



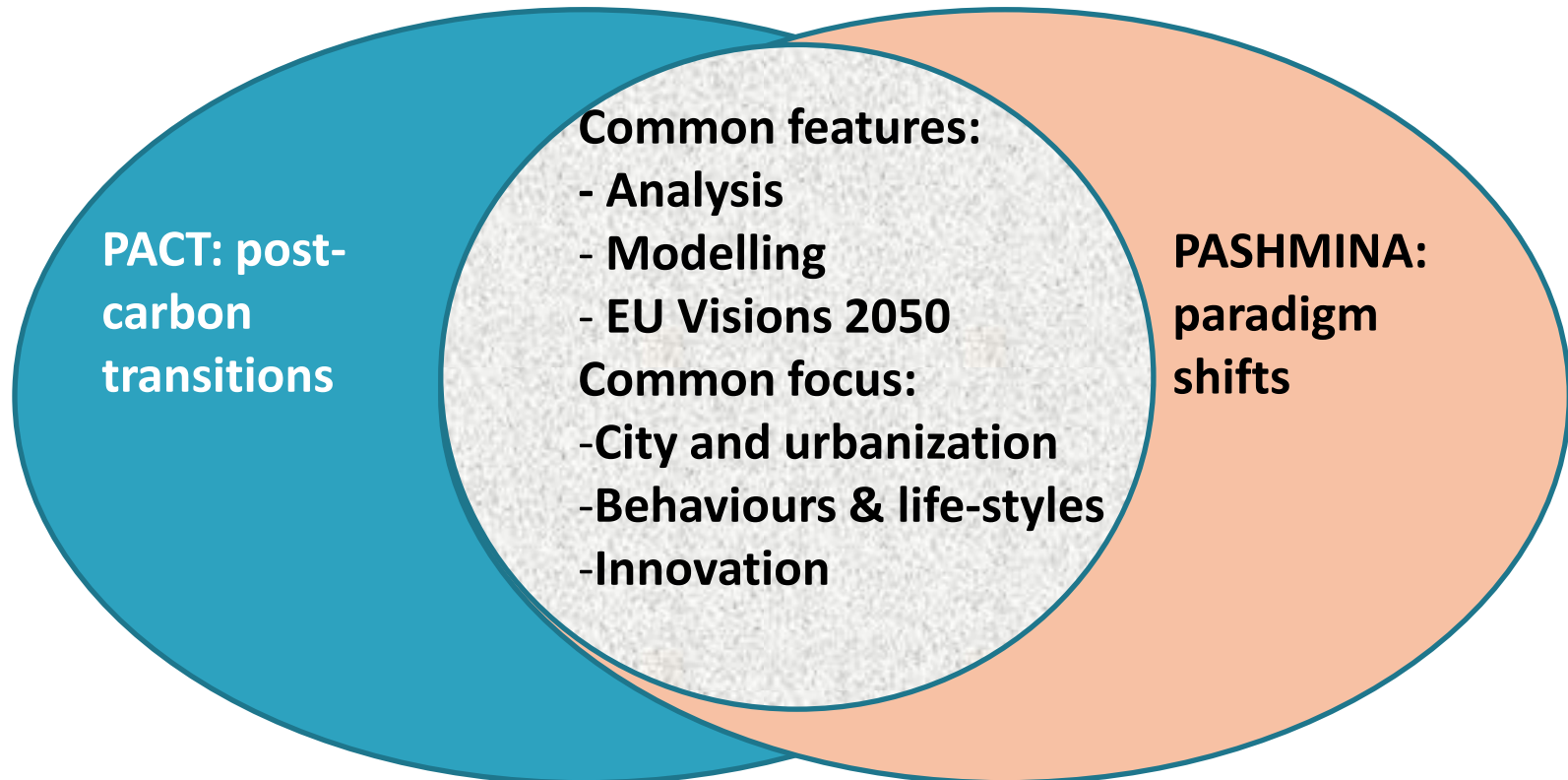
**Visions of Sustainable Economic Growth:
A Transatlantic Dialogue on Energy,
Water, and Innovation**

