

External costs of energy and their internalisation in Europe

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Improvements on the quantification of external costs

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Background

- Research so far has provided a “usable body of knowledge”
 - Increasing awareness
 - Technology and policy choices (standards, Directives, extended CBA)
 - Internalisation

BUT...

- There are still gaps and needs for improvement in several areas
 - **Methodologies** => better quality and reliability of external cost data, reduced uncertainties
 - **Coverage** => additional technologies, burdens, impacts, pathways, countries
 - **Practical implementation** => integration into policy and decision making: LCA, Modelling/scenarios

Methodological improvements

□ Atmospheric modelling

- Complexity of physical process (chemical transformation, orography, meteorology, background concentrations)
- Trade off between accuracy (better models) and simplicity (parametrisation)
- Finer representation (modelling) at local level
- Impacts across continents => Hemispheric modelling of airborne pollutants

Methodological improvements

□ Global warming

- Large uncertainty of cost estimates, reflecting
 - ✓ Uncertainty of emissions/climate change scenarios
 - ✓ Context dependency of impacts (including e.g. discount rate)
- Combined approach: joint use of damage and avoidance estimates
- Better estimation of damage costs
 - ✓ Inclusion of additional sectors (e.g. tourism)
 - ✓ Inclusion of additional GHG (SF₆, PFCs, HFCs)
- Better estimation of avoidance costs
 - ✓ More and better scenarios (socio-economic, policy, energy sector)
 - ✓ Inclusion of additional GHG

Methodological improvements

□ Mortality and morbidity

- Prevailing weight in damage costs (e.g. air pollution)
- Mainstream approach: Contingent Valuation (CVM)
 - ✓ Reliability and accuracy issue
 - ✓ Value Of Life Years lost (VOLY) to measure changes in life expectancy
 - ✓ Quality Adjusted Life Years (QALY) to measure morbidity impact
- More and better surveys
 - ✓ Extension of geographical coverage (additional surveys)
 - ✓ Additional criteria for transferability (cultural, risk perception)

Extension of scope and coverage

□ Multimedia pathways

- Air Vs soil and water
- Prevailing effects on human health
- Multimedia chains, extension of the impact pathway(s)
- Exposure => food trade and consumption
- Biotransfers (milk, meat, fish)

Extension of scope and coverage

□ Biodiversity

- Land use change, land take (power plants, distribution infrastructure), acidification, eutrophication
- Limits of Contingent Valuation (and relevance to energy production)
- Methodological problem: how to measure



- PDF (Potentially Disappeared Fraction)
- Costs of compensation

Other areas for improvement

□ Methodologies

- Improvement of Exposure-Response functions
- Generalisation and transferability of external cost values
- Inter-sectoral issues associated to internalisation policies
- ...

□ Scope and coverage

- External costs associated to the security of energy supply
- Extraction and transport (e.g. oil spills)
- ...

Integration into policy and decision making

- Long term perspective
 - Future technologies

“Future” energy technologies

- hydrogen technologies
- fuel cells
- offshore wind
- photovoltaic
- concentrating solar thermal power plant
- biomass (including wet)
- wave energy
- geothermal
- ...

BUT ALSO...

