



**U.S.–European Summit on Science, Technology,
Innovation, and Sustainable Economic Growth
Post Carbon Transitions, Visions and Challenges**

Needs of energy services to 2100

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Brussels, 29 September 2011

- ▶ **1. Enerdata**
- 2. Methodological foundations
- 3. Needs of energy services: outlook to 2100
- 4. Conclusions and findings

Enerdata : an independent information and consulting company specialized in energy since 1991

- Intelligence & information on energy markets, worldwide; In-house databases, research, models and indicators
- Specialized in global energy supply and demand issues:
 - Energy demand, DSM, energy efficiency
 - Global interactions: prices, availability of resources...
 - Forecasts and foresight, scenarios
- Over 150 clients in 40 countries; a strong commitment in EU research projects

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Energy , life-styles and behaviours: a key question for EU research on post-carbon transition

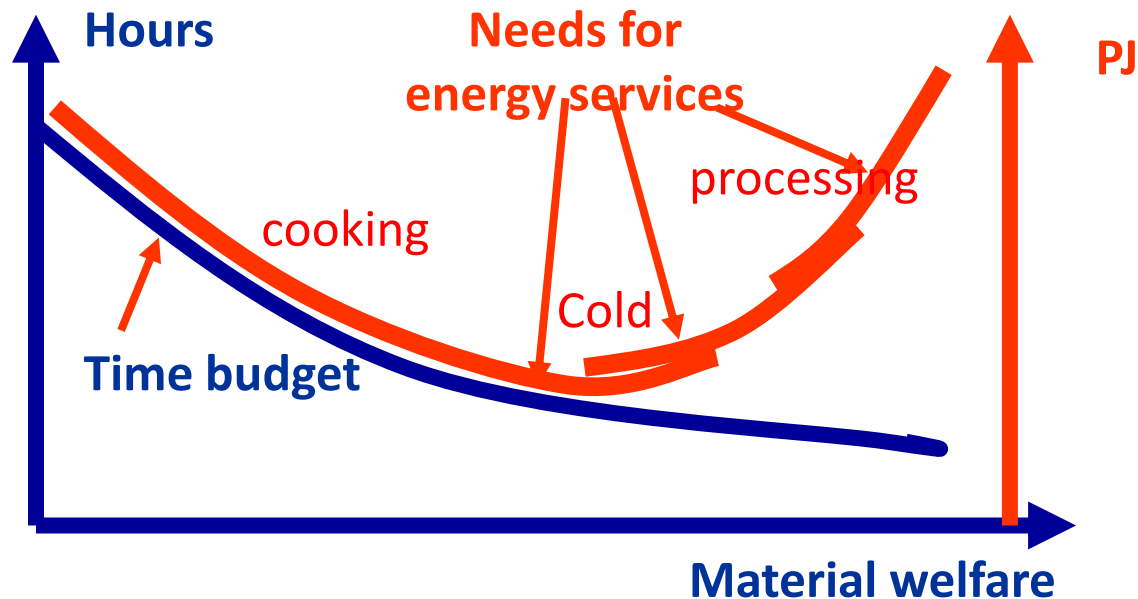
- VLEEM (Very Long Term Energy Environment Model): sustainable energy systems up to 2100 (www.VLEEM.org)
- PACT (Pathways for Carbon Transition): social, economic , policy and technology aspects of post-carbon transitions in the EU (www.pact-carbon-transition.org)
- WETO-T (World and European Energy and Environment Transition Outlook) : findings of major EU research projects regarding post-carbon transitions

Assessing the needs of energy services over the very long run

- A strong focus on education and human capital:
 - Demographic transition
 - Education and labour productivity
 - Innovation and technology performance
- Time-use: a key driver of wealth and energy needs:
 - Working for money versus non priced services
 - Food, shelter, self-accomplishment
 - Mobility, imposed and chosen

