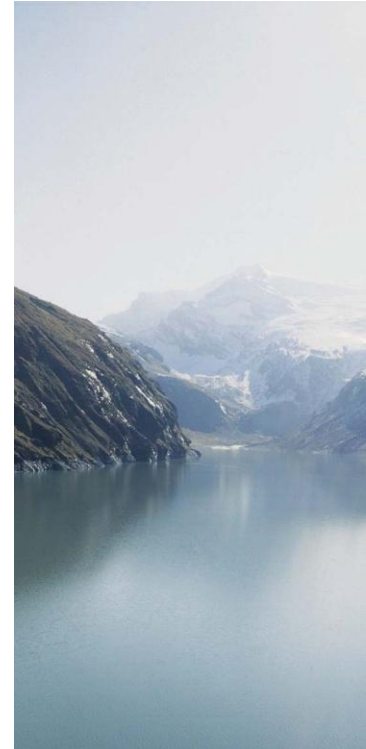


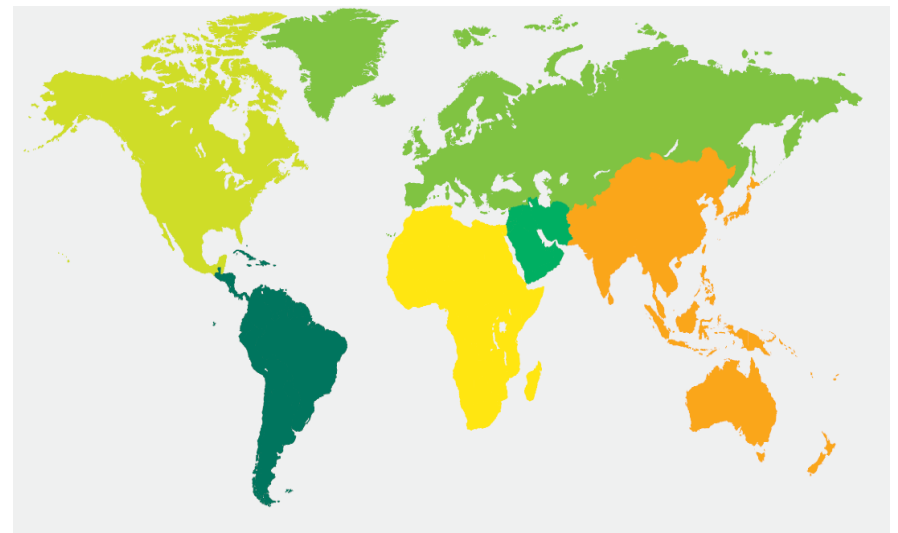
Future of the European Energy System

Wolfgang Anzengruber, CEO VERBUND
Danube Region Business Forum, 3.11.2011



World Energy Challenges by 2050*

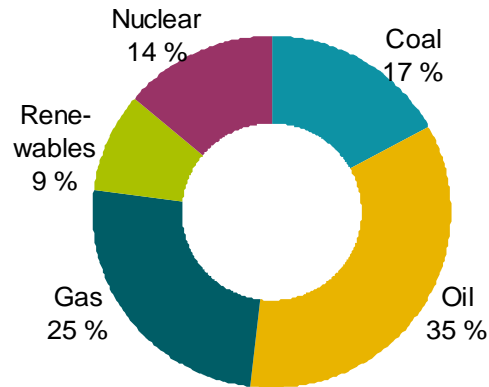
- **double energy demand**
- **half the emissions (-80% in OECD)**
- **electricity access for 1.5 billion energy poor**
- **globally governed risks management**



* World Energy Council

Energy policy priorities of Europe: security of supply, sustainability, competitiveness

