



TURUN KAUPPAKORKEAKOULU
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ASA TOOL FOR SUSTAINABILITY ANALYSIS

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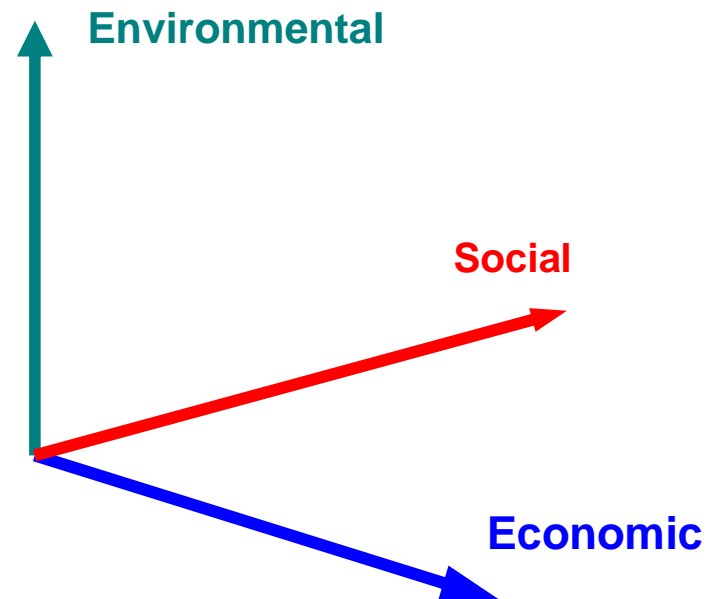
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What is Advanced Sustainability Analysis (ASA)

- The **ADVANCED SUSTAINABILITY ANALYSIS (ASA)** approach offers decision-makers a tool for policy analyses and policy formulations regarding different dimensions of sustainable development





What is Advanced Sustainability Analysis (ASA)

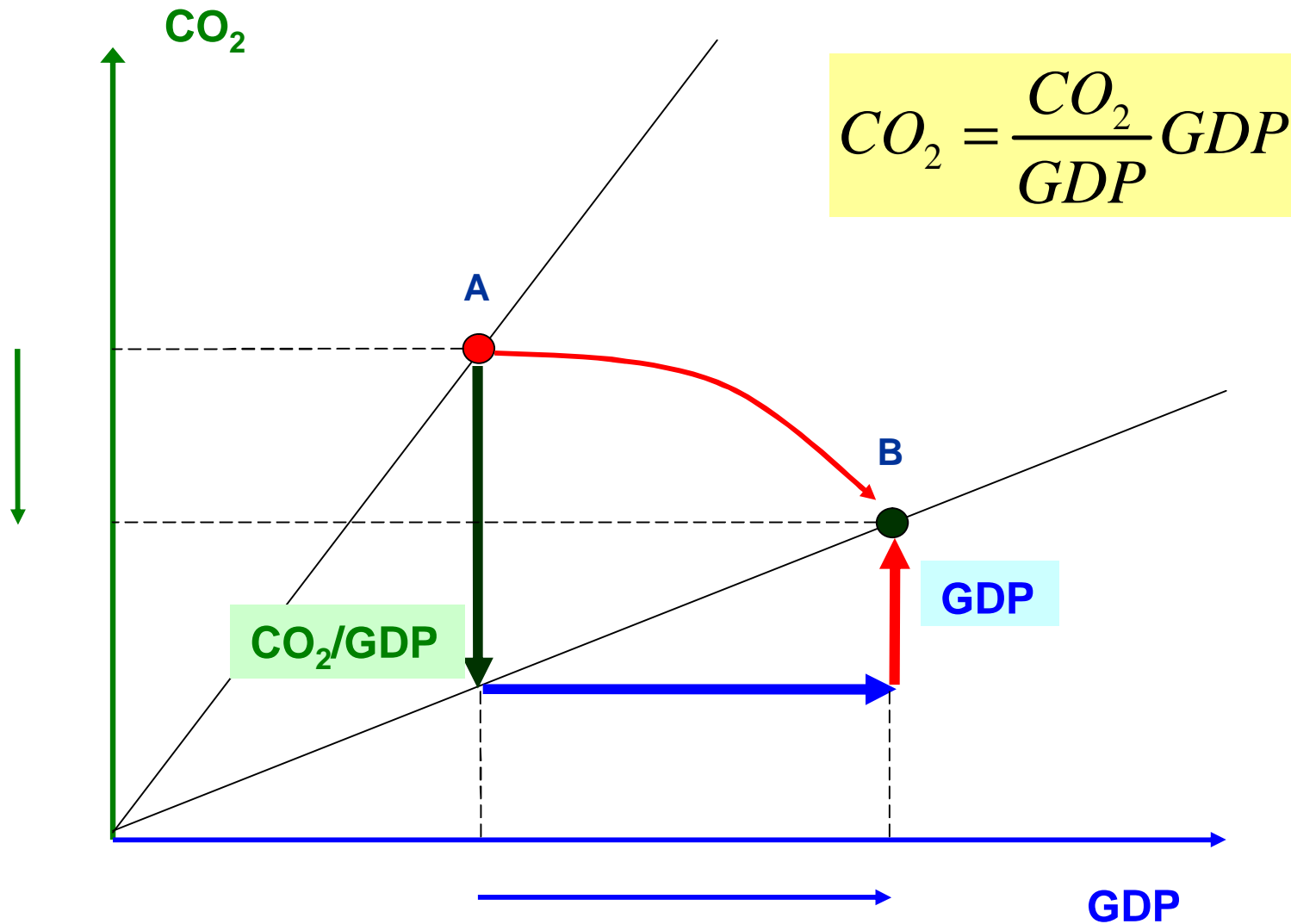
- The **ASA** tool is a mathematical information system for analyzing macro- and micro-level data from different sustainability points of view
- ASA analysis **decomposes** the factors affecting changes e.g. in environmental stress into meaningful components

What is Advanced Sustainability Analysis (ASA)

$$CO_2 = \frac{CO_2}{GDP} GDP$$

- CO₂ emissions are determined by
 - CO₂ intensity of the economy (CO₂/GDP)
 - economic activity (GDP)

