

GPP as an environmental policy instrument

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- Involved in research projects and activities related to:
 - Behavioral and experimental economics
 - Economics of waste and CE
 - Eco innovation

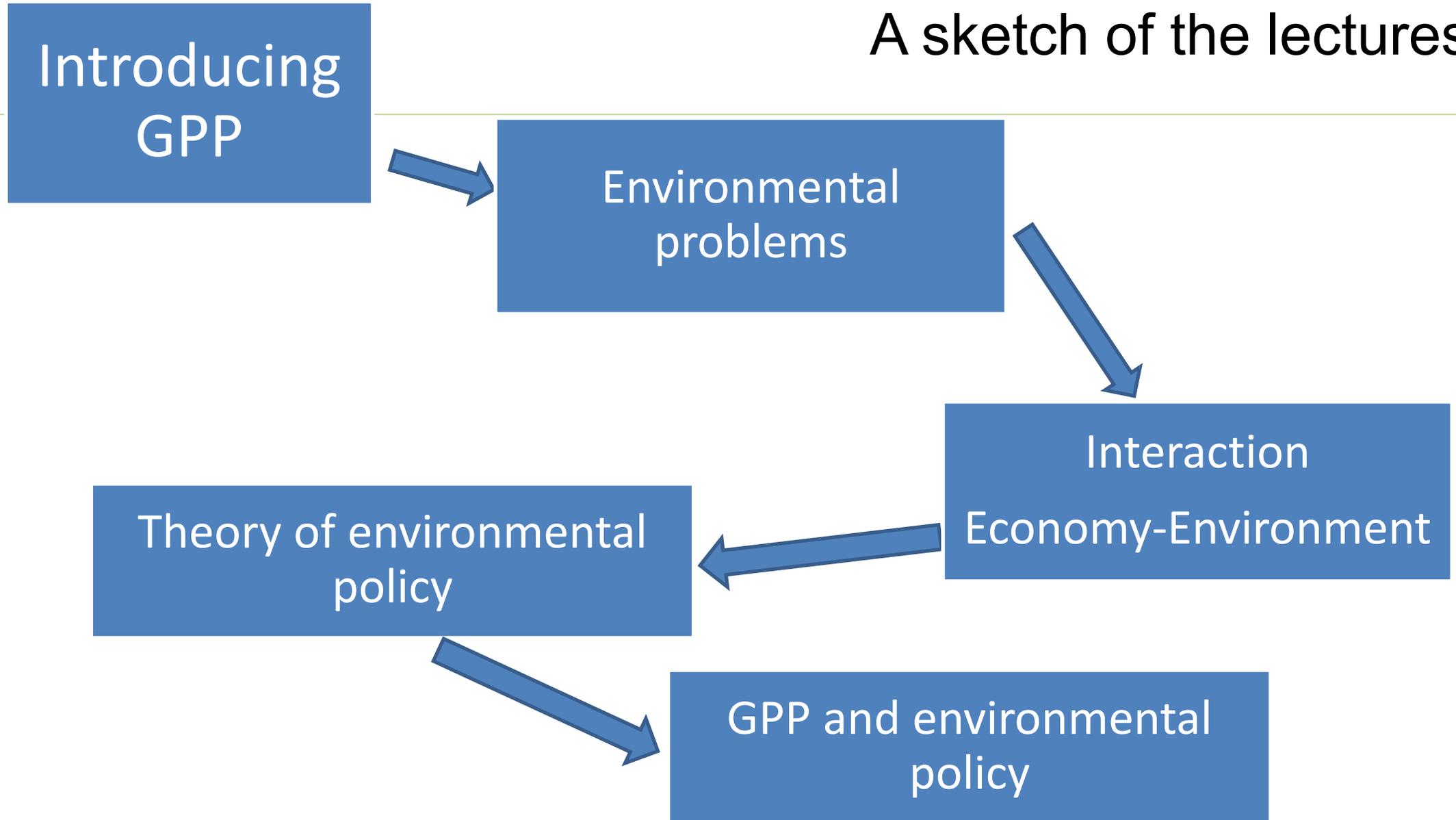
Collaborations with:

- EC-JRC
- EEA
- OECD
- Italian Ministry of the Environment

Teaching:

Environmental and Natural Resource
Economics;
Green Finance;
Sustainable Development

A sketch of the lectures



1. From Public Procurement to Green Public Procurement
 - Introduction to GPP and its application in Europe
 - Potential benefits of GPP uptake
 - Environmental benefits of GPP: is it an environmental policy measure?

2. Why do we need environmental policies? Market failures and public intervention
 - Pollution as an externality
 - Setting environmental standards
 - Defining efficient environmental policies
 - The main consequence of pollution: climate change and related economic risks

3. The origin of the sustainability problem: the interaction between the economic system and the environment
 - The absence of property rights for environmental resources: the Tragedy of the commons

4. Is GPP an efficient instrument of environmental policy?

From Public Procurement to Green Public Procurement

- Public procurement refers to the process by which public authorities, such as government departments or local authorities, purchase work, goods or services from companies.
- Public concern should be considered in the procurement process different from the private market (Sung, 2011).
- Public procurement is a powerful market force
- High quality public services depend on well-managed and efficient procurement.

€1.8 trillion

is spent by EU public authorities each year
(14% of EU GDP)

https://ec.europa.eu/environment/gpp/toolkit_en.htm -- Module 1

- Generally, public procurement is done for products and industries which have potential economic and social benefits when they are diffused but have difficulty in the creation of a market due to the low technological competitiveness (Edquist et al., 2015).
- Especially among EU countries, public procurement is implemented to achieve economic growth and solve social problems simultaneously.
- Public procurement is the most direct and effective **demand-side policy** to stimulate innovation.

- ***Supply-side innovation policy:*** focuses on improvement of innovation capacity by circulation of knowledge, capital, and labor force among industries. It includes R&D program by public research institutions, R&D subsidy, and program of human resources education.
- ***Demand-side innovation policy:*** specifies the demand, stimulates the reaction of the entities of innovation, and, as a result, the willingness to innovate of these entities.
- Regulations, subsidies and tax incentives, public procurement are demand-side innovation policies.

- Public procurement (as demand-side innovation policy) may be more effective for stimulating innovation than other supply-side innovation policy tools.
- Rothwell and Zegveld (1981) and Geroski (1990): public procurement stimulates innovation more than R&D subsidy and tax grants in the long run.
- Palmberg (2004; 2005) studied commercialized innovation projects from 1984 to 1998 in the world, and concluded that about 48% of the successful commercialized projects was due to public procurement.

- **“Green Public Procurement (GPP)** is a process whereby public authorities seek to procure goods, services and works with a reduced environmental impact throughout their life cycle when compared to goods, services and works with the same primary function that would otherwise be procured.”(COM (2008) 400)
- **Sustainable Public Procurement (SPP)** is a similar concept referring to “a process by which public authorities seek to achieve the appropriate balance between the three pillars of sustainable development — economic, social and environmental — when procuring goods, services or works at all stages of the project”.
- SPP aims to improve environmental protection, energy saving, as well as labor security, small and medium-size enterprises support and a regional balance.
- GPP is subsumed within SPP with a focus on an environmental dimension.

