Energy planning practice vs. vulnerabilities

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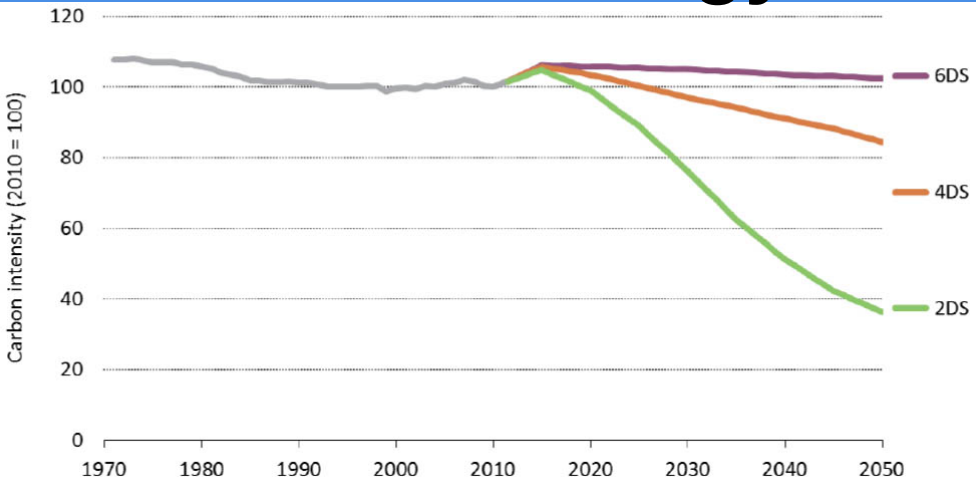
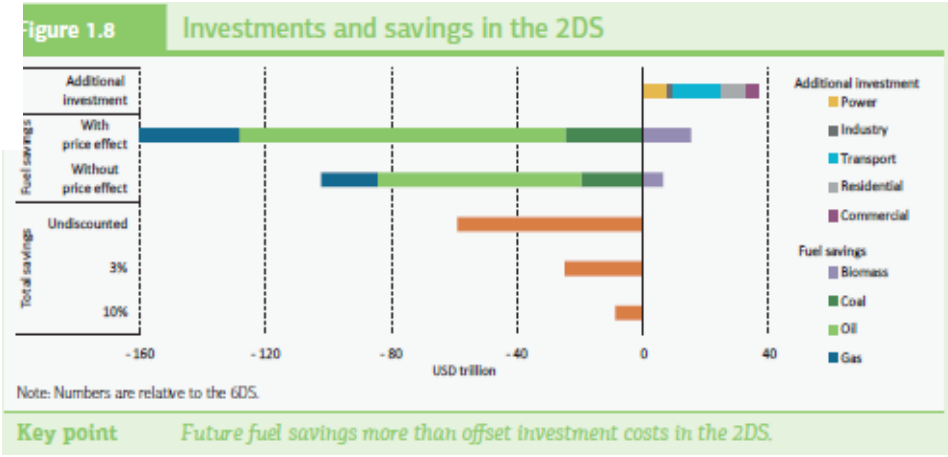
IEA Energy Technology Perspectives



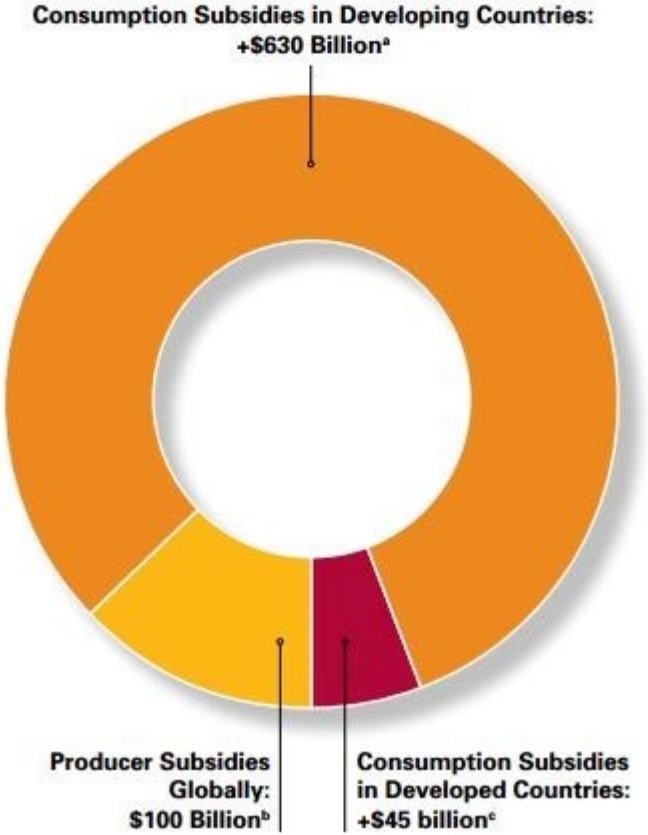


Fully economically viable but not being done?

IEA Energy Technology Perspectives

Figure 1: Estimates of International Fossil Fuel Subsidies in 2012

$775 Billion in total international fossil fuel subsidies in 2012



Fossil fuel subsidies – 10 times bigger than RES subsidies

Estimate of Fossil Fuel-related Subsidies

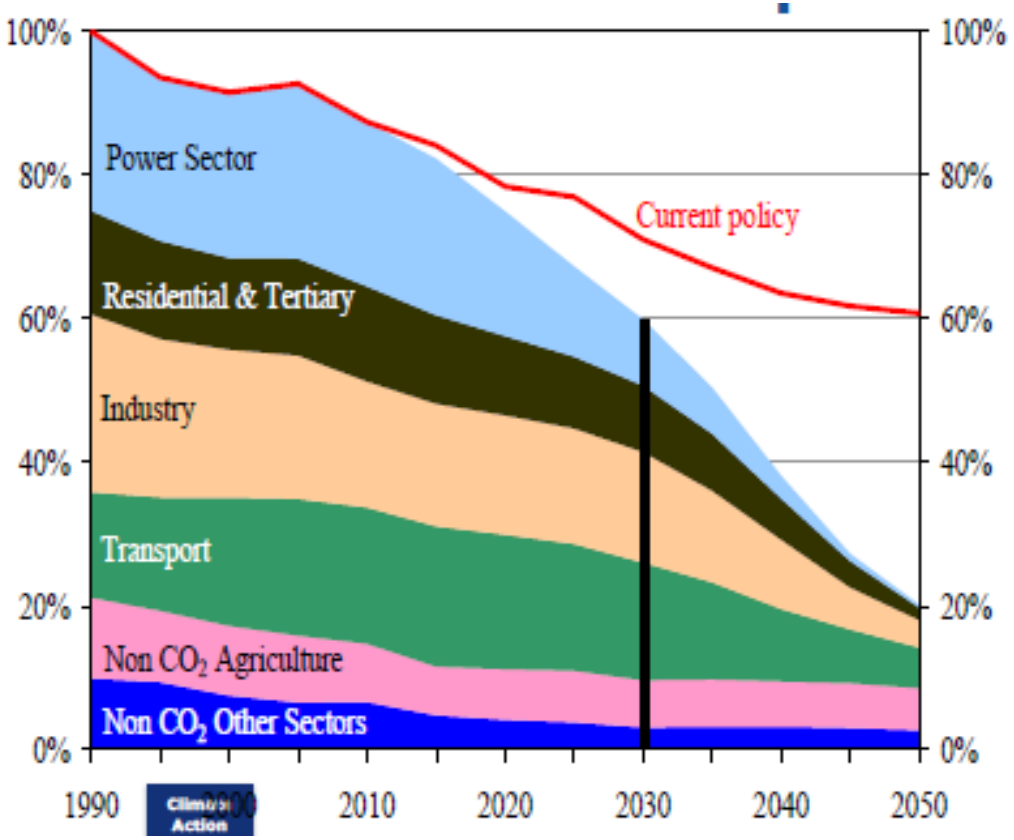
Country	Energy related subsidies as % of GDP
Albania	7-8%
Bosnia-Herzegovina	9-10%
Croatia	5-6%
Macedonia	8-9%
Montenegro	10-11%
Serbia	7-9%
Kosovo	35-36%

