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EUSUSTEL

European Sustainable Electricity; Comprehensive Analysis of Future European Demand and Generation of European Electricity and its Security of Supply

WP8.2: „Development of conceptual framework for sustainable electricity supply“ – Input for discussion

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WP8.2: „Conceptual framework for sustainable development“

- Sustainable development is the general accepted guiding principle (concept) for further development.

Gothenburg European Council (2001)

- "Sustainable Development offers the European Union **a positive long-term vision** of a society that is more prosperous and more just, and which promises a cleaner, safer, healthier environment – a society which delivers a better quality of life for us, for our children, and for our grandchildren. Achieving this in practice requires that economic growth supports social progress and respects the environment, that social policy underpins economic performance, and that environmental policy is cost-effective."

- But, there are many different interpretations of what is meant by ‘sustainable development’.

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- Various international and national organisations have been developing criteria and sets of indicators to measure and assess one or more aspects or Sustainable Development
- Indicators for Sustainable Development in General
  - CSD
  - OECD
  - EU Commission
- Indicators for Sustainable Development of the Energy Sector
  - IAEA, UNDESA, IEA, Eurostat and EEA
  - Enquete Commission of the German Parliament
  - International Committee of Nuclear Energy (ILIC)
- But, a generally acknowledged set of specific indicators does not currently exist and approaches for integrating have not yet been established.

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Objective of the EUSUSTEL project: „*To provide the Commission and the member states with coherent guidelines and recommendations to optimise the future nature of electricity provision and the electricity generation mix in Europe so as to guarantee affordable, clean and reliable, i.e ‚sustainable‘, electriciyty supply system*“

- This requires a common understanding of ‚Sustainable Development‘ amongst the project partners, which is also be used to assess the EUSUSTEL scenarios

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Sustainability Concepts

- Weak Sustainability:
  - Substitution paradigm – postulating a largely substitutability of natural resources by man-made capital

- Strong Sustainability:
  - Non-substitutability of natural capital by man-made capital preservation of naturel capital

- Three – Pillar Model
  - Economical dimensions
  - Ecological dimensions
  - Social dimensions

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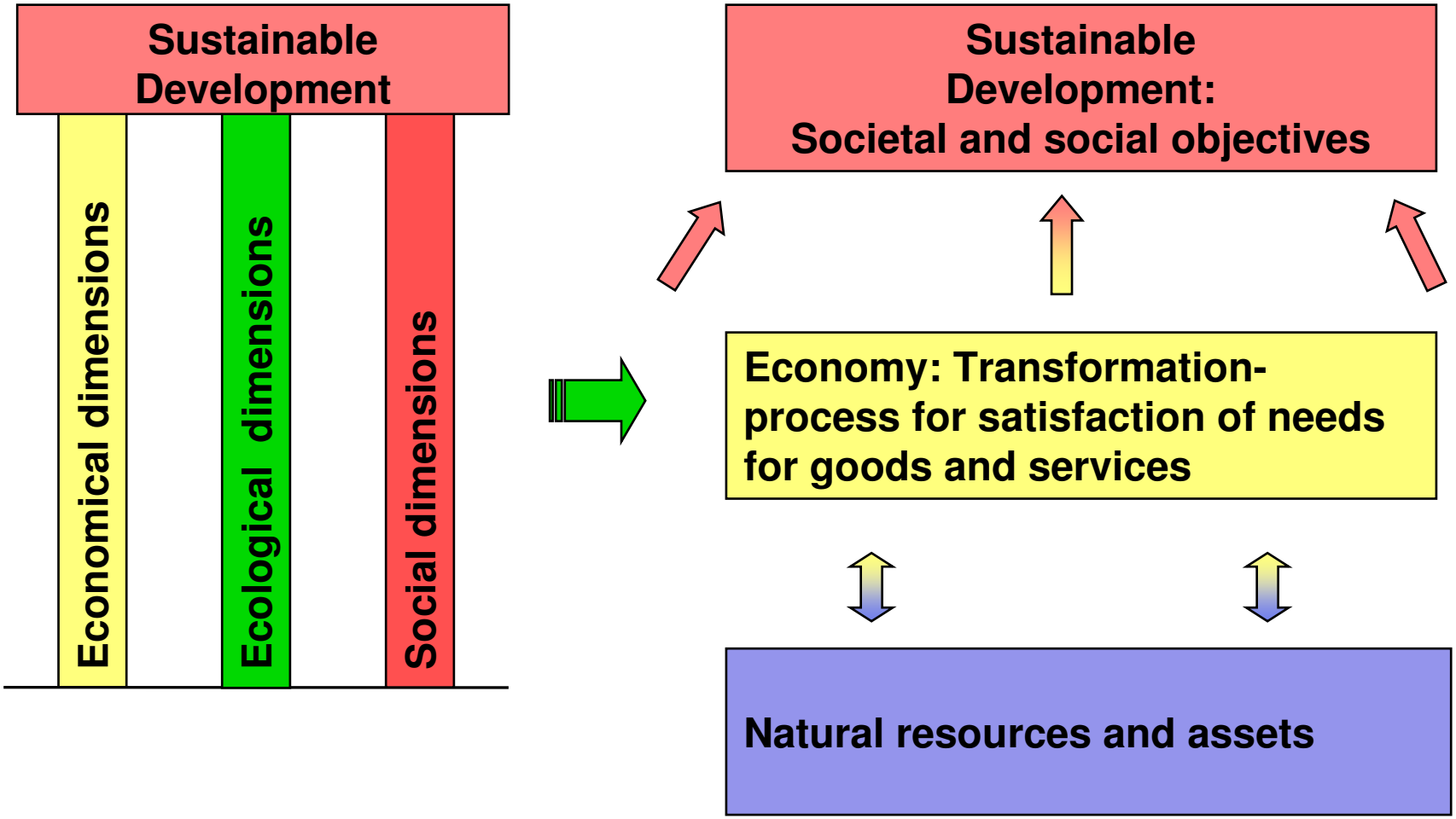