ASA decomposition of production



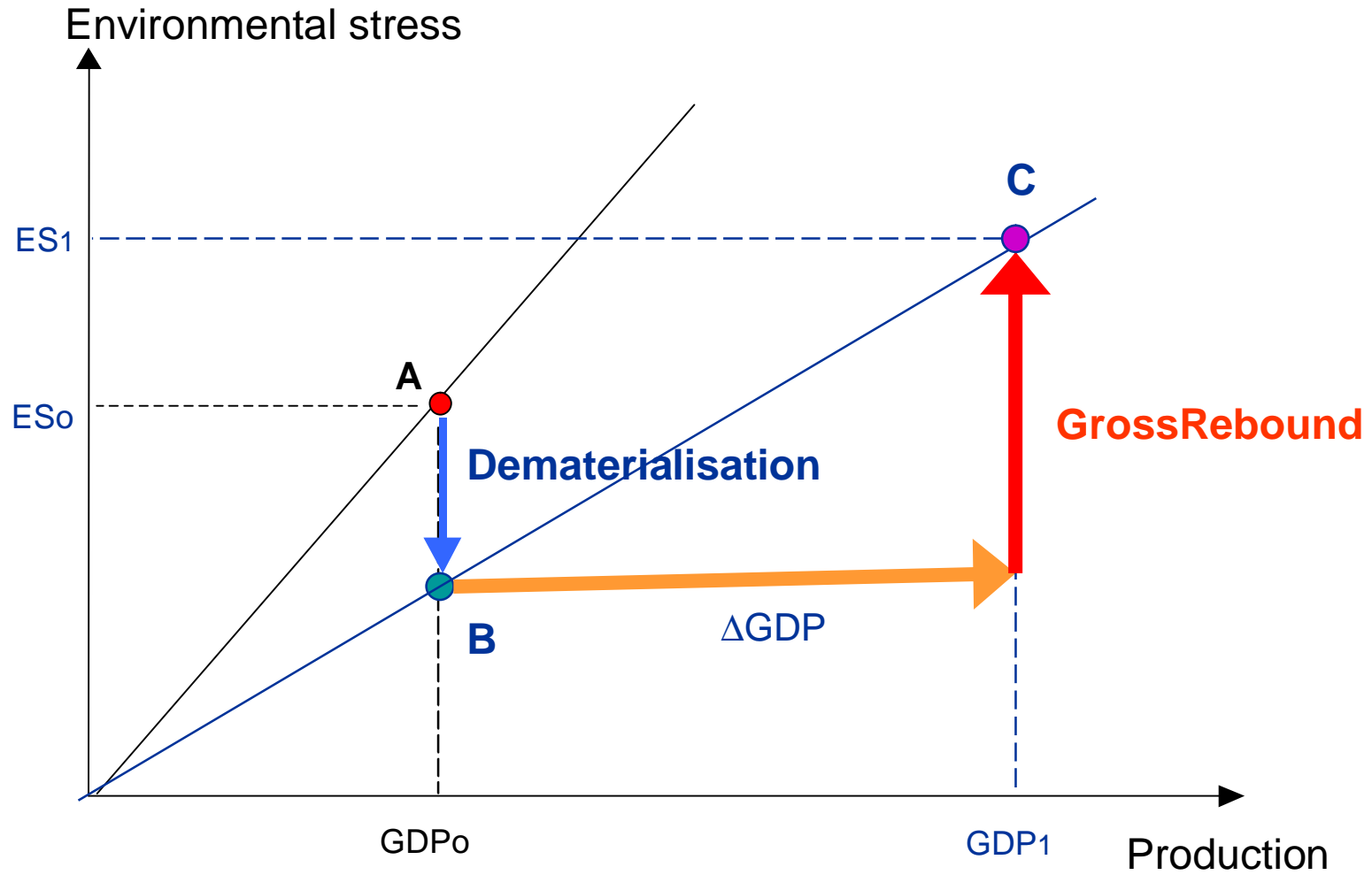


ASA decomposition

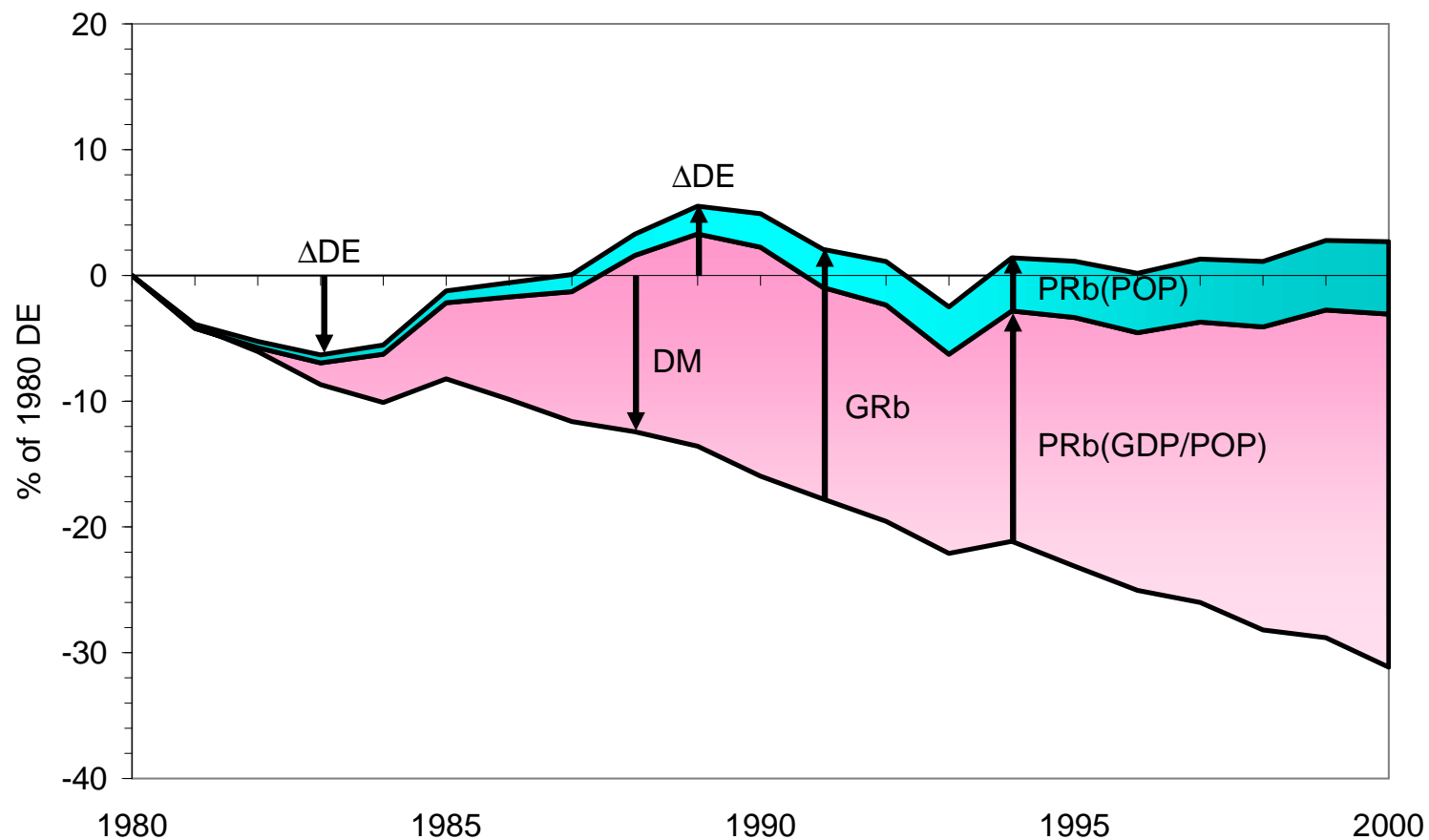
- Provides new information of the causes of changes that take place in environment, economy and society
- Provides new **indicators** e.g.
 - Dematerialisation of production
 - Rebound effect
 - Immaterialisation of consumption
 - Sustainable economic growth
 - Sustainable technological development
 - Welfare productivity
- **Sustainability in relation to the direction of change**

ASA framework

Dematerialisation of production



Dematerialisation and Rebound as ASA concepts



The dematerialization effect and rebound effects of material flows in the European Union, measured by domestic material extraction (DE).



ASA decomposition

$$CO_2 = \frac{CO_2}{GDP} GDP$$



$$CO_2 = \frac{CO_2}{TPES} \frac{TPES}{GDP} GDP$$



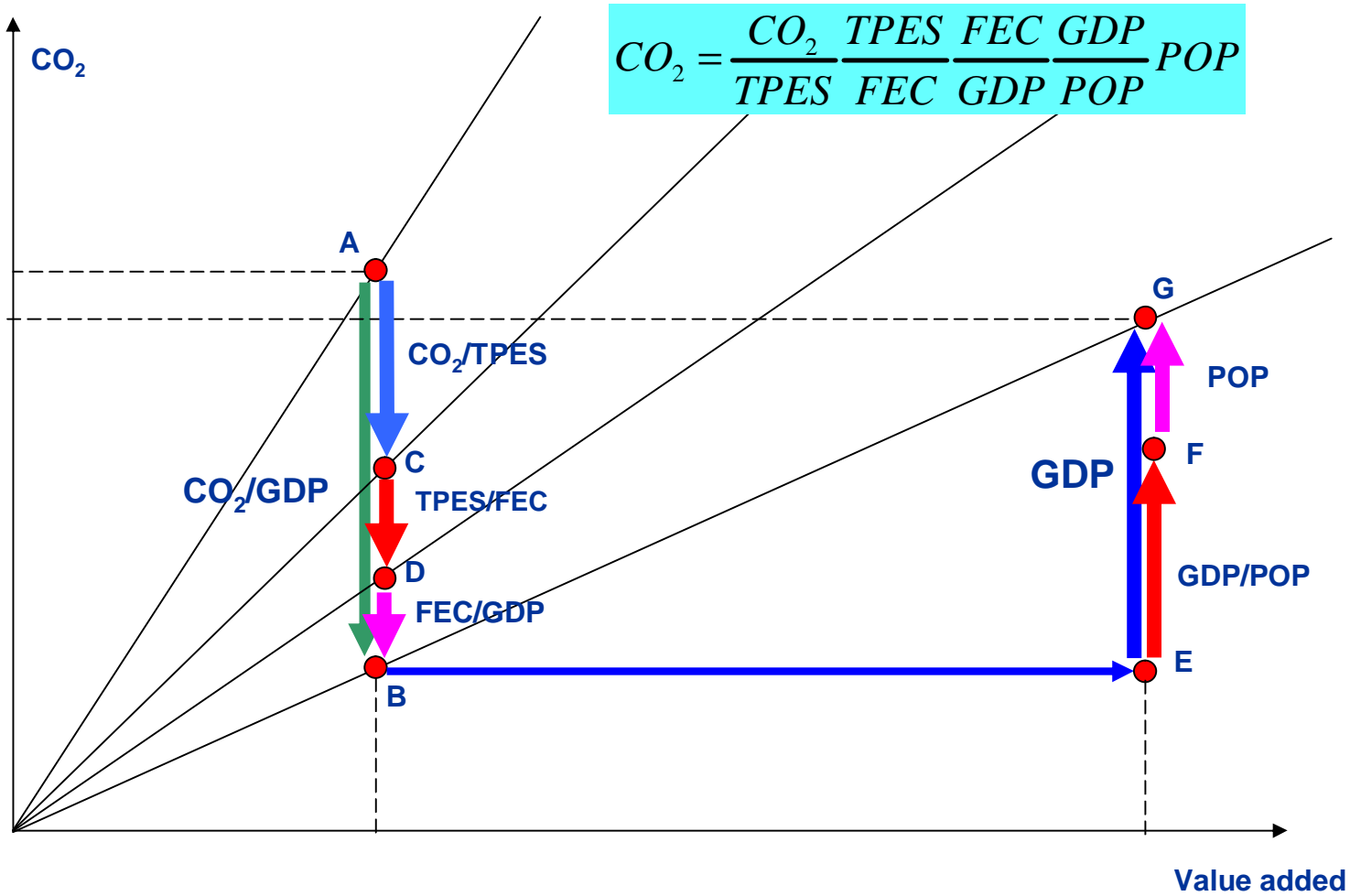
$$CO_2 = \frac{CO_2}{TPES} \frac{TPES}{FEC} \frac{FEC}{GDP} GDP$$