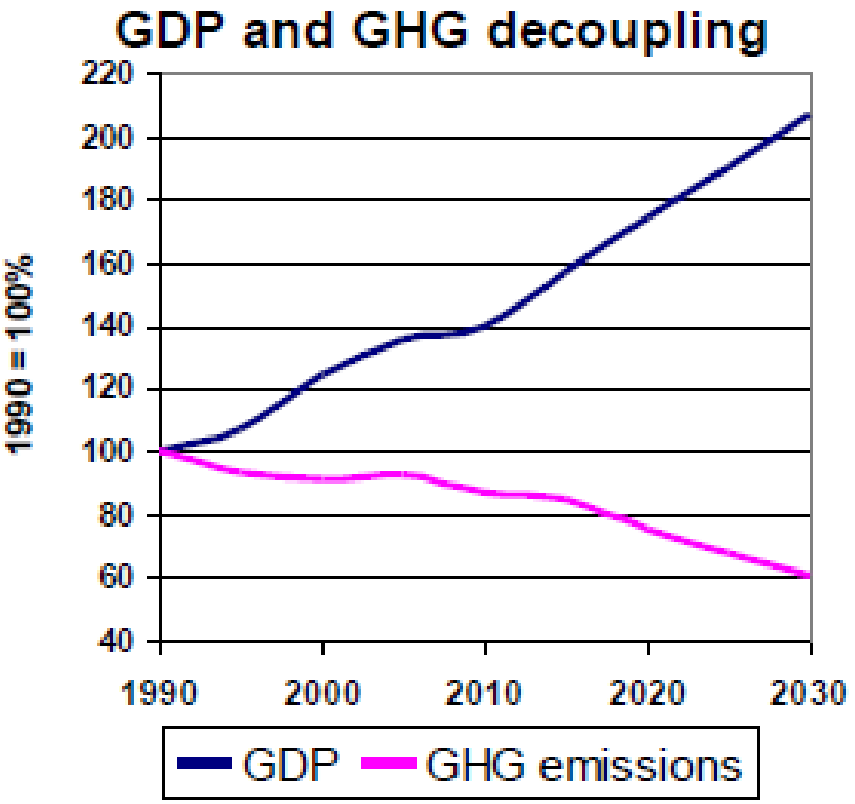
Aleksandar Kovacevic, UNDP: Fossil Fuel Subsidies in the Western Balkans

EU energy context

- Security of energy supply
  - Import dependence from 50% to 70% by 2030
- Employment and regional development policies
  - Deindustrialization and trade liberalization
  - “Boosting growth and jobs by meeting our climate change commitments”
- Mitigation of global warming
- Environmental protection
- Sustainable development
- 20-20-20 till 2020

Decoupling is possible – EU case

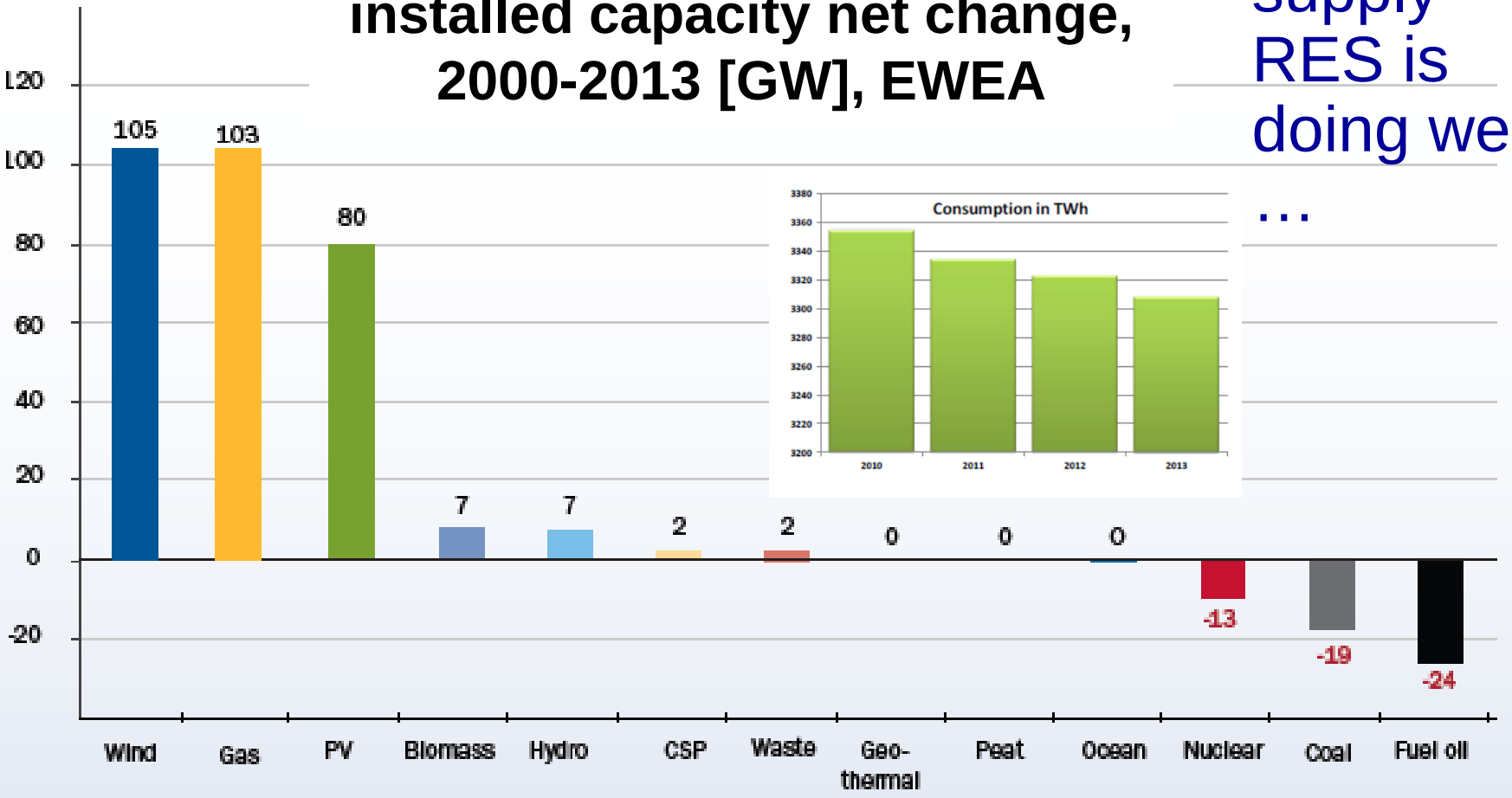




http://ec.europa.eu/clima/policies/roadmap/faq_en.htm

Electricity market

EU electricity generation installed capacity net change, 2000-2013 [GW], EWEA



Energy supply – RES is doing well …

Wind share in electricity demand

Wind share in electricity demand 2013

Denmark – 34%

Portugal – 24%

Spain – 21%

Cape Verde – 19%

Ireland – 17%

Germany – 10%

Romania – 9%

Estonia, UK, EU – 8%

Greece, Sweden – 7%

Lithuania – 6%

Cyprus, Italy, Netherlands – 5%

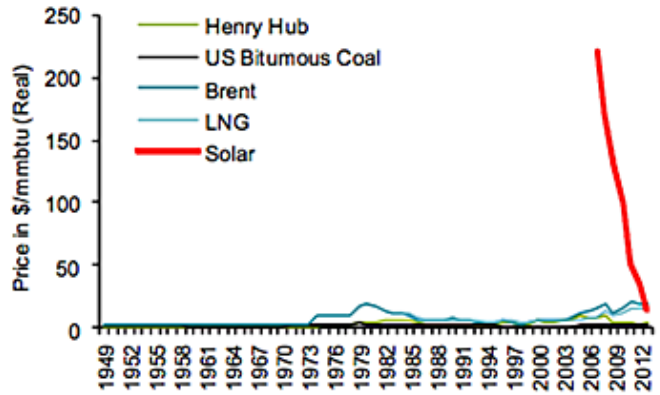
India, US, Austria, Belgium, Bulgaria, Poland – 4%

