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Innovation for Sustainable Development Network

MEASURING ECO-INNOVATION FOR A GREEN ECONOMY

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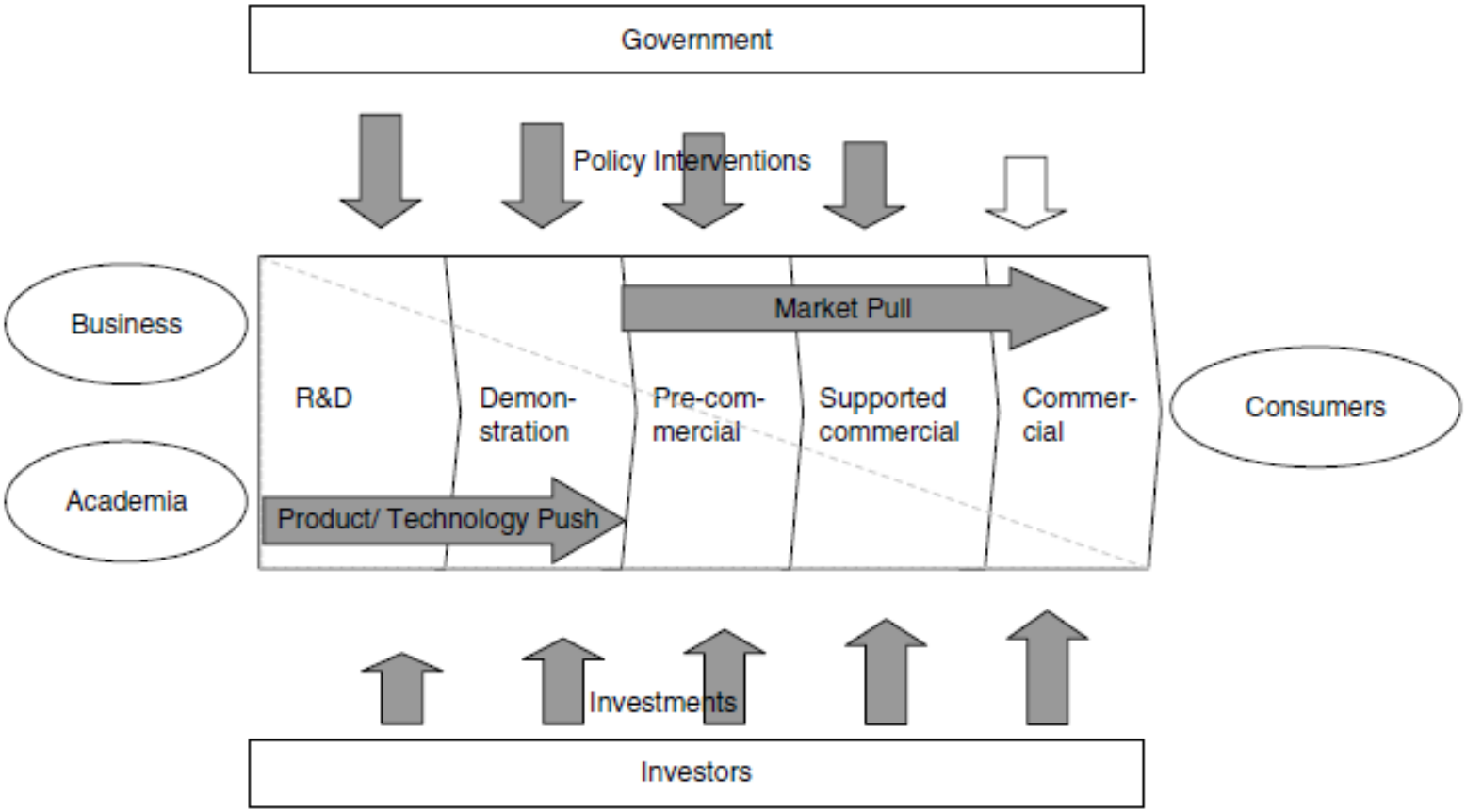
Eco-innovation

is a **new or improved product or practice of a unit** that generates lower environmental impacts, *compared to the unit's previous products or practices*, and that has been made available to potential users or brought into use by the unit.