How time-use and energy services are linked? example of the food system

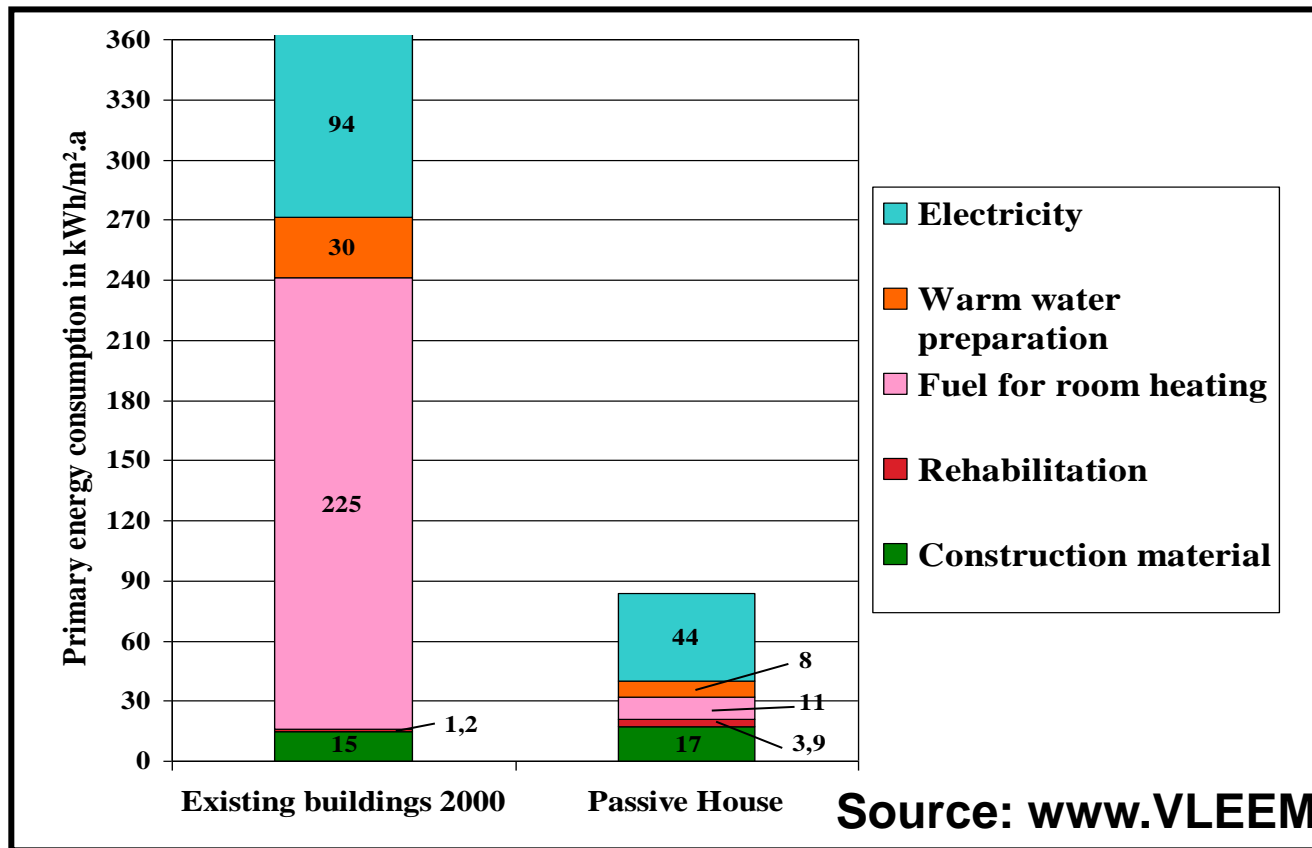
- Energy to produce, transform, transport, distribute and consume food products: 21% in France, 23% in the US
- Energy required by the food-feeding system: a matter of time that people spend in activities related to food



Technology plays a key role in the relation between time budgets and energy needs: example, mobility

- One hour per day per capita for daily mobility, worldwide (Zahavi)
- But large differences in distance travelled per hour : 35 km in Europe, 74 km in the US, 3 km in China: a matter of transport modes and speed, i.e. technology
- Distance and speed, a double impact on energy : 0.9 toe/cap in EU, 2.1 toe/cap in the US, 0.06 toe/cap in China

Energy efficiency , a powerful lever to decouple energy needs and commercial energy demand: exemple of buildings



From energy services to commercial energy demand in the transition processes towards low carbon future