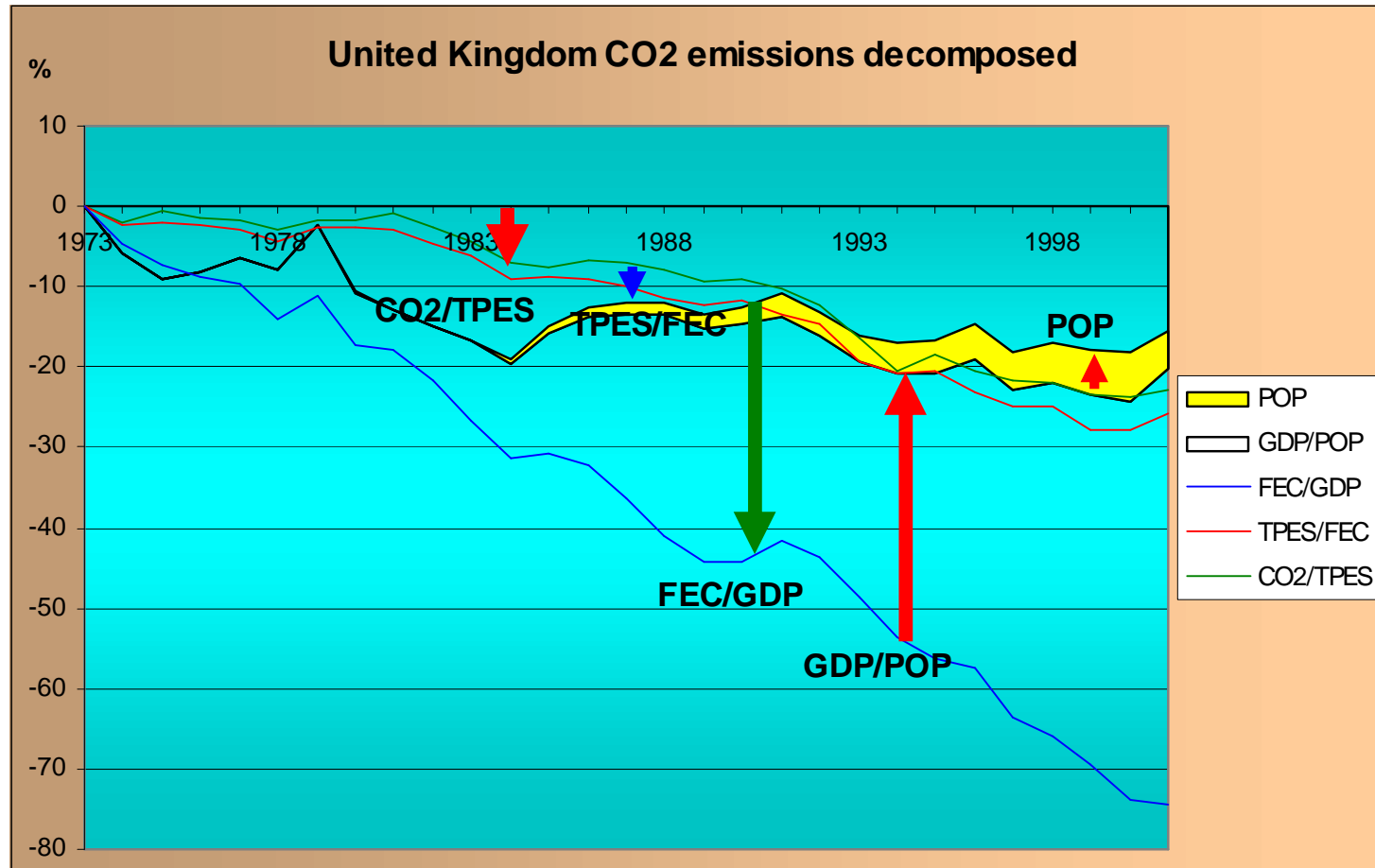
$$CO_2 = \frac{CO_2}{TPES} \frac{TPES}{FEC} \frac{FEC}{GDP} \frac{GDP}{POP} POP$$

- ASA decomposition can be deepened
- TPES is primary energy supply
- FEC is final energy consumption
- $CO_2/TPES$ is CO_2 intensity of primary energy use
- $TPES/FEC$ is efficiency of energy system
- FEC/GDP is energy intensity of production