- The terms used by countries are different, BUT the central idea in definitions is a demand-oriented policy tool to achieve desirable environmental outputs and to promote green service and products by using public procurement.
- The public sector can influence GPP both by designing suitable policies and by leveraging “green” markets through the significant share of public purchases on GDP.
- GPP is increasingly used as an environmental policy instrument, though at different paces in different countries/regions.

Green purchasing can influence the market:

Several green technologies may still be in early stages, so market and technology uncertainty exists.

Potential suppliers suffer from several problems:

1. asymmetric information for expected market demand
2. significant sunk costs in development and production
3. high path dependency on the existing technology.

By promoting and using GPP, public authorities can provide the industry with real incentives for developing green technologies and products.

- In some sectors, public purchasers command a significant share of the market (e.g. public transport and construction, health services and education) and so their decisions have considerable impact.

GPP is a voluntary instrument: Member States and public authorities can determine the extent to which they implement it.

- Austria, the UK, and the Netherlands have *mandatory green procurement* for their central governments.
- In France, green procurement is mandated for selected product groups.
- Voluntary approaches tend to be more common in decentralized countries, leaving as much autonomy as possible to the sub-central government level.

The EU has set a voluntary target of at least 50% of procurement following GPP criteria. Many countries have set their targets, ranging from as low as 20% in Poland to less than 50% in France and Latvia to as high as 100% in the Netherlands.

In some countries, green procurement's scope and targets have not been set.

In the 2008 Communication “*Public Procurement for a Better Environment*” + Sustainable Consumption and Production and Sustainable Industrial Policy Action Plan:

the EU Commission developed common GPP criteria for 10 product and service groups:

cleaning products and services; construction; electricity; catering services and food products; gardening services and products; office IT equipment; copying and graphic paper; textiles; transport; and furniture.

Authorities are invited to include these criteria in their tendering procedures and thus to purchase greener products, works, and services.

For each of those product groups, the Commission has set:

- “*Core criteria*”
- “*Comprehensive criteria*”

Main findings

THE UPTAKE OF GREEN PUBLIC PROCUREMENT IN THE EU27

Submitted to the European Commission,
DG Environment

1. 26% of the contracts signed by public authorities in the EU27 included all EU core GPP criteria; 55% of these contracts included at least one EU core GPP criteria + increasing GPP uptake;
2. 38% of the total value procured included GPP criteria;
3. The uptake of EU GPP criteria varies significantly across the EU27;
4. The uptake of EU core GPP criteria varies also across product groups;
5. Many authorities face difficulties in including GPP criteria in public procurement
(On a 1 to 5 scale, the average level of perceived difficulty among all respondents is 3.06. Independent regulators and central government respondents reported the highest levels of perceived difficulty).

THE UPTAKE OF
GREEN PUBLIC
PROCUREMENT IN
THE EU27 (2012)

Figure 6 – Uptake of EU GPP in the EU27 (last contracts by number)*

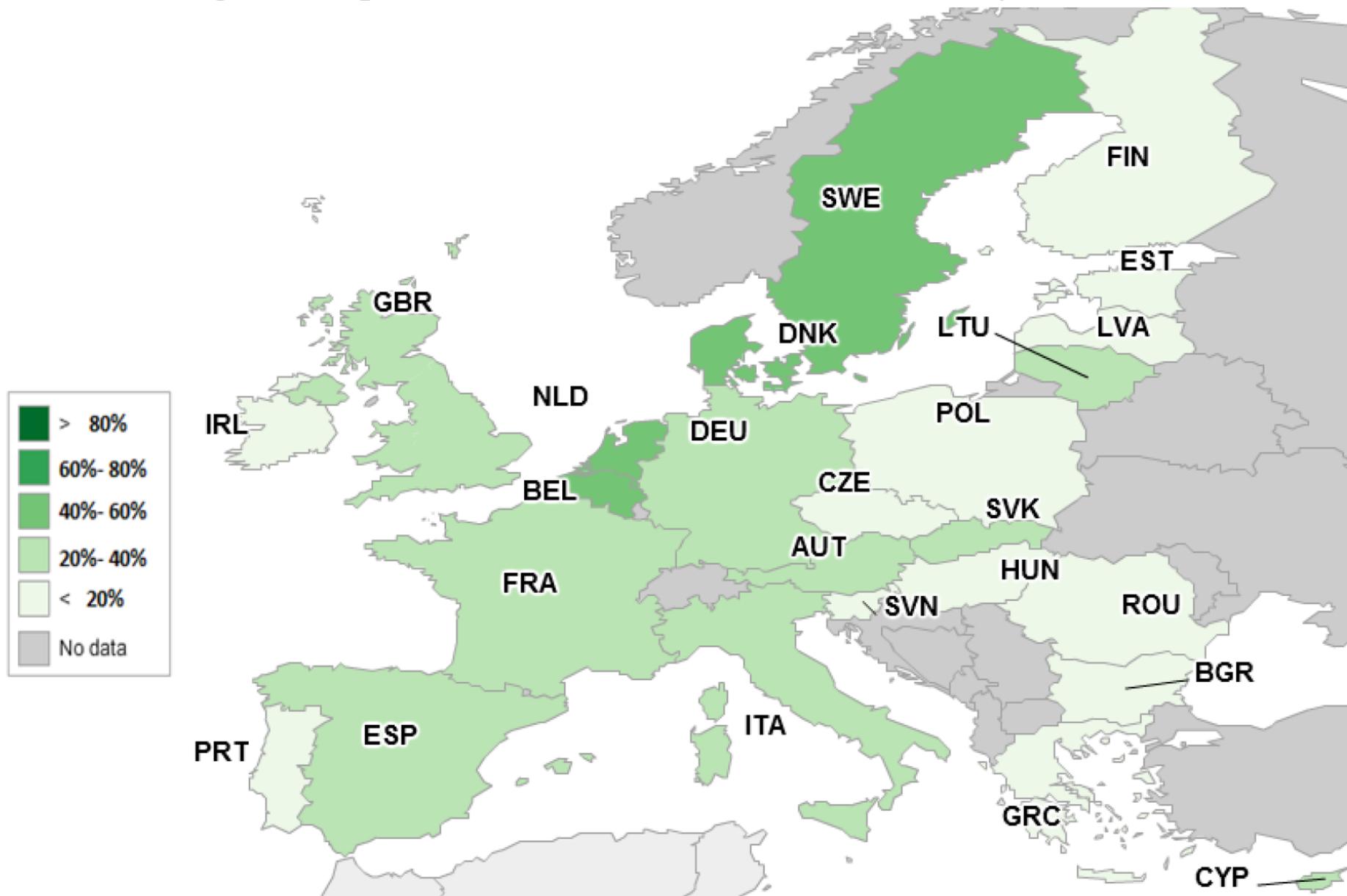
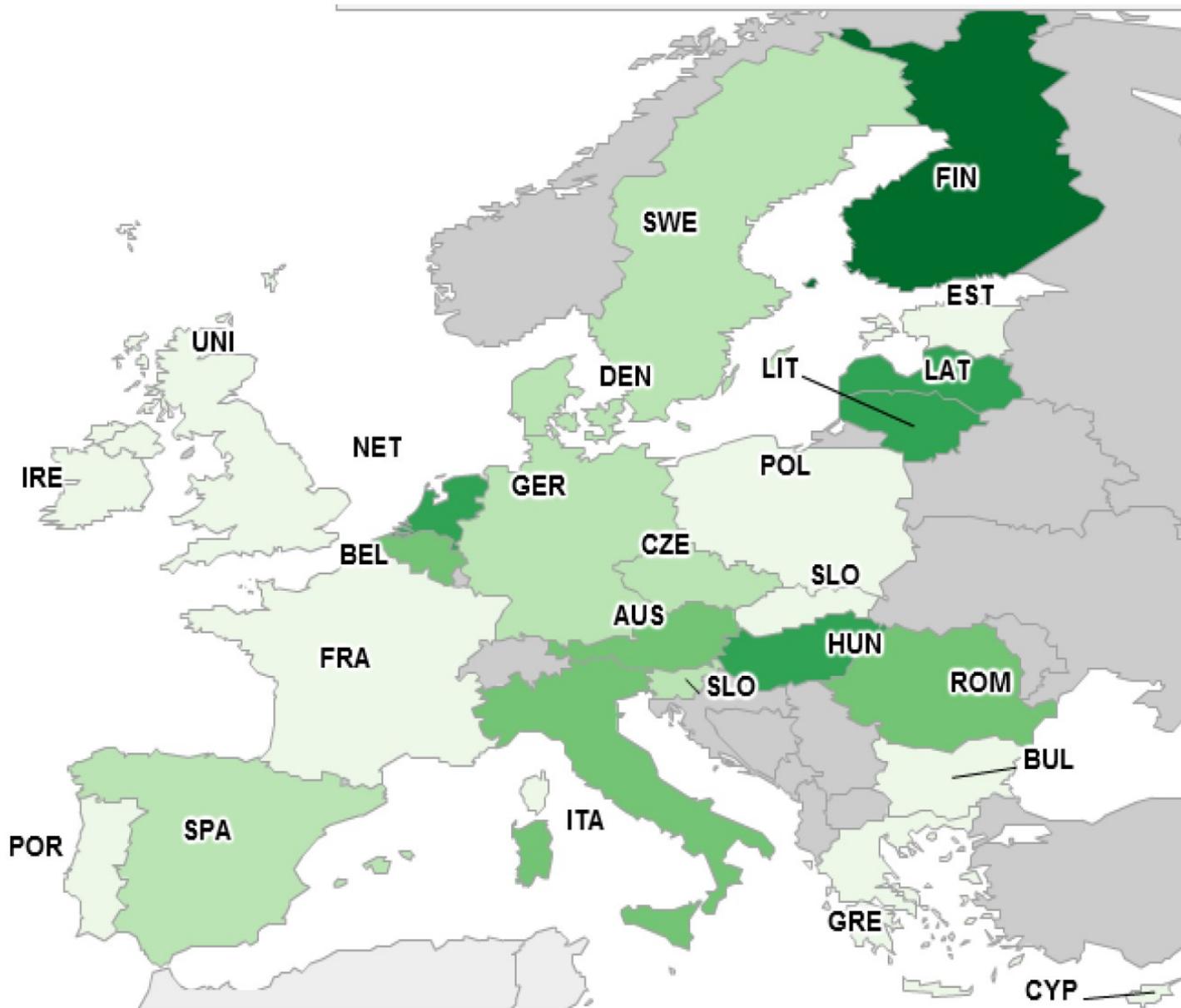
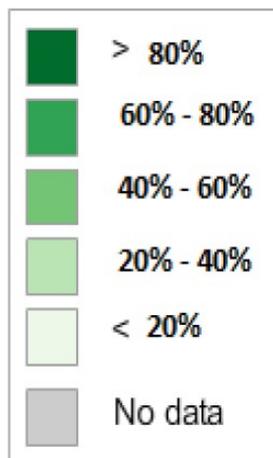


