

Global energy futures economic dynamics – markets – values

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The Millennium Project seminar on global energy futures

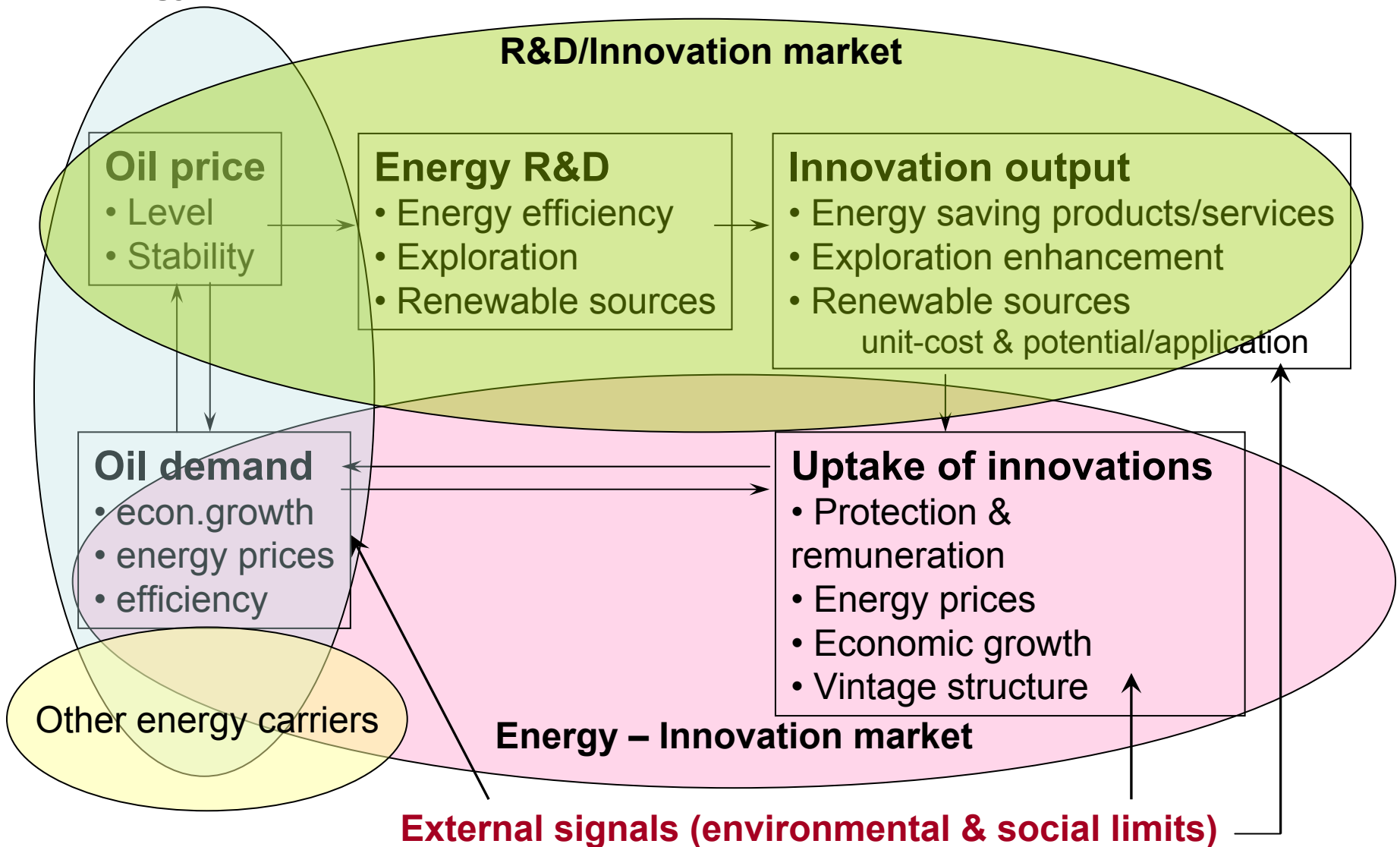
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Presentation structure

- What is driving the desired changes (towards more sustainable energy use)?
- Energy efficiency is the least understood source
- The crucial position of global trade and transport
- Technical innovations have only great success if embedded in **social innovations**
- Feedback on the Millennium scenarios