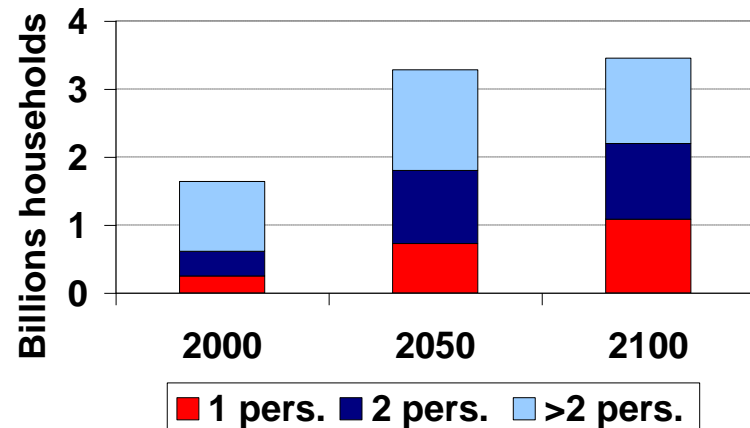
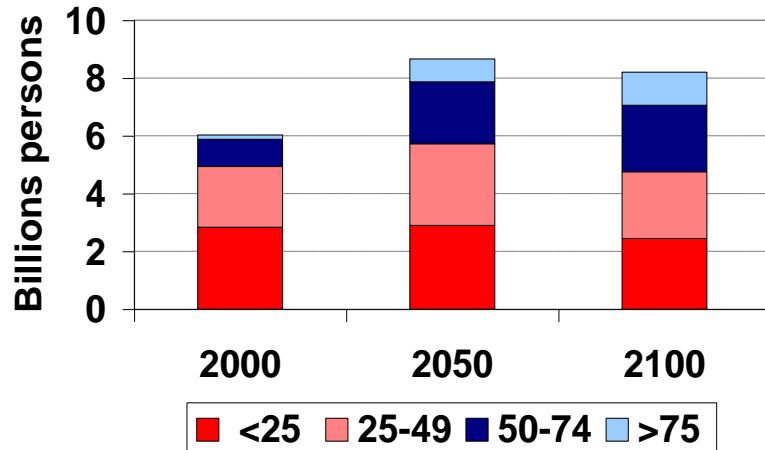
- Commercial energy demand in « post-carbon » societies
 - Energy efficiency and renewables
 - Cities, land-use and spatial organisation
 - Social behaviours, thriftiness

- What transition processes towards « post-carbon » ?
 - Top down, centralized technology and GDP focus
 - Bottom-up, decentralized, behaviours focus, « beyond GDP »
 - BAU hit by crises, changes in behaviours imposed

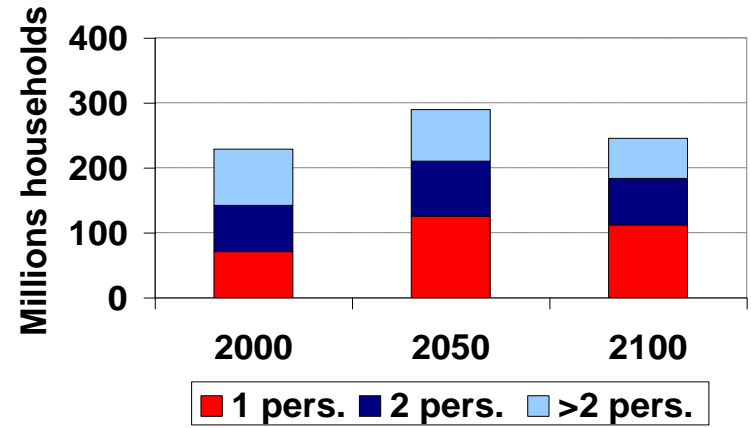
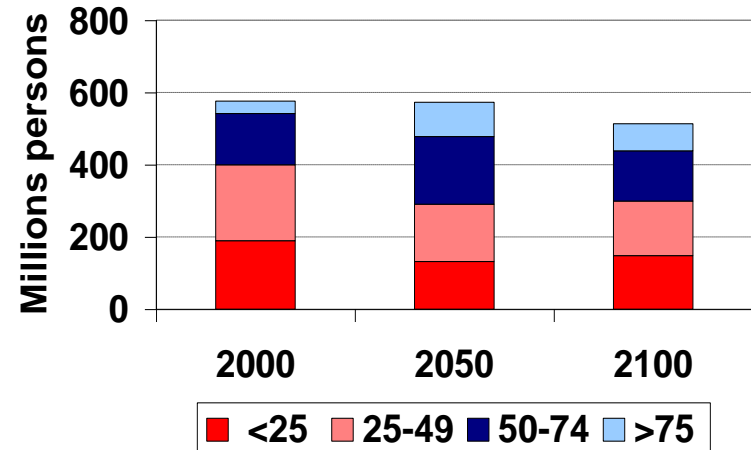
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Key demographic trends over the next century : Stabilisation/Decline, Aging, Reduced Size Families