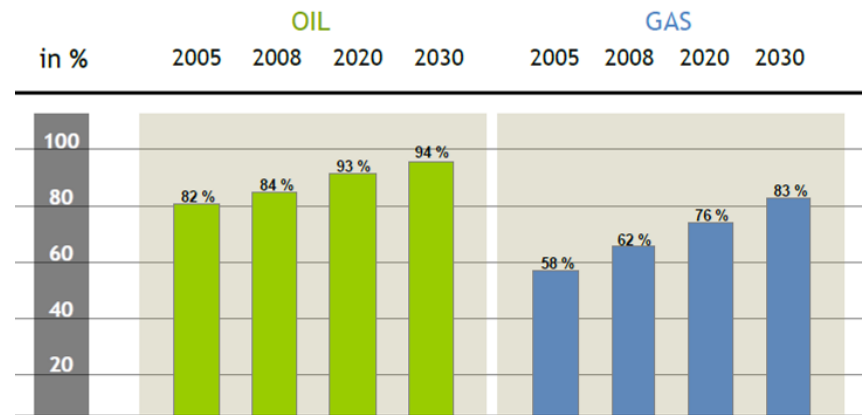
Energy demand by energy source in the European Union



Figures for 2008, European Commission 2010

- **20-20-20 goals of the EU till 2020:**
 - 20 % share of renewable resources
 - 20 % reduction of CO₂-emissions
 - 20 % increase of energy efficiency
- **Electricity: 20 % share in total energy consumption**