Source: Maastricht Manual for Measuring Eco-Innovation for a Green Economy (2018)

Innovation

- Is **the introduction of novelty in the economic realm**
- Innovation is a **journey**: a generative process of which the final result is indeterminate, with parallel paths and many actors in changing networks who converge and diverge on ideas, in which there are many in-process assessments and spin-offs (van de Ven et al., 1999, p. 8). It may be set into motion by one particular impulse but is not governed by it (Foxon and Kemp, 2007)


Government
Policy Interventions
Business
Academia
Market Pull
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Consumers
Investments
Investors

A green economy

- "An economy that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities" (UNEP, 2011)
- **It is an economy whose growth in income and employment is driven by investments that:**
  - Reduce carbon emissions and pollution;
  - Enhance energy and resource efficiency;
  - Prevent the loss of biodiversity and ecosystem services

About well-being

- "One of the reasons that most people may perceive themselves as being worse off even though average GDP is increasing is **because they are indeed worse off**."
- Well-being is **multi-dimensional**:
  - i. Material living standards (income, consumption and wealth);
  - ii. Health;
  - iii. Education;
  - iv. Personal activities including work
  - v. Political voice and governance;
  - vi. Social connections and relationships;
  - vii. Environment (present and future conditions);
  - viii. Insecurity, of an economic as well as a physical nature.

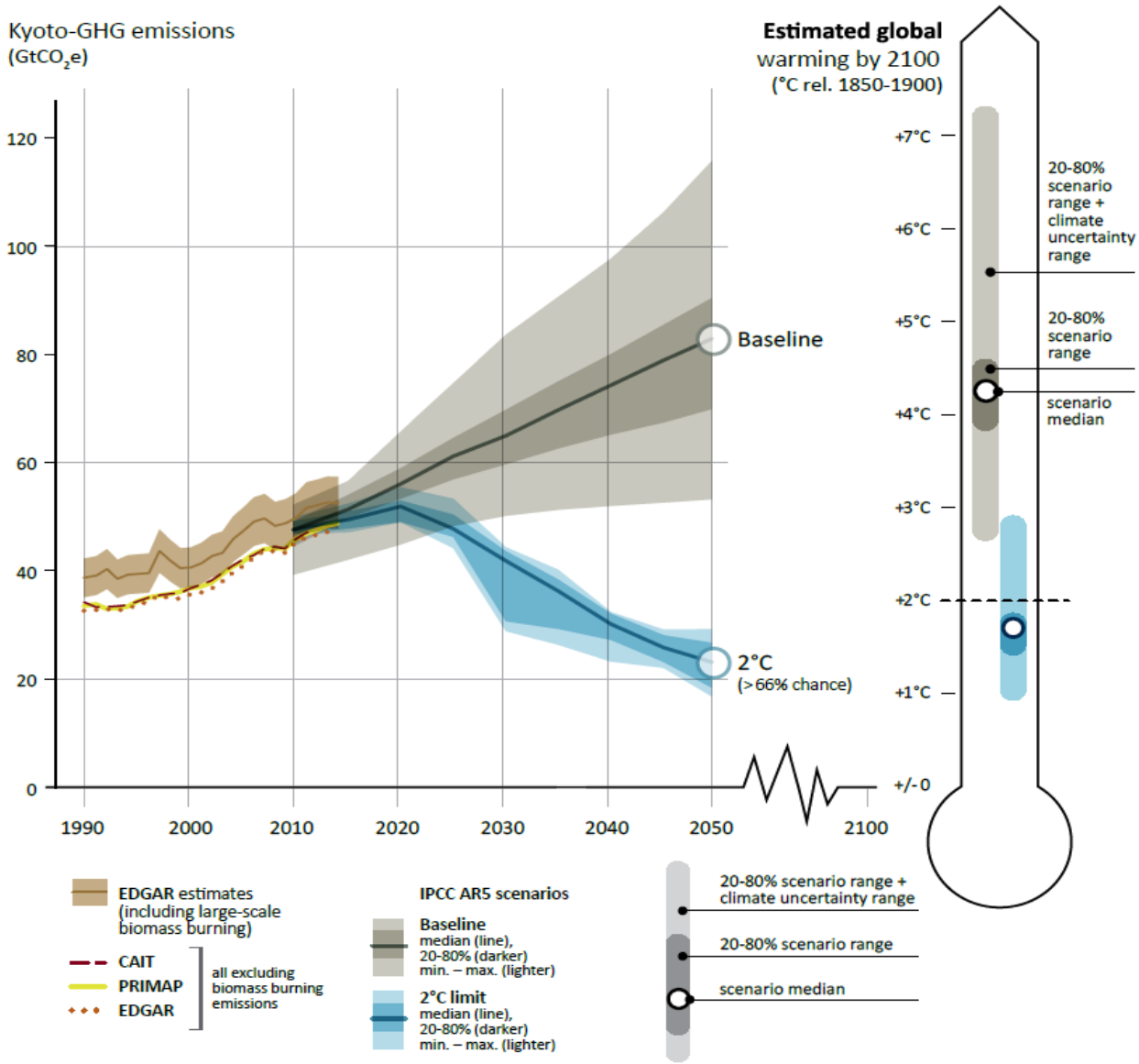
Source: Stiglitz-Sen-Fitoussi Report on the Measurement of Economic Performance and Social Progress, 2009