Washington DC, 11 September 2012

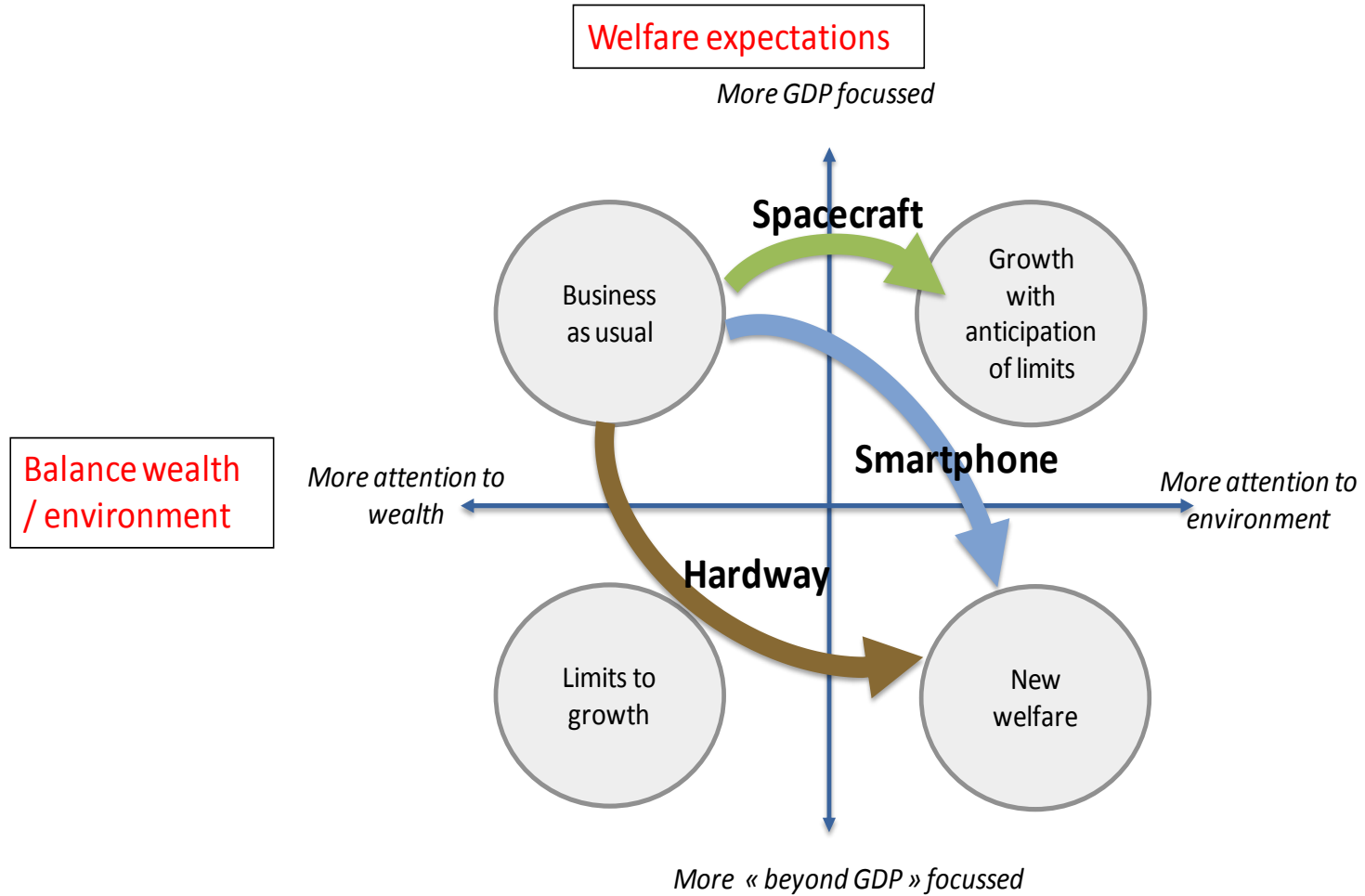
Steady Progress Scenario

Bertrand Château

PACT, PASHMINA: two inter-related EU-FP7 research programmes to explore energy transitions up to 2050



3 scenarios for post-carbon transition and related paradigm shifts in the EU



"Spacecraft" : a steady progress scenario for the EU, established on 3 main foundations

- Growth, growth, growth!!! No welfare progress without sustained GDP growth
- Innovation and human capital are the fuels of the GDP growth on the long term
- Physical limits on climate and natural resources, especially fossils, threaten GDP growth if not anticipated and duly addressed

A steady progress scenario driven by top-down forces, with a high consensus at the top

- High level of consensus worldwide on:
 - Globalization and market as pre-conditions for long term growth
 - Threats due to physical limits must be addressed immediately through timely organized energy and carbon transitions
- Governments and big stakeholders take the lead of the transitions:
 - Successful governance at world and EU levels of climate and resources issues
 - Adequate and consistent policies in EU member countries to raise human capital and facilitate “green” innovations
 - Big stakeholders very active in proposing new technologies and services, mostly centralized

High level of consensus on threats and how to address them: some examples

- Commitments on carbon intensity of the GDP : Annex1 countries + major BRICs
- High level of flexibility & cooperation to reach commitments and embark emerging countries
- GHG intensity targets include GHG embodied in imports/exports
- Mechanisms to prevent price shocks & turbulences on oil and gas markets

Adequate policies in EU member countries some examples

- Land use policies to foster post-carbon cities:
 - Urban sprawl to be controlled
 - Priority to small/medium cities, especially if close to big cities
- Transport policies to address increasing demand for speed, while consistent with post-carbon cities
 - Spatial networking among cities
 - Fast rail infrastructures, regional and long distance
- Energy efficiency and renewables policies:
 - CO2 taxation combined with Emission Trading System
 - Feed-in tariffs for electricity from renewables
 - Standards for vehicle CO2 emissions, insulation of new buildings,...
 - R&D: batteries, building retrofitting techniques, ...