Canada, Costa Rica, Australia, Morocco, Croatia, France– 3%

World, China, Hungary, Latvia, Luxembourg – 2%

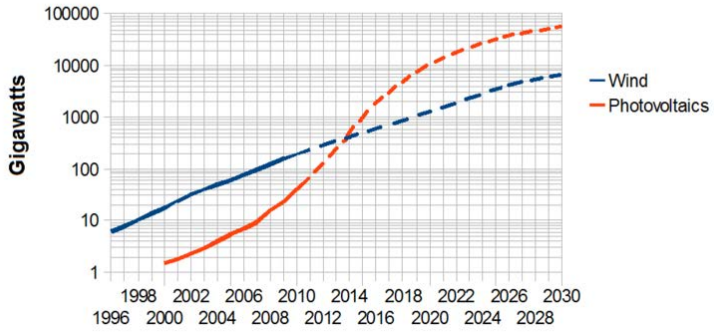
PV revolution

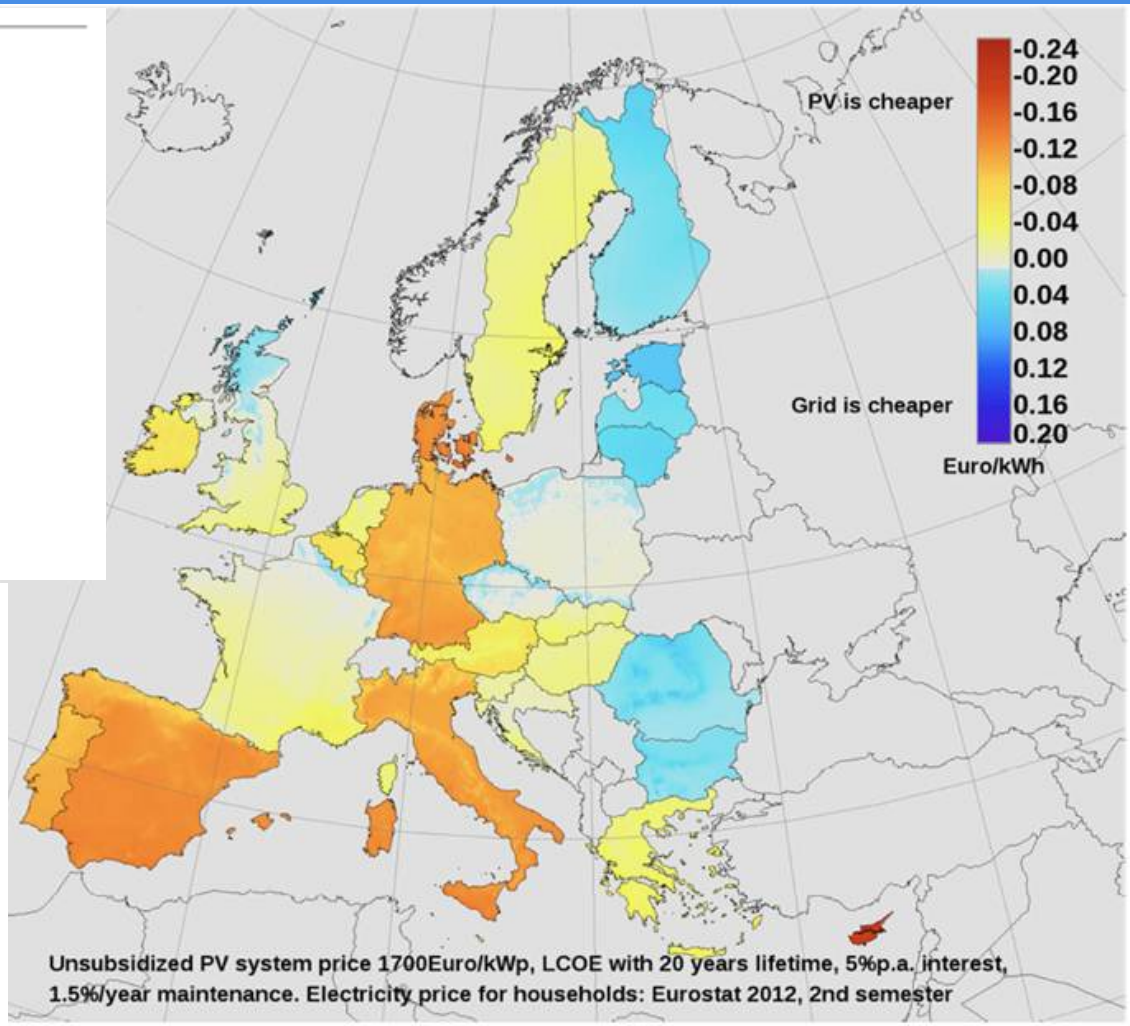
Exhibit 2
Welcome to the Terrordome… $/MMBTU by Energy Type



Source: EIA, CIA, World Bank, Bernstein analysis

Growth of Wind and Photovoltaics





PV revolution

- Solar share in electricity demand 2013
  - Greece, Italy – 7%
  - Germany, Spain – 5%
  - Bulgaria – 4%
  - Belgium, Czech Rep. – 3%
  - Luxembourg, Slovakia – 2%

Next step 2030

- Green Paper "A 2030 framework for climate and energy policies“
- A policy framework for climate and energy in the period from 2020 to 2030
  - 40% lower GHG emissions by 2030
  - 27% RES by 2030
  - 27% less energy by 2030

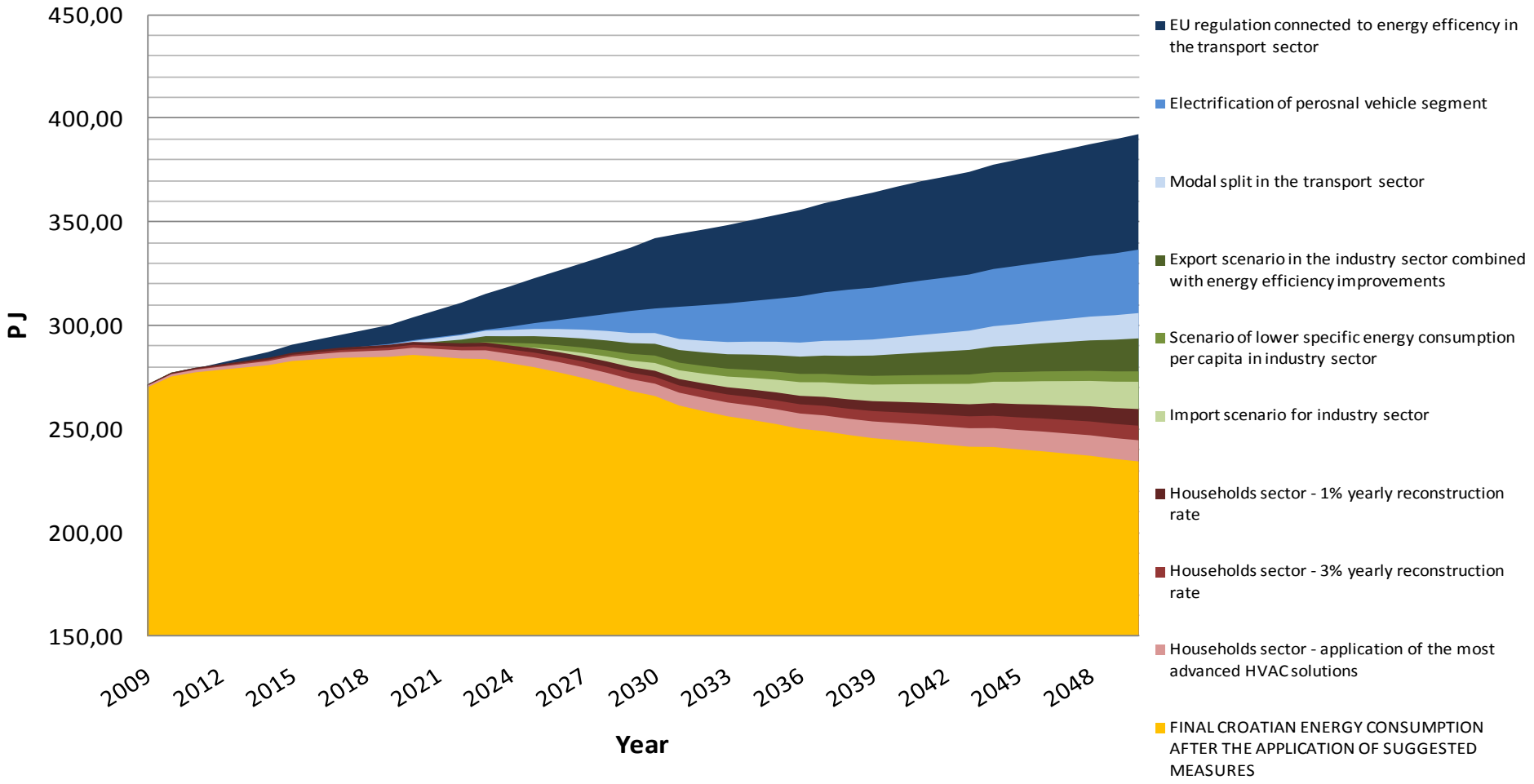
Towards 2050

- 80% lower GHG emissions by 2050
  - Decarbonising power
    - RES 40%-100% + nuclear + CCS
  - Buildings – energy neutral from 2018
  - Electrification of transport
- Four pillars of Post carbon society
  - Renewable Energy
  - Buildings as Positive Power Plants
  - Energy Storage
  - Smart grids and Plug-in Vehicles

Research methods - demand

- Bottom up demand forecasting
  - Decoupling cannot be found if econometrics models based on historic elasticity is used
  - Necessary to do sector by sector bottom up analysis, based on policies and financial mechanisms
  - Finding flexible demands that could be used to balance variable renewables:
    - District heating (power to heat)
    - Electric cars (power to transport and vehicle to grid)
    - Synthetic fuels (power to fuels)