Driving change – market imperfections 1

Energy market



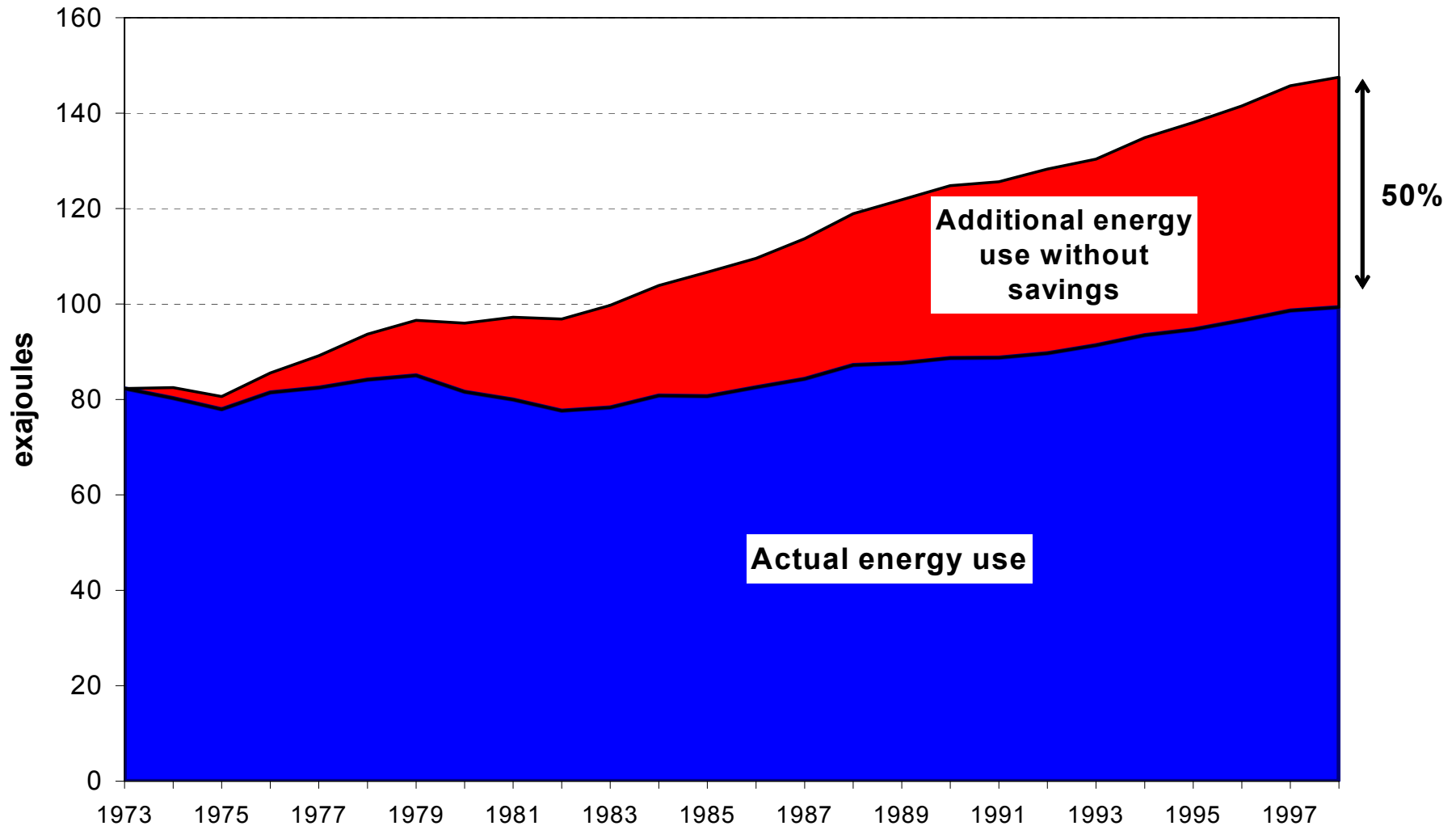
Driving change – market imperfections 2

- Imperfect foresight ('pig cycles')
- Rent seeking (sectoral / national)
- Basic uncertainties -> difficult risk handling
- The more long term, the harder it gets
- Governance challenges:
 - Pushing signals (e.g. energy prices) towards threshold strength without unleashing collapses
 - Enabling sufficient and appropriate social innovations alongside technical innovations
 - Fostering societal acceptability (in a democratic setting)
 - Appropriate evaluation systems