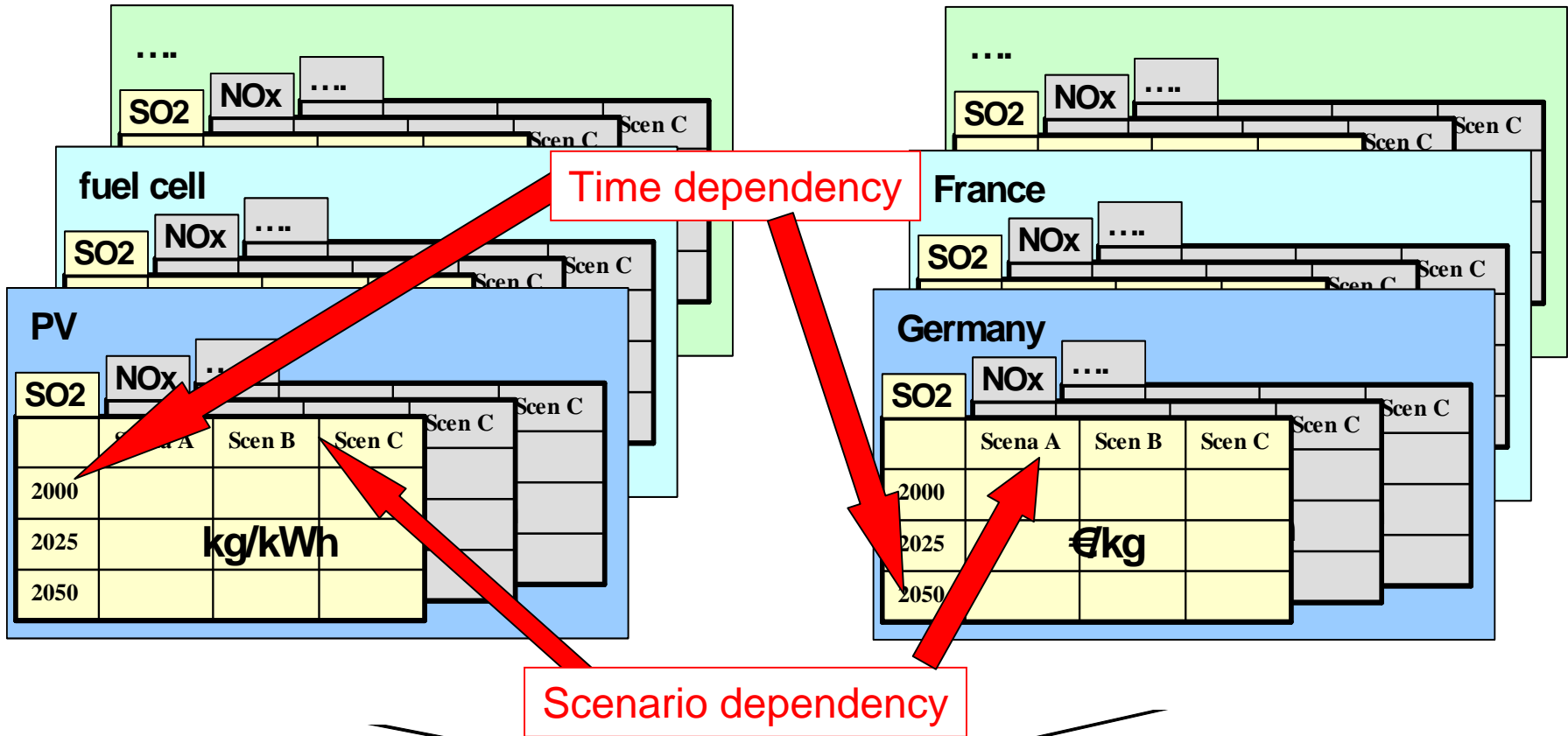
- advanced fossil fuels
- advanced nuclear
- ...

Integration into policy and decision making

- Long term perspective
 - Future technologies
 - Dynamic LCA (time- and scenario-dependent)