Research methods - demand



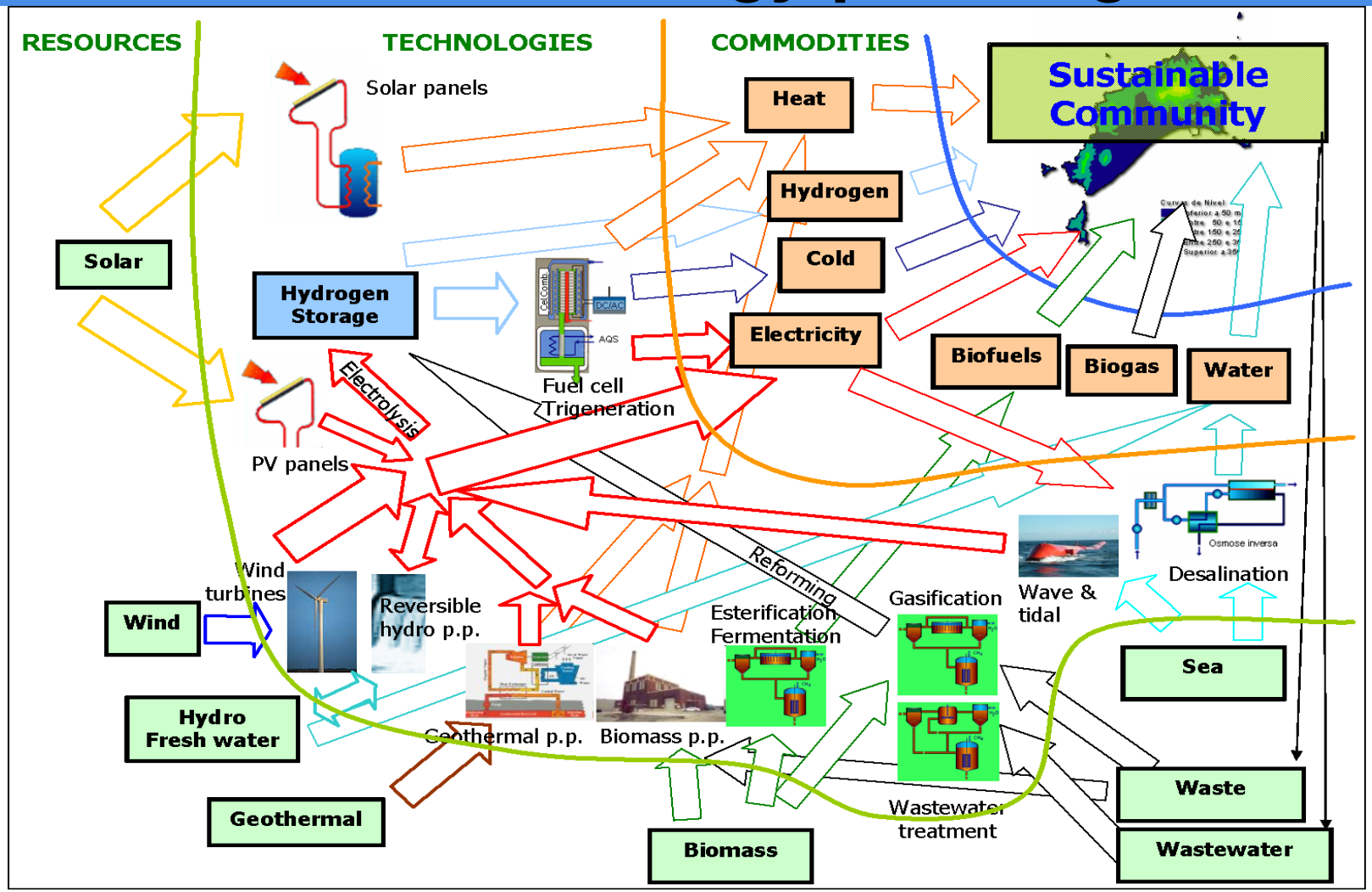
Research methods – potentials

- Renewables potentials
  - Wind and solar quite easy, but sustainable biomass difficult
  - Food and biomass nexus
  - Wood industry and biomass nexus
  - Biofuels and fuels nexus
  - Biomass and biodiversity nexus
  - Waste biomass is sustainable obviously, but what if biomass helps sustainability of other sectors?
    - Case of Brazilian bioethanol

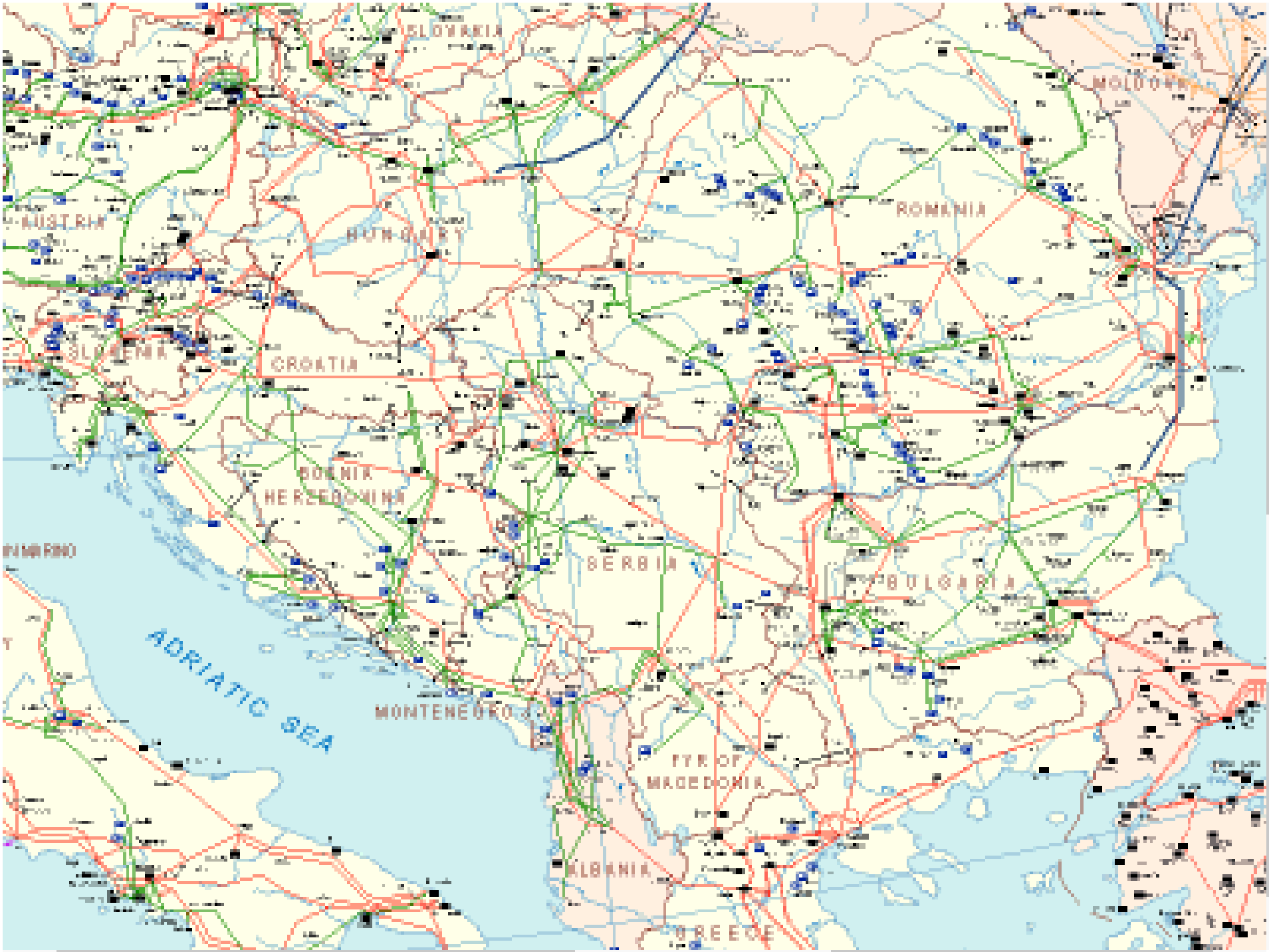
Research methods – energy planning

- High penetration of VRES - planning
  - Technical and economic issues, balancing, reserve, market
  - Storage
  - Integration of power and heating/cooling, water, transport, waste …
  - Time series analysis approach, technical simulation, Energyplan, H2RES