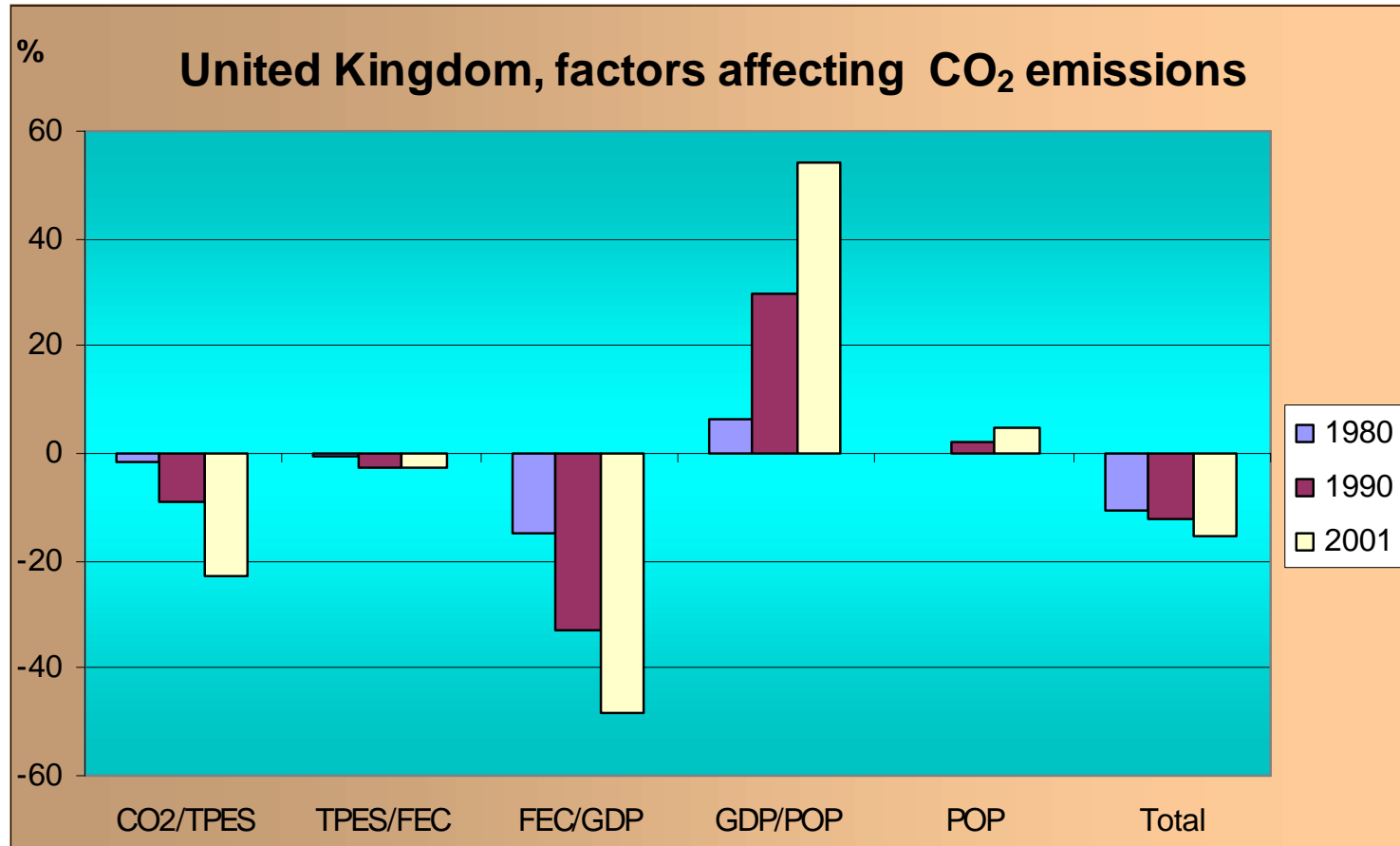
ASA decomposition



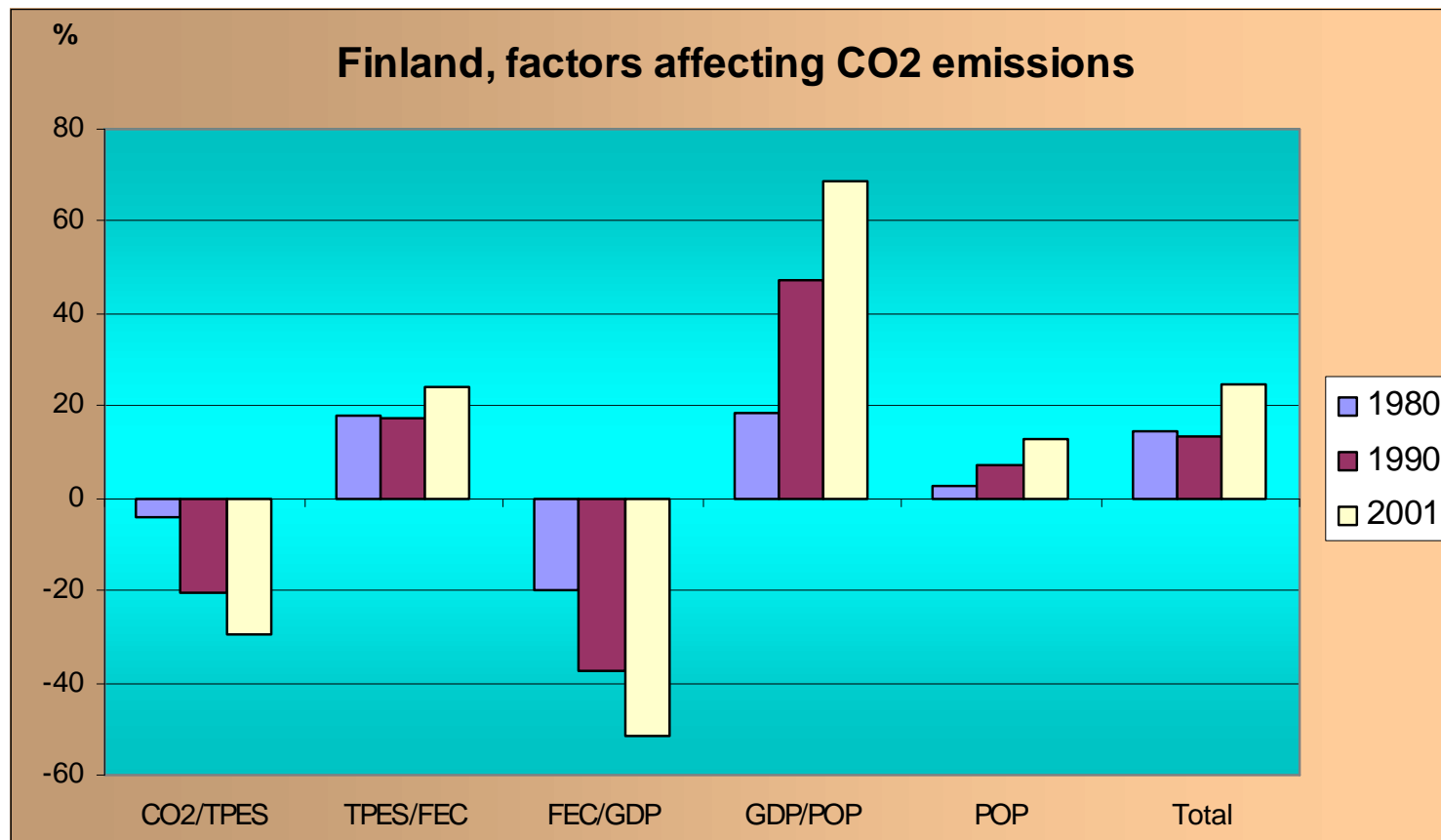
ASA decomposition



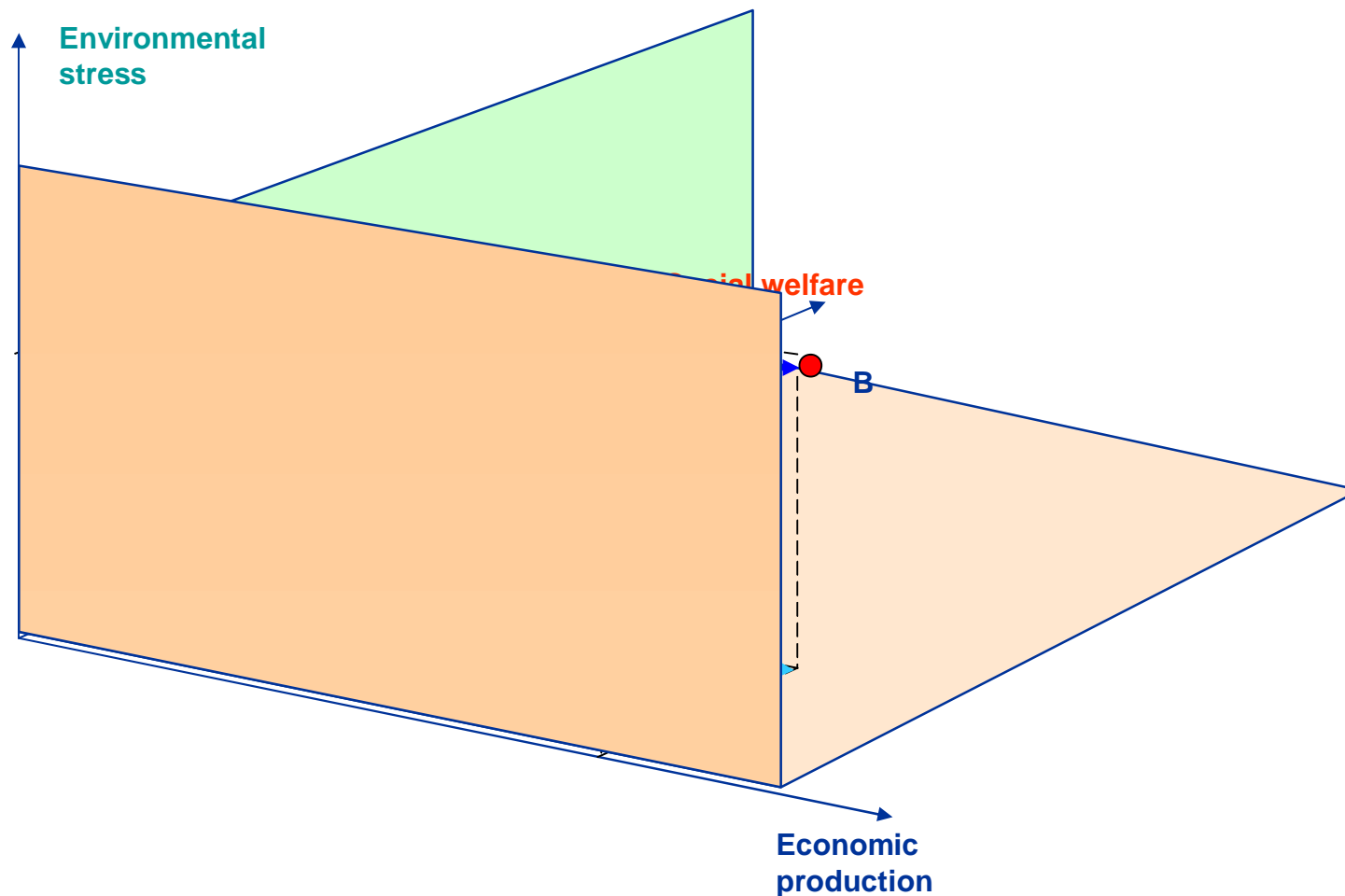
ASA decomposition



ASA decomposition

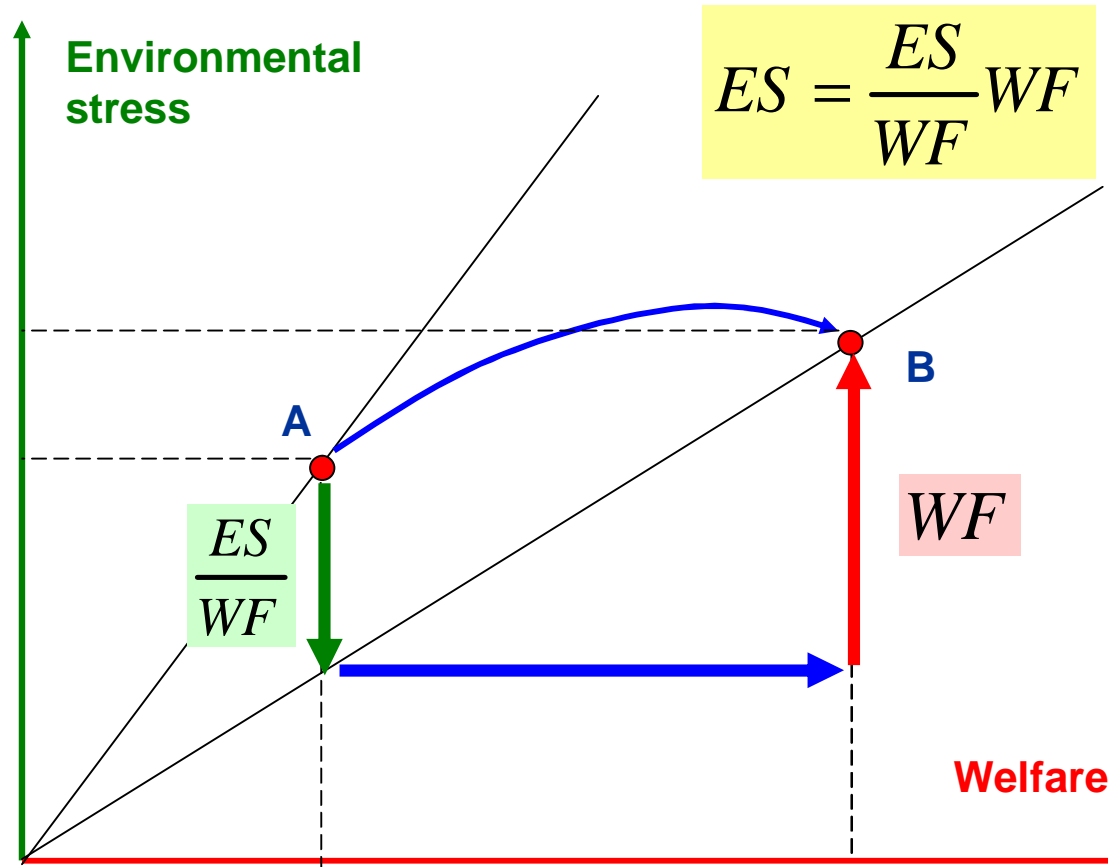


Environmental stress – Economic production – Social welfare decomposition