Figure 7- Uptake of GPP in the EU27 (share of all contracts in 2009-2010 – by value)*

THE UPTAKE OF GREEN PUBLIC PROCUREMENT IN THE EU27 (2012)



Possible explanations for the fragmentation

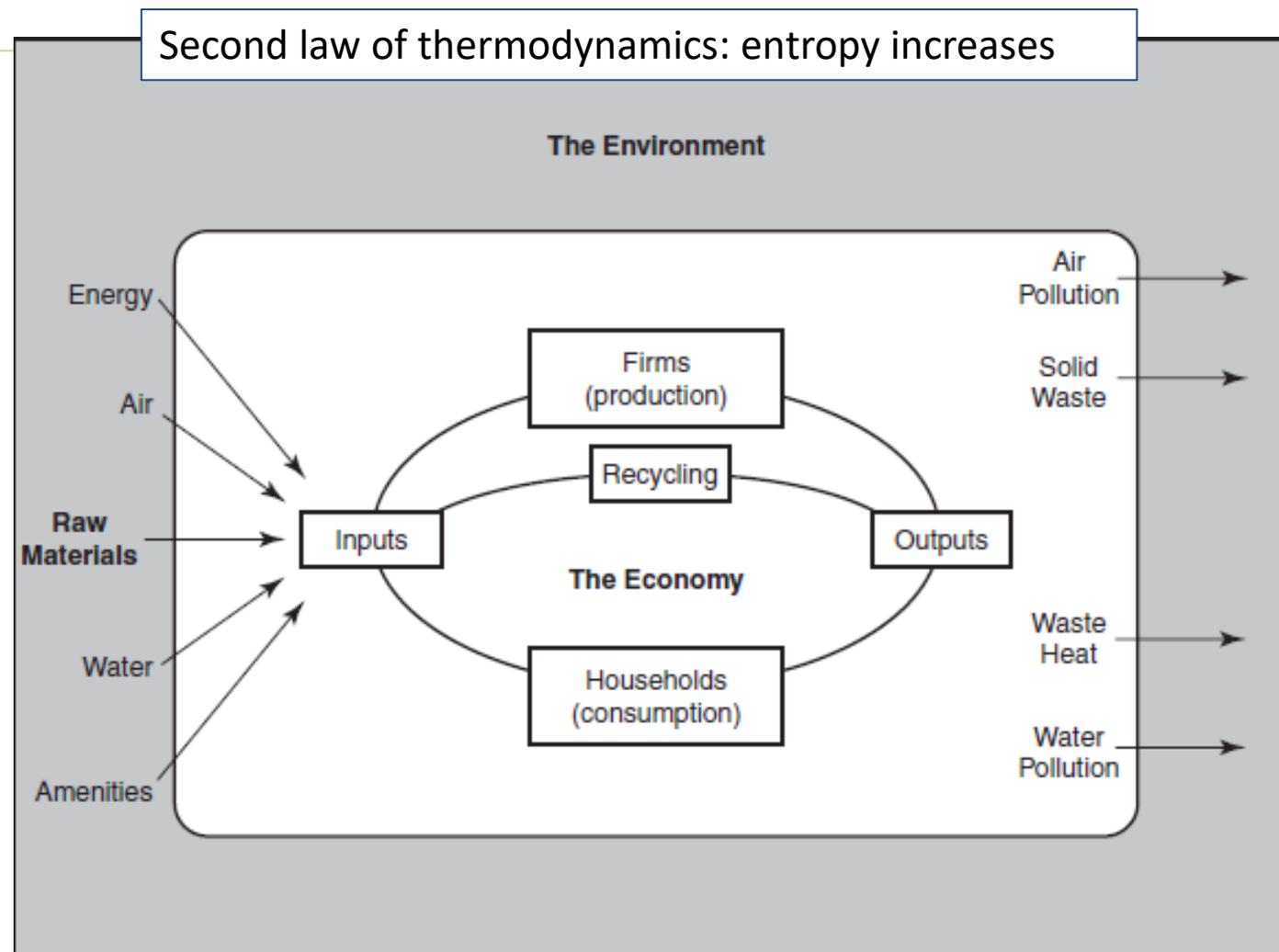
1. Existence and implementation of dedicated National Action Plans (NAPs) for GPP.
2. The variety of approaches and targets in the EU27.
3. Different practices of the inclusion of green criteria.
4. Governance-related problems.