Innovation driven by big stakeholders some examples

- Energy:
 - more electricity, more renewables at consumer levels
 - centralized renewables (and nuclear?) for electricity generation
 - Smart grids to manage intermittency and peak demand
- Transport:
 - Electro-mobility, pure electric and plug-in hybrids road vehicles
 - Bio-fuels for remaining ICE, air and sea transport
 - Fast trains to cope with increasing transport speed demand
 - New services for urban mobility in relation to electro-mobility
- Buildings
 - Passive architecture
 - New technologies for retrofitting

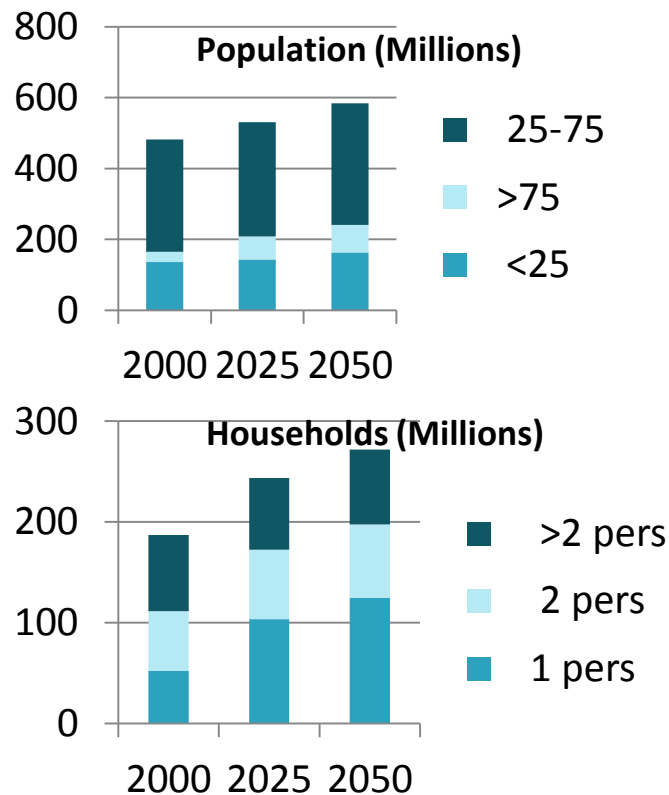
The European demographic structure to change deeply by 2050, changing the energy consumption pattern

■ Population:

- slow growth
- aging: >75 from 6% to around 13%
- less active people: 25-75 from 66% to 61%

■ Households:

- faster increase
- singles from 28% to 45%
- reduced average size



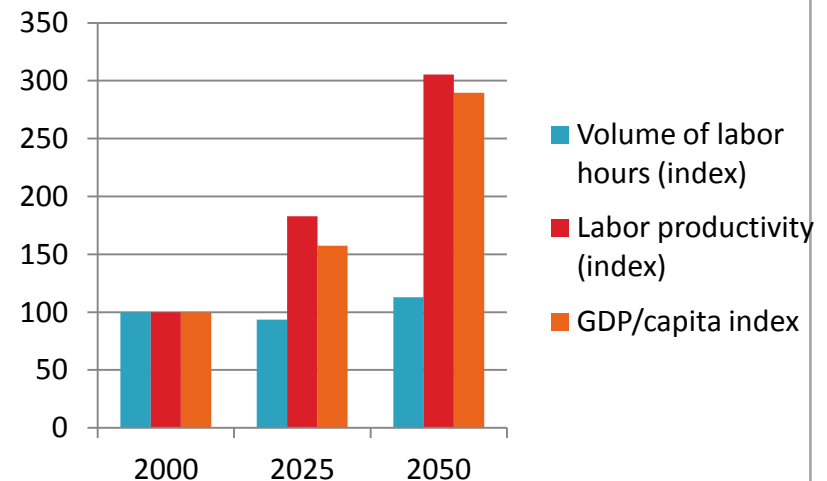
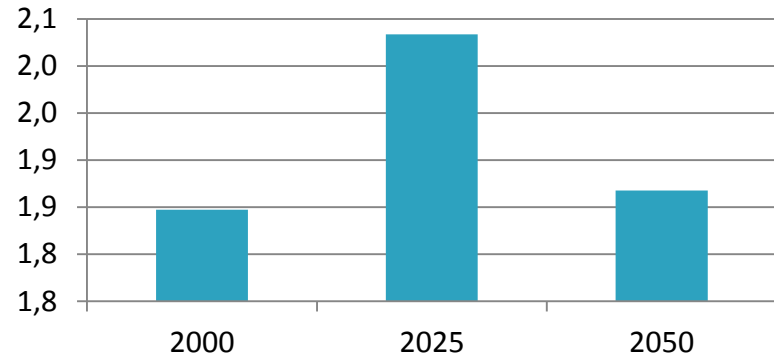
More singles and two persons households imply more energy intensive life styles for the same income: more m² per person, higher equipment ratios of the population, etc...

Behaviours and life-styles still driven by income growth and increasing diversity of consumption opportunities

- Time-use preference: working for money first!

- Economic outlook:
 - strong increase in GDP/capita
 - despite stable labor hours
 - thanks to high productivity

self-accomplishment / work time-use ratio



Towards a better balance between big conurbations and small/medium cities?