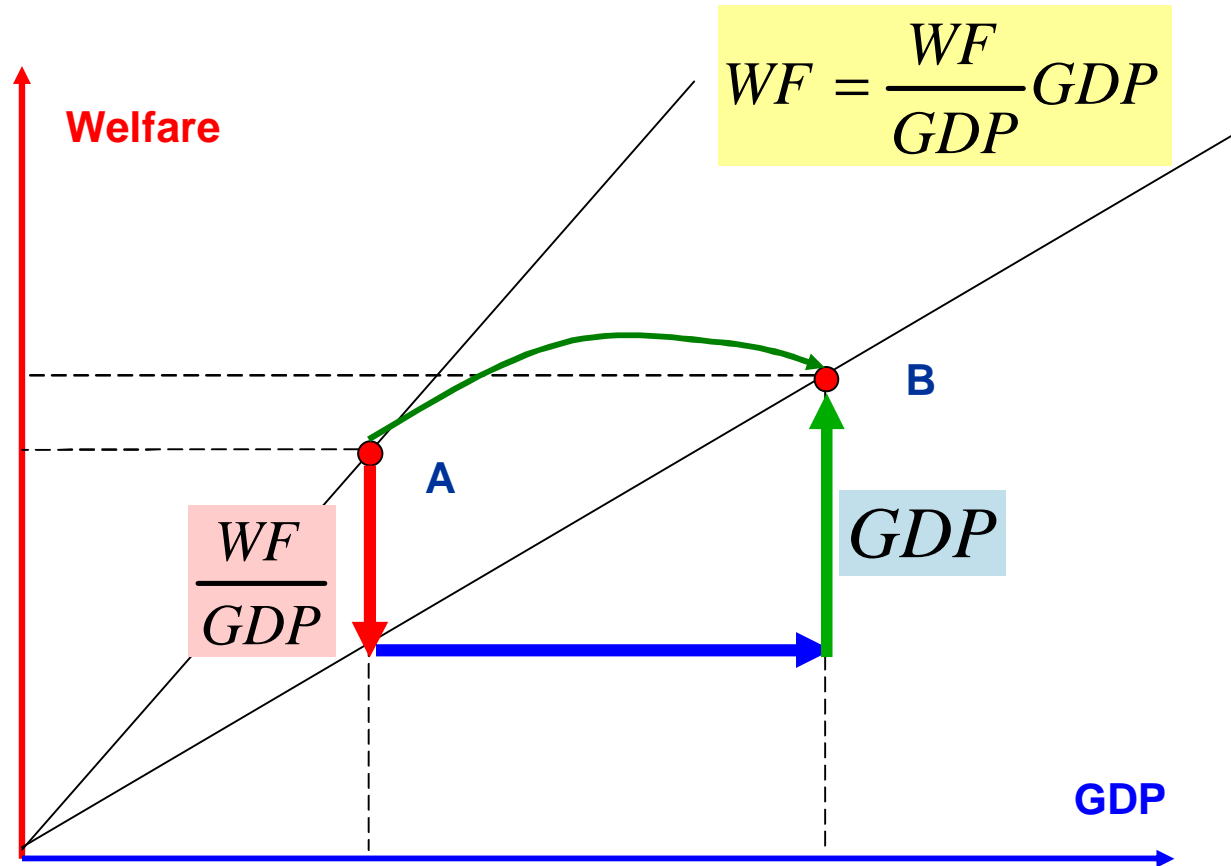




ASA analysis of environment and welfare

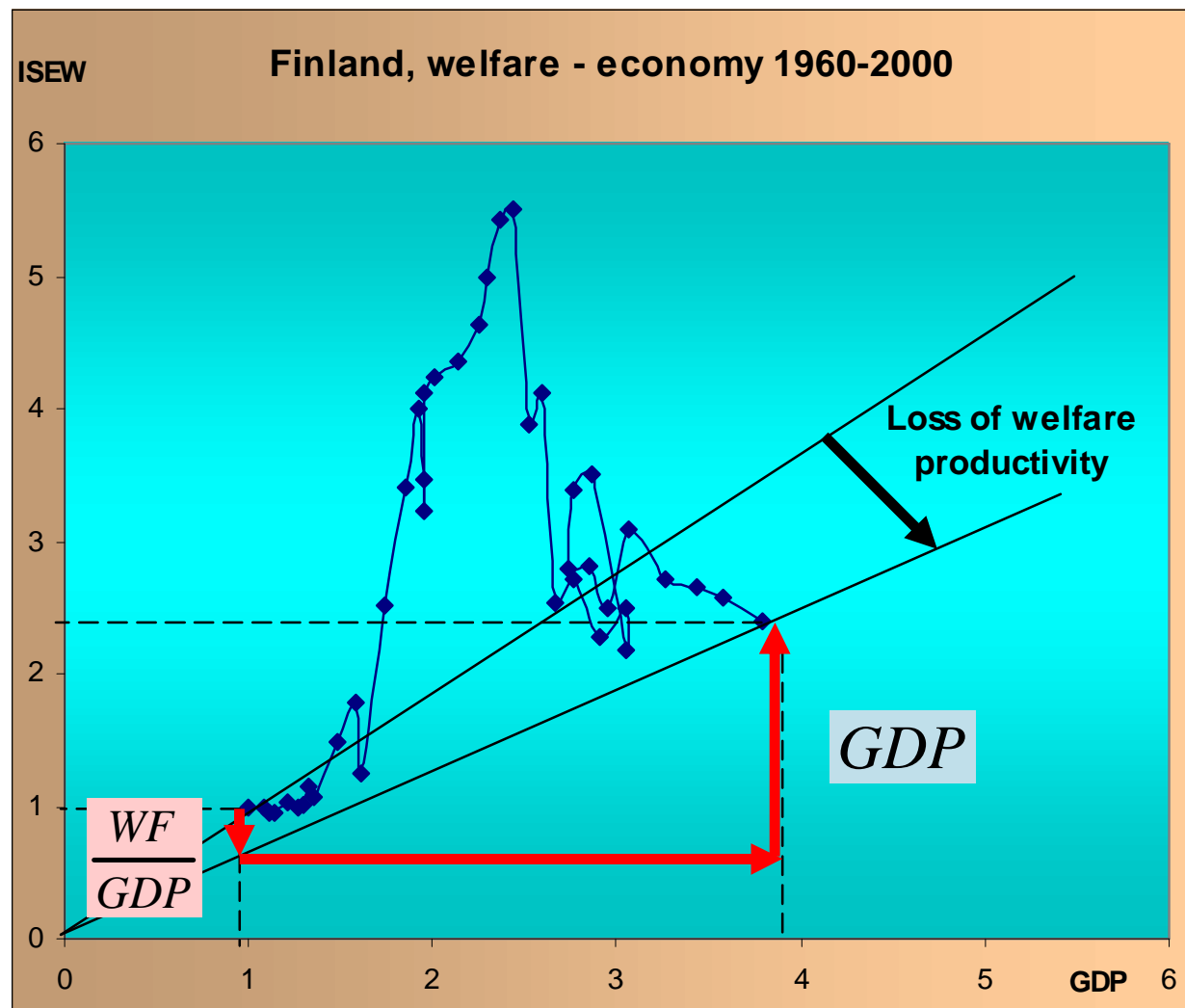


Welfare analysis with ASA



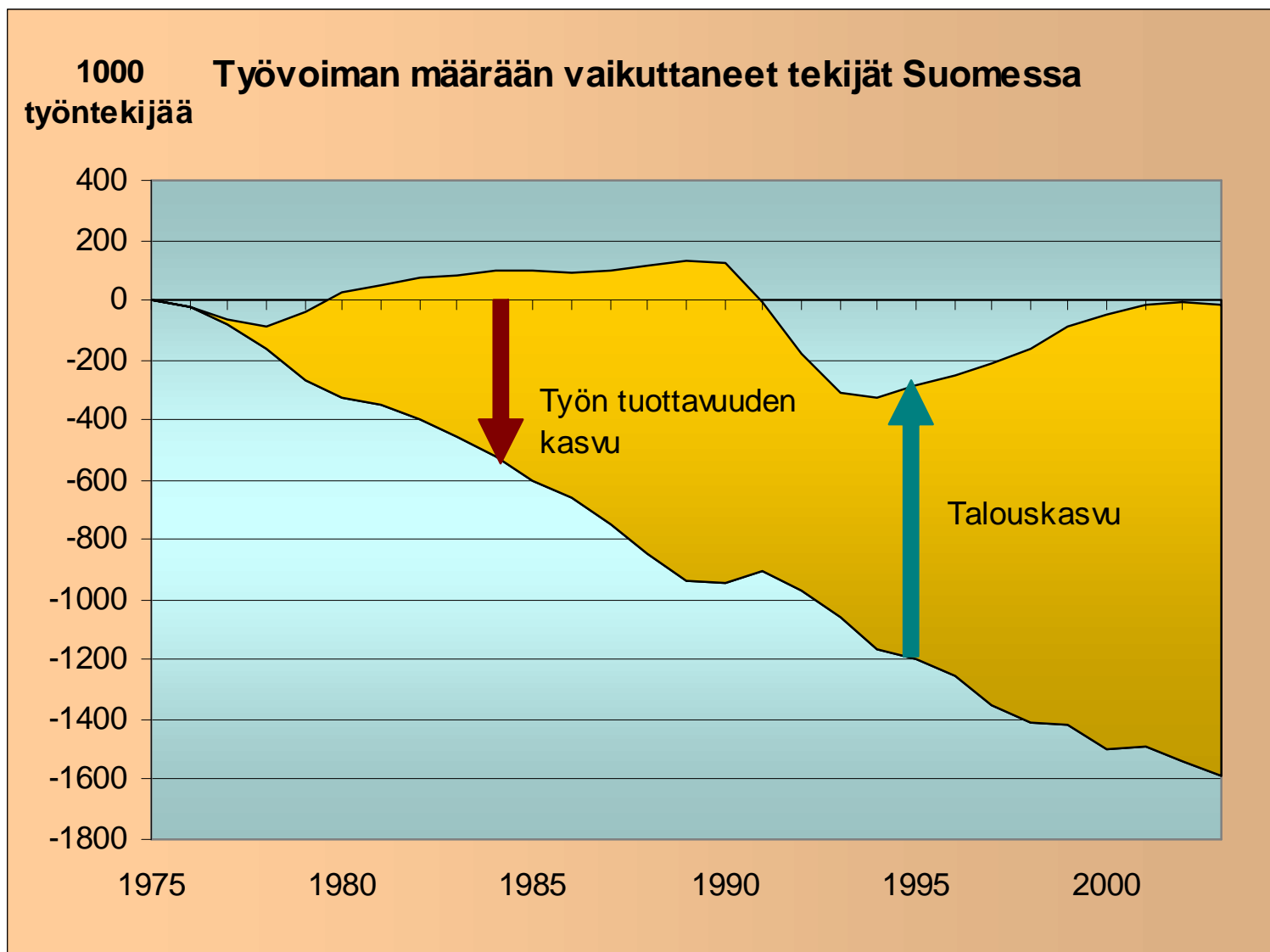


Welfare analysis with ASA



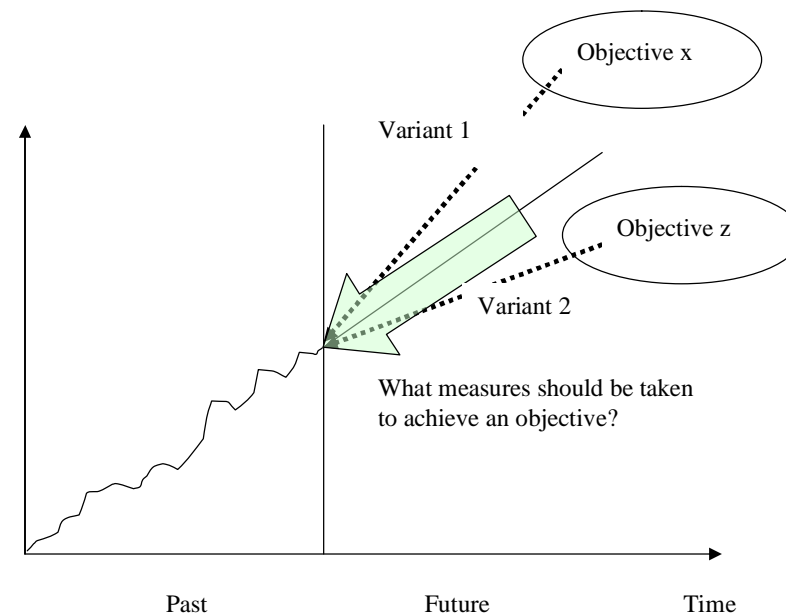