Projected development of the EU import dependence by fossil energy sources

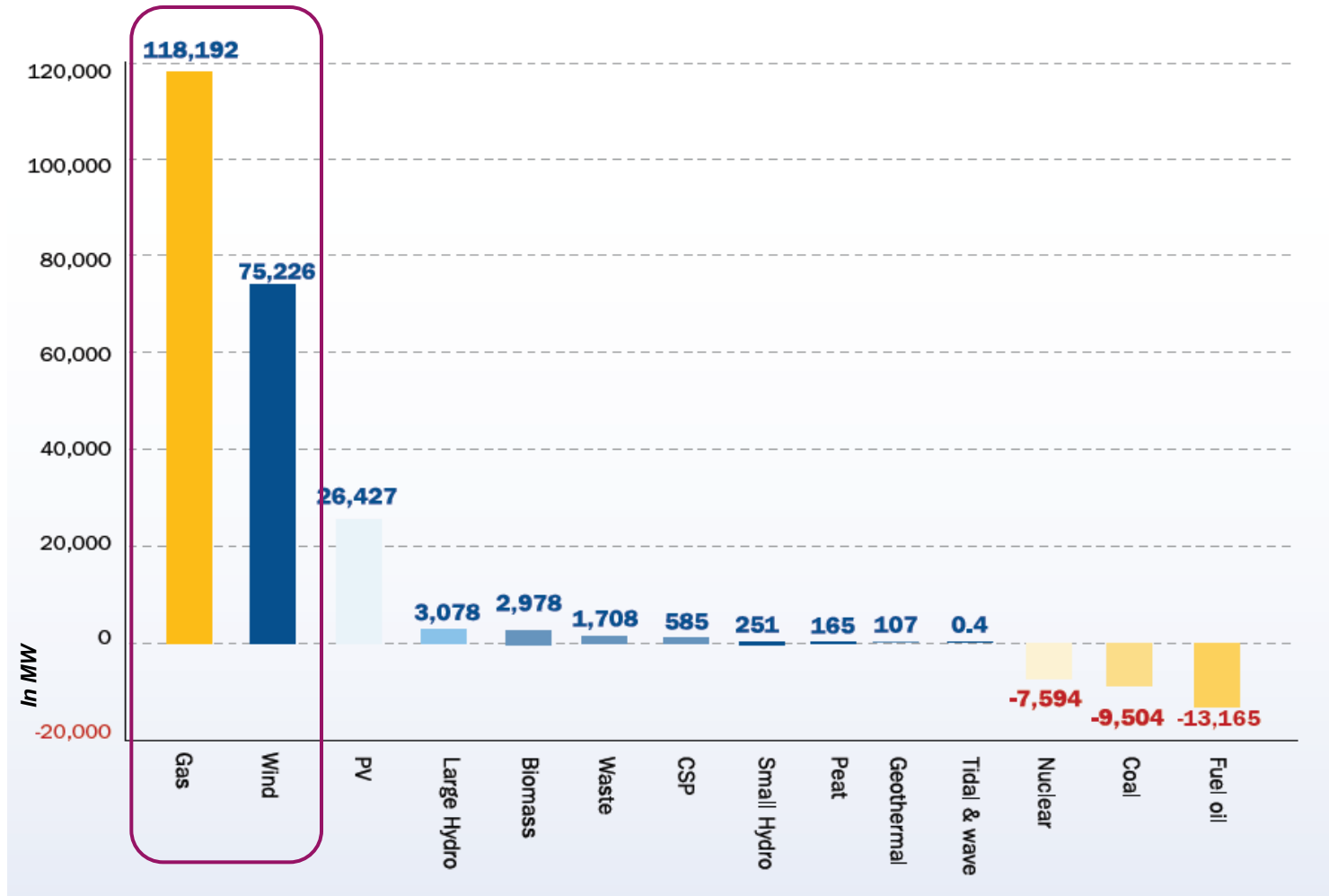


« Business as usual » scenario based on 2009 figures

European Council, 2011

- **Europe imports over 50% of it's necessary energy**
- Very high dependency on oil- and gas-imports
- Diversification of routes and products sources for the EU strategically very important.

Europe: change in power plant capacities shows focus on gas and wind power between 2000 - 2010

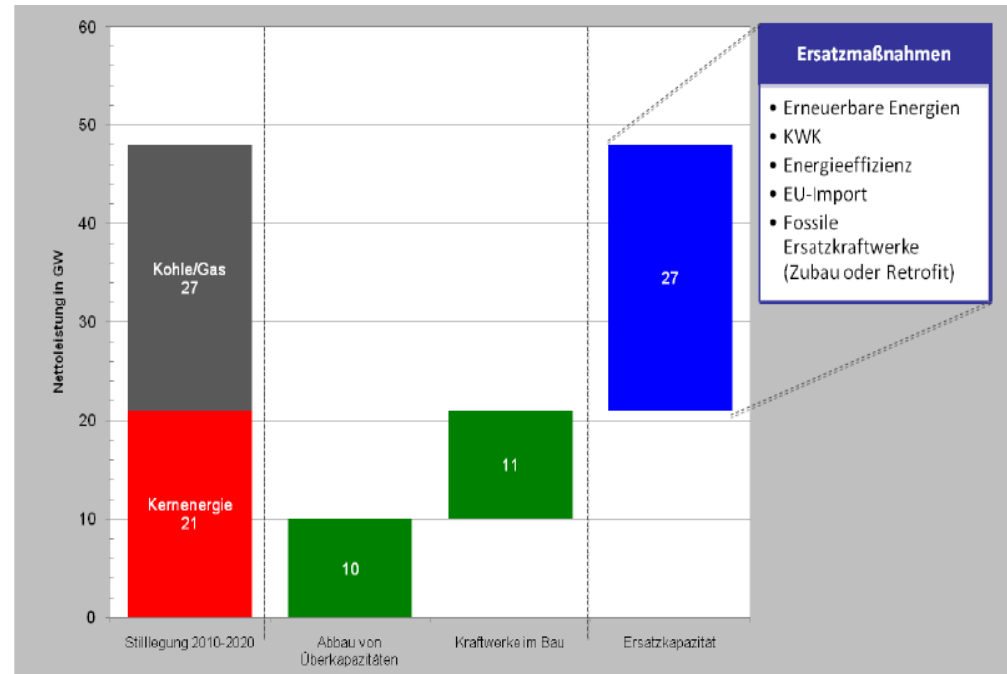


The European Wind Energy Association, 2011

Germany: nuclear phasing out requires also a strengthening of energy cooperation and partnerships within Europe

- Phasing out of nuclear energy :
 - Expansion of renewables
 - Construction / extension of thermal power plants
 - Effects on CO₂ emissions
 - Accelerated expansion of the grid
- Goals: affordable electricity prices, security of supply and achieving climate goals