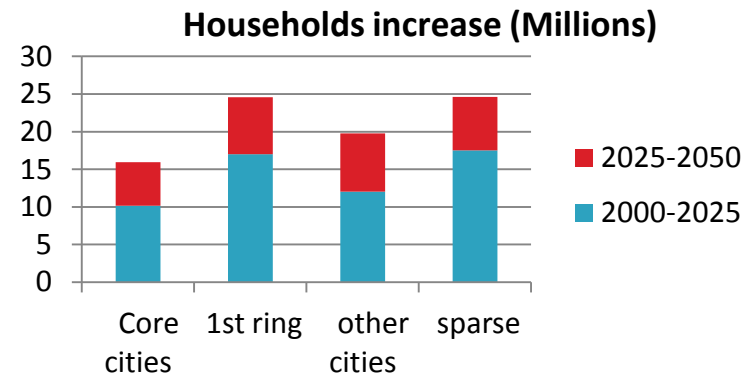
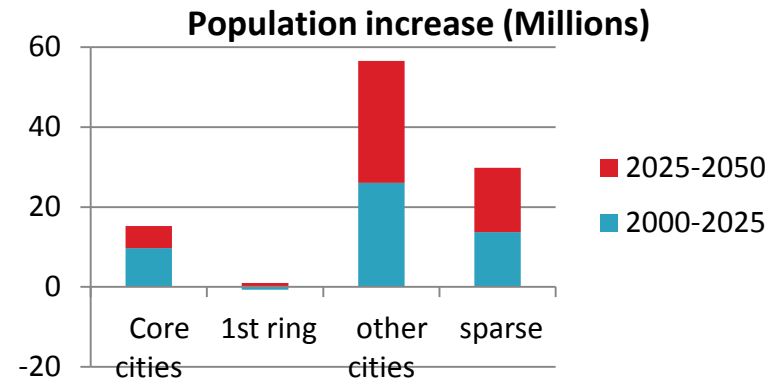
- Population:
 - 55% of population increase in small/medium cities
 - big conurbations almost stabilized

BUT

- Households:
 - 45% new dwellings needed in big conurbations
 - twice more than in small/medium cities



Singles and two persons households more attracted by big conurbations, while families with children still attracted by countryside

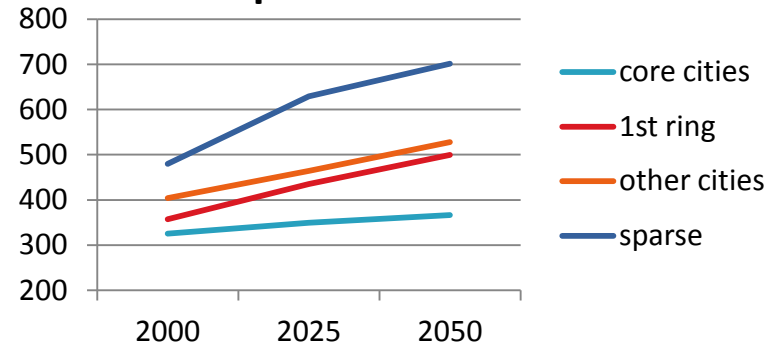


Mobility still driven by the demand for speed related to GDP growth, daily transport time budget constant

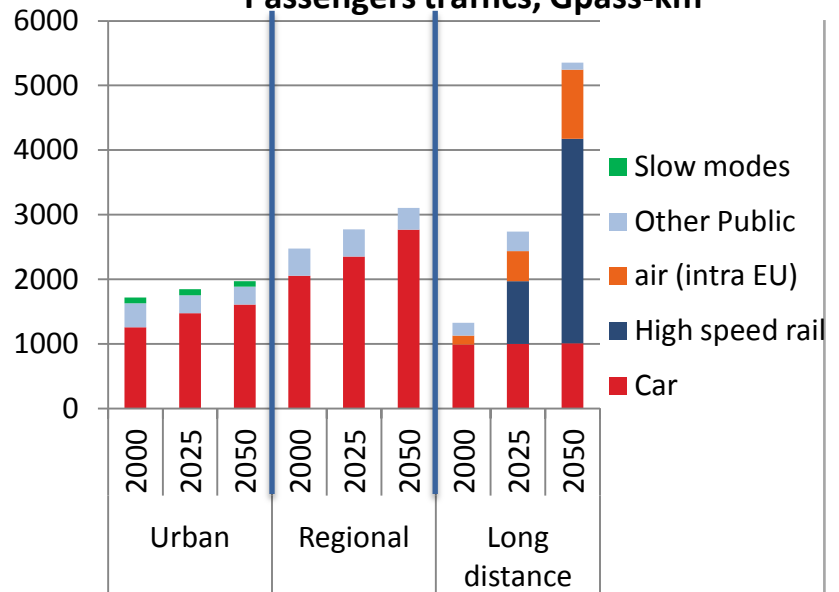
- Motorization impacted by
 - urbanization
 - households structure

- A major shift in mobility structure and modal split
 - Urban and regional traffics per capita stabilized
 - Long distance traffics explode (X 4)
 - road less and less compatible with speed increase