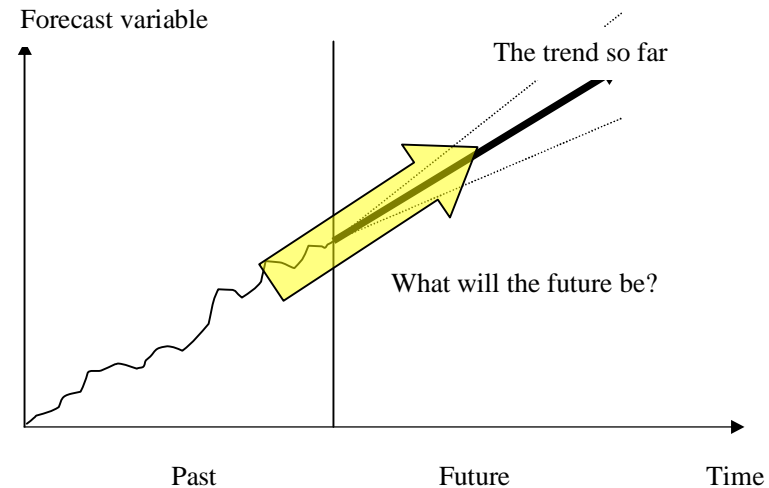


Case study – Labour force decomposition

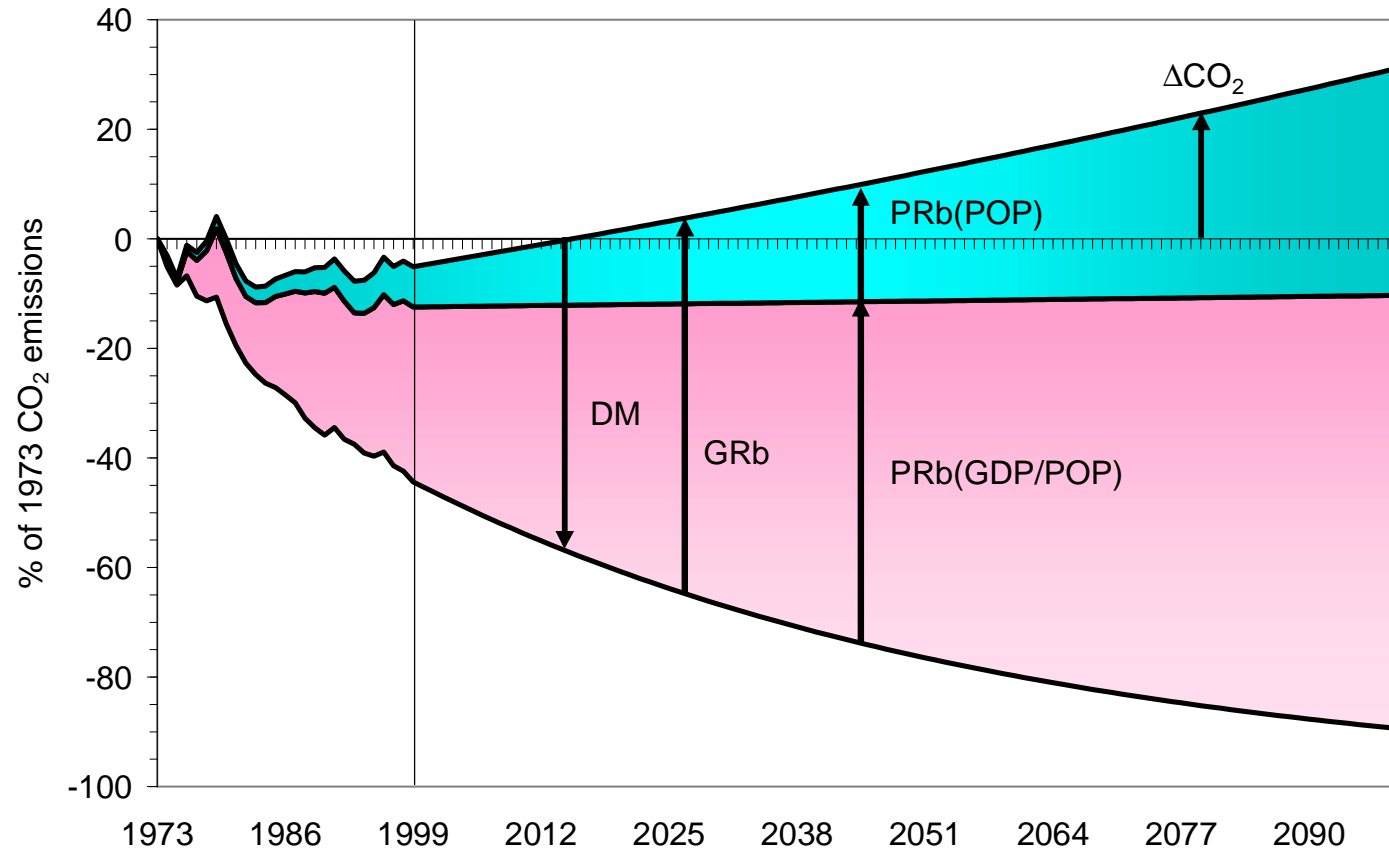


ASA and future

- ASA approach can be used for scenario building
- Forecasting and backcasting (landing place) scenario approach can be utilized