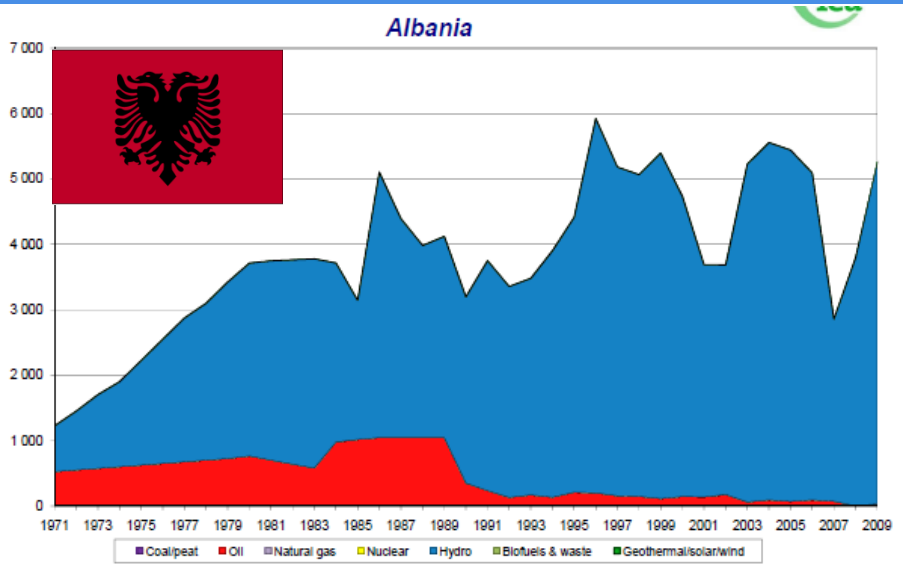
Energy planning

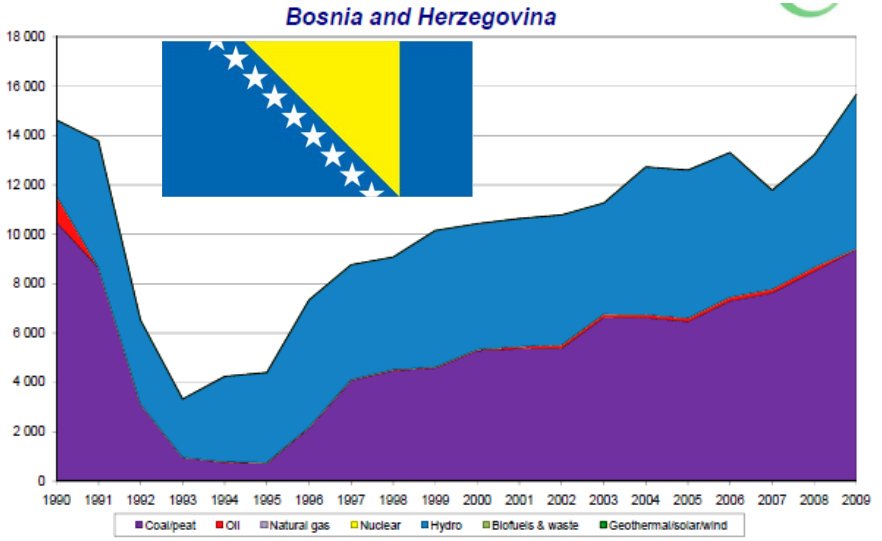


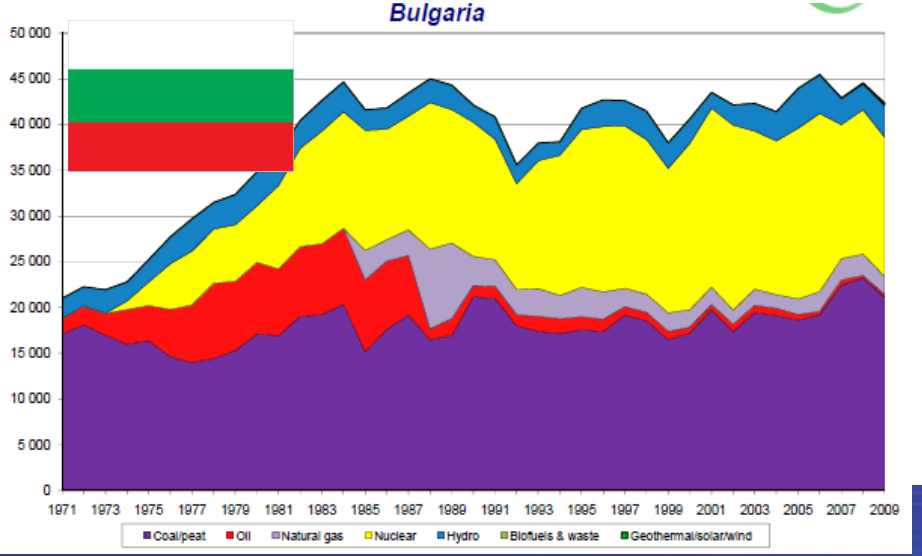
South-East Europe

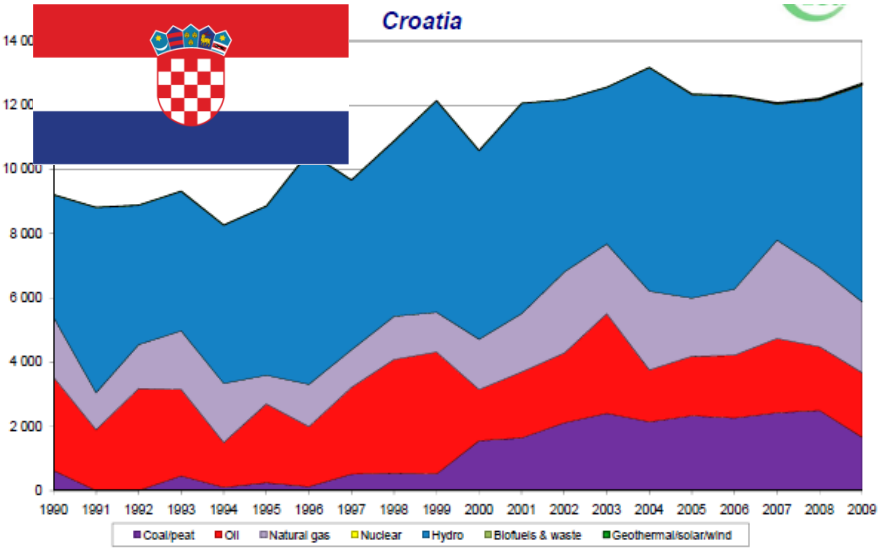

SLOVAKIA
MOLDOVA
ROMANIA
HUNGARY
CROATIA
BOSNIA
HERZEGOVINA
SERBIA
BULGARIA
ADRIATIC SEA
MONTENEGRO
FYR OF
MACEDONIA
ALBANIA
GREECE

Electricity share by fuel (IEA)









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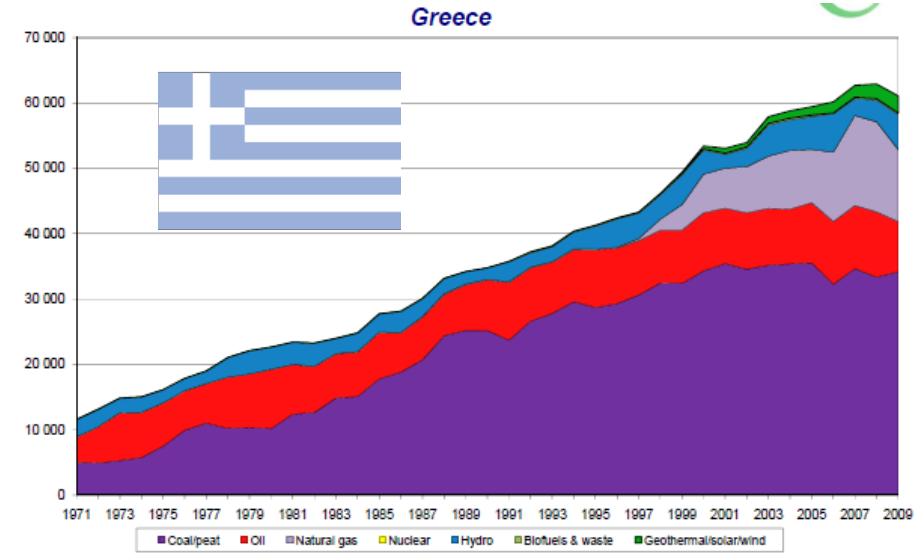
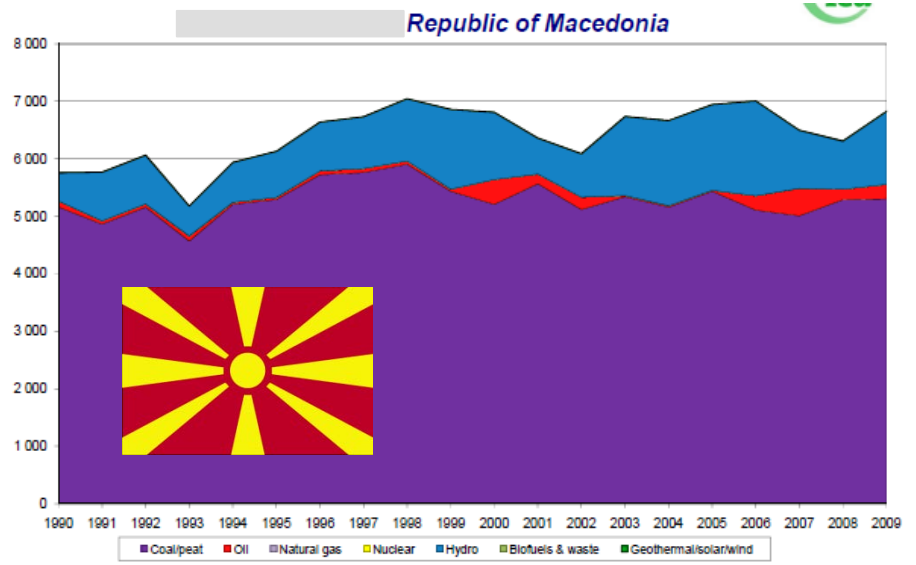
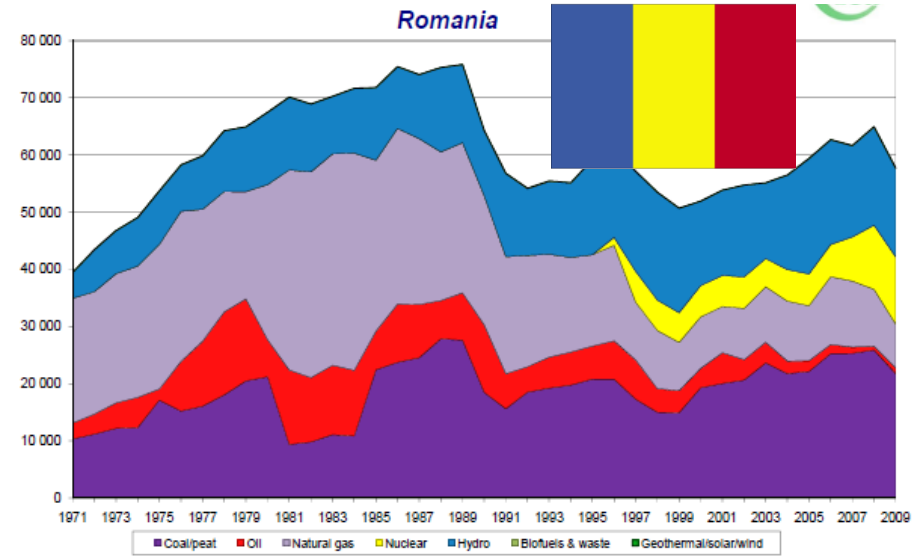
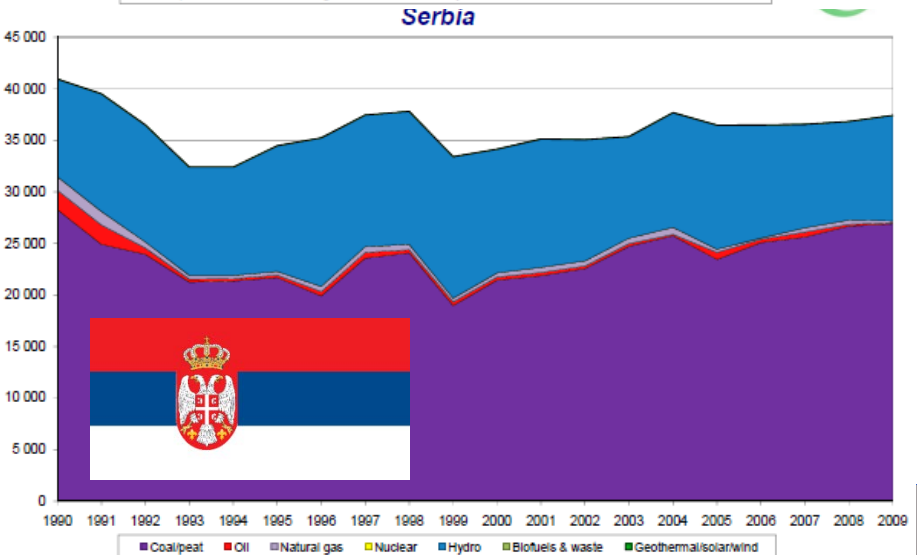