Cars per '000 hab

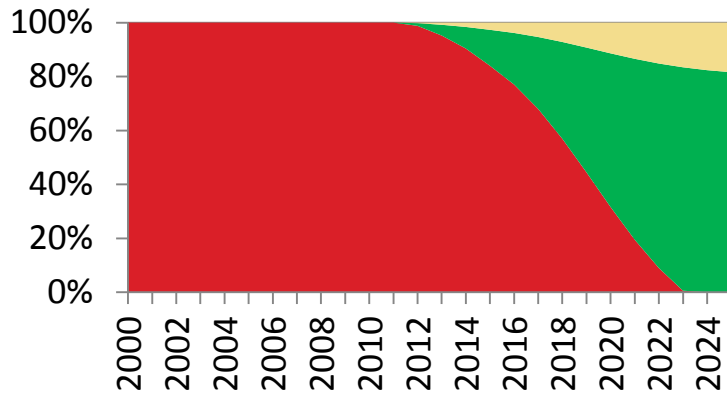


Passengers traffics, Gpass-km

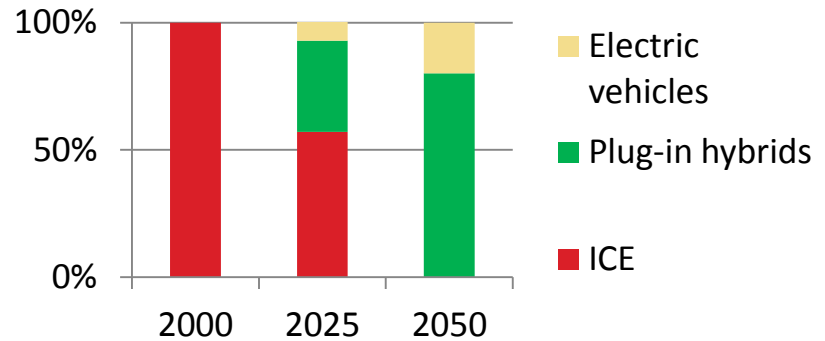


New electric technologies for road mobility

market shares of technologies in sales of new cars



market shares of technologies in the car fleet



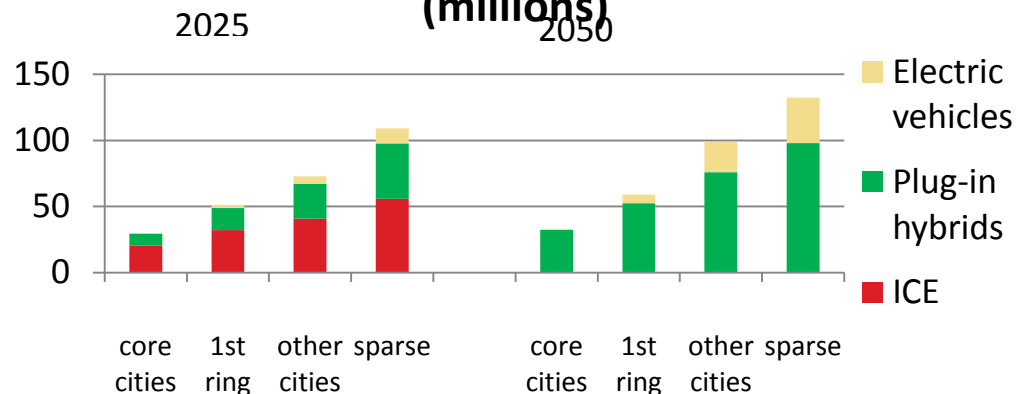
Pure electric cars:

- second family car,
- daily trips

Plug-in hybrids:

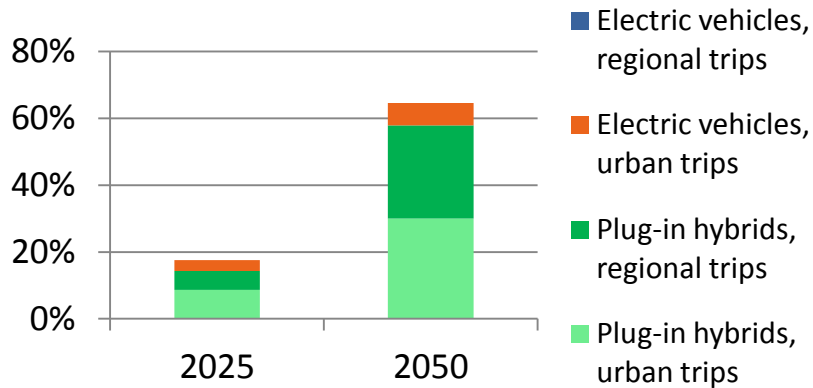
- multipurpose
- various concepts

car fleet by technology and living areas (millions)

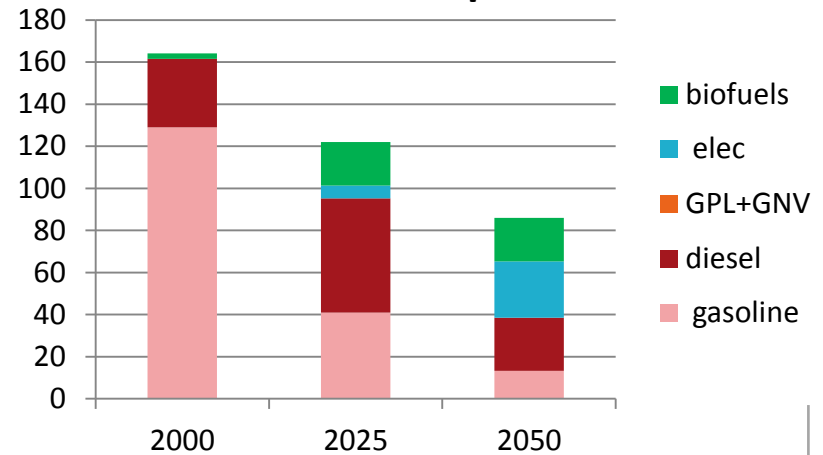


Electricity and road mobility: towards a new paradigm based on centralized renewables