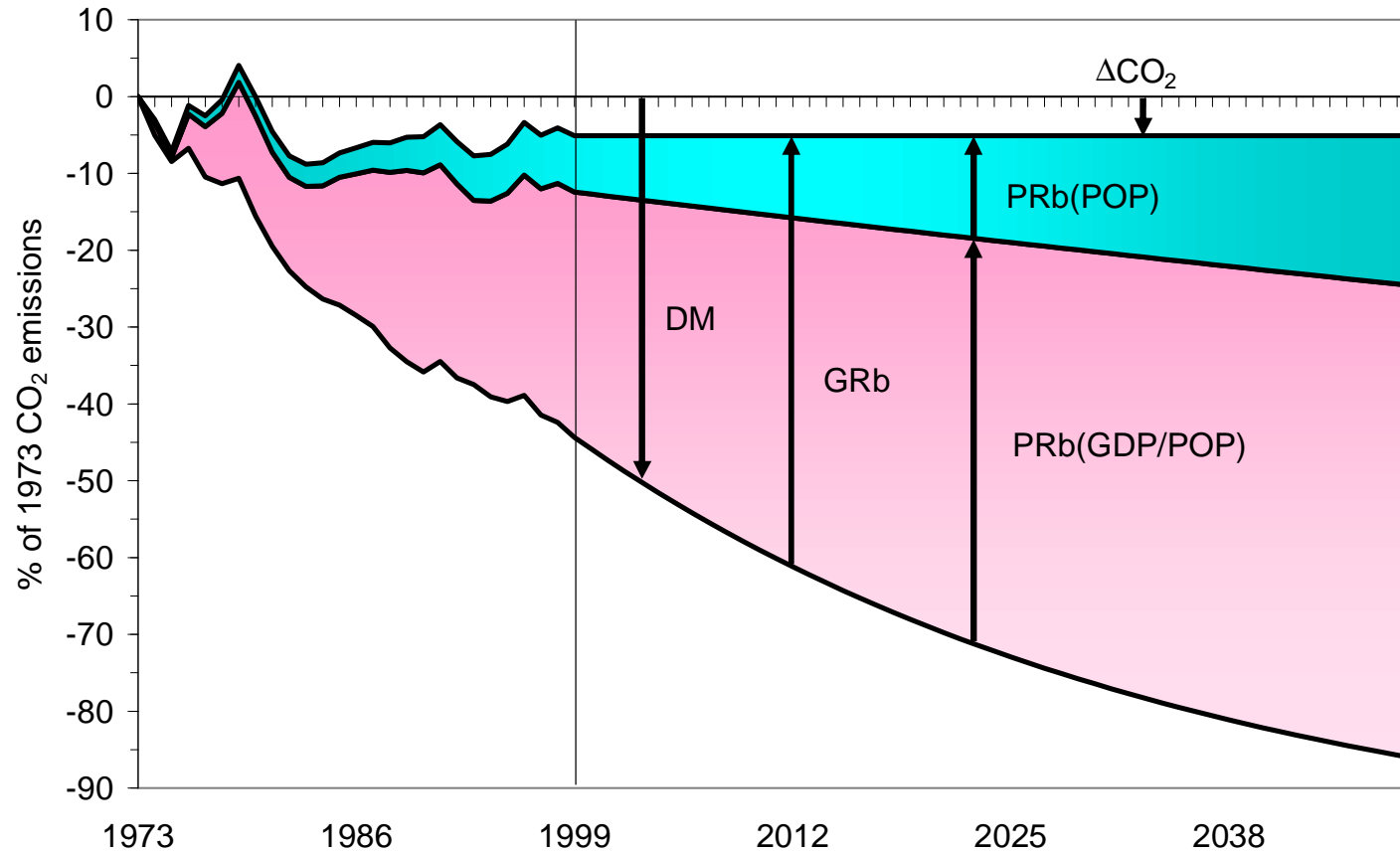


ASA forward scenario



The ASA variables as a percentage of the 1973 environmental stress (CO₂) value in the Business as usual scenario (BAU) for CO₂ emissions in the EU

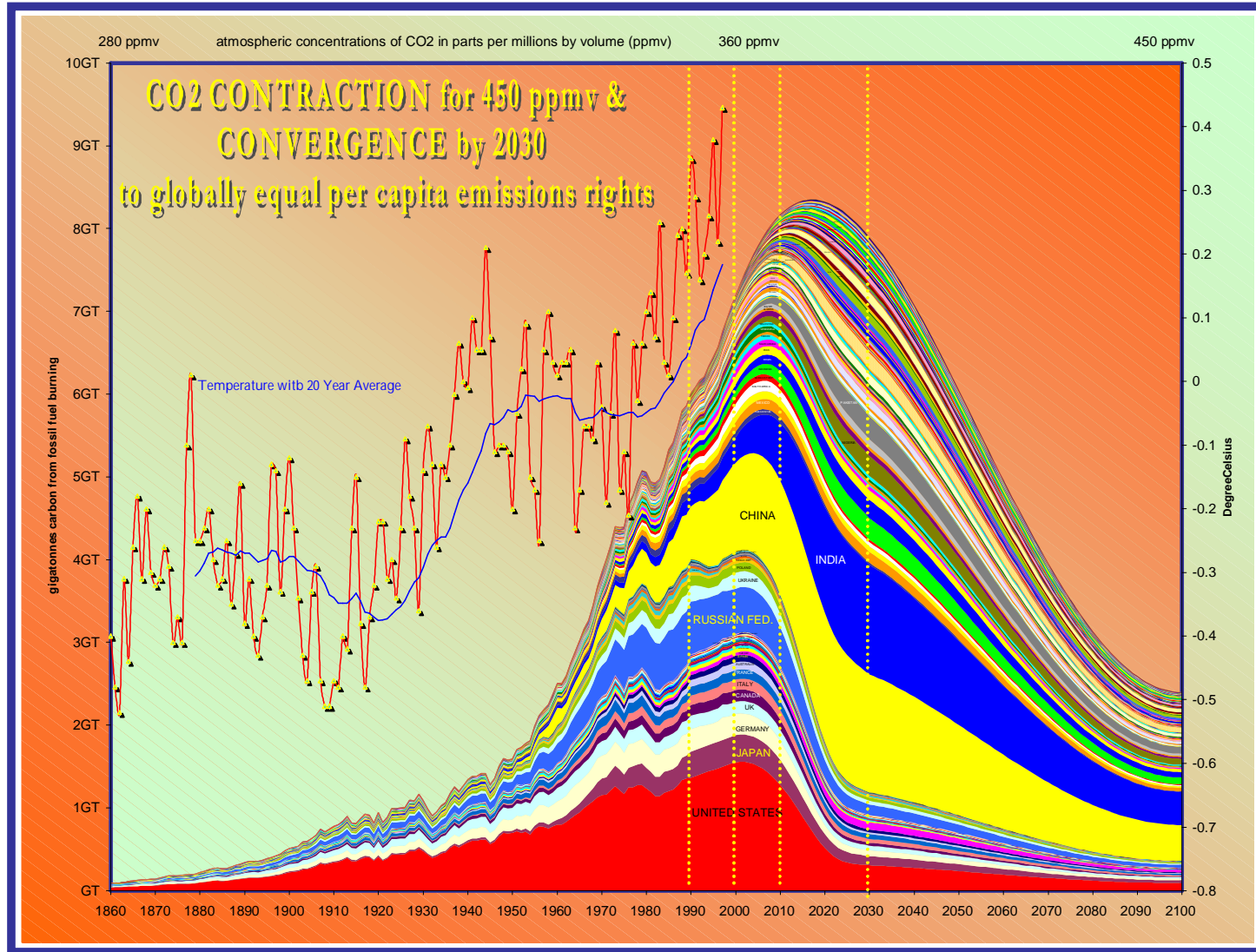
ASA backward Factor 4 scenario



Cumulative change of CO₂ emissions in the ASA Factor 4 scenario for the EU.