World



Europe

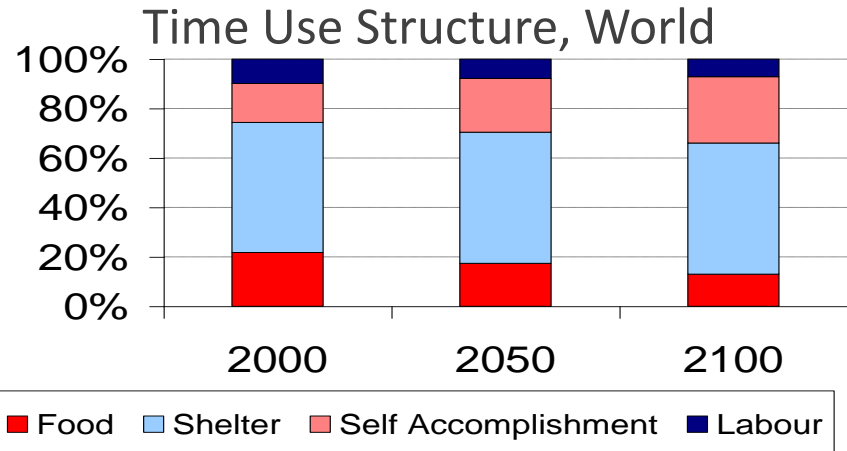


Demographic trends and long term behavioural changes

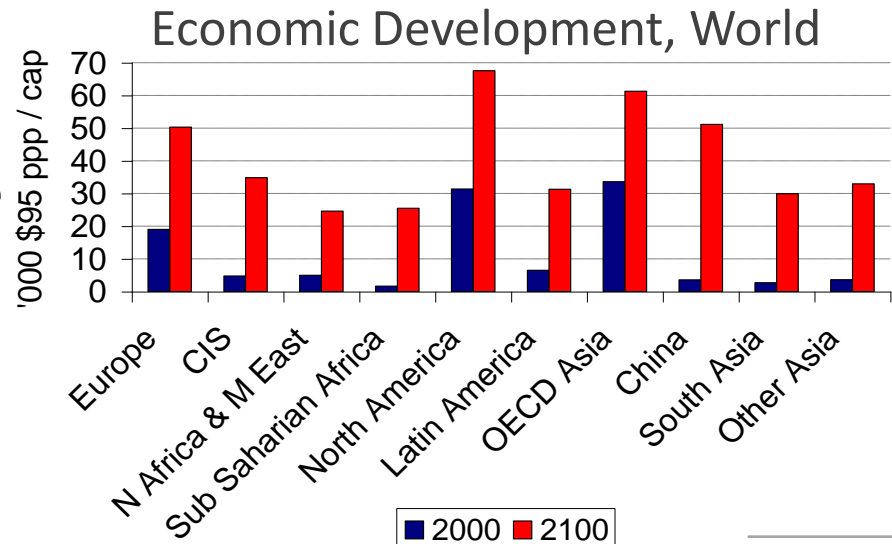
- Behaviours rather stable within an age class, but change with generations; a slow process which starts at school
- Population is aging, and life-styles will be increasingly marked by those of retired people
- More singles and two persons households imply more energy intensive life styles for the same income: more m² per person, higher equipment ratios of the population, etc...