Electric drive in urban and regional car traffic (% of veh-km)



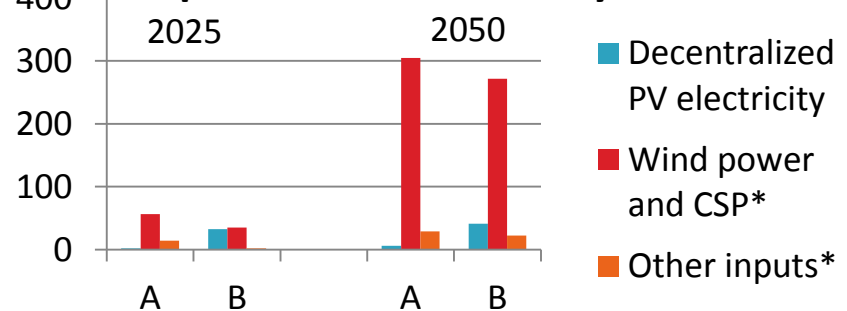
Car consumption, Mtoe



New technology clusters:

- A:** decentralized PV + electromobility + house appliances + local S/D balance
- B:** centralized renewables + smart grids + electromobility + smart/centralized batteries reloading

Inputs for car electricity, TWh

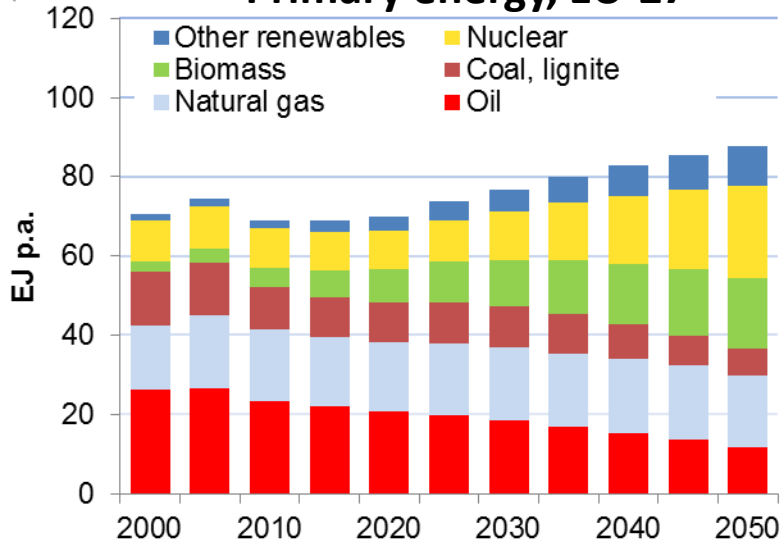


A: minimum development of decentralized PV cluster

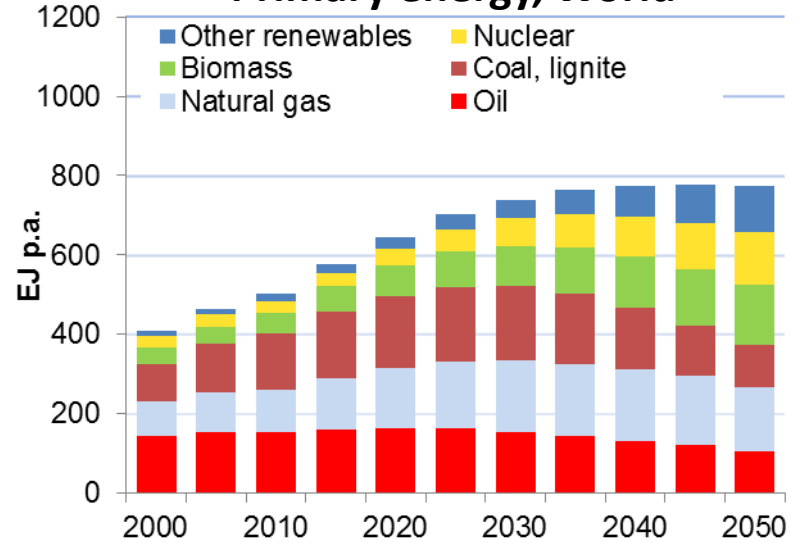
B: maximum development of decentralized PV cluster