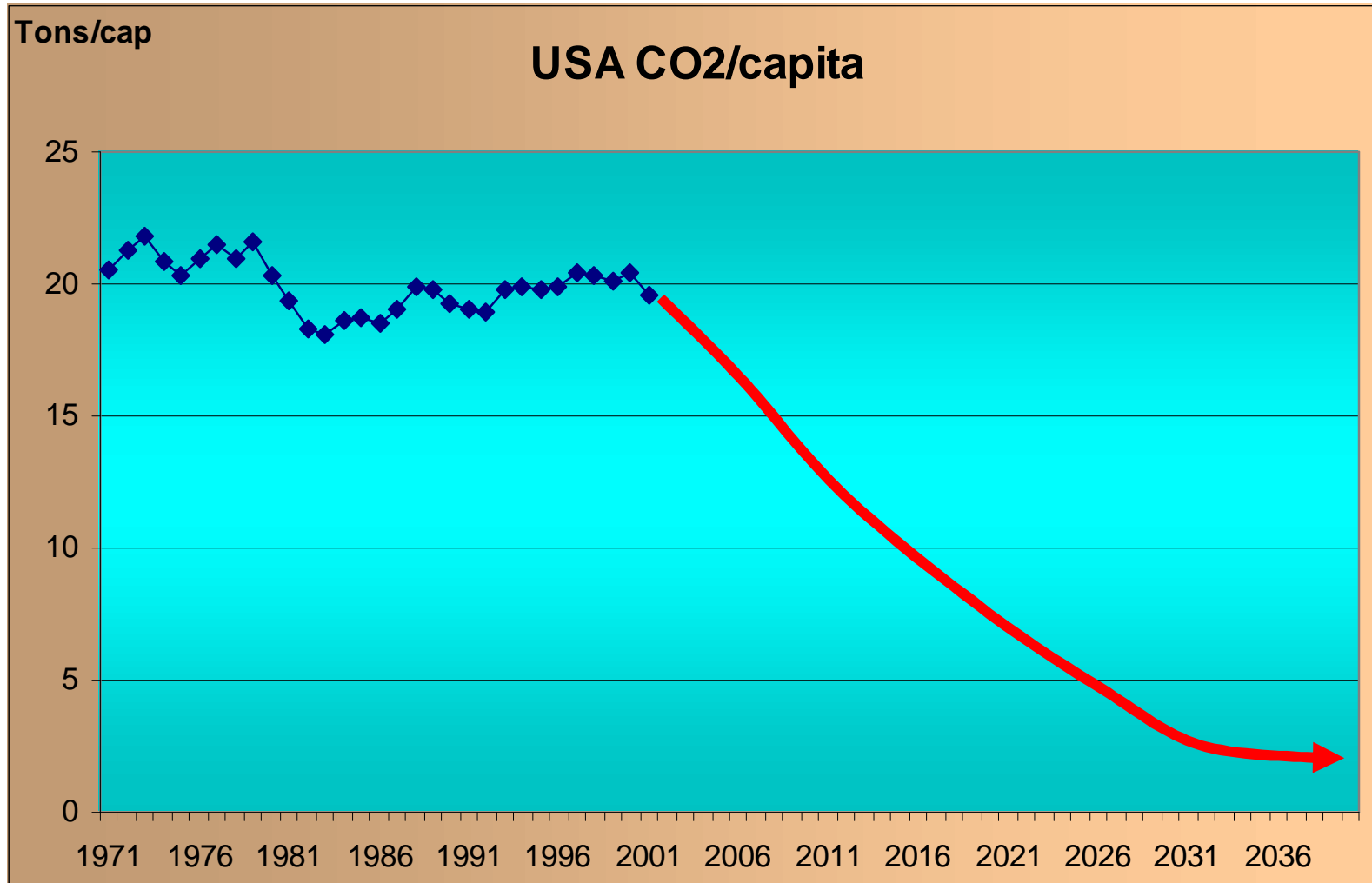


Example of intensity analysis with ASA



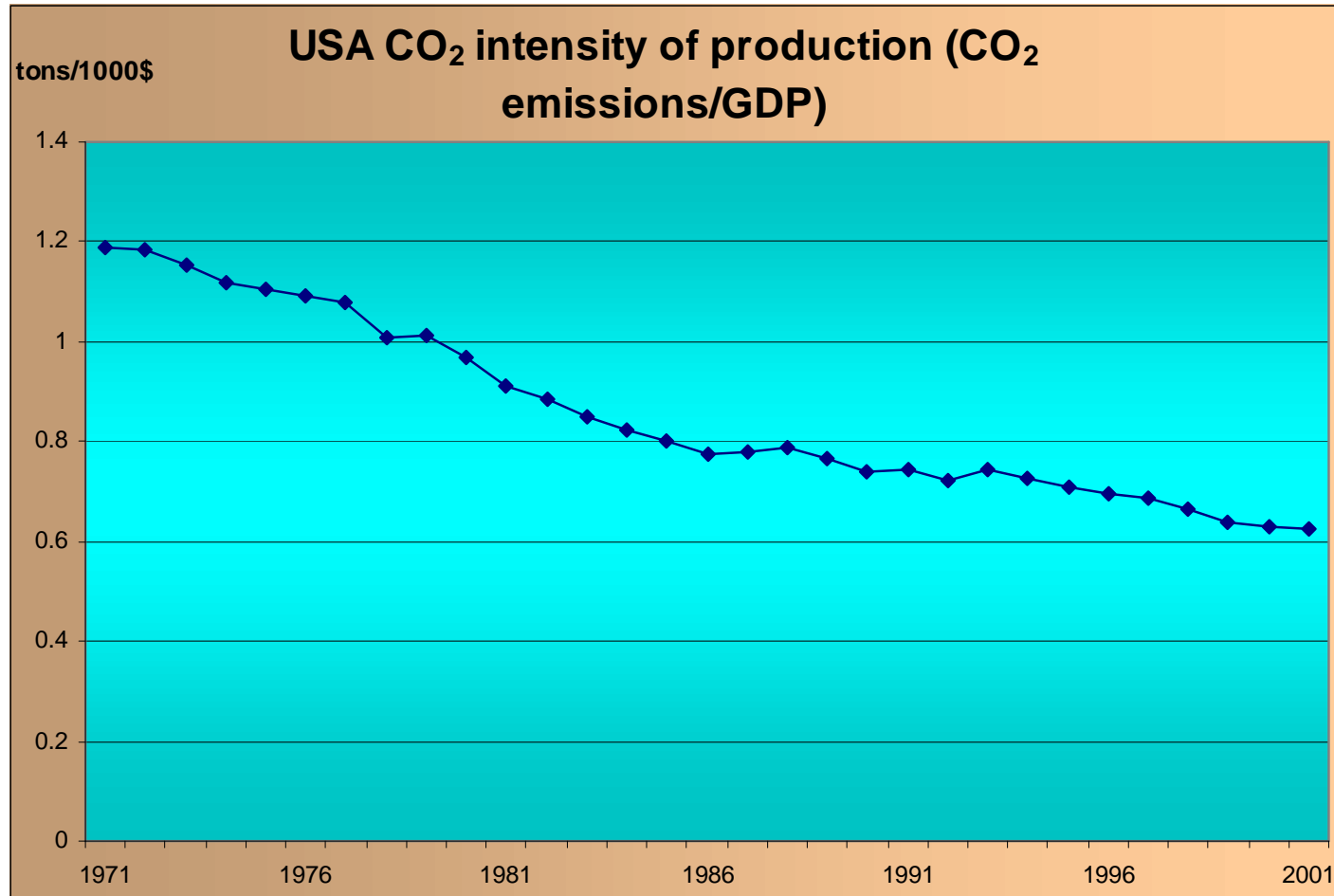


USA CO2 emissions per capita



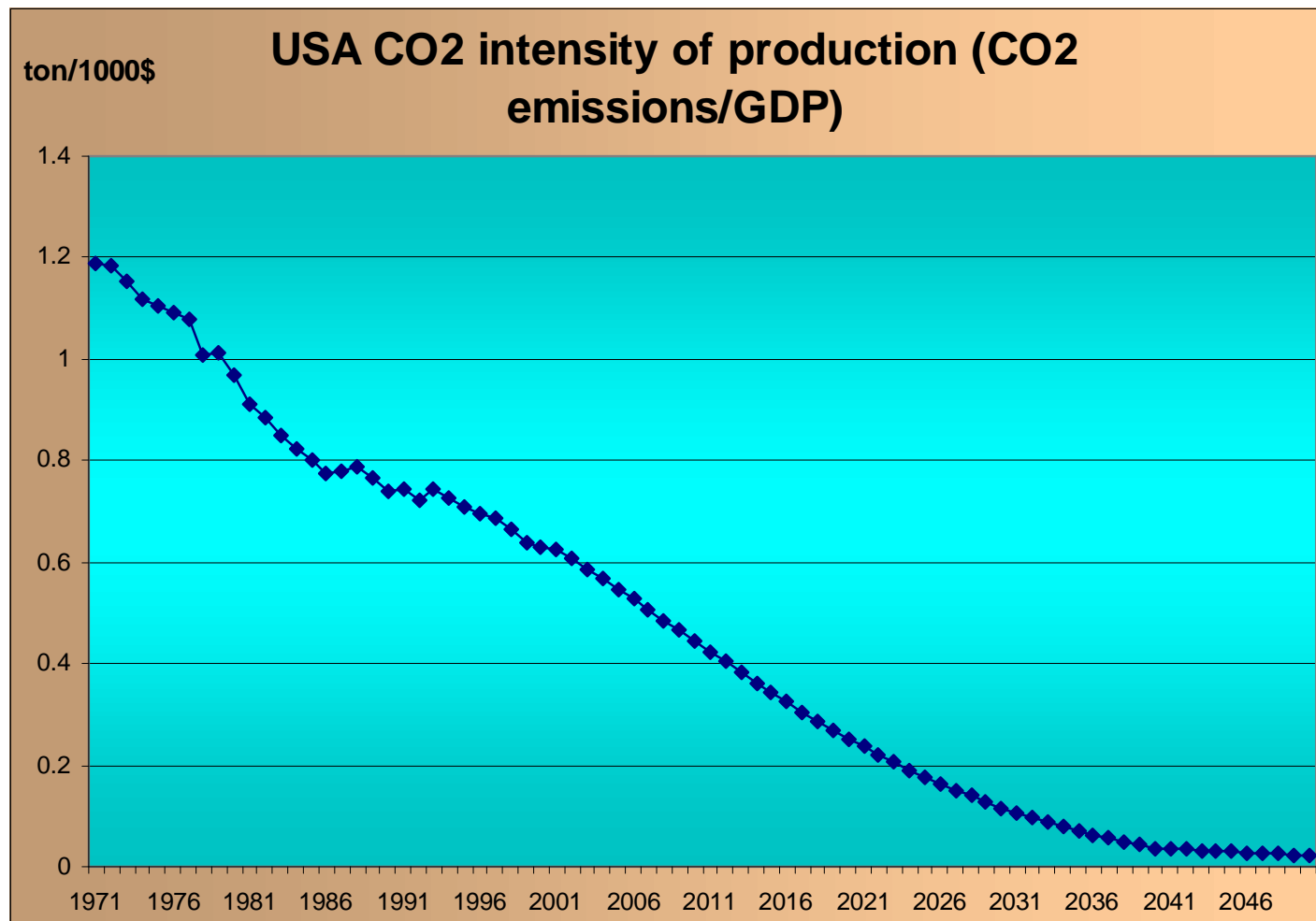


Historical CO₂ intensity development





Future development needed in USA to reach C&C target





Thank you

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Teollisen ekologian foorumi 24.11.2004