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Frameworks used in sustainability assessments of nuclear fission power

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Outline

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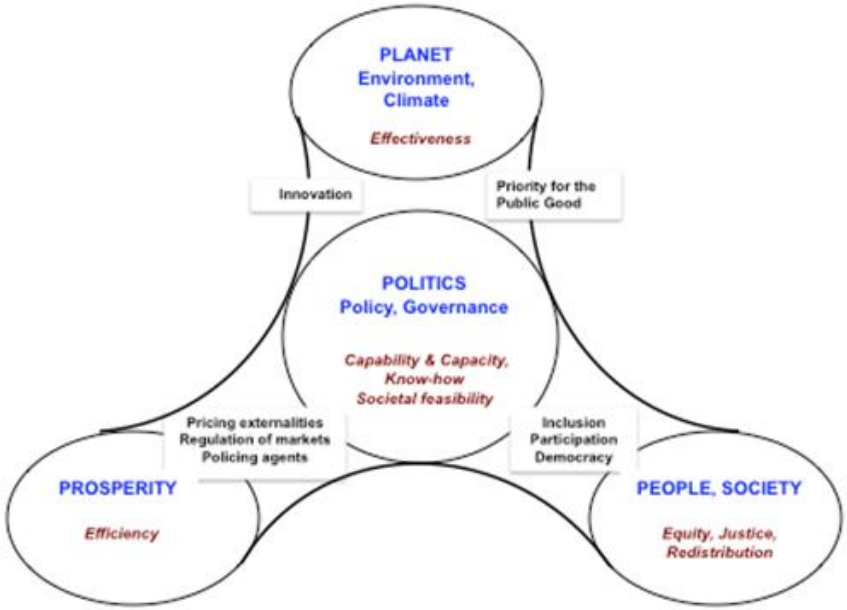
1. Rationale

- Nuclear industry grasps **climate change issues** to lay foundations for a third nuclear renaissance
- Major institutions (IAEA, IEA, UK gov) focus on the **marketability** of nuclear power, overriding sustainability concerns
- **Fundamental question**: can nuclear power play a role in future electricity systems, built and run to support sustainably developing societies?

2. The Sustainable Development Paradigm

- Sustainable Development: inclusive definition
  - Interpretations diverge; some perceive it as vague

  ⇔Three concrete actions: **growth control, redistribution & societal change**
- 4 Dimensions:
  - Planet
  - People
  - Prosperity
  - **Politics**



3. Nuclear Power expansion in the past

- First wave: "Atoms for peace" (1953)
  - Abundant, clean& cheap power
- Second wave: Oil crises in 1970s
  - Back-stop supply
- Third wave (?): Climate change

- 60 years of nuclear power:
  - Massive support: R&D budgets + public
  - Nuclear sector visions and strategy didn't really change
  - Criticism and incidents are not valued to their full extent

4. Frameworks by main institutions (IAEA, IEA, UK)

- All three:
  - Adopt **narrow framing** of sustainable development
  - **Accept NP** as valid option without comprehensive investigation and evaluation of the past
  - Focus on the **marketability** of nuclear power, the actual assessment of sustainability is omitted

4. Frameworks by main institutions (IAEA, IEA, UK)

1. International Atomic Energy Agency
   - "To achieve sustainable nuclear energy systems on national, regional and global level"
   - SD approach: limited covering (Politics), 'responsible' NP
2. International Energy Agency
   - SD requirements are impediments, 'challenges'
   - Risk: "To reach nuclear goals, countries need to make significant efforts to **convince an increasingly skeptical public** that nuclear power should continue to be part of the future energy mix" (p.73)
3. UK Department of Energy & Climate Change
   - 'Assess role of NP in future sustainable energy system'
   - Report includes several unresolved issues and unwarranted positions

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5. Our framework for sustainability assessment of nuclear power

- A framework is proposed:
  - The world is climate-constrained
  - Urgent and drastic change implies standard scenario metholologies cannot be applied

    ⇔ decision making is a time-sequential process ((ir)revocable decisions, (ir)reversible impacts)
  - SD is globally approved as paradigm for the structuring of our common future (Rio Summit 1992)
- Built on 5 dimensions:

  Planet, People, **Risk**, Prosperity, Politics

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5. Our framework for sustainability assessment of nuclear power

PLANET: Environmental/Ecological

1. **Climate change** problems are relieved (mitigation and adaptation)
2. Ecological **resilience** of the energy system's embedding environment is preserved
3. Exhaustible finite **resources** are managed in light of future substitutes
4. Electricity use **efficiency** and deployment of **renewable electricity potentials** are stimulated

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5. Our framework for sustainability assessment of nuclear power

PROSPERITY: Economics

1. **All costs** of the nuclear system are identified, measured (or properly assessed), and billed to end-users of nuclear power
2. Technology evolves to higher economic **efficiency**: more output at reduced costs
3. **Capital investments** are **affordable** for most countries in the world
4. The electricity supply industry resulting from generation technology choices, is **secure** and **reliable**, and of low **vulnerability**

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5. Our framework for sustainability assessment of nuclear power

RISK

1. Risks are fully **insurable**, also catastrophic risks
2. Nuclear plant owners and operators are **fully liable** for risks, including long-term effects and impacts
3. **Proliferation** of technologies and know-how that can be used for nuclear weaponry is limited and reduced

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5. Our framework for sustainability assessment of nuclear power

PEOPLE: Social

1. **Electricity bills** are **affordable** (match expectations of constituencies)
2. External and future costs are allocated according the **polluter pays principle** and precluding displacement of problems and risks to the poor, to developing countries, and to future generations
3. Exposure to **harmful pressures** is low, with proper information on safety and health impacts
4. **Global redistribution** of access to natural resources and of economic wealth growth is stimulated

5. Our framework for sustainability assessment of nuclear power

POLITICS: Governance/Policy

1. A **global, independent agency** studies nuclear power issues and choices in light of its longevity, uncertainties, and irreversible impacts
2. Independent and accountable nuclear **regulatory institutions and processes** are established and publicly monitored
3. At national-regional levels, **public interest** prevails over private profit, and **democratic institutions** prevail over technocracy
4. At local levels, citizens can deliberatively commit in energy system governance, and **participate** in deployment of local energy systems

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6. Conclusion

- Assess whether nuclear power can be part of a **sustainable development** before marketability
- **Assessment framework** with SD paradigm as reference, supplemented by risk dimension for specific case of nuclear
- To safeguard the **public interest**, independent global agency and national nuclear regulatory institutions are necessary