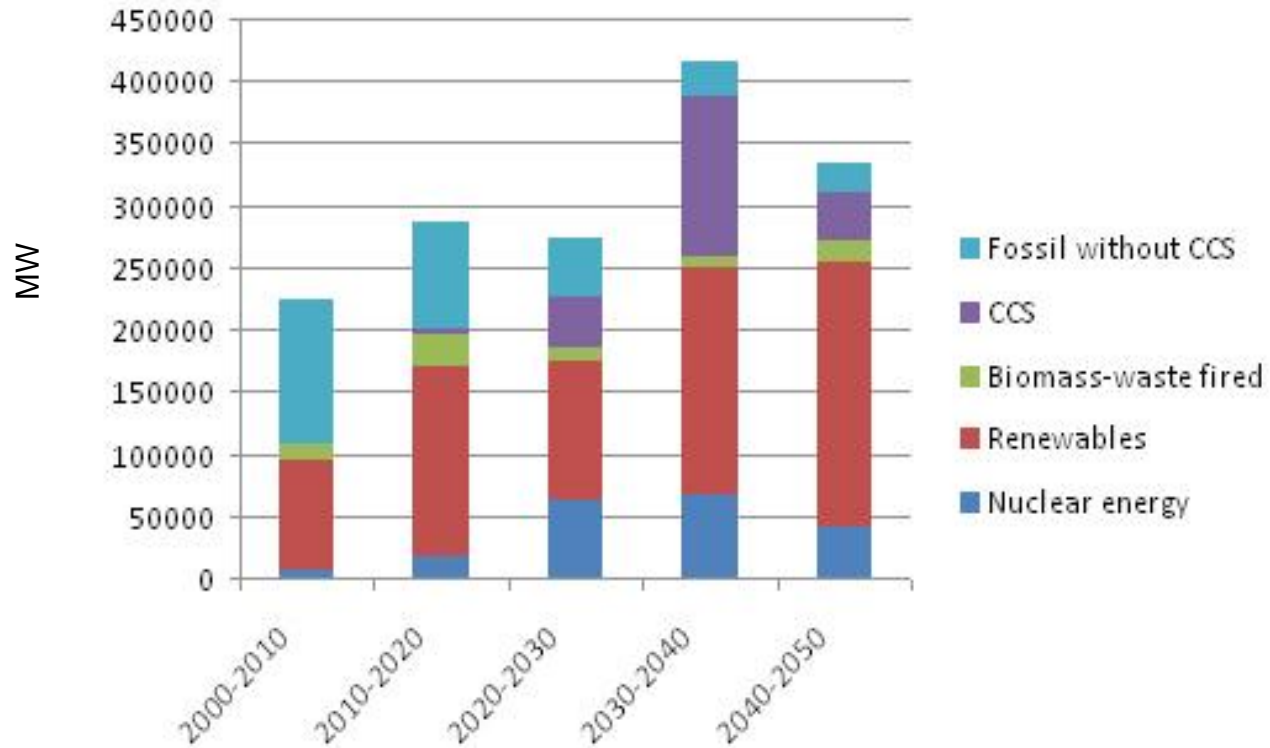
But investments are  
needed NOW!