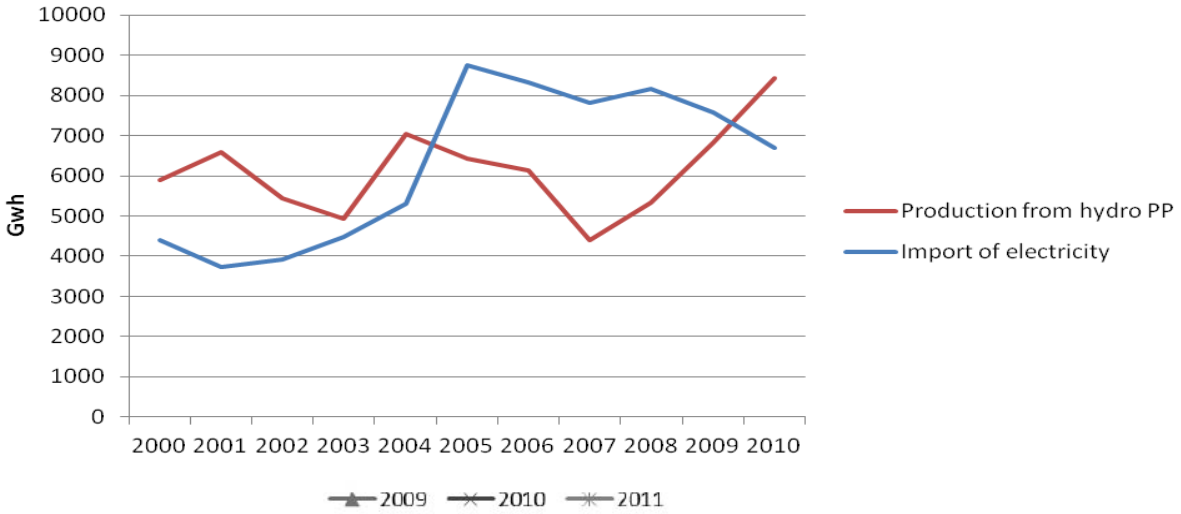




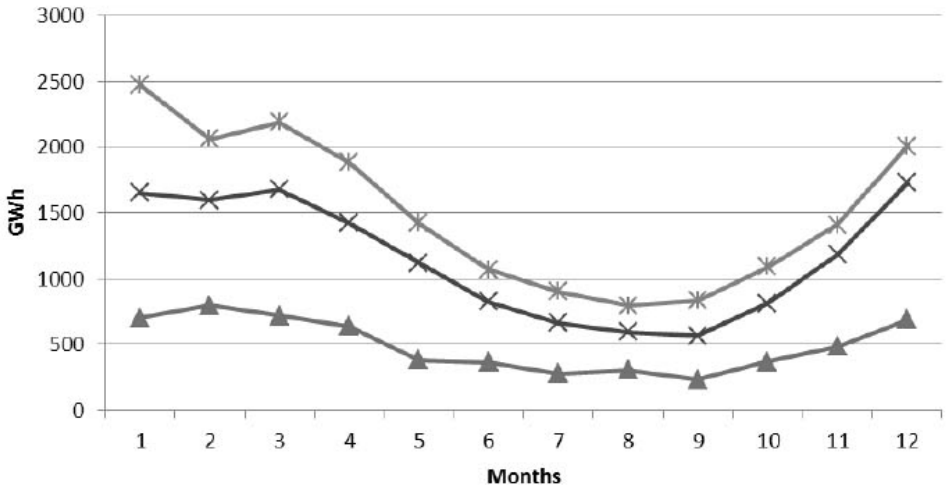


Electricity production from hydro PP

- Croatia

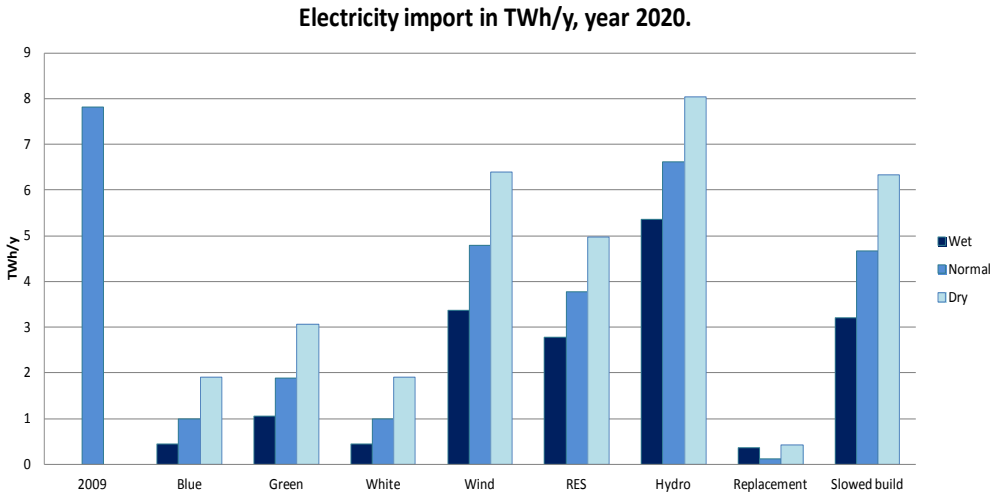


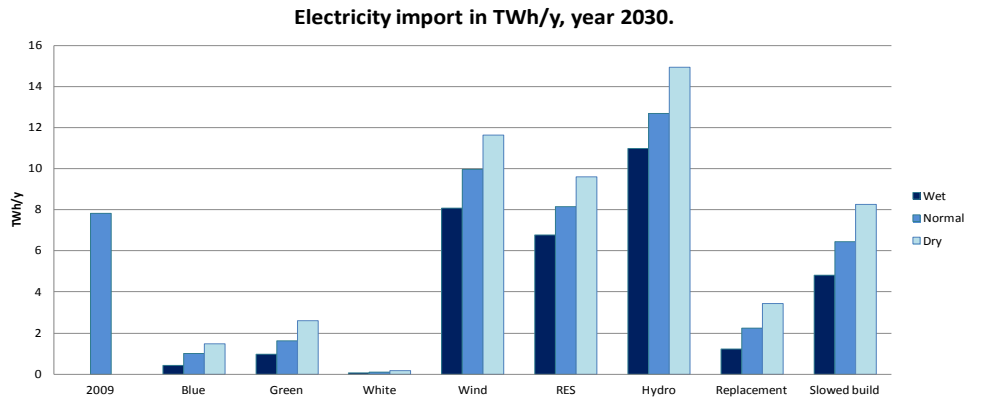
- B&H



Advanced system analysis - Croatia

- Base year 2009 in EnergyPLAN → establishing a valid system model
- Scenario approach:
  - 8 scenarios - following National energy strategy, TSO's development plan and RES implementation
  - 3 hydro sub-scenarios for each of the main scenarios – wet, dry and normal conditions
- Scope for the years 2020 and 2030