Environmental achievements and problems

- **Achievements**: improved water & air quality, better waste management, recovery ozone layer, green energy transition, energy efficient products, …
- **Deteriorating problems**: climate change, P+N cycle, fresh water scarcity, biodiversity losses, ..

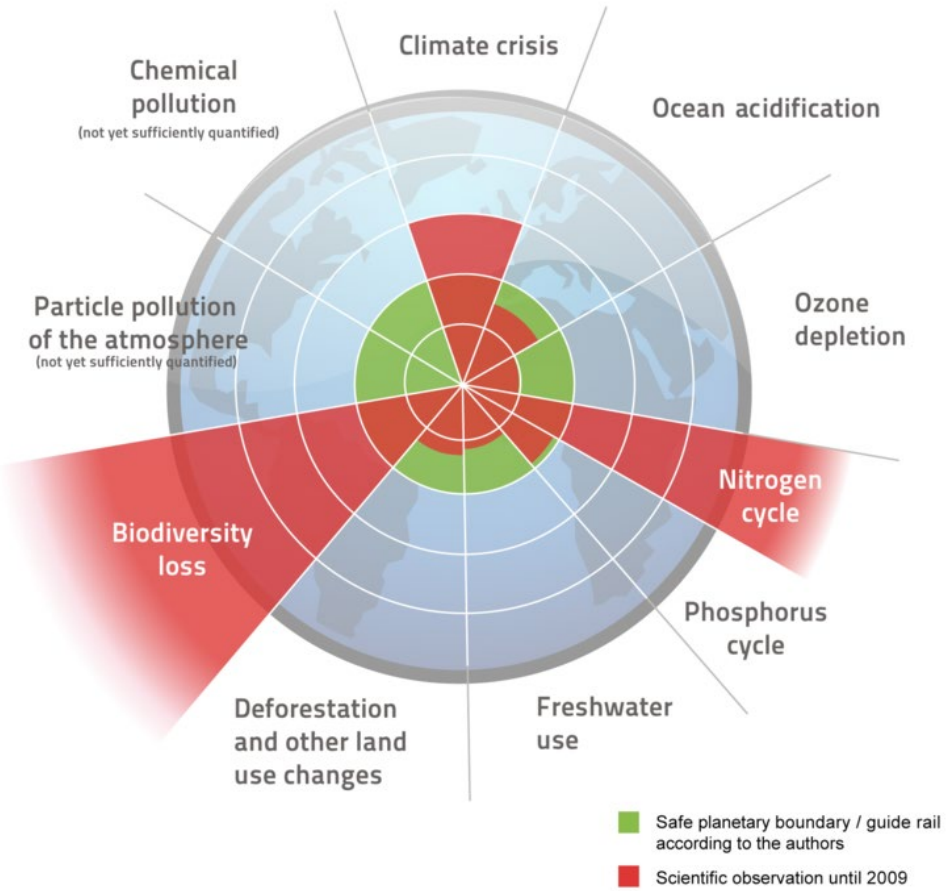
A **gap** between what is achieved and needed