Primary energy

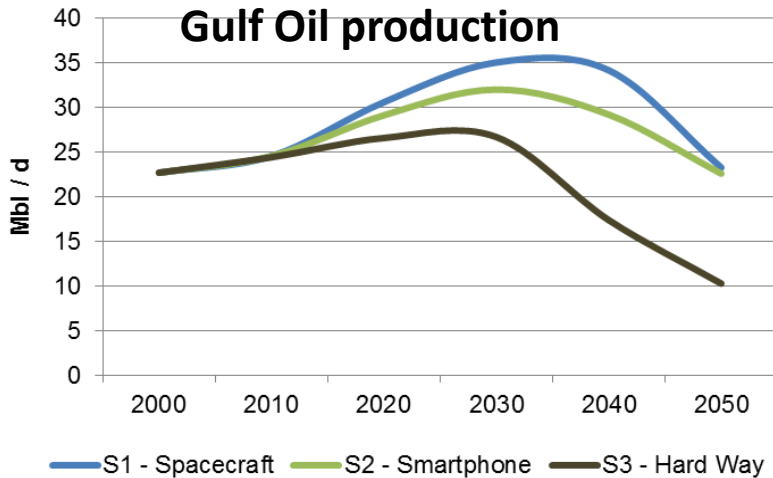
Primary energy, EU-27



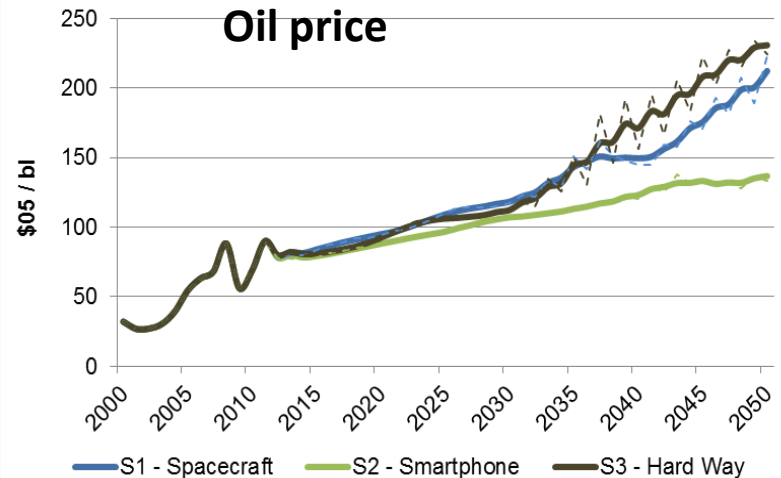
Primary energy, World



Gulf Oil production

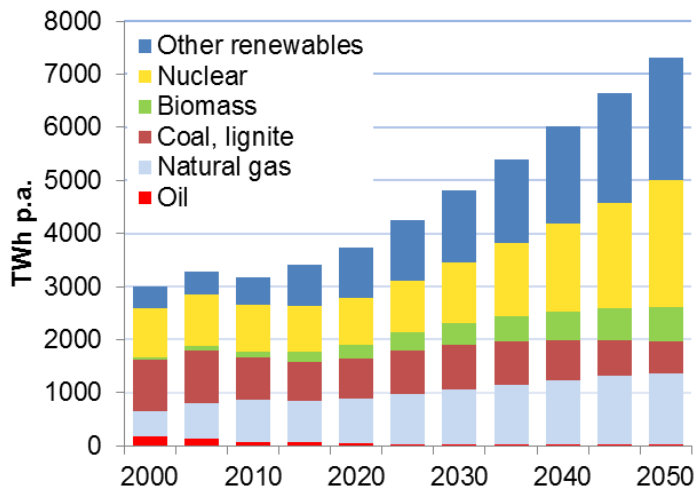


Oil price

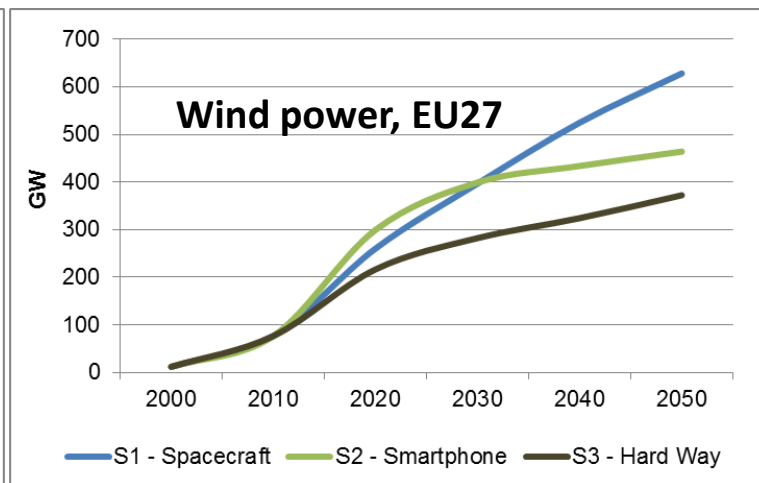
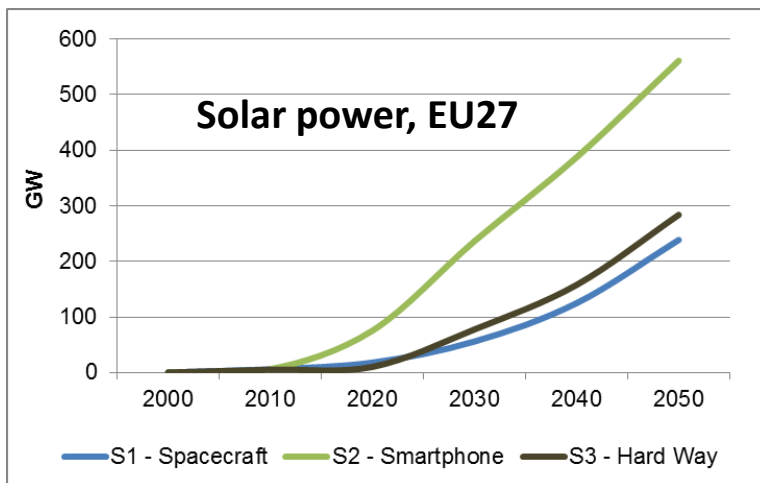
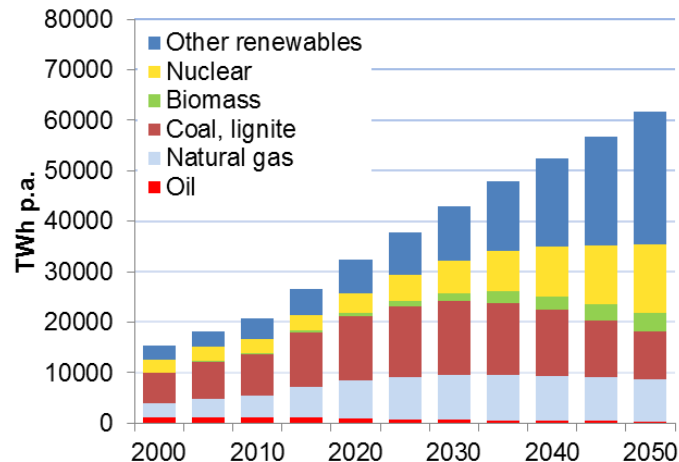