The Brundtland Commission ‘s Definition of Sustainable Development

"Sustainable Development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs".

It’s “a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development and institutional change are made consistent with future as well as present needs.”

The challenge is to simultaneously help to deliver economic prosperity, to reduce and eliminate poverty, to provide environmental quality and social equity and to maintain the natural foundations of life in spite of a growing global population.

"Sustainable development": What does it mean for the energy sector

- Scientific fundamentals
- Sustainability and the use of finite *(non-renewable)* resources
- Sustainability and the economic principle

➢ Scientific fundamentals

- Second law of thermodynamics => Life and development of economical and cultural achievements require a permanent input of workable energy and material.

- Growing knowledge (*Gestaltungsfähigkeit*) and the connected possible technological progress create the base for preserving and expanding the abilities of future generations.

- Environmental pollution results from the release of substances into the environment, not from the energy degradation.

➢ Sustainability and the use of finite *(non-renewable)* resources

- Can the use of finite resources (e.g. Oil and Coal) be consistent with the principles of sustainability?
- Supply of energy service requires the use of workable energy, but also the use of non-energetic resources and materials.
- Use of finite resources require a compensation
  => the expansion of resource quantities available technically and economically.
- State of technology determines the technological-economical available base *(potential)* of raw materials and energy.

Sustainability and the economic principle

- Prudent use of scarce resources represents a key aspect of sustainability.

- Also the general economic principle targets at minimising the use of resources.

  => Costs and prices are a measure for usage of resources.

- Costs can only be a measure for relative sustainability of energy systems, if all costs (including the usage of the environment) are considered.

  => Internalisation of external costs (Getting prices right).

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- Potential for beneficial supply of energy services for following generations should be enlarged, i.e. extension of economical useful energy and resource basis.
- Energy supply induced emission should not exeed absorption capacity of natural resources as a sink.
- Energy supply related risk for health should be smaller than the avoided natural risk due to the use of energy services.
- Energy services should be provided by a minimum of resources used, regarding sources and sinks.
- Relative Sustainability of energy systems can be measured by the amount of resouces used per energy service unit, i.e. overall private and social cost for energy provision.

Sustainable energy supply: management rules (1/2)

1. Use of renewable resources must not exceed their rate of regeneration.

2. Use of non-renewable energy carriers and raw materials requires a compensation for future generations. This compensation requires the extension of the technical-economical accessable resource base.

3. Emissions of substances into the environment shall not exceed the absorption capacity respectively the ability for assimilation of the natural environment.

4. Hazards and risks for human health and environment from energy provision should be smaller than the avoided natural risks due to the use of energy services.

Sustainable energy supply: rules for orientation and activities (2/2)

5. Energy services should be provided by a minimum of resources used, I.e. with the possibly lowest total costs (private plus external costs).

6. Relative Sustainability of energy systems can be measured by the amount of resources used per energy service unit, I.e. total (social) cost.


Thank you very much for your attention!