Figure ES1: Historical greenhouse (GHG) emissions and projections until 2050



Source: UNEP, The Emissions Gap Report 2015

Planetary boundaries

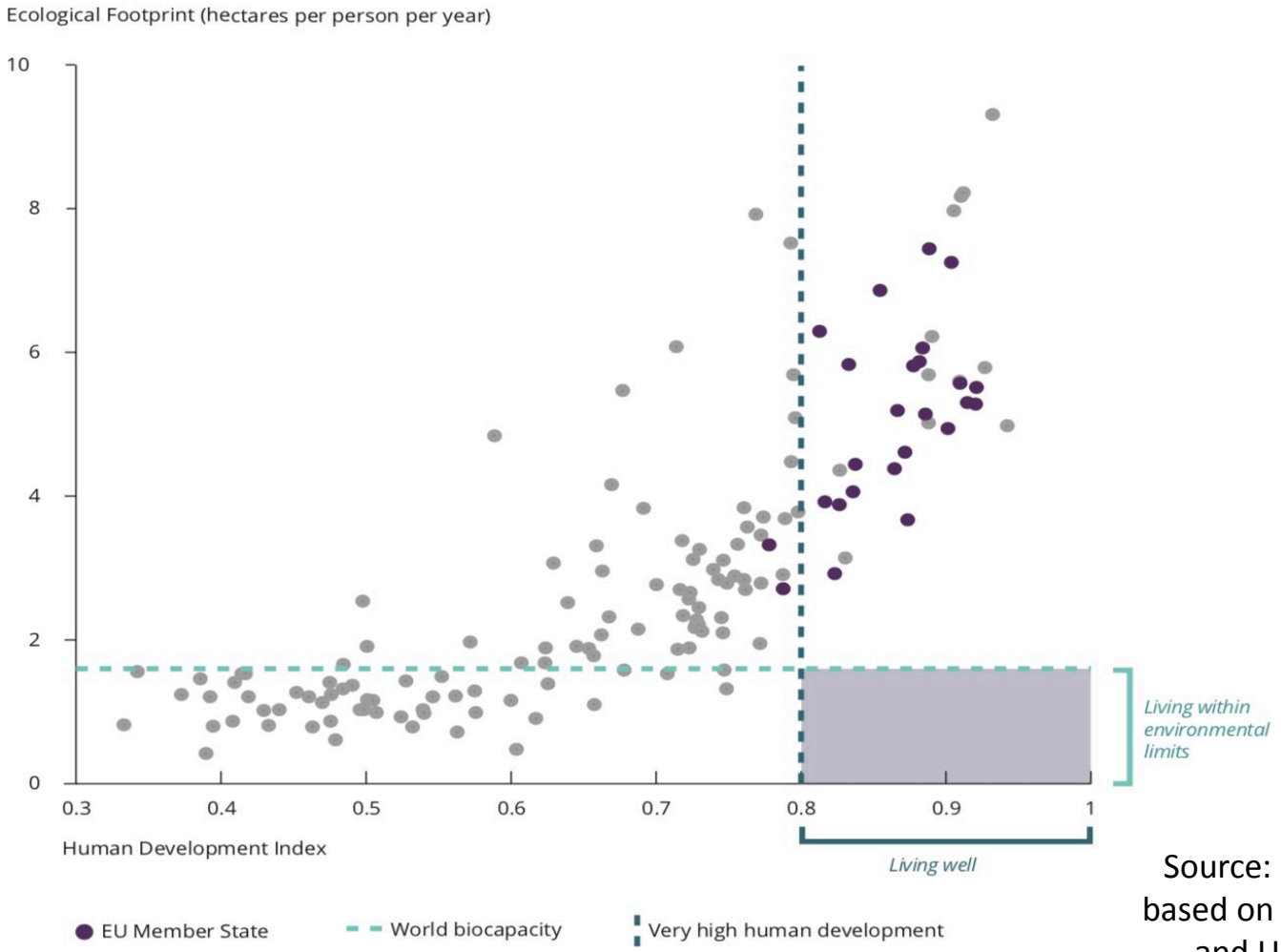


Source: Steffen et al (2015)

What is preventing an absolute decoupling?

