

Cost evaluation of energy considering externalities

Ma Zhan

maz03@mails.tsinghua.edu.cn

Outline

- ❖ What are externalities
- ❖ The ExternE Project
- ❖ The Ecosense Model
- ❖ Apply the Ecosense Model in China

What are externalities?

- ❖ Fuel cycle externalities are the costs imposed on **society and the environment** that are not accounted for by the producers and consumers of energy, i.e. that are **not included in the market price**.
- ❖ They include damage to the natural and built environment, such as effects of air pollution on health, buildings, crops, forests and global warming; occupational disease and accidents; and reduced amenity from visual intrusion of plant or emissions of noise.

The ExternE Project

- ❖ Who is involved?
- ❖ What are the achievements of the ExternE project?
- ❖ What is the ExternE Methodology?

Who is involved?

- ❖ involves over 30 teams from research institutes and consultancies in nine Member States of the European Union and other European countries
- ❖ include economists, ecologists, environmental scientists, energy technologists, health specialists, atmospheric chemists and modellers, and computer software specialists.

What are the achievements of the ExternE project?

- ❖ Developed an effective “impact pathway” methodology
- ❖ Assessed many different fuel cycles consistently
- ❖ Made reliable assessments of marginal costs
- ❖ Identified the key externality issues for future policy

What is the ExternE Methodology?

- ❖ Definition of the fuel cycle
- ❖ Guiding principles
- ❖ Impact Pathway Approach

Definition of the fuel cycle

The coal fuel cycle:

- ❖ Construction of new plant
- ❖ Coal mining
- ❖ Limestone quarrying
- ❖ Transport of coal, wastes, other materials
- ❖ Power generation
- ❖ Waste disposal
- ❖ Electricity transmission

Impacts of the coal fuel chain

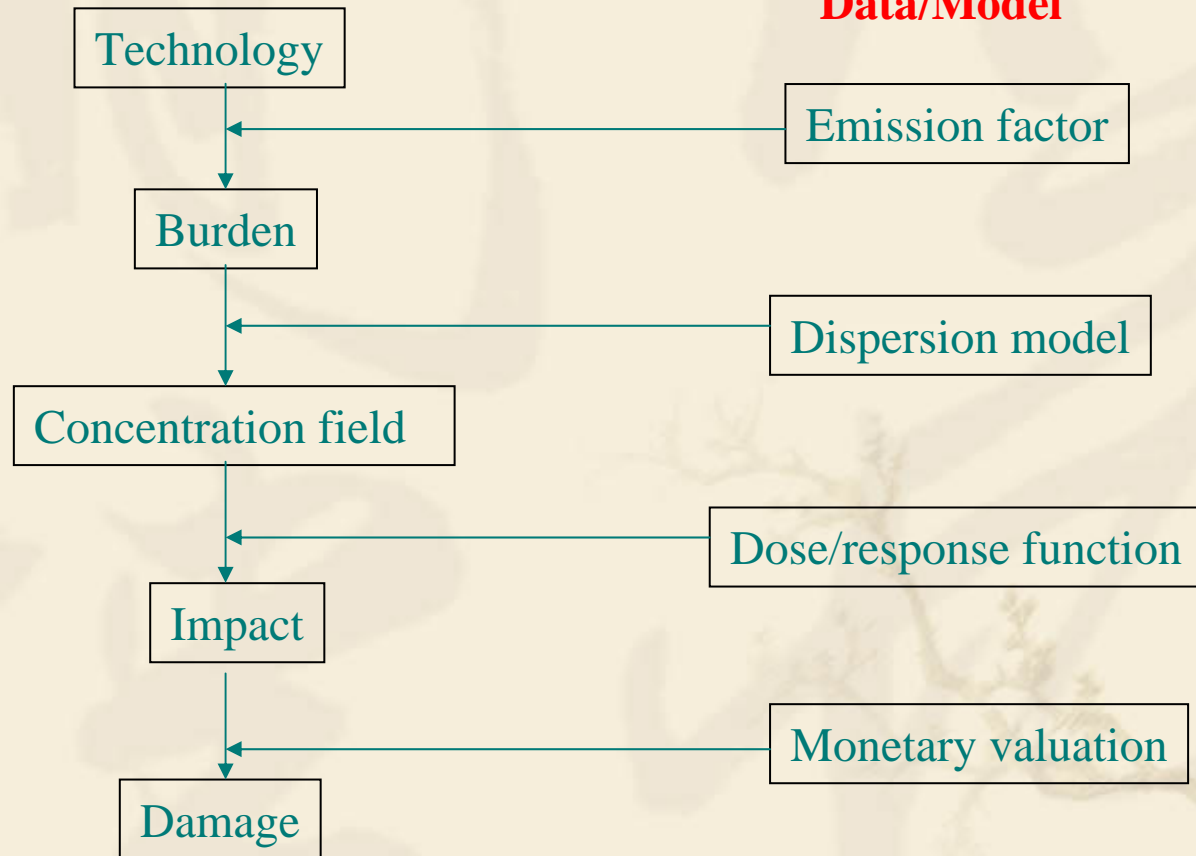
- ❖ Human health
- ❖ Accidents
- ❖ Building materials
- ❖ Crops
- ❖ Forests
- ❖ Freshwater fisheries
- ❖ Ecosystem
- ❖ Global warming
- ❖ Noise