Energy efficiency – undervalued 1

- Lot of market imperfections
- Continuously new evidence on underutilised commercially viable e-saving potential
- Invisibility makes it hard to market, while less symbolic value to key decision makers
- Despite these setbacks energy saving could be regarded as the largest energy source in the past 30 years (IEA (next slide))
- Energy saving eases up many other challenges:
 - Renewable penetration
 - Security of supply
 - Building quality
- Learning curve based insights to be included in policy design – longer term settings (2nd next slide)

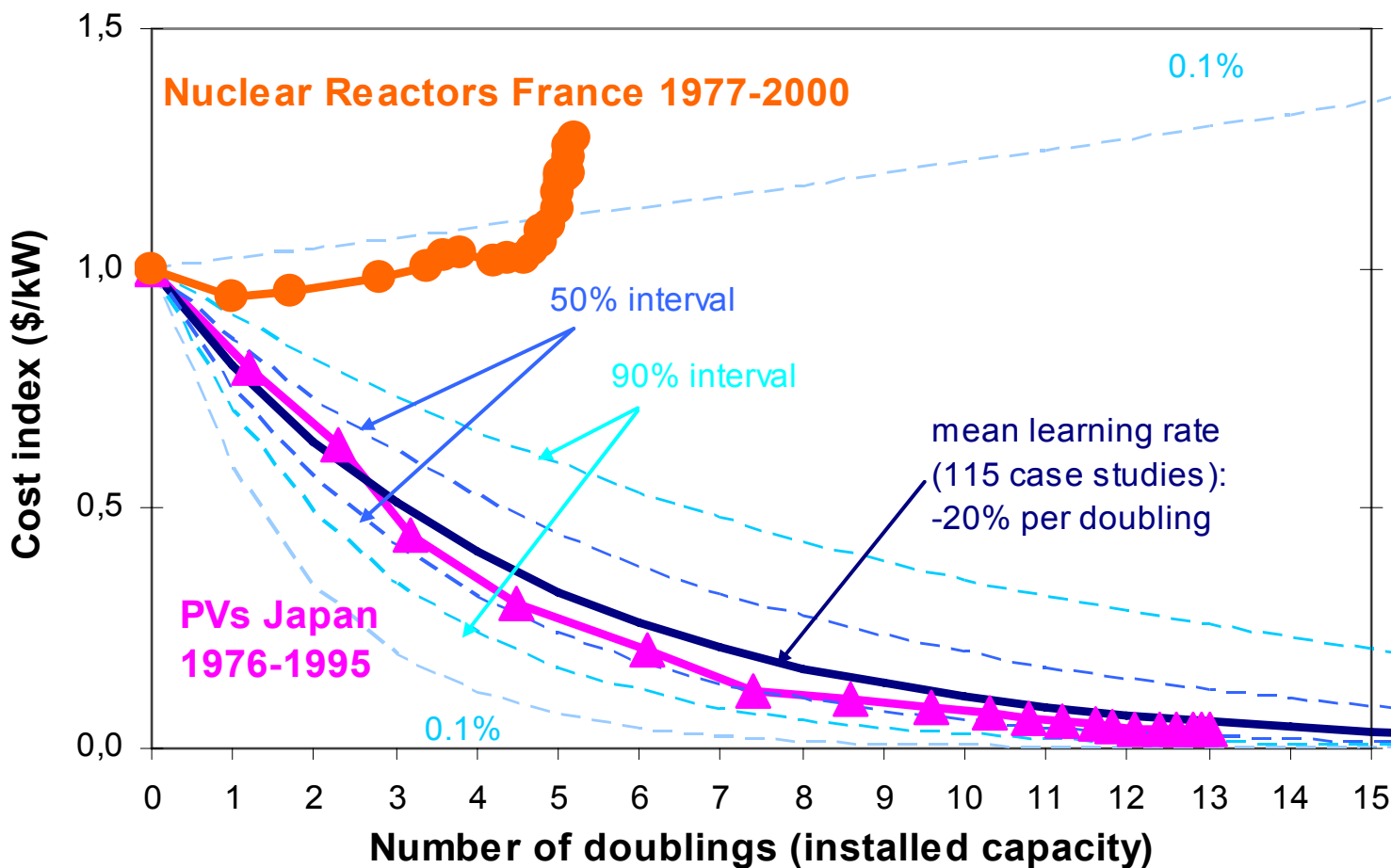