Power generation

Electricity mix, EU-27

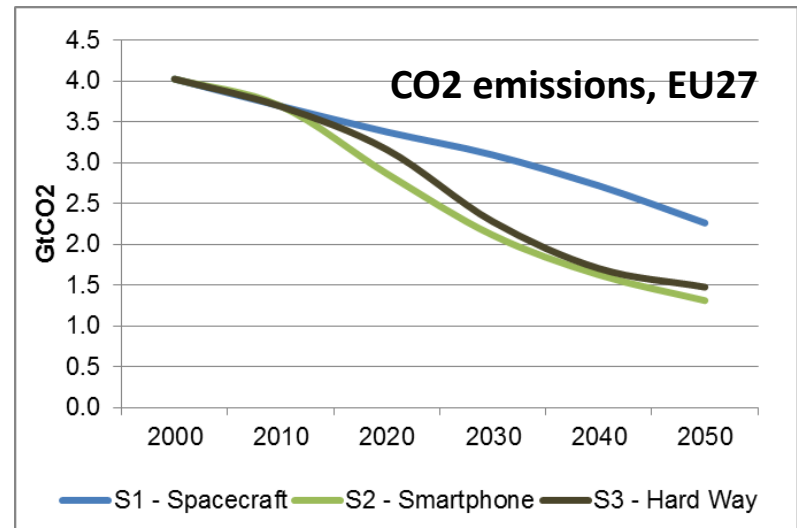
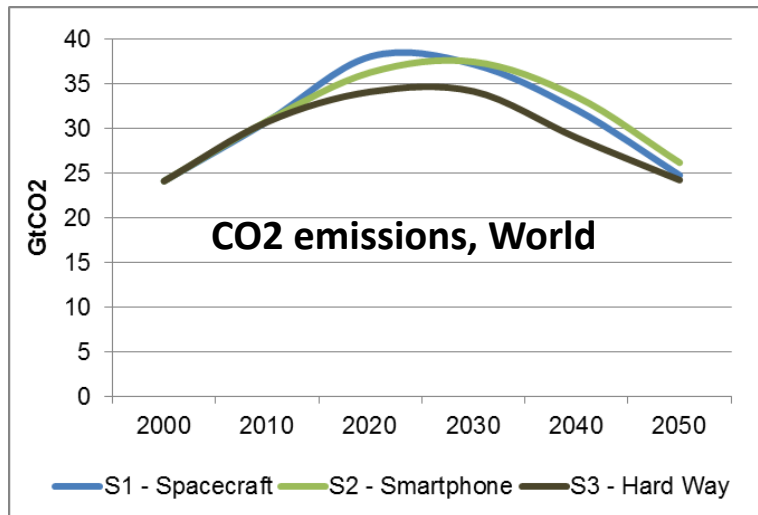
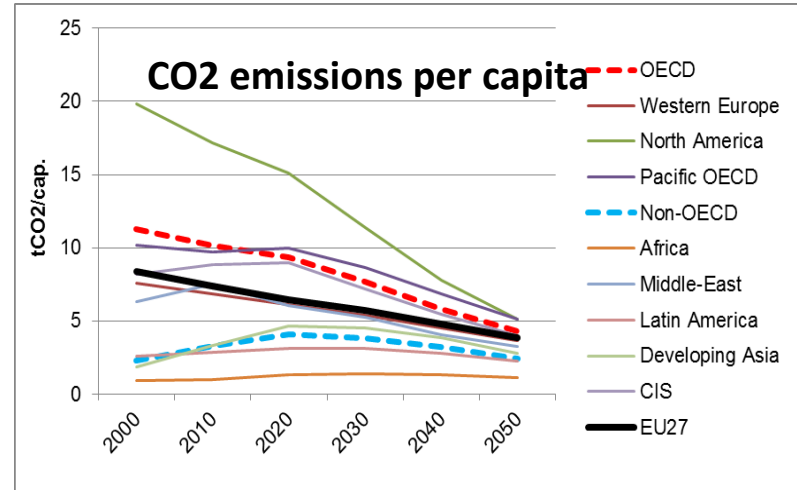


Electricity mix, World



CO2 emissions

- Carbon constraints
 - 500 ppmv concentration in 2050 for energy CO2
 - carbon price around 400 US\$05/tCO2 in 2050





Merci pour votre attention!

www.pact-carbon-transition.org



www.enerdata.net

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