Time use and wealth, the other main drivers of the needs of energy services

- More time for leisure, and less for labour and for food

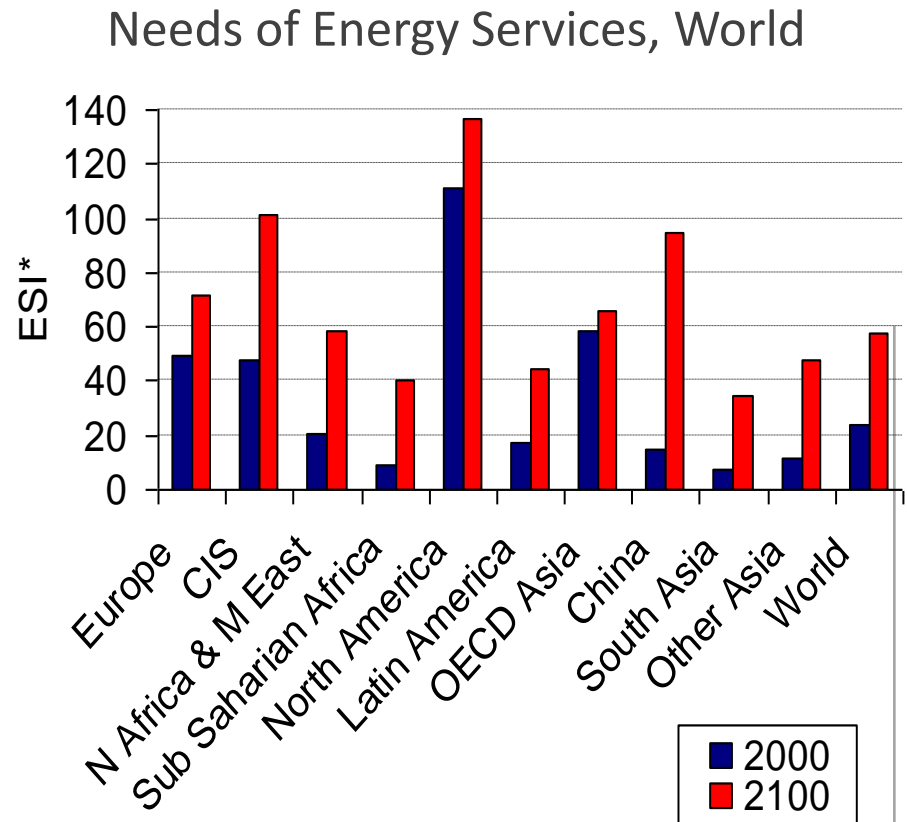


- Wealth increases across the world and converge

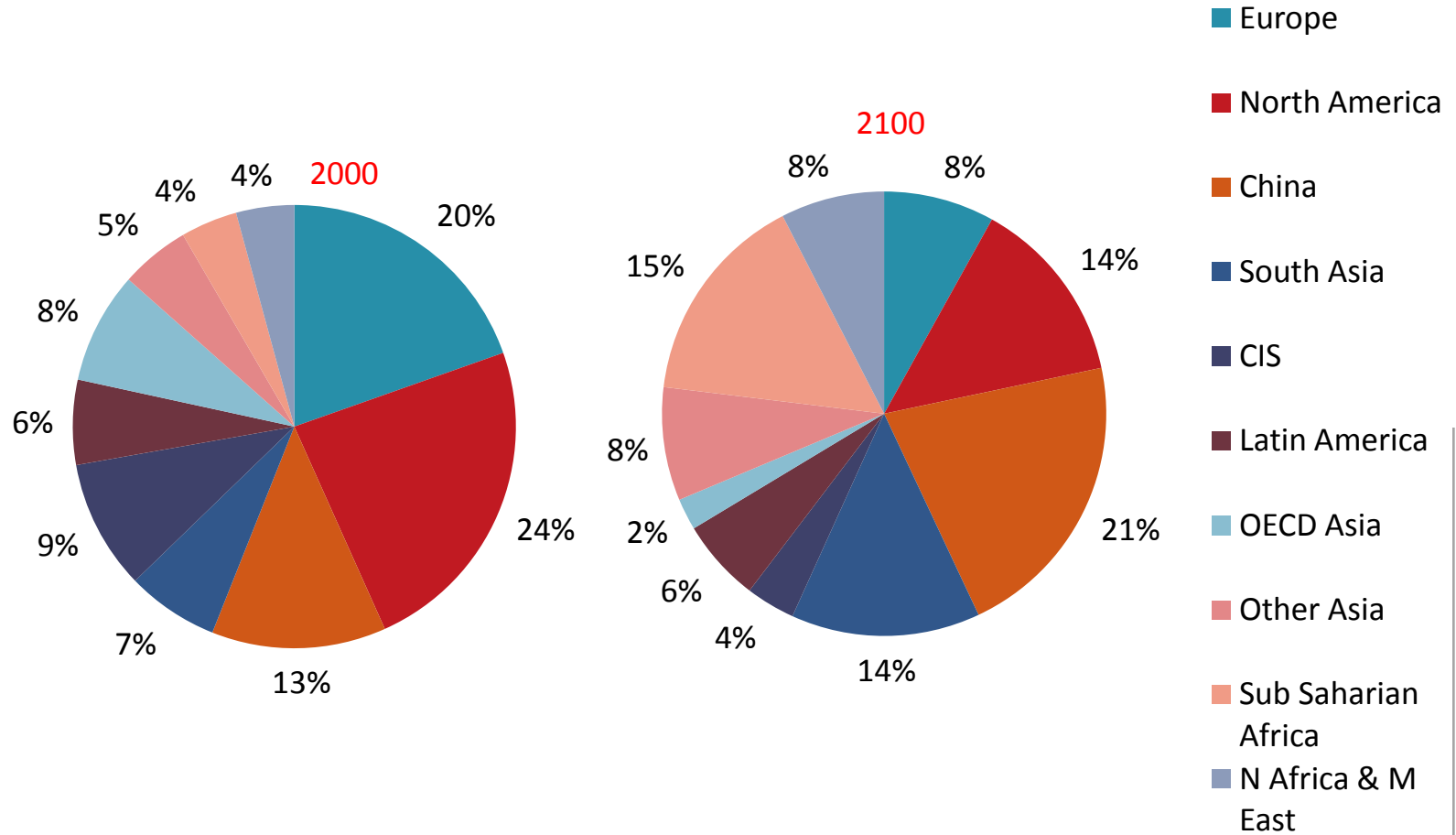


Needs of energy services worldwide in 2100 : between 1.5 and 3 times the level of 2000