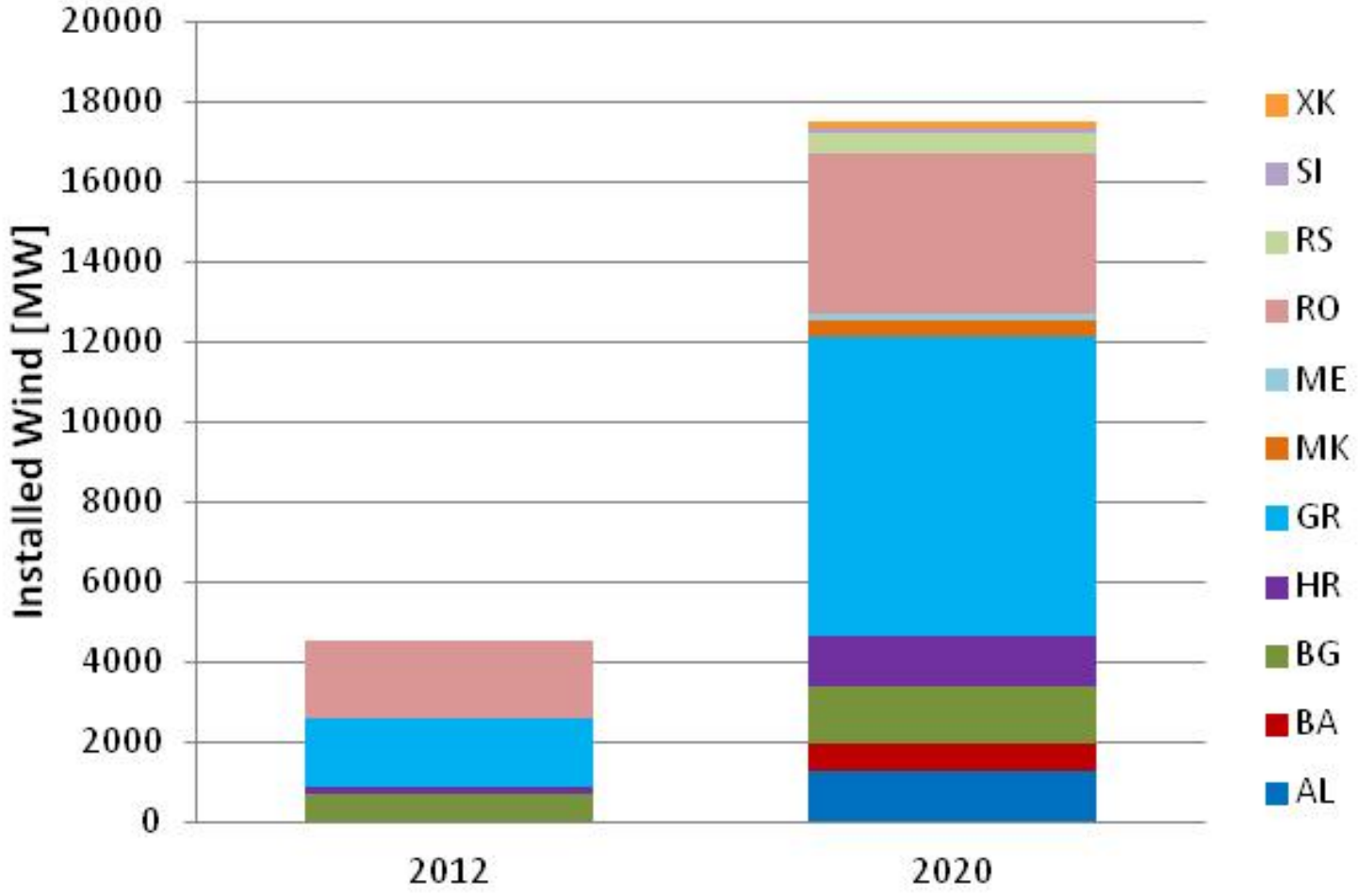




Advanced system analysis - SEE

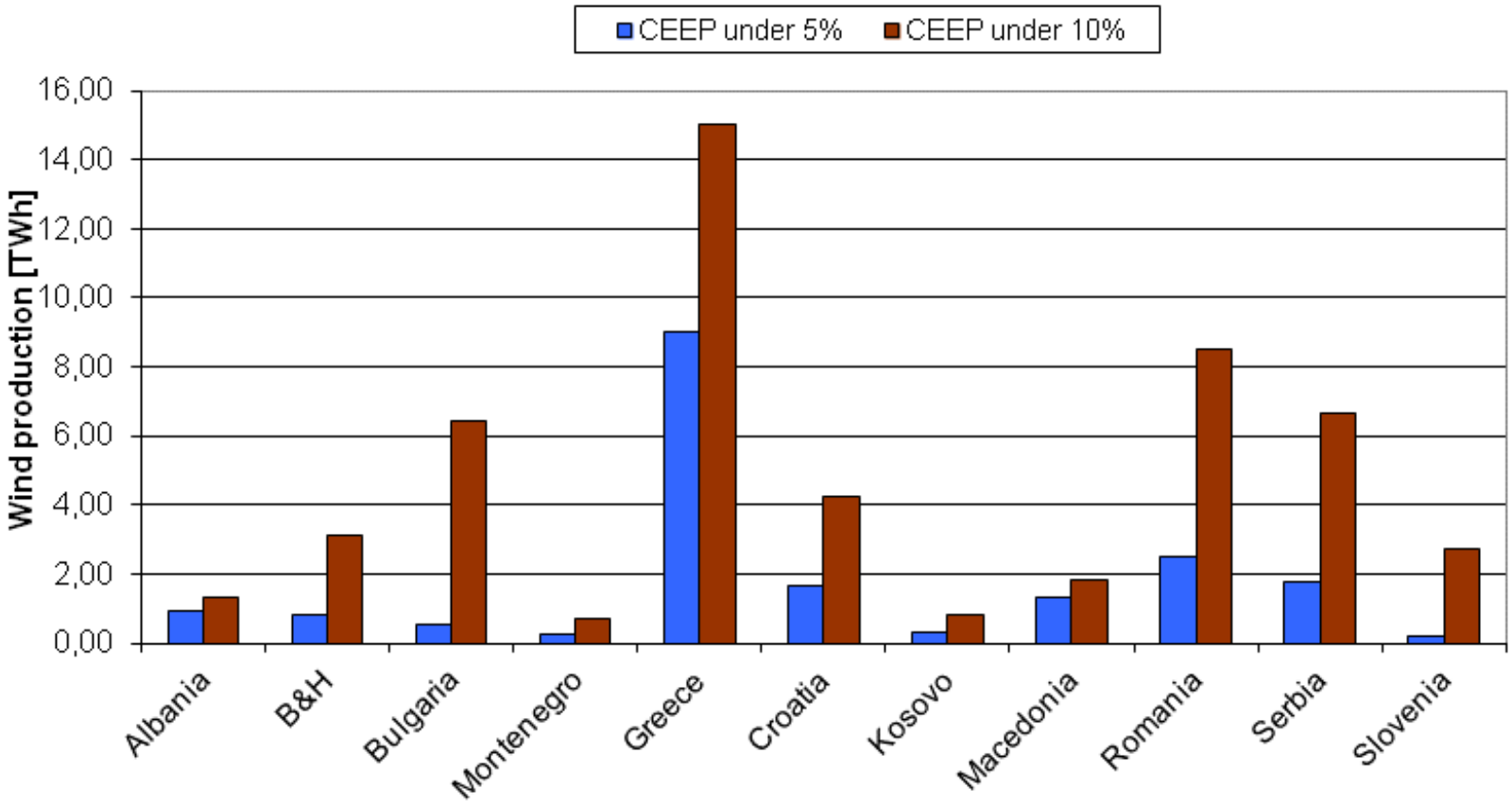
- 2 Scenarios
  - 1st Scenario – “NATIONAL SCENARIO”
    - Analyses for wind penetration are conducted for countries
  - 2nd Scenario – “INTEGRATED SCENARIO”
    - Analyses for wind penetration are conducted for integrated energy system of SEE
- Analyses are conducted for 50% power plant minimum