Guiding principles

- ❖ **Transparency:** to show how the work was done, and what was assessed and what was not.
- ❖ **Consistency:** to allow valid comparisons to be made between different fuel cycles and different types of impact within a fuel cycle.
- ❖ **Comprehensiveness:** all impacts of a fuel cycle should be considered, even though many may not be investigated in detail

Impact Pathway Approach

Pathway Stage



Differences between LAC and ExternE

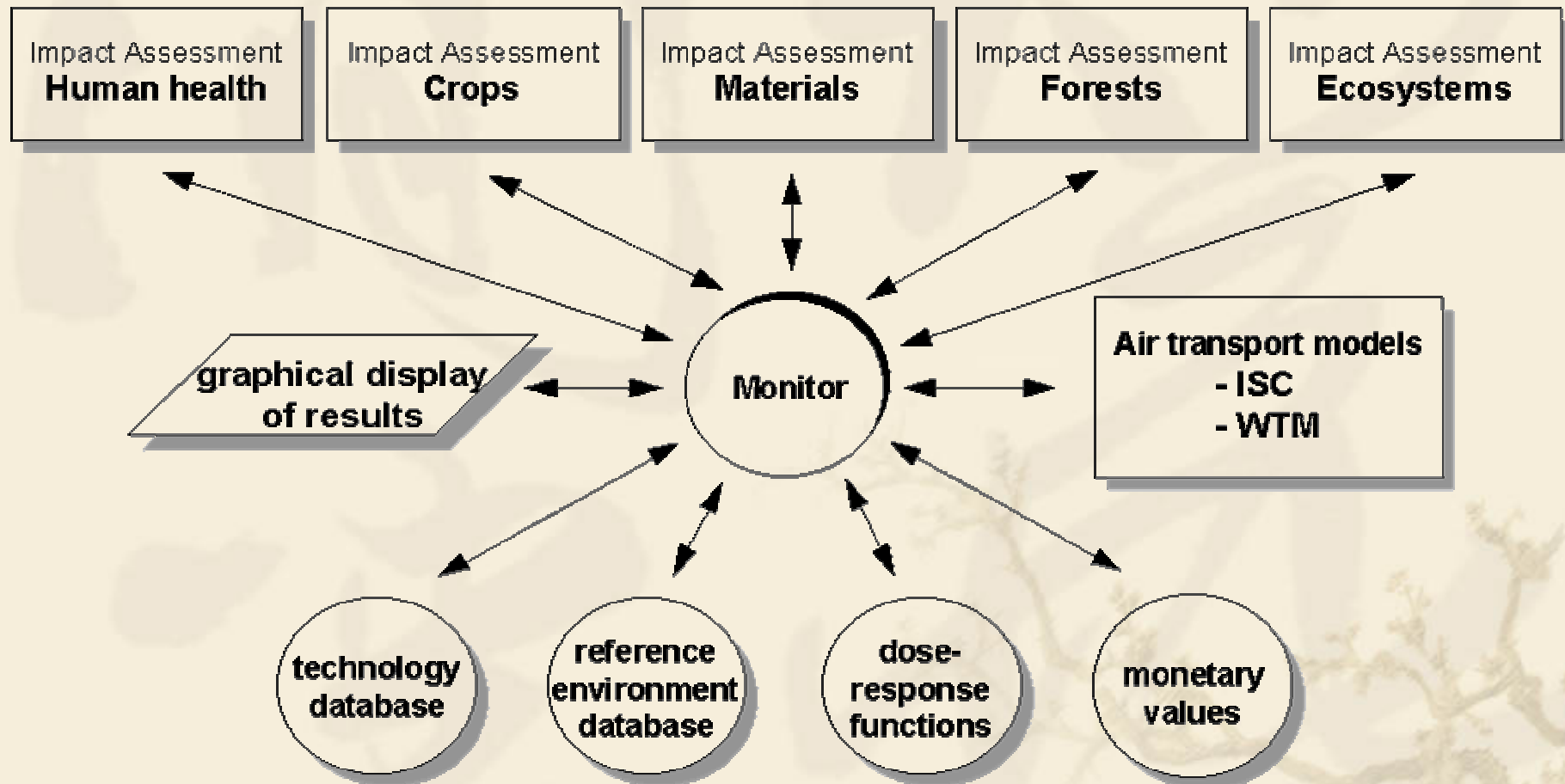
- ❖ LCA tend not to be specific on the calculation of impacts, if they have attempted to quantity impacts at all.
- ❖ LCA have a much more stringent view on system boundaries and do not prioritize between different impacts.

The EcoSense Model

The objectives for the development of the EcoSense model were:

- ❖ to provide a tool supporting a standardized calculation of fuel cycle externalities
- ❖ to integrate relevant models into a single system
- ❖ to provide a comprehensive set of relevant input data for the whole of Europe
- ❖ to enable the transparent presentation of intermediate and final results
- ❖ to support easy modification of assumptions for sensitivity analysis

The EcoSense Modules



Source: www.externe.jrc.es

Apply the Ecosense Model in China

- ❖ Feasibility
- ❖ Plan of My Research
- ❖ Significance

Reference

- ❖ <http://www.externe.jrc.es>
- ❖ <http://www.weblakes.com>



Thank You