Replacement demand after closure of conventional capacities till 2030



Potsdam-Institut für Klimaforschung, Universität Leipzig, 2011

Planned expansion of wind and solar power in Europe raises new challenges

Installed wind power could be expanded to about 350 GW till 2030



- Significant increase of fluctuating power generation (wind, PV) in Europe: Currently 20 % renewable electricity; by 2020: 35 % possible
- Challenge of integration in the European power system

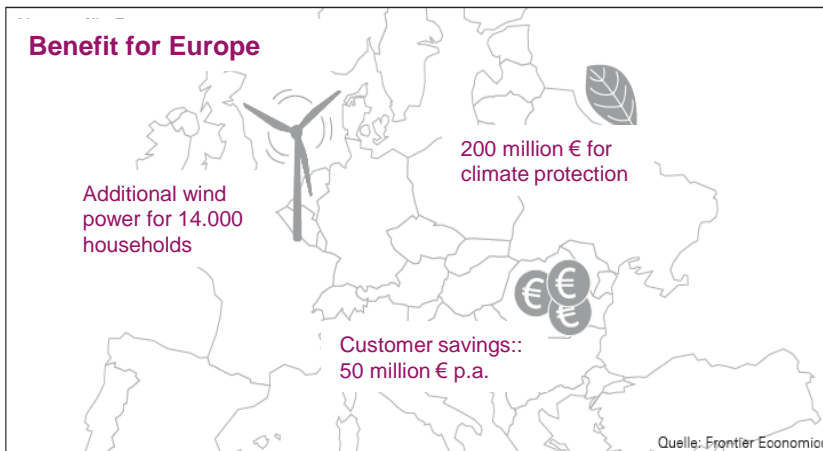
European answers: expansion of grid and storage power stations



- **ENTSO-E**: European grid infrastructure is important for maintaining the security of supply
- **APG master plan**: expansion of the grid and 380-kV-ring necessary for secure electricity supply in Austria
- **Chance for Austria**: „green battery for Europe“

Flexibility of pump storage power stations ensures ecological and economic benefits for Europe

Benefit of the investments (~800 million €) in new storage power plants (1.000 MW)

