

Policy descriptions for 3 Alternative Scenarios

Types of Economic Instruments

- * Tradable permits,
- * Taxes
 - on production,
 - on demand (goods taxes).
- * Subsidies
 - on production,
 - on demand (goods subsidies)

Types of Regulation Policy Inputs

- * supply,
 - * demand.
- Direct effects on production technologies (input structures) and costs were based on expert judgement. Resulting indirect effects were calculated by the models.

Types of Policy on Information instruments

- * for supply (producer),
 - * for demand (consumer).
- Comment:** Requirements for implementation
Direct effects on behavioural changes by producers and consumers and direct effects on costs were based on expert judgement. Resulting indirect effects were calculated by the models.

The Alternative Scenarios

Assumptions for all alternative scenarios

- * **Intensity of policy instruments** was raised year by year with the same speed till targets are met"
- * **Population development** according to the UN population prospect (medium variant)

* **Basic fossil fuel extraction prices:** for all alternative scenarios: the relevant IEA scenario

* **Basic prices for minerals:** Basic prices for metals increase due to diminishing ore contents

Alternative scenario 1 Global Cooperation

EU27 and Non-European countries

- Sustainability targets:
- * Climate policy: 2 degree target
- Resource targets: Planetary boundaries (determined in POLFREE project) for:
 - Raw material consumption,
 - Water withdrawal,
 - Agricultural land use.

Targets met by a policy mix: combination of economic instruments, information and regulation instruments

Alternative scenario 2 Europe Goes Ahead

EU27

- * Sustainability targets
- Climate policy: 80% reduction of CO2 emissions compared to 1990
- Resource targets: Planetary boundaries (determined in POLFREE project) for:
 - Raw material consumption,
 - Water withdrawal,
 - Agricultural Land use.

* Policy mix: Targets met by a combination of economic instruments, information and regulation instruments

Non-European countries

- Climate Policy: Emission path consistent with RCP 4.5
- No resource targets
- Policy mix: Unambitious with implementation of some climate policy instruments and global 2 degree target not met.

Alternative scenario 3 Civil Society Leads

EU27

- * Sustainability targets:
- Climate policy: 80% reduction of CO2 emissions compared to 1990
- Resource targets: Planetary boundaries
- Resource targets: (determined in POLFREE project) for:
 - Raw material consumption,
 - Water withdrawal,
 - Agricultural Land use.

* Policy mix: Targets met by a combination of economic instruments, information and regulation instruments, autonomous change of preferences of consumers by intrinsic motivation concerning structure and level of consumption and labour supply.

Non-European countries

- Climate Policy: Emission path consistent with RCP 4.5
- No resource targets
- Policy mix: Unambitious with implementation of some climate policy instruments and global 2 degree target not met.

Input to GINFORS model

The POLFREE team defined a set of about 30 different policy instruments (economic instruments, regulations, information instruments)

- These instruments have been allocated to the three scenarios with the following characteristics:
- **Scenario 1: Global Cooperation: Everything, but no cap and trade systems.**
- **Scenario 2: EU Goes Ahead: Mainly economic instruments influencing the supply side**
- **Scenario 3: Civil Society Leads: behavioural change of consumers and employees by intrinsic motivation is dominating, additionally policy instruments on the demand side.**
- Numerical implementation of regulations and information instruments based on literature and expert judgement.
- Choice of tax and subsidy rates to meet the targets, numerous simulations with different tax and subsidy rates necessary for each alternative scenario.

The GINFORS model simulations were run...

1. For the Business as Usual (Reference) Scenario. Simulations start from the present policy mix with given values for exogenous variables.

Outcome: The sustainability targets were not met.

The Reference Scenario

- A reference scenario reflects a future of the economy and the environment under the following conditions for the EU and ROW:
- * business as usual in climate policy, (6 degree scenario) and in resource policy.
 - * no additional autonomous change in preferences, technology.
 - * Real basic prices for fossil fuels taken from the IEA 6-degree scenario
 - * Real basic prices for minerals forecasted by trends.
 - * For LPJmL the 6 degree climate scenario was taken with the regional variant of a hot and dry Europe.

2. For the three Alternative Scenarios.

Simulations start from the present policy mix. The evolution of the parameters of the policy instruments (tax rates, intensity of regulatory interventions etc.) in time was set so that the targets could be met.

Outcome: Sustainability and climate targets are more or less met. A comparison with the Reference scenario and between the different alternative scenarios shows the impacts of the policy mixes on the economies.

Output of GINFORS model

For the Reference and all 3 alternative scenarios
For each year up to 2050
For all EU27 countries, 11 major trade partners and the region "Rest of World"

- National accounts with GDP and all other macro variables including a flow of funds system (Rest of World not complete)
- Final and intermediate demand for 59 product groups, differentiated for 6 categories of final demand and 35 industries
- Employment, capital, prices, and production for 35 sectors
- Energy use by industries and households for 20 energy carriers
- Emissions of CO2 and six other greenhouse gases
- Extraction of abiotic resources (oil, gas, coal, metals, non-metallic minerals)
- Demand and supply for 13 different types of crops (Temperate cereals, Rice, Maize, Tropical cereals, Pulses, Temperate roots, Tropical roots, Sunflower, Soybean, Groundnuts, Rapeseed, Sugarcane, Others) and 3 types of (Meat, Wool, Milk & Eggs)
- Water abstraction by agriculture, public water supply, industries and electricity production (mainly for cooling purposes)
- Agricultural land use for 13 different crops (irrigated and rainfed) and for pastures
- Resource indicators calculated on base of a Global Multi Region Input Output algorithm that allocate the global extractions of abiotic raw materials to the countries where they are used as an input to the economic activity (Raw Material Input) or to final domestic demand (Raw Material Consumption).

POLFREE Project Results

-What does the POLFREE project enable decision makers and their staffs to learn?

Reference Scenario:

Shows the economic and environmental risks of a business-as-usual policy for the EU (and other countries from the rest of the world (totallying 38 countries)>

Alternative Scenario One:

Shows that global cooperation is still able to reach the 2 degree climate target and the resource extraction targets with gains for the economy compared with the reference scenario.

Alternative Scenario Two:

Shows that the EU can go alone with a market oriented supply side policy reaching the sustainability targets and improve its economic performance compared with the reference using the first mover advantage.

Alternative Scenario Three:

Shows that the EU has also the option of reaching the sustainability targets mainly by reduced consumer spending. Civil society does this by changing its perception of welfare to less consumption with more leisure and to more participation by more people.