THE ORIGINS OF ENVIRONMENTAL PROBLEMS: ECONOMY-ENVIRONMENT INTERDEPENDENCE

The origins of environmental problems: Economy-environment interdependence

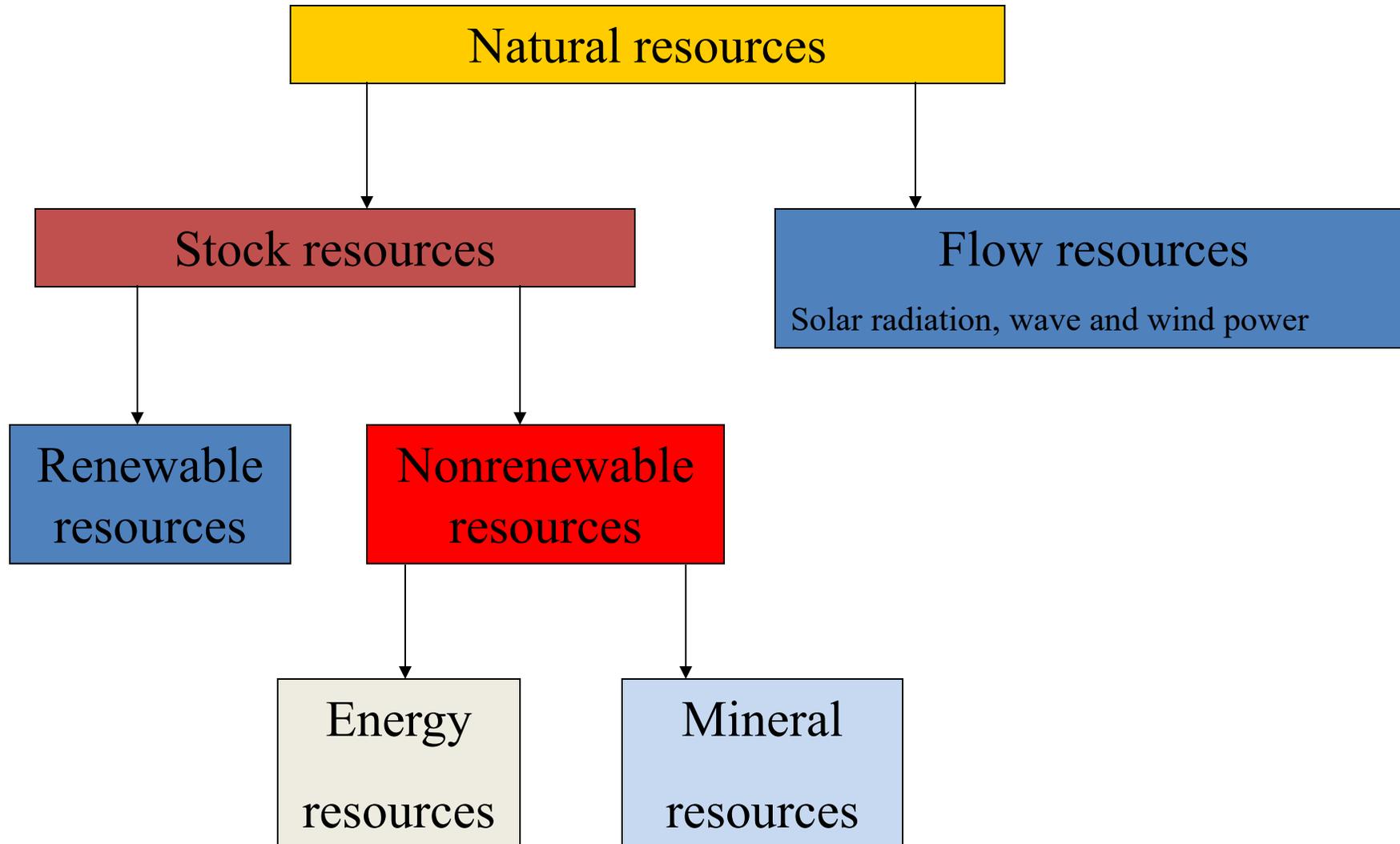
- Economic activity takes place within, and is part of, the system which is the earth and its atmosphere.
- This system is 'the (natural) environment'.
- This system itself has an environment, which is the rest of the universe.
- There are two-way relationships between the economy and the environment.

The Economic System and the Environment



First law of thermodynamics: energy and matter can neither be created nor destroyed

Classification of natural resources



The sustainability problem

Interrelationships between economic system and the environment are at the origins of the sustainability problem:

“how to alleviate poverty in ways that do not damage the natural environment”

The sustainability problem

The report that WCED produced in 1987 – *Our common future*, also known as “*the Brundtland report*”- advanced, with great effect, the concept of “sustainable development”, which is now on political agendas around the world:

“development that meets the needs of present generations without compromising the ability of future generations to meet their needs”

Different ways of conceptualizing the sustainability problem.

- Ecological vs Economic point of view.
- From an economic point of view:
- Sustainability means a path of non-declining consumption.
- Both human made capital and natural capital are used in used in production.
- Natural resources are available in a finite amount:
- What future generations will be interested in is not the amount of “oil” in the ground that they inherit from us, but rather if they inherit the capability to do the things that we now do using “oil” (Solow, 1986).

GPP as an environmental policy instrument

WHY DO WE NEED ENVIRONMENTAL POLICIES?

- In principle, we do not need (environmental) public intervention
- Markets are efficient: through the price mechanism, they ensure the efficient allocation of the resources, i.e. the maximum social welfare

Supply and Demand (price determination)

- What is a market?
 - “Demand” (MB, WTP), Demand schedule, Demand curve
 - “Supply” (MC, WTA), Supply schedule, supply curve
- Market equilibrium
- Pareto Efficiency
- Consumers and firms’ surplus

- Equilibrium Principle
 - A market in equilibrium leaves no unexploited opportunities for individuals
 - All opportunities for profit have been exploited
- Efficiency Principle
 - Main condition: marginal benefit=marginal cost
- Efficiency occurs when
 - the market-demand curve captures all the marginal benefits of the good
 - the market-supply curve captures all the marginal costs of the good

- Markets are efficient ONLY under very restrictive assumptions.
- In the presence of market power, asymmetric information, missing markets, EXTERNALITIES, PUBLIC GOODS...
- ... Markets fail (no social welfare maximization)
- There is room for public intervention
- Environmental problems are the consequence of externalities and public good characteristics => role for environmental policies

The role of policies for environmental protection

Markets generate and make use of a set of prices that serve as signals to indicate the value (or cost) of resources to potential users.