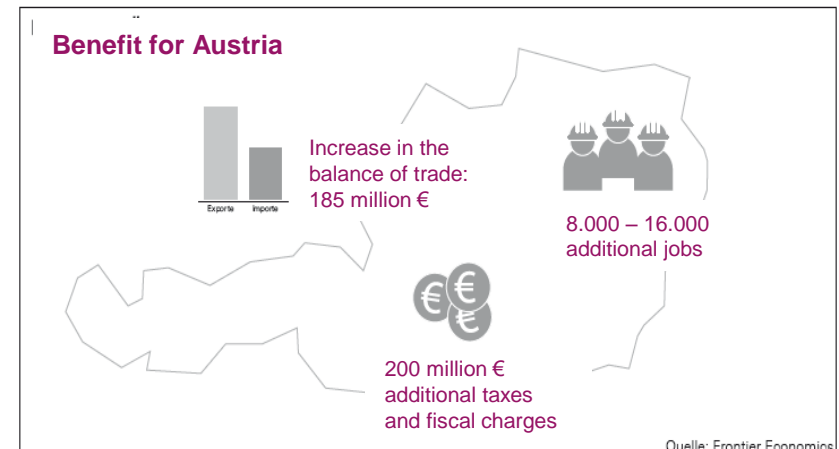


Benefit for Europe

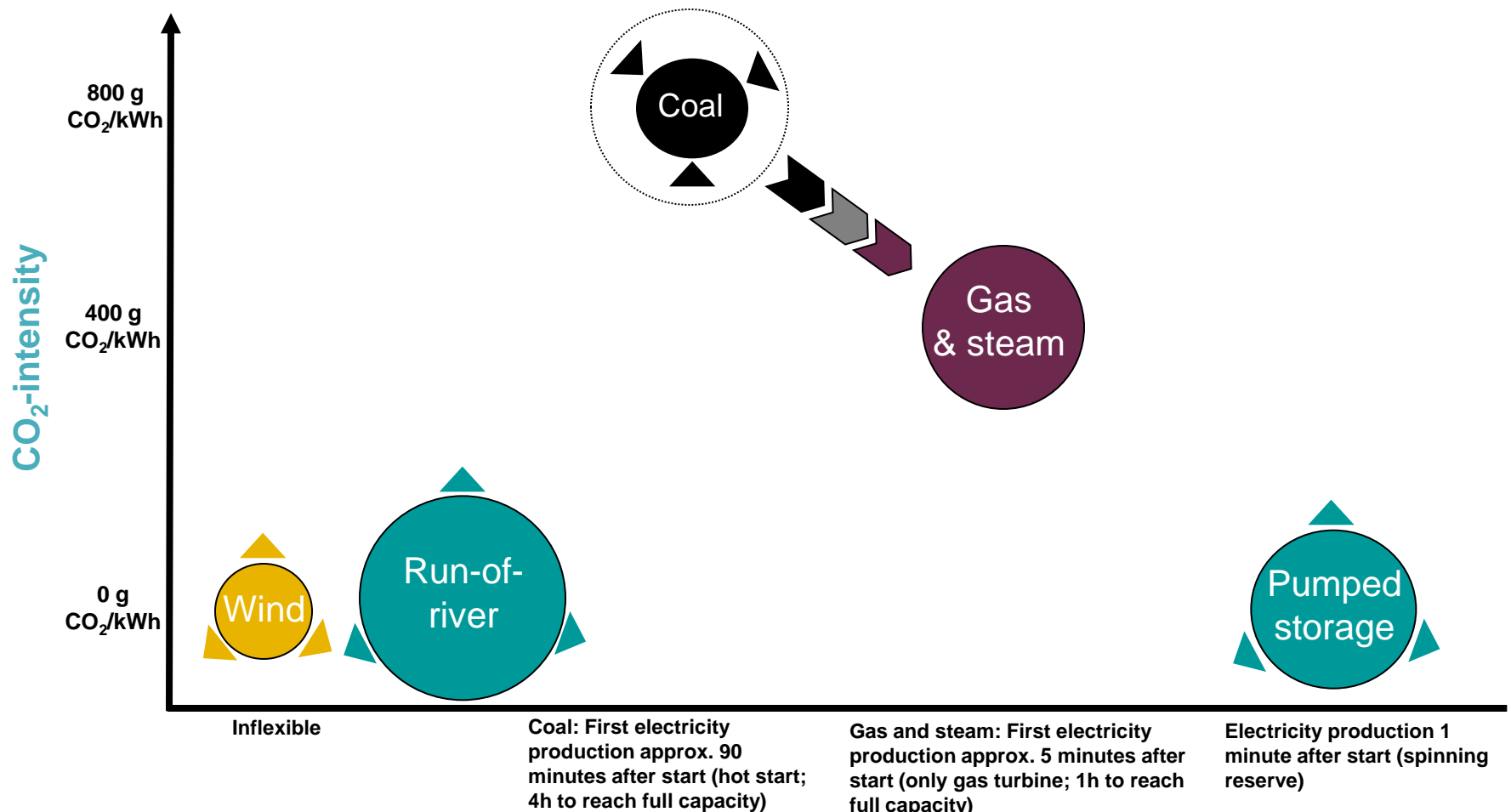
- **Ecological benefit**
 - Improved wind integration
 - Reduction of the CO₂ abatement costs through more efficient use of the power plant park
- **Economic benefit**
 - Relief for consumers through more efficient use of power plants and lower costs for CO₂

Benefit for Austria

- **Direct und indirect regional wealth**
 - Storage power stations are efficient investments
 - Stimulating investments for other sectors result in additional taxes and jobs
- **Increase in the balance of trade**



VERBUND-Focus on energy mix with future: renewable energies, flexible low carbon power plants and storage