- The **smallness** of the environmental benefits of eco-innovation compared to relevant alternatives
- **Slow diffusion** of eco-innovations
- **Environmental rebound effects** from eco-innovation (environmental impact from expenditures induced by cost savings)
- Economic growth that remains material intensive

Towards a green economy: A twin challenge



Source: EEA (2018), based on GFN (2016) and UNDP (2016)

Our proposal and contribution:
A four-pillar system of indicators

- **Environmental pressure & state indicators**: pollution, exposure rates to toxins and natural capital
- **Eco-innovation**: direct and indirect measures
- **Eco-policy**
- **Socio-economic well-being**

To address the gap to environmental sustainability

Five pointers for eco-innovation indicator measurement for a green economy

- We should **track important areas for eco-innovation**
- The *indicator* systems should contain **direct** measures for eco-innovation next to indirect measures and inputs
- We should track the extent to which eco-innovations *replace* non-sustainable practices
- **Side-effects** of eco-innovation should be considered and measured, both *positive* ones (contributing to SDG) and *negative* ones (e.g., health hazards associated with handling waste and rebound effects that stem from money that is being saved as a result of using an eco-innovation)

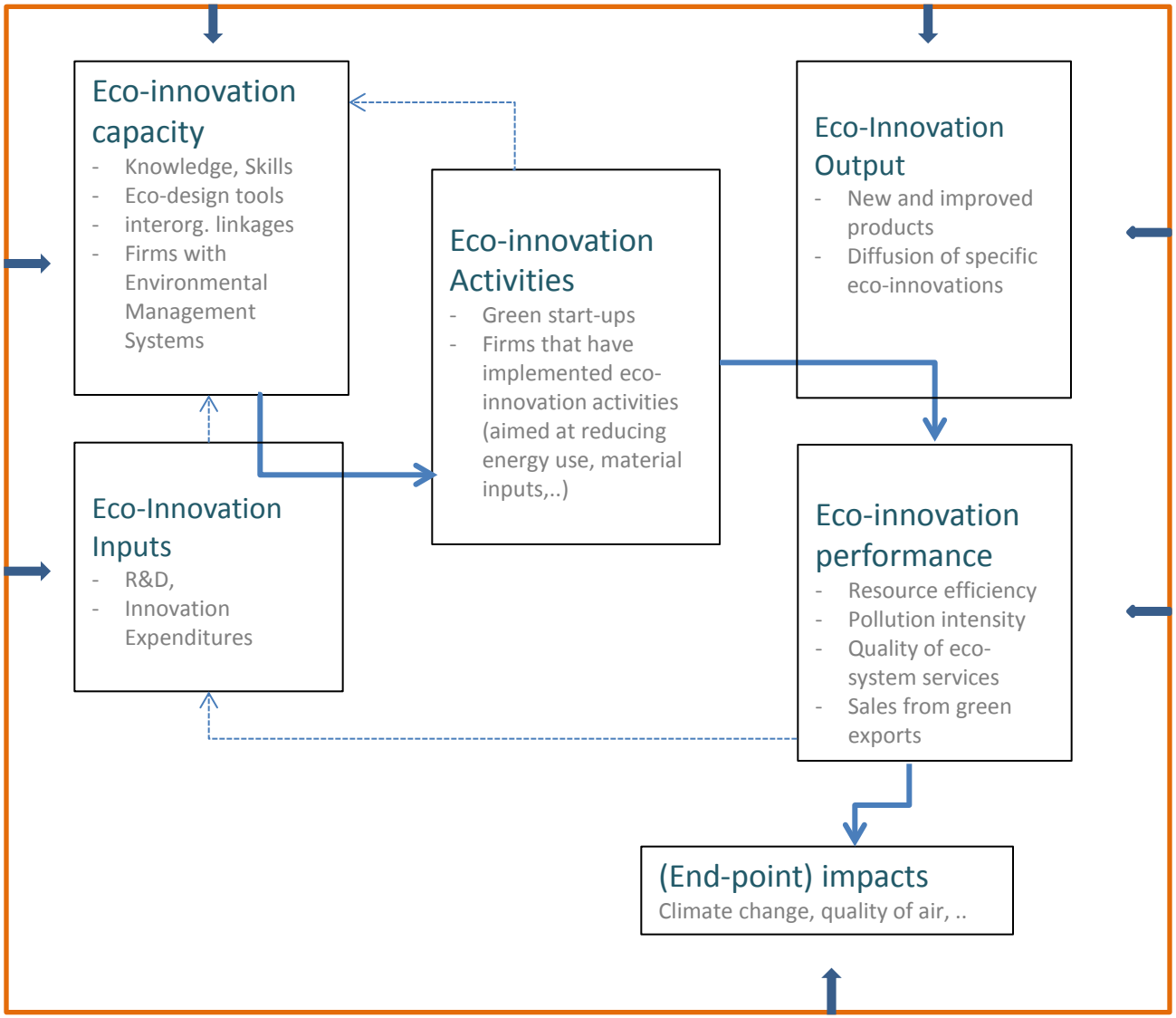
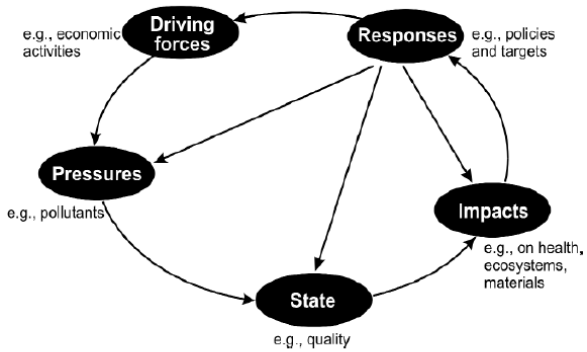
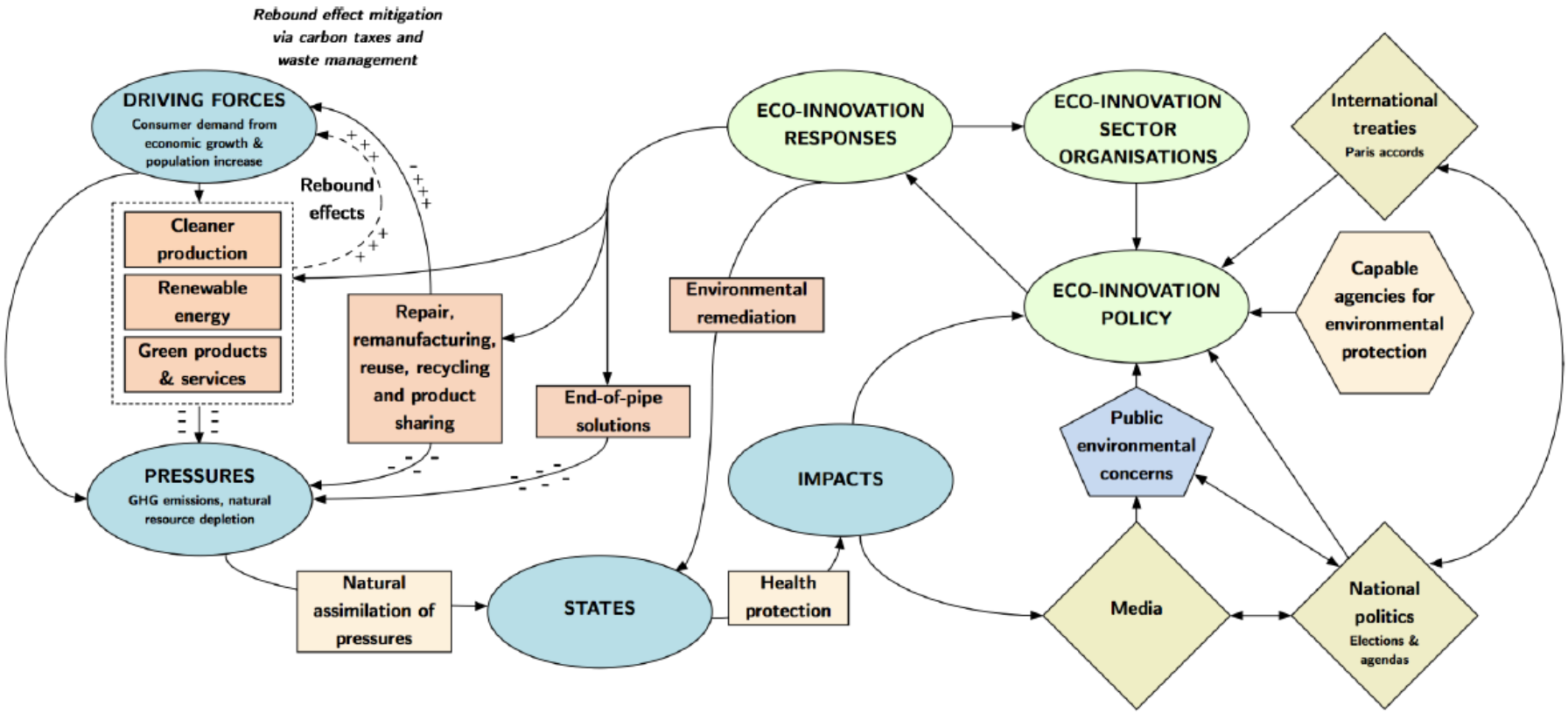