There are circumstances where a market price may not emerge to guide individual decisions (environmentally damaging activities): in the absence of an appropriate price for certain scarce resources the market leads to their excessive use.

The source of this “market failure” is what economists call an “externality.”

- Strong argument for public intervention.

What is an externality?

Externality: *Whenever an individual or firm undertakes an action that has an effect on another individual or firm, for which the latter does not pay or is not paid.*

- An externality is a link between economic agents that lies outside the price system
- Externalities are not controlled directly by price
- In the presence of externalities the outcome of markets is not Pareto efficient (agents will not take account of the external effects of their consumption/production decisions).
- Externalities are of practical importance (i.e. global warming)

Taxonomy of Externalities

- *Production externality*: the externality affects profit
- *Consumption externality*: the externality affects utility
- *Positive externality*: raises utility or profit
- *Negative externality*: reduces utility or profit

Effect on others	Originating in consumption	Originating in production
Beneficial	Vaccination against an infectious disease	Pollination of blossom arising from proximity to apiary
Adverse	Noise pollution from radio playing in park	Chemical factory discharge of contaminated water into water systems

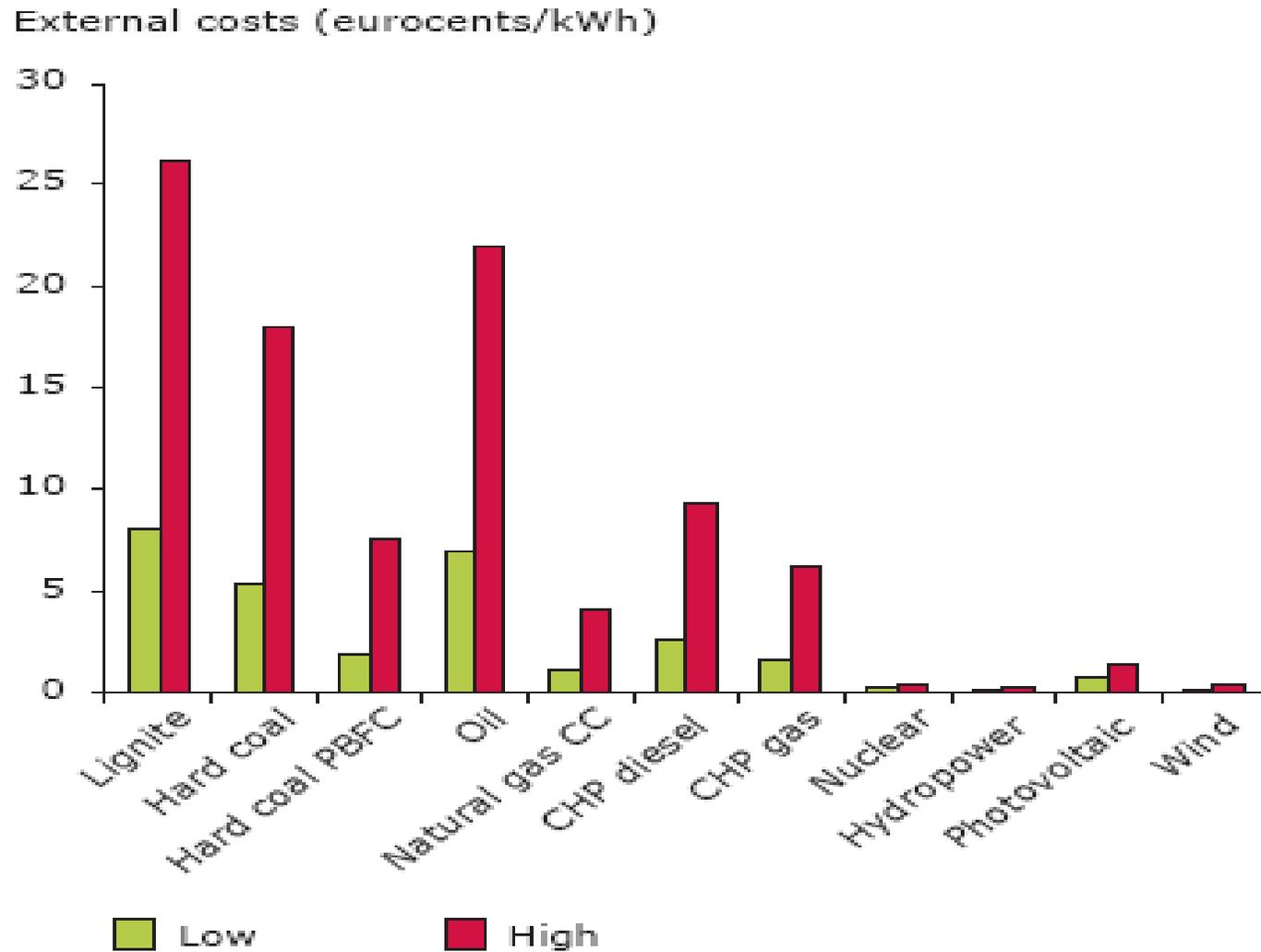
With externalities the actions of agents are not independent and not determined solely by prices.

In the case of a harmful externality, the market will produce more than efficiency requires.

- Example: a case of environmental pollution-based harmful externality:
 - where the unintended effect is from a producer to consumers
- In these case, *private equilibrium* of supply and demand is not the same as the *social equilibrium* which includes all costs:
 - $\text{Social costs} = \text{Private costs} + \text{External (environmental) costs}$

- Externalities are a source of market failure and require public intervention.
- Several environmental problems can be conceptualized as externalities.
- Environmental policies should be designed with the aim of correcting externalities.
- How should environmental policies be designed?

Externalities



Pollution as a negative externality

ENVIRONMENTAL POLICIES AGAINST POLLUTION

Two major questions about pollution policy:

- How much pollution should there be?
It depends on the objective that is being sought
(**economic efficiency**, sustainability, risk to health deemed reasonable, what is acceptable to public opinion or politically feasible)
- Given that some target level has been chosen, what is the best method of achieving that level?

Relationship between emissions and pollution damage

The extent to which waste loads generate impacts on the environment depends upon several things, including:

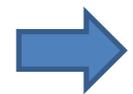
- the assimilative (or absorptive) capacity of the environment
- the existing loads on the environment
- the location, the number of people and the characteristics of the affected ecosystems

- Pollution is socially bad



should it be 0?

- Economists' point of view: Pollution creates social damages and social benefits (due to production revenues...)



there is an “optimal” level of pollution, so that reducing it causes costs to society.