LCA of individual technologies

External costs per unit emission



technology specific external costs per unit electricity generation

€/kWh
12/16

Integration into policy and decision making

□ Long term perspective

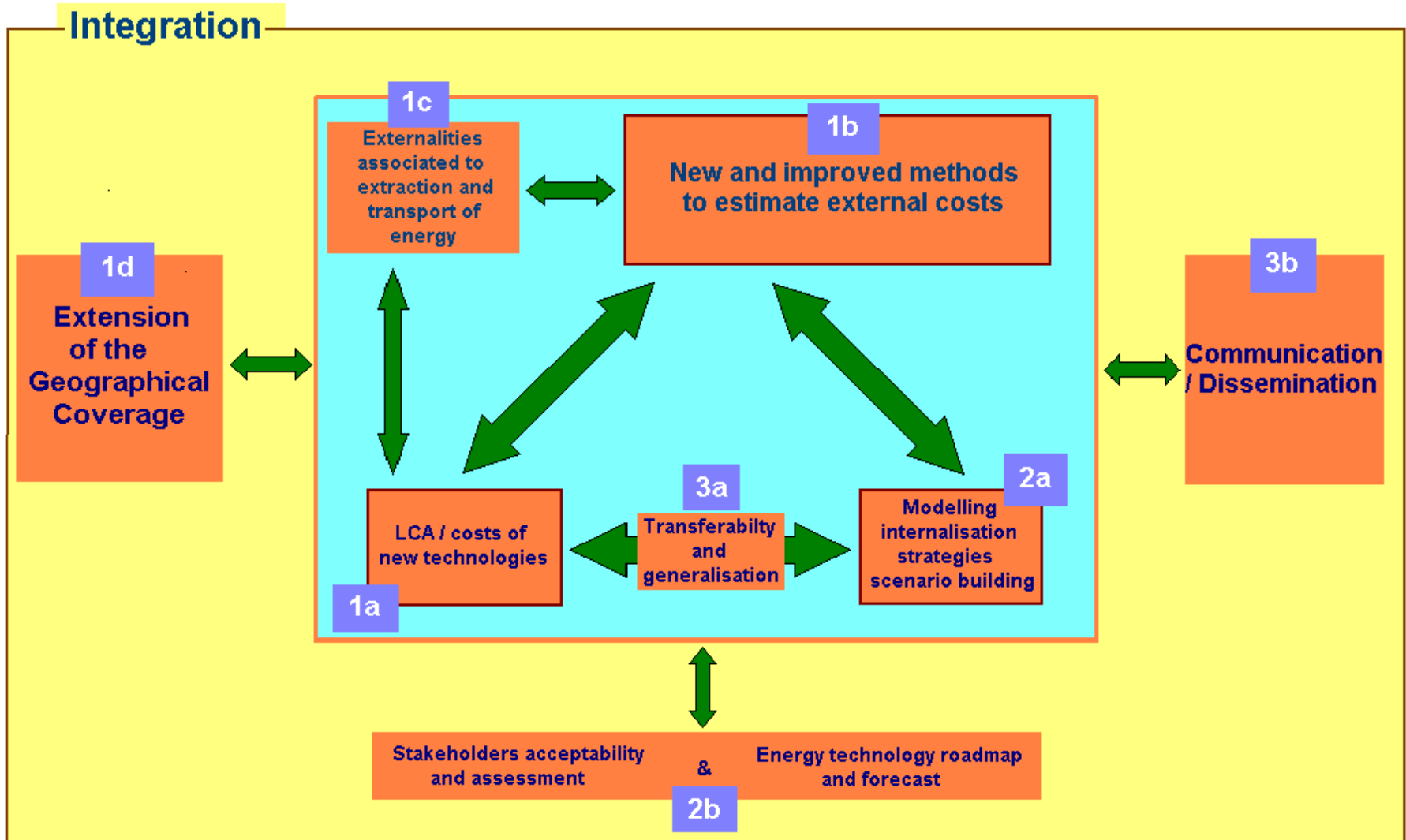
- Future technologies
- Dynamic LCA (time- and scenario-dependent)
- Individual technologies Vs policy packages



- Meaningful and credible scenarios
- Improved modelling fully integrating LCA and external costs (better technology representation, energy trade and cross-country harmonisation, impacts of internalisation...)

The NEEDS Integrated Project (FP6) *ExterneE*

New Energy Externalities Developments for Sustainability



Is it worth the effort?

YES!

Thank you for your attention

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