Verbund

~ € 2,6 billion capital expenditure 2012-2016*

Austria / Germany

- 1,691 MW hydro storage capacity** (ReisseckII, ES Riedl, LimbergIII)
- 196 MW run of river** (GKI, Mur, Salzach)
- 1,232 MW CCGT** (Mellach, Klagenfurt)
- 51 MW wind (Bruck)
- Investments in high-voltage grid

Albanien

- 53 MW run of river

Rumänien

- 200 MW wind

Türkei

- Business model: Vertically integrated utility with 3 million end consumers at present
- Aprox. 5,0 GW hydro power, thermal power and renewables until 2015



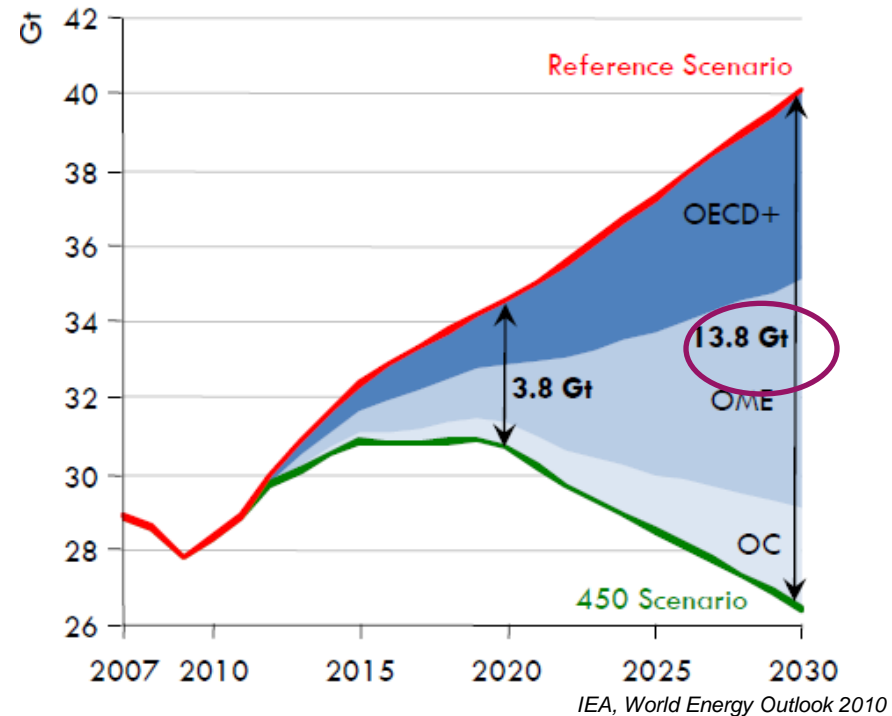
* Current authorized capital expenditure plan

** VERBUND-share of total capacity: 1,305 MW hydro storage; 100 MW run of river; 1,032 MW CCGT

Solution energy efficiency: essential to achieve national and international climate protection goals