Two major questions about pollution policy:

- How much pollution should there be?
It depends on the objective that is being sought
(**economic efficiency**, sustainability, risk to health deemed reasonable, what is acceptable to public opinion or politically feasible)
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- **Direct regulation/command-and-control**
 - maximum emission level
 - absolute terms
 - relative to input/output level
 - technology requirements: BAT, BATNEEC

- **Market-based instruments**
 - emission taxes
 - abatement subsidies
 - tradable emission permits

EXAMPLES OF CAC INSTRUMENTS

Instrument category	Description
<i>Command and control instruments</i>	
Input controls over quantity and/or mix of inputs	Requirements to use particular inputs, or prohibitions/restrictions on use of others
Technology controls	Requirements to use particular methods or standards
Output quotas or prohibitions	Non-transferable ceilings on product outputs
Emissions licences	Non-transferable ceilings on emission quantities
Location controls (zoning, planning controls, relocation)	Regulations relating to admissible location of activities

- Alter the structure of pay-offs that agents face, creating incentives for individuals or firms to voluntarily change their behavior.
- Change in relative prices. Two ways:
 - By the imposition of taxes on polluting emissions (or on outputs or activities deemed to be environmentally harmful), or by the payment of subsidies for emissions abatement (or reduction of outputs or activities deemed to be environmentally harmful).
 - By the use of tradable emission permit (or allowance) systems in which permits command a market price. Those prices are the cost of emitting pollutants.
- More generally, any instrument which manipulates the price system in such a way as to alter relative prices could also be regarded as an incentive-based instrument.

Instrument category	Description
<i>Economic incentive (market-based) instruments</i>	
Emissions charges/taxes	Direct charges based on quantity and/or quality of a pollutant
User charges/fees/natural resource taxes	Payment for cost of collective services (charges), or for use of a natural resource (fees or resource taxes)
Product charges/taxes	Applied to polluting products
Emissions abatement and resource management subsidies	Financial payments designed to reduce damaging emissions or conserve scarce resources
Marketable (transferable, marketable) emissions permits	Two systems: those based on emissions reduction credits (ERCs) or cap-and-trade
Deposit-refund systems	A fully or partially reimbursable payment incurred at purchase of a product
Non-compliance fees	Payments made by polluters or resource users for non-compliance, usually proportional to damage or to profit gains
Performance bonds	A deposit paid, repayable on achieving compliance
Liability payments	Payments in compensation for damage

Corrective Taxation and Subsidies

- Taxes and subsidies change the private marginal cost or marginal benefit towards the social marginal cost or benefit.
- They can therefore be used to internalize the externality.
- Taxes that correct externalities are called “Pigouvian taxation,” after A.C. Pigou.
- The optimal corrective tax is equal to the marginal damage created by pollution at the efficient level and changes PMC of the firm.
- The firm will consider $PMC + tax$

Comparison among policy instruments

- All these instruments seem to be effective in reducing emissions/reaching the efficient allocation of pollution.
- Are they really «equal»?
- Is there a criterion to identify the «best» policy solution?

Cost-effective pollution abatement instruments

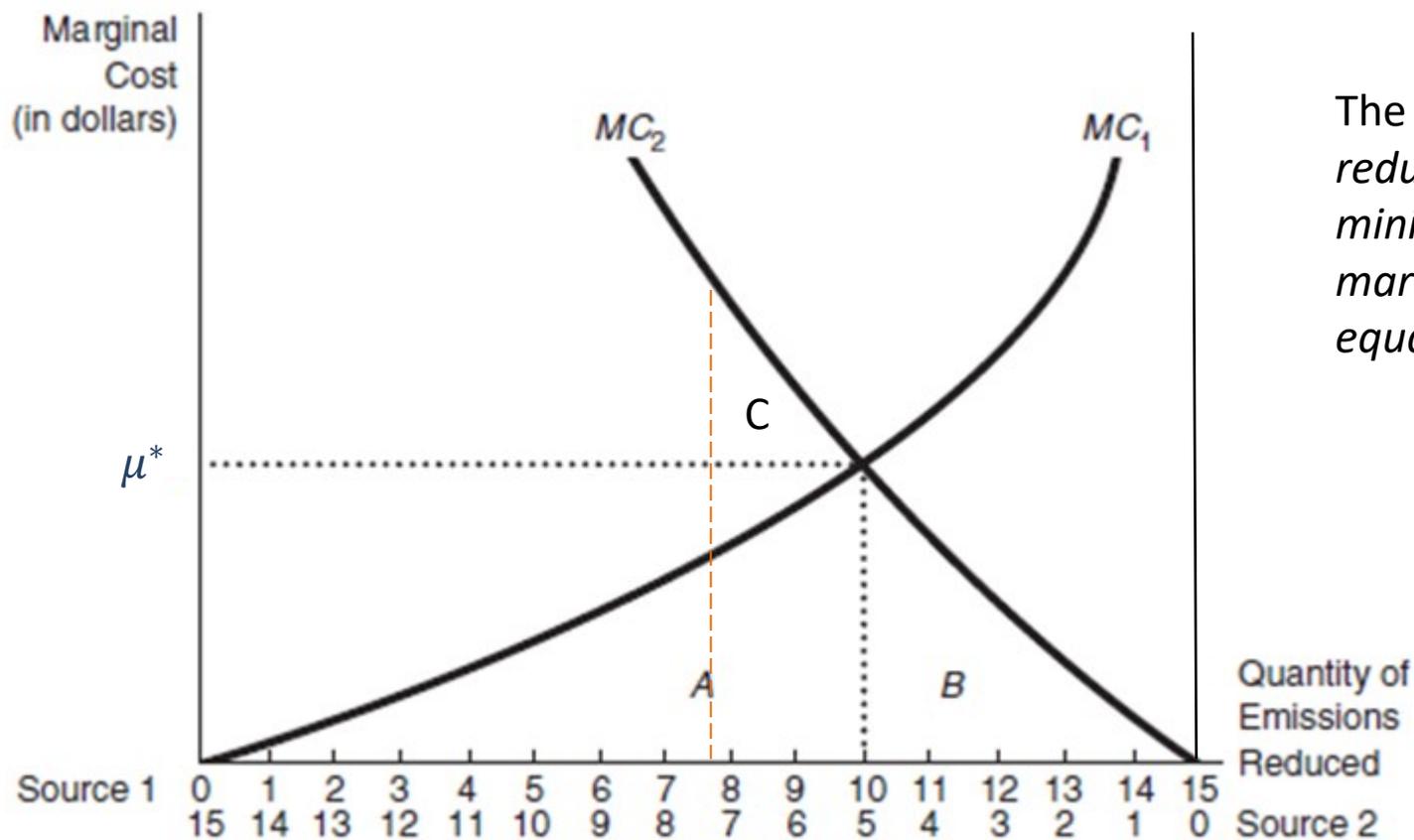
- Suppose a list is available of all instruments which are capable of achieving some predetermined pollution abatement target.
- If one particular instrument can attain that target at lower real cost than any other, that instrument is **cost-effective**.
- Cost-effectiveness is clearly a desirable attribute of an instrument.
 - Using a cost-effective instrument involves allocating the smallest amount of resources to pollution control, conditional on a given target being achieved.

Least-cost theorem of pollution control

A necessary condition for abatement at least cost is that the marginal cost of abatement be equalised over all abaters.

If a policy instrument is able to reach the pollution target at the minimum cost for all abaters, the instrument is *cost-effective*.