Wind in South-East Europe

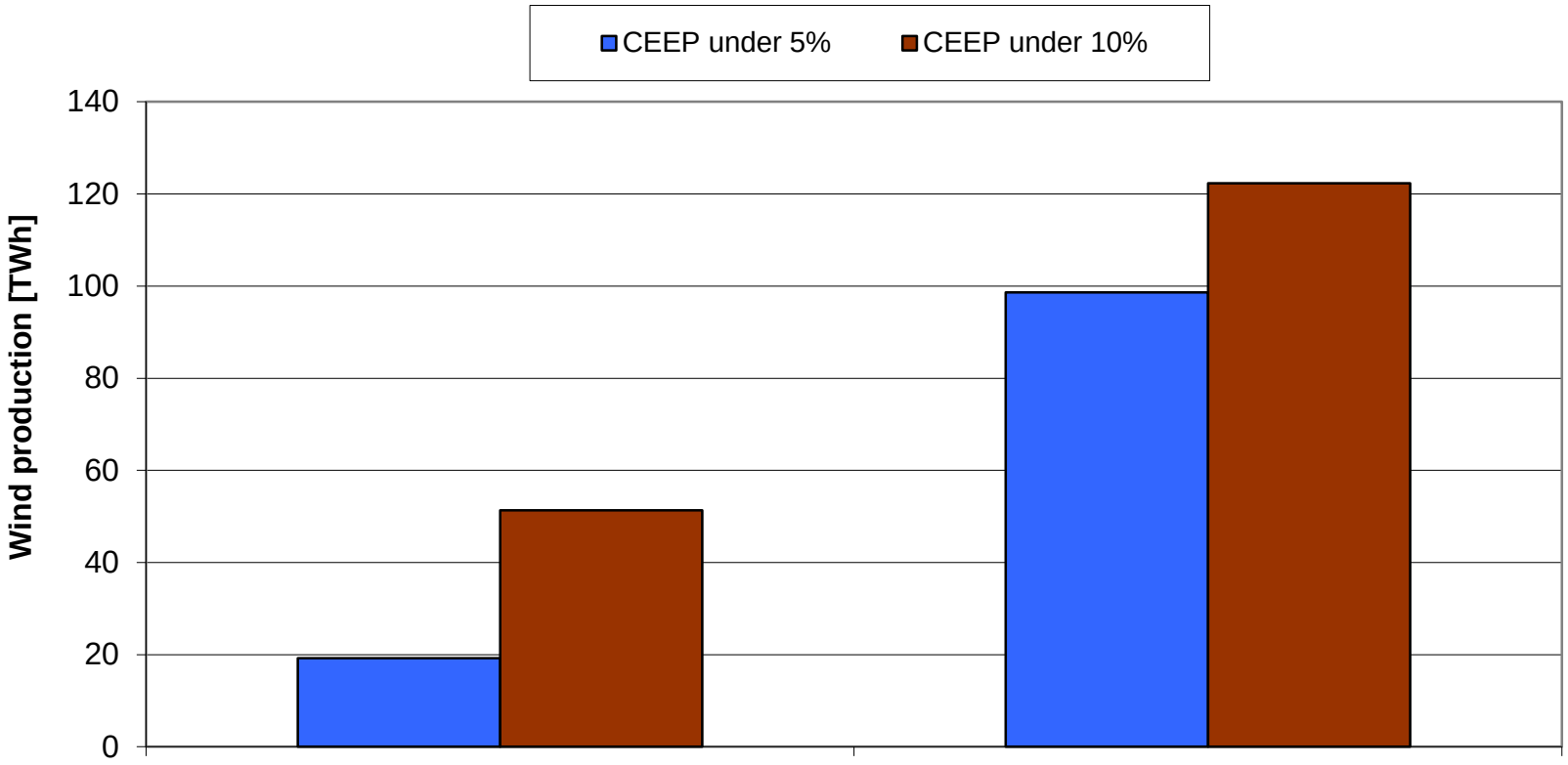


Sources: NREAPs, TYNDAP, IPA, EWEA

National energy systems



Comparison of two scenarios



Scenario 1 – national energy system balancing

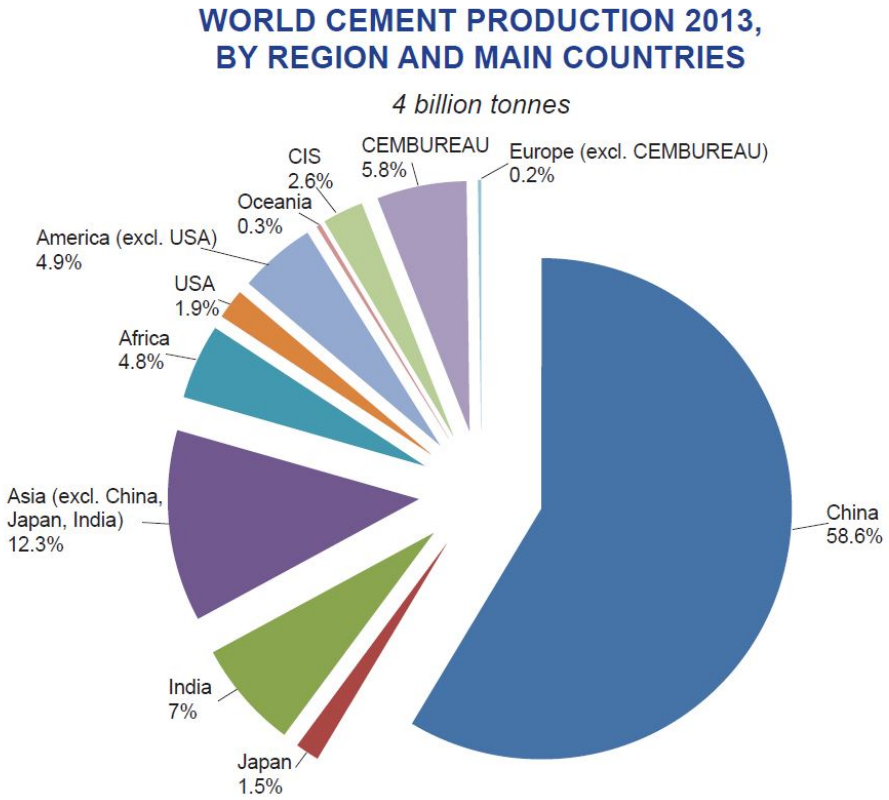
Scenario 2 – regional energy system balancing

Research methods – EV integration

- Integration of EV and VRES
  - Driving cycle optimisation
  - Driving patterns
  - Charging pattern, demand estimation
  - Smart charging, VRES balancing
  - Vehicle to grid

Cement industry – RES integration

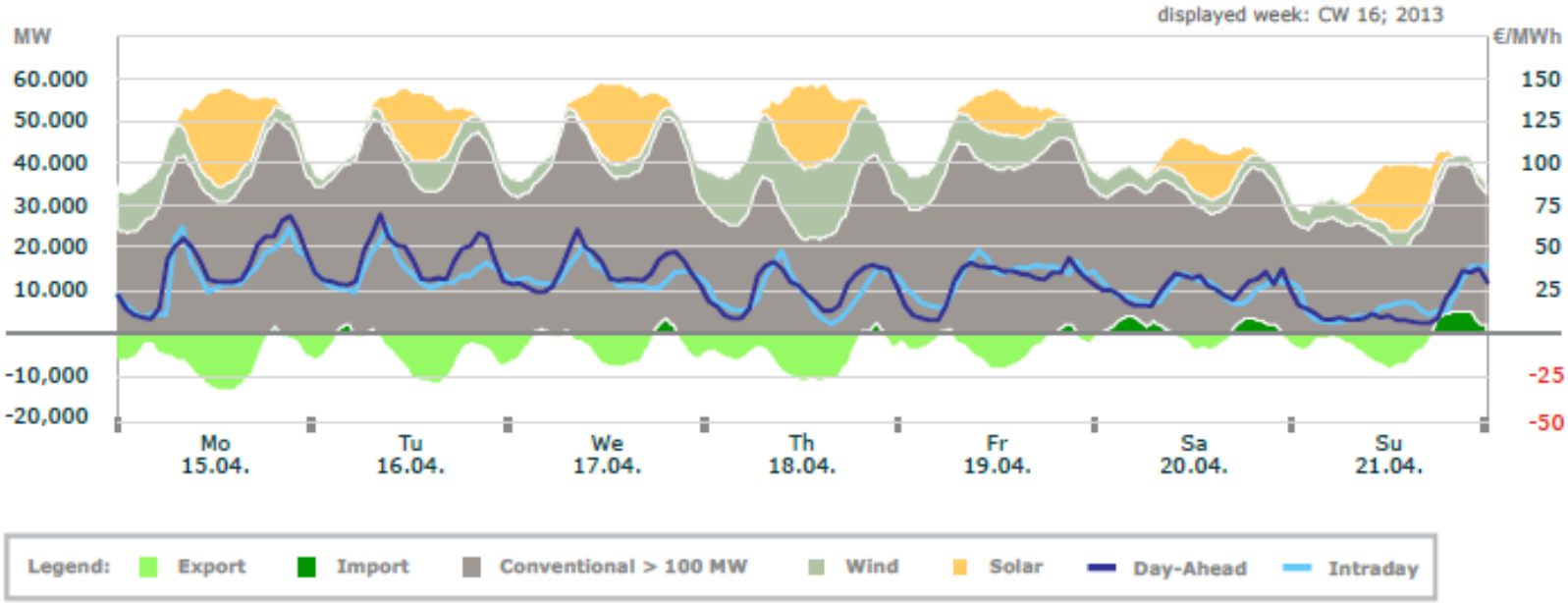
- Integration of RES in the cement industry – future technologies



Cement emits 5-7% of total CO_2 emissions

Cement industry – RES integration

Electricity Production and Spot-Prices: CW 16 2013



€ / MWh	Period Mean	Period Min	Period Max	Std Deviation
Day-Ahead	32.25	7.60	70.70	14.54
Intraday	30.74	6.80	63.70	12.11

Source: Johannes Mayer, Bruno Burger, Fraunhofer Institute for Solar Energy Systems; Data: EEX, Entso-e

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Thank you for your attention!

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