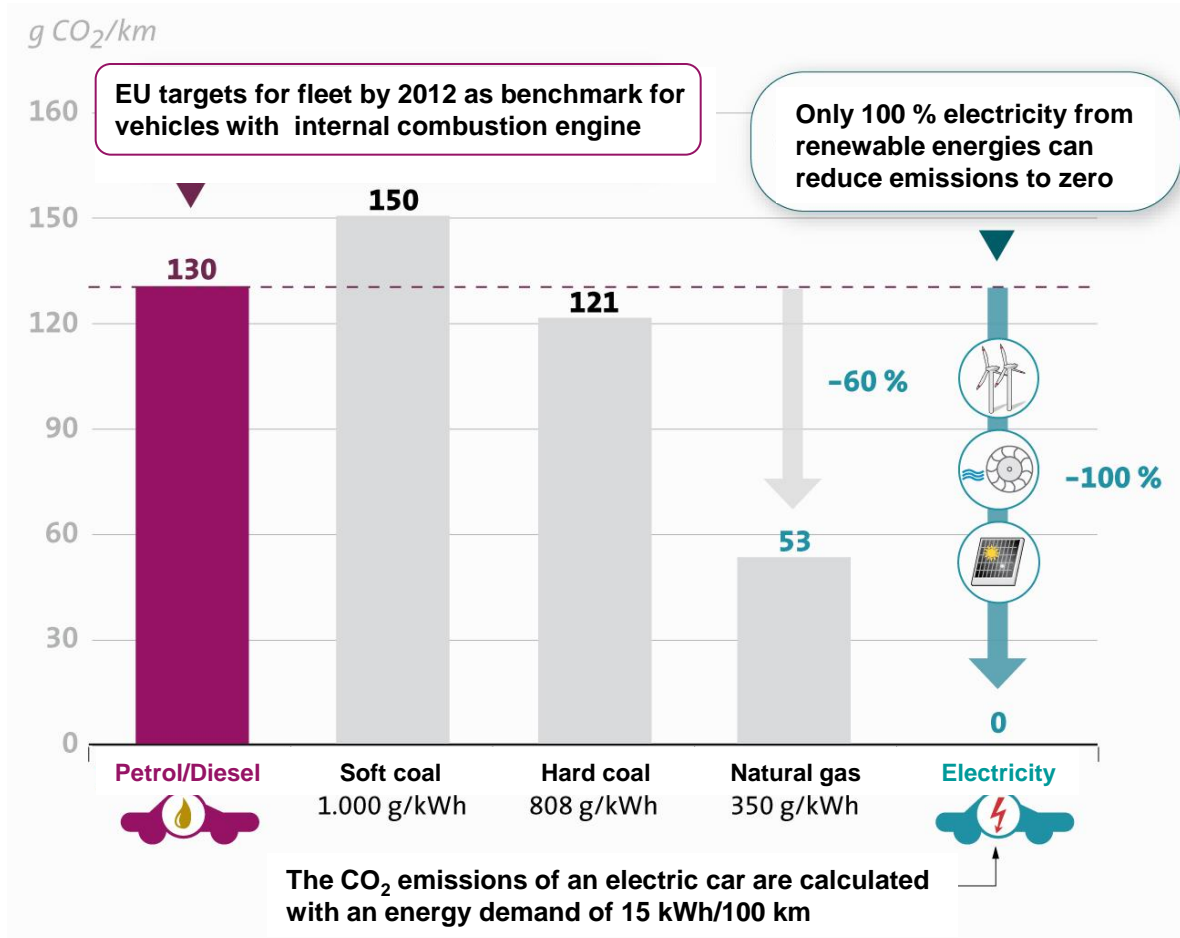
- Careful handling of valuable resource energy
- Global importance of energy efficiency measures: biggest contribution for climate protection → 57 % of necessary CO₂ reductions
- „*Low carbon economy – Roadmap*“ of the EU by 2050:
 - Goal: reduction of CO₂ emissions of 80-95 % by 2050 to achieve 2° C goal
 - Annual needed investments of 270 billion € in environmental and transport technologies and infrastructure projects (like grid, storage,...)
 - Potential for saving oil and gas imports: 175-320 billion € annually

Necessary CO₂ savings by 2030 to achieve the climate goals



OECD+: OECD countries + EU members, but not OECD members
 OME: Other Major Economies (Brasilia, China, Russia, South Africa, Middle Eastern countries)
 OC: Other countries (all countries not OECD+ or OME)