Least-cost theorem of pollution control



The cost of *achieving a given reduction in emissions will be minimized if and only if the marginal costs of control are equalized for all emitters*

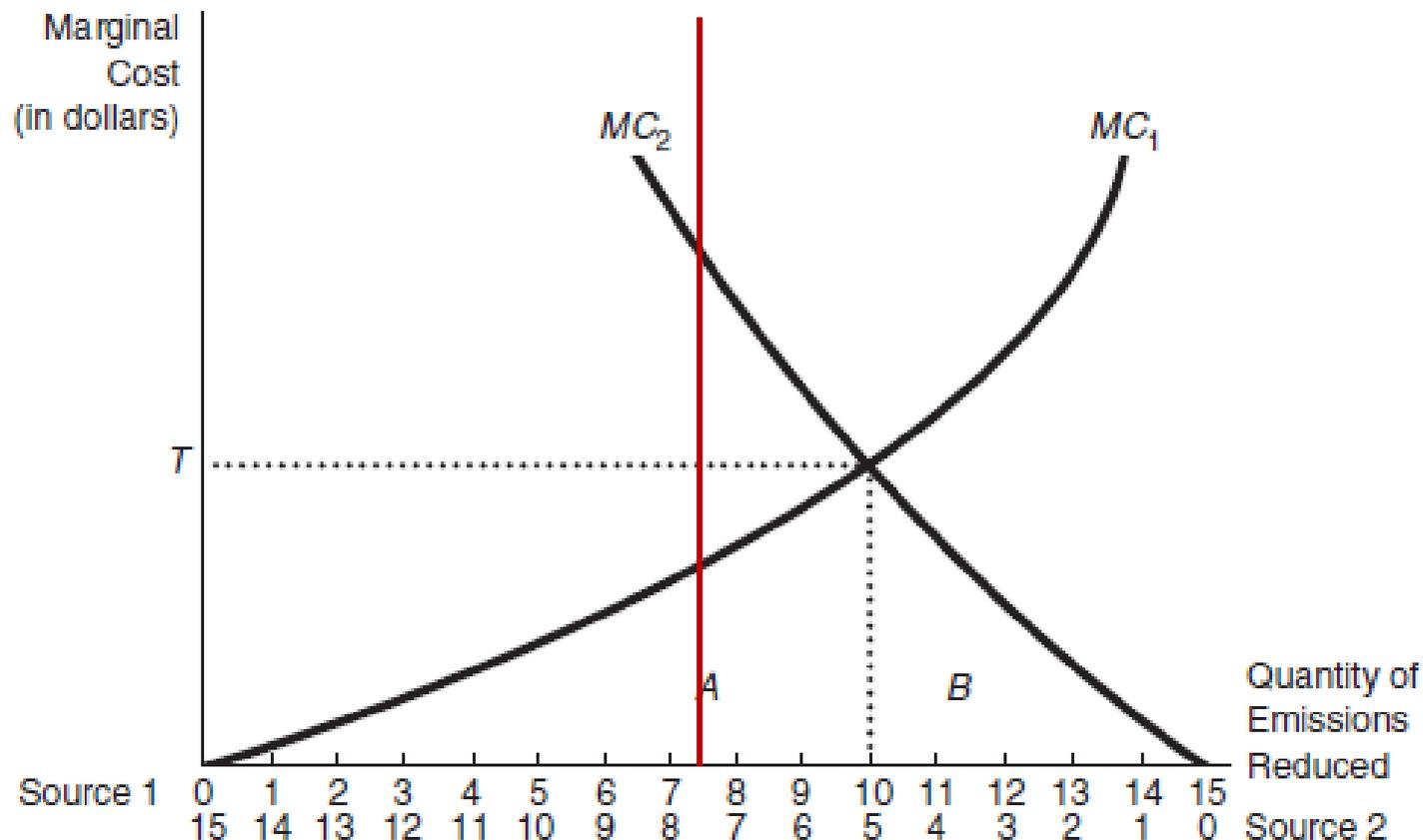
Conclusions from the least-cost theorem of pollution control

- A least-cost control regime implies that the marginal cost of abatement is equalised over all firms undertaking pollution control.
- A least-cost solution will in general not involve equal abatement effort by all polluters.
- Where abatement costs differ, cost effectiveness implies that relatively low-cost abaters will undertake most of the total abatement effort.

CAC and cost effectiveness

Standard on emissions (example of **command-and-control** instrument).

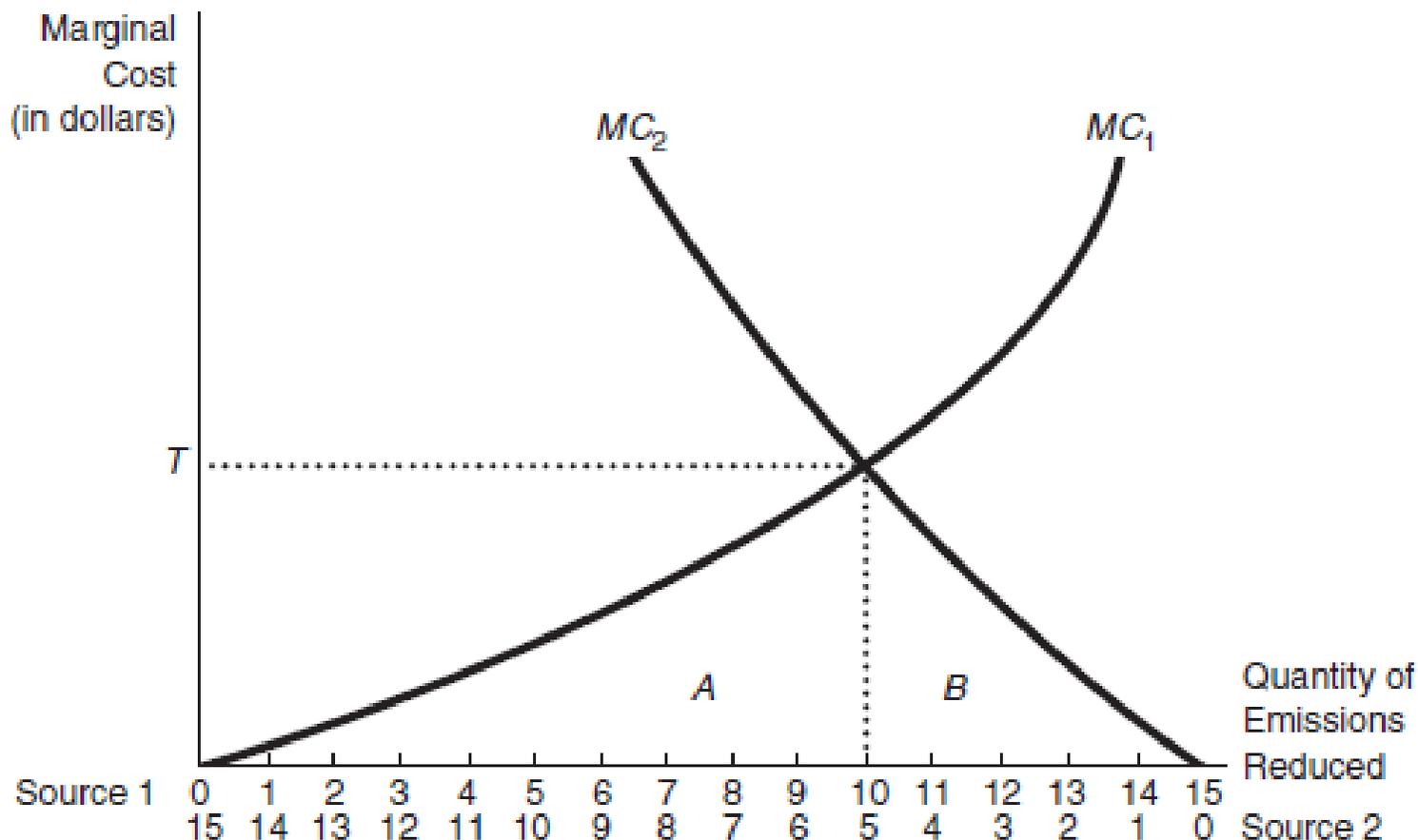
- a. An **emission standard** is a legal limit on the amount of pollution that can be released.
- b. It generally violates cost-effectiveness conditions.