Eco-innovation capacity
- Knowledge, Skills
- Eco-design tools
- interorg. linkages
- Firms with Environmental Management Systems
Eco-innovation Activities
- Green start-ups
- Firms that have implemented eco-innovation activities (aimed at reducing energy use, material inputs,..)
Eco-Innovation Output
- New and improved products
- Diffusion of specific eco-innovations
Eco-Innovation Inputs
- R&D,
- Innovation Expenditures
Eco-innovation performance
- Resource efficiency
- Pollution intensity
- Quality of eco-system services
- Sales from green exports
(End-point) impacts
Climate change, quality of air, ..

Figure 1.2. The DPSIR framework



Source: Stanners et al., 2007, p.128

Figure 1.3. DPSIR Framework and Eco-Innovation



Next to existing indicators we need data on

- **System innovations and social innovations**. Examples include the circular economy, decentralized renewable energy systems, zero carbon transportation systems, product sharing systems, green lifestyles involving co-housing, product sharing and down shifting, etc.
- **Life Cycle Assessment data** for innovations and existing goods and services. These data can be used in economic and socio-technical system analysis to determine whether a good, service or system is an eco-innovation and for obtaining information about the nature and magnitude of environmental benefits
- **Rate of replacement** of current products or processes by eco-innovations, for instance by sector and industry
- **Ratio of eco-innovations to non-green innovations** by number, percentage of sales, process output, etc.
- Information on **stocks of capital goods and products** with details on their environmental characteristics
- **Eco-innovation improvements** (increases in energy efficiency, pollution control efficiencies, improvements in resource efficiency, etc.)
- **Trade-data** about eco-innovations that are not included in Environmental Goods and Services (EGSS)
- **Policies** relevant to eco-innovation (as drivers and barriers)

- **Data collection for policy evaluation should be designed as part of a policy learning system**. To ensure systemic learning, the system has to include formal monitoring and evaluation studies as well as a learning environment in which research results are interpreted and used in policy design.

- The capacity to learn and adapt policies to new knowledge and circumstances depends on two pillars: **evidence-based evaluations** that allow policy lessons to be drawn, and an **ability to make societal actors accept certain policy changes**. Platforms for interaction can facilitate useful exchanges between researchers and public and private actors about innovation possibilities and potentially useful policies.

- Data collection should support both quantitative and qualitative research methods. Qualitative data are often necessary to understand contexts and the variety of contextual factors that can influence eco-innovation or environmental outcomes. In particular, policy evaluation needs to pay more attention to the context-specific mechanisms through which a policy wields influence and assess, where relevant, the reasons why a policy lacks influence. The data and research requirements of dealing with those challenges are formidable but necessary to undertake. Eco-innovations address wide-ranging environmental problems, calling for. **eco-innovation assessment and appropriate policy mixes**

Maastricht Manual
on Measuring Eco-Innovation
for a Green Economy

Deliverable 2.5 of green.eu project

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