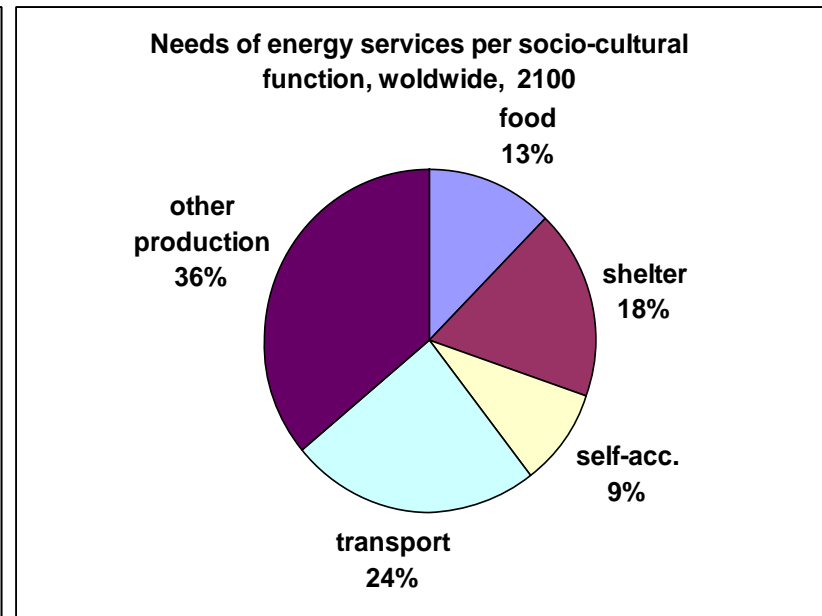
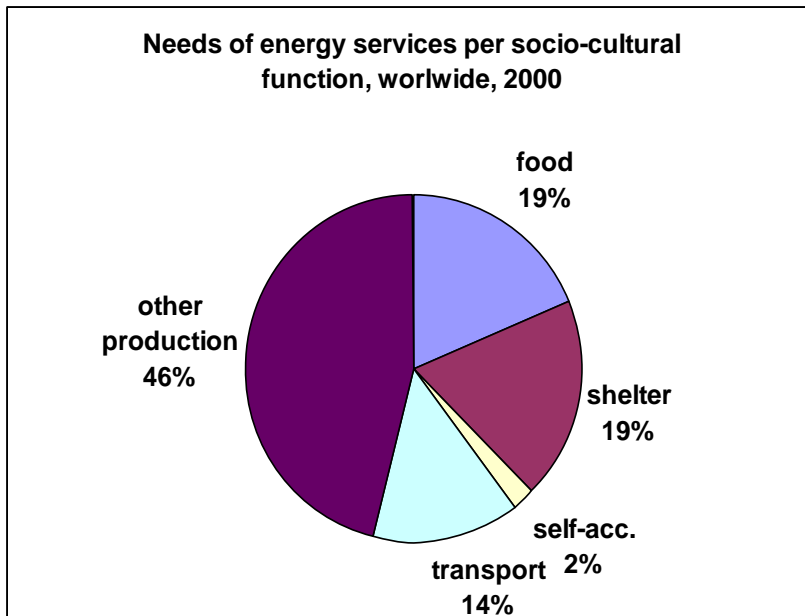
- Needs of energy services per capita could be multiplied by 2.5 worldwide over the century, but only 40% in Europe.
- Demographic uncertainties result in a range plus/minus 30% in needs of energy services in 2100 .