Market based instruments and cost effectiveness

- The emission tax brings about a **socially efficient *aggregate* level of pollution** and achieve that aggregate target in a **cost-effective way**.
 - As the tax rate is identical for all firms, so are their marginal costs.
- Permit systems achieve the target at the lowest aggregate cost. Firms trade permits until they do not have further incentives to buy/sell. The permit price will be equal to the marginal abatement cost of all firms. They are cost-effective.

Market based instruments and cost effectiveness



Each firm will independently reduce emissions until its marginal control cost equals the emission charge / Each firm will sell/buy permits until its marginal control cost equals the permit price.

Table 3 – Stages of procurement cycle where green criteria are applied and available guidance (2010)

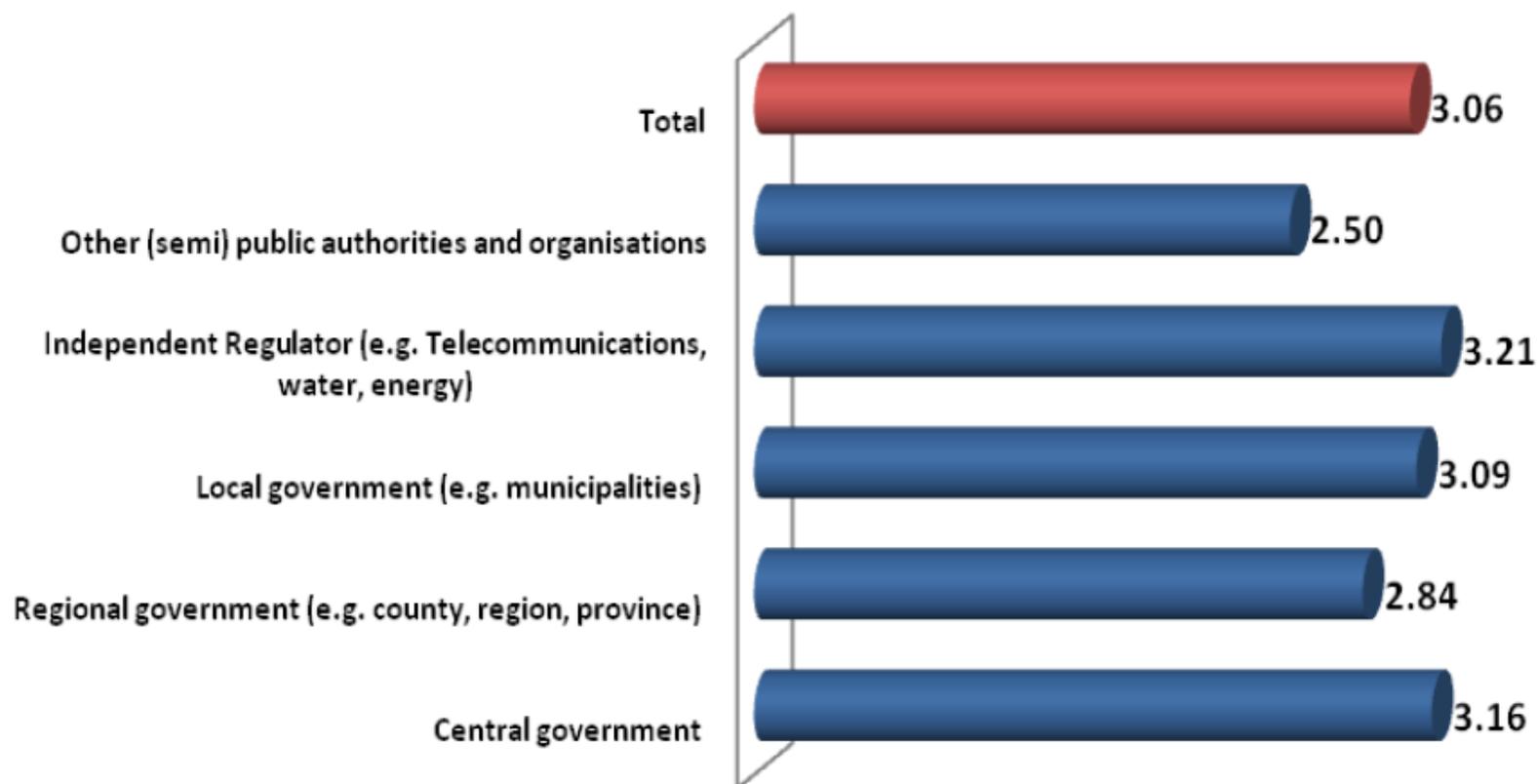
	Stages of procurement where green criteria are applied			Guidance to promote green procurement in practice			
	In the technical specifications	In the award phase	As a contract performance clause	Practical guide	Training materials	Ad hoc advice	Code of practice
<i>Austria</i>	●	●	●	●	○	○	●
<i>Belgium</i>	●	●	●	●	○	●	○
<i>Czech Republic</i>	○	○	○	○	○	○	○
<i>Denmark</i>	●	●	○	●	○	●	●
<i>Estonia</i>	●	●	●	●	●	●	○
<i>Finland</i>	●	○	○	●	●	●	○
<i>France</i>	●	●	●	●	●	●	●
<i>Germany</i>	○	○	○	●	●	○	○
<i>Greece</i>	○	○	○	○	○	○	○
<i>Hungary</i>	○	○	○	●	●	○	○
<i>Ireland</i>	●	●	○	●	○	○	○
<i>Italy</i>	●	●	●	●	●	●	○
<i>Luxembourg</i>	●	●	●	●	○	○	○
<i>Netherlands</i>	●	●	●	●	●	●	●
<i>Poland</i>	●	●	●	●	●	○	●
<i>Portugal</i>	●	●	○	○	○	○	○
<i>Slovak Republic</i>	○	○	○	○	○	○	○
<i>Slovenia</i>	●	●	●	●	●	●	●
<i>Spain</i>	●	●	●	○	○	●	●
<i>Sweden</i>	○	○	○	●	●	●	●
<i>United Kingdom</i>	●	○	○	●	●	○	○

Source: OECD 2010 Survey on Public Procurement.

THE UPTAKE OF GREEN PUBLIC PROCUREMENT IN THE EU27 (2012)