NOW: 1423 MtCO<sub>2</sub>  
2050: 128 MtCO<sub>2</sub>



# Investment needed across the period

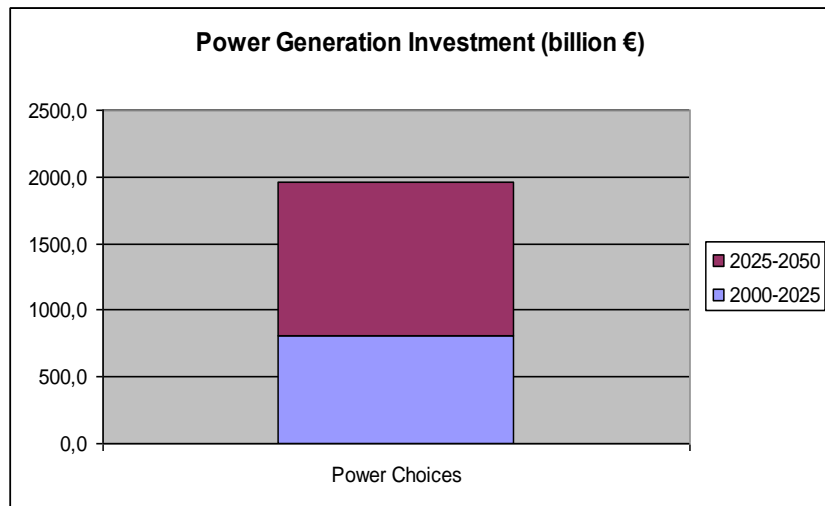
Gross investment in generation capacity



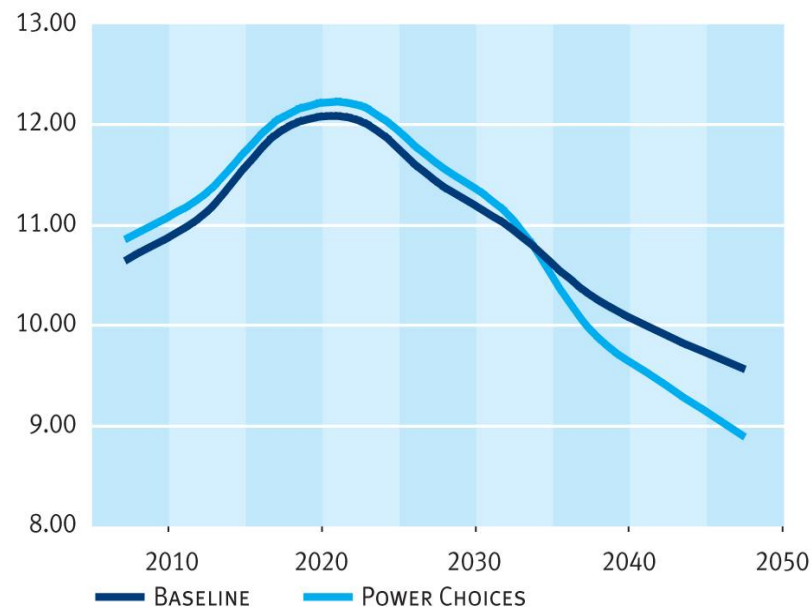


# Significant investments... ... but a reasonable cost for society

Investment needed in  
power generation by 2050:  
€2 trillion



TOTAL COST OF ENERGY AS % OF GDP

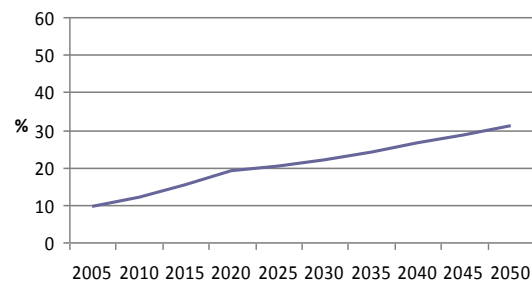




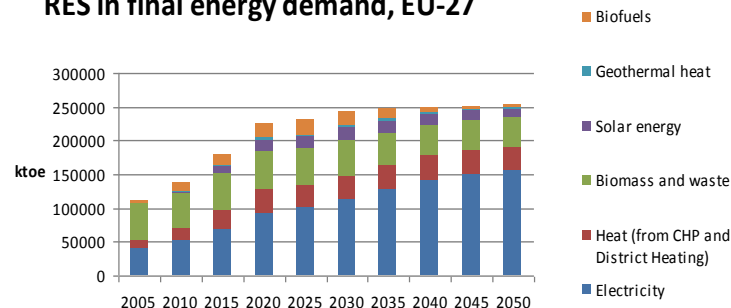
# Renewable energy in Power Choices

- EURELECTRIC scenario results in 19,1% share for RES in final energy demand
- Remaining 0,9% could be covered by imports from third countries to reach 20% target by 2020
- In final demand for RES, electricity will hold a key role