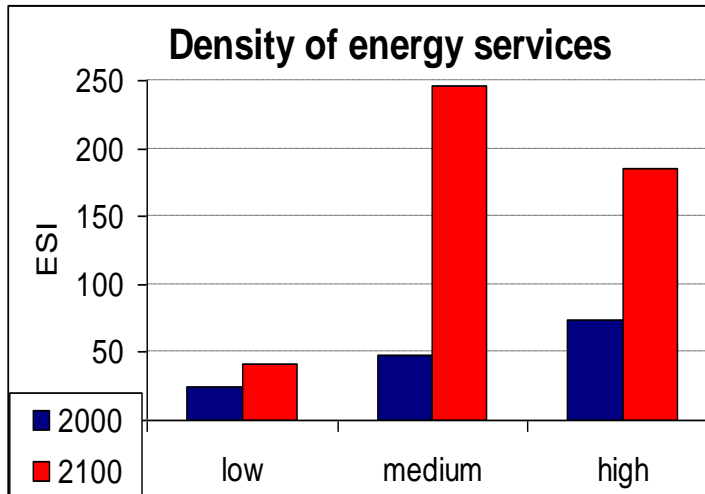
A deep change in the geographical breakdown of the needs of energy services



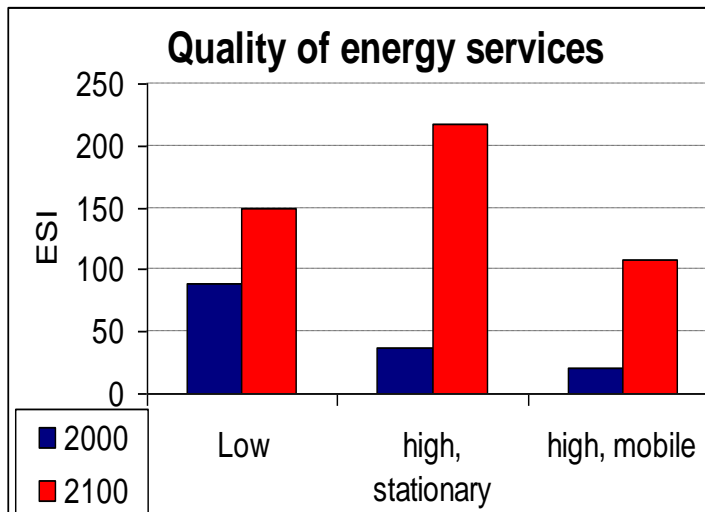
Transport and self-accomplishment : the main drivers of the needs of energy services worldwide



Needs of energy services more and more concentrated and requiring more and more high quality energies



- A huge **concentration** of the needs of energy services:
 - spatial (urbanisation)
 - power (industrialisation)



- A strong focus on **high quality** energies for:
 - stationary needs (mechanical, electronics, ...)
 - mobile needs (transport)

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Some findings on post-carbon transitions

- Decoupling commercial energy demand from wealth is a prerequisite
- Energy efficient technologies necessary to decouple energy demand from needs of energy services, but not enough
- Changes in behaviours also required to decouple individual needs from affluence: a matter of generations
- Welfare is not just a matter of affluence: change in welfare measurement needed
- Transport-energy-environment nexus is a core issue
- Timing is key



Merci pour votre attention!



www.enerdata.net

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