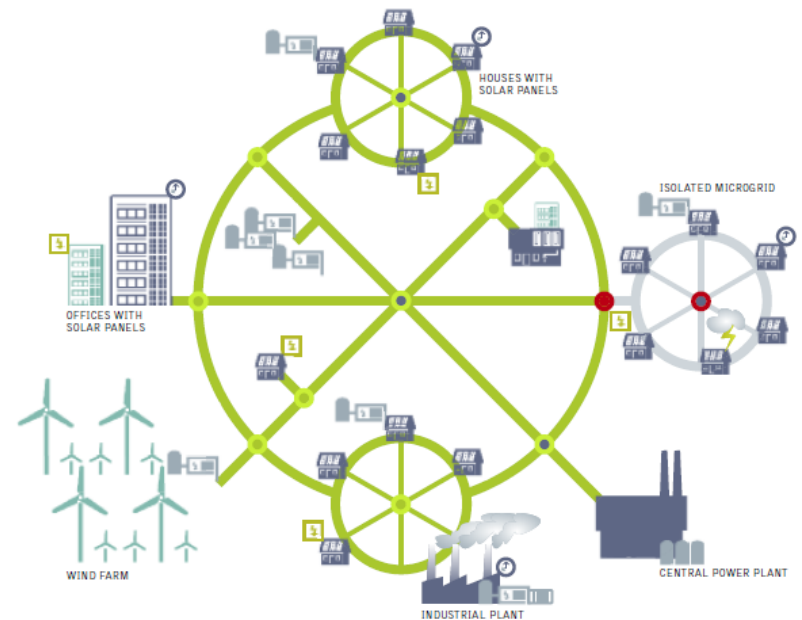
Solution E-Mobility: key to energy demand reduction and CO₂ emission reduction in traffic



Solution new energy system: How „smart“ can we create our energy future?

- **Smart Meter:**
 - **EU target:** smart meter used by 80 % of consumers by 2020
 - **Target in Austria:** nationwide implementation for electricity by 2014
 - **Advantages of a smart meter:**
 - Transparency of electricity consumption
 - Detect needless energy waste
 - Financial savings opportunities
 - CO₂ reduction through energy awareness
 - Flexible price and tariff schemes

- **Smart Grids:** essential for security of supply, expansion of renewable power, integration of volatile generation



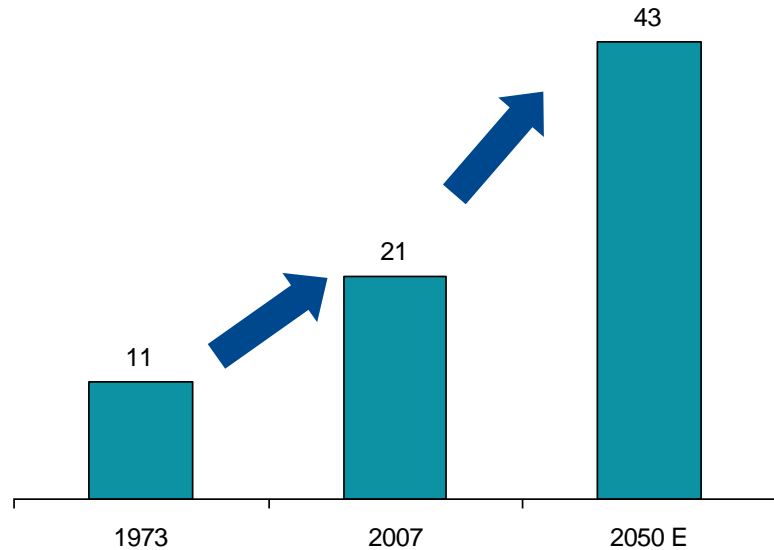
Electrification as a major part of sustainable energy system

Important arguments:

Higher efficiency

Easier decarbonization

Share of electricity in final energy demand
(% in Europe)



1973 and 2010 are values for OECD ; Source: IEA, 2050 values – average of different European Studies forecasts

A sustainable future energy system requires innovations and investments: timely as well as in an European and global context



- Extension of renewables and their integration in the energy system requires investments in flexible power plants and storage capacities as well as in grid infrastructure
- Coordinated European climate and energy policy necessary: harmonization of renewable support, realization of priority infrastructure projects, etc.
- Sustainability of our energy system has to include safety issues as top priority
- Increase of energy efficiency at all levels by „smart systems & applications“ as a major contribution for the reduction of the energy consumption and the CO₂-emissions
- Electricity is part of the solution for a future and safe energy system