Energy efficiency – undervalued 2



Source: IEA – 30 years of energy use in IEA countries

Energy efficiency – undervalued 3

integrate learning curve insights into energy policy

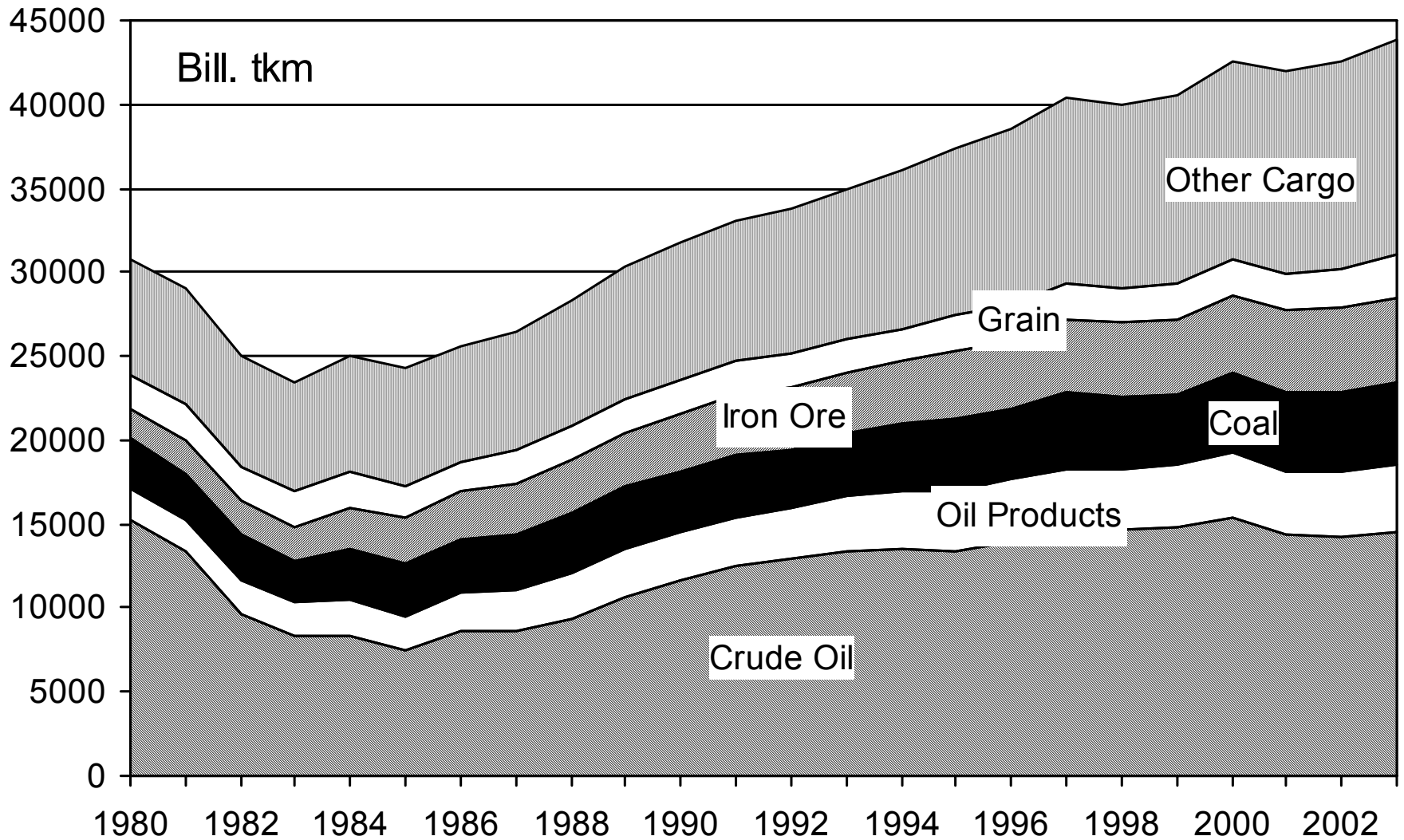


Source: Nakicenovic/IIASA – Energy Modelling Forum 2004

Global Transport & Trade 1

- Haulage of goods requires transport fuel (incl. haulage of transport fuel! - Pastowski)
- market openness may reduce willingness to be forerunner in energy efficiency
- physical trade versus trade of ideas / patents / etc. -> trade vs. FDI -> scale economies
- Do we need to redefine 'access' ? (for passenger transport)