RES as % in final energy demand



RES in final energy demand, EU-27





## What if...

**Nuclear  
phase-out is  
reversed in  
Germany and**



**Commercial  
deployment of  
CCS is delayed  
to 2035?**



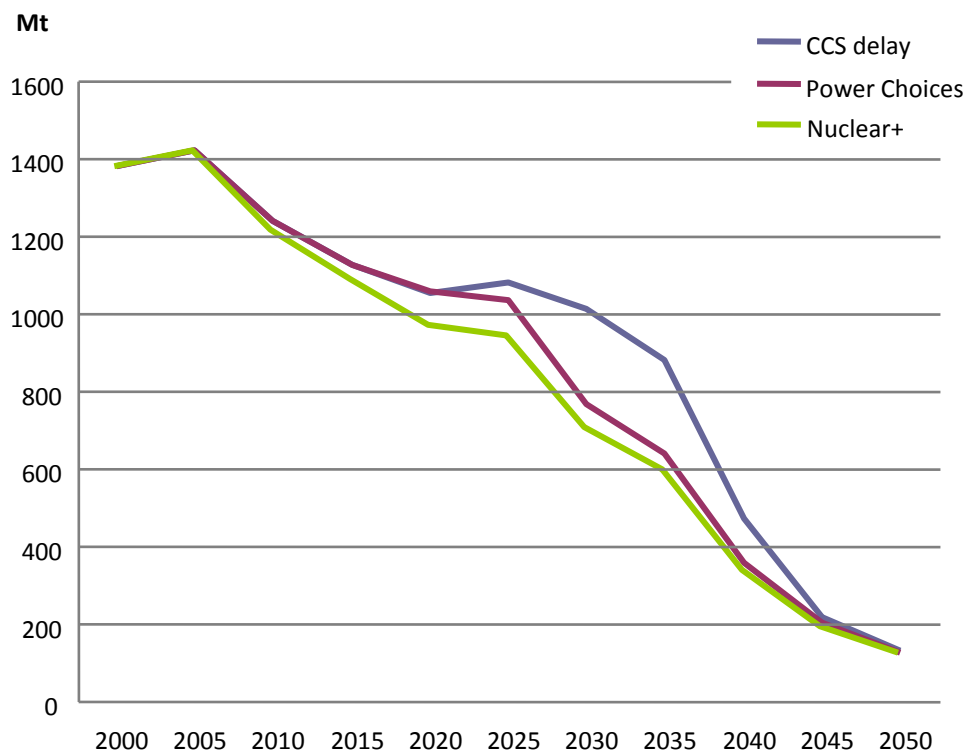
**One-third of  
onshore wind  
power is not built  
due to planning**





# All technologies are *really* needed

CO<sub>2</sub> emissions from power, EU-27



- 10-year delay of CCS = delayed CO<sub>2</sub> emission reductions from power & whole economy!
- More nuclear = more rapid reduction curve
- 1/3 onshore wind not built = more CCS & nuclear, off-shore wind not likely to fill gap.



## Key outcomes

- **EU carbon-neutral power by 2050 is realistic**
  - 75% GHG on whole economy can be reached
- **All power generation options needed**
- **Electrification of the demand side essential**
- **Significant investment but at acceptable cost to society**
- **The major CO<sub>2</sub> reductions in power are achieved from 2025 onwards**
- **CCS delayed &/or nuclear phase-out = slower CO<sub>2</sub> reduction**



# Policy recommendations

## CO2 reductions

- Support CO<sub>2</sub> market to deliver cap at least cost
- All sectors to internalise cost of GHGs
- Promote an international agreement on climate

## Technology choices

- Enable the use of all low-carbon options for power generation
- Encourage public support for modern energy infrastructure: onshore wind, CCS, smart grids...

## Cost

- Significant investment cost but reduction in share of GDP
- Recognise that cost of technology deployment differs substantially across the EU

## Demand-side

- Facilitate electrification of road transport and spatial heating & cooling
- Major policy push in energy efficiency



## EURELECTRIC's partner organisations in Power Choices study:



National Technical University  
of Athens



Verband der  
Großkraftwerks-Betreiber



**- For more information -**

Hans ten Berge,  
Secretary General  
EURELECTRIC

[htenberge@eurelectric.org](mailto:htenberge@eurelectric.org)

+32 2 515 1001