Global Transport & Trade 2



Source: A. Pastowski (2005) – ECEEE Summer Study

Global Transport & Trade 3

Imports (-) and Exports (+) of oil and coal
by world region or country

Million tons OE	Oil			Coal		
	1970	2003	2030	1985	2003	2030
Other Countries	410	271	169	4	52	47
Middle East	636	880	2231			
FSU& Transformation	106	339	397	25	32	37
OECD America	-158	-422	-893	47	-23	18
OECD Pacific	-228	-373	-496	-17	-21	77
OECD Europe	-653	-452	-694	-69	-128	-242
China	3	-106	-471	4	43	98
India		-76	-243	-4	-13	-35
Total Imports	-1040	-1429	-2796	-90	-186	-277
Change /1970 /1985	0%	37%	169%	0%	107%	209%

Source: A. Pastowski (2005) – ECEEE Summer Study

Technical **AND** Social Innovations 1

- Technical innovations only:
 - Rebound effects
 - Acceptability problems
 - Problem transfer to other realms
- Social changes only malleable to some extent
 - Challenges for societal decision making
 - Cognitive dissonance
 - Example of socio-spatial selectivity in case of urban planning (e.g. van Wee et al)
 - Consistency and reliability in policy designs
 - Equity is to be taken into account fully, not as side condition

Technical **AND** Social Innovations 2

- Assessment methods for sustainability policies need to involve all three pillars (ecologic/economic/social) on an equal footing
- Utility based on material wealth to be revised into a multi-attribute utility (or ‘quality of life’) indicator for the assessments
- Currently quest for ‘near first best solutions’ following from neo-classical logic
- However market imperfections are very often inherent and imply equity effects

Technical **AND** Social Innovations 3

- Utility in practice based on material wealth → obstacle in Sustainability Policy
- Mainstream economics allows extensions both to ‘time use’ (less problematic, but only used at micro-level) and to ‘common goods’ (more problematic, stressed by heterodox views)
- Behavioural economics provides some keys:
 - both relative and absolute measures of happiness/utility/satisfaction relevant
 - the assessment of the (weighing of) relative and absolute fractions will need constant attention
- Next to ‘green accounts’ we need } **QoL –**
‘psychological accounts’ } **quality of life indicators**

Technical **AND** Social Innovations 4

- Environmental limits to growth, yes but where?
 - Hartwick rule is necessary but insufficient condition
 - Ecological economic answers are incomplete or have other setbacks

(Pezzey & Toman 2003; Perrels 2005)
- Social limits to growth (Hirsch, Bourdieu, Ritzer)
 - Socially constructed but nevertheless inevitable scarcity
 - ‘Means of consumption’ as extension to means of production
- Happiness ~ wealth
 - Finding right mix of Absolute & Relative comparisons
- **New challenges in the governance of a sustainable transition**

The Millennium Scenarios 1

- Scenarios illustrate the difficulty of kicking-off change in a responsible way
- ‘end-of-oil’ perhaps not a preferable notion:
 - Misleading
 - Paralysing
- High oil price is crucial ingredient of change
 - Its **variance and pace of change** are the issue
 - Does not need to be disruptive (e.g. 50\$/bbl now ~ 70\$/bbl in 2025)
- Scenario storylines have some US flavour
- BaU~IPCC-A1B; E_B~IPCC-B1/2; T_P~IPCC-A1T

The Millennium Scenarios 2

- The source(s) of high inflation in BaU scenario are debatable
- Systematic upward resumption of e-intensity trend is unlikely (BaU), e.g. change in economic structure tends to reduce the energy intensity (macro level)
- The BaU scenario seems heading for serious trouble regarding inadequate adaptation to climate change
- The Environmental backlash and consequent radical green scenario may be overdoing the issue of kicking-off change (why do we need 'scare' to introduce green solutions?)
- What is exactly driving the enormous ecological technology progress in the Tech_Push scenario?
 - Co-ordinated action?
 - If so, how does that relate to such a high overall growth rate (if somehow trade, investment, etc. are quite conditional/steered?)

The Millennium Scenarios 3

- Year of Hubbert peak?
 - Earlier in BaU than Tech_push than Env_backlash
 - Don't attribute too much value to Hubbert peak (the Hotelling rule is not so easy to apply at global fossil fuel level) at use side eventually oil = oil
- Carbon trading: probable in BaU & Env-Backlash (E_B), but it seems less an issue in Tech_push (T_P) unless it finances the rapid innovation – but what is the allocation mechanism from carbon revenue to innovations?
- Drop of 25% in e-intensity is modest in long run (goal achieved: E_B: 2020BaU: 2030)
- 2020 is too short a time for major changes, at best take-offs of some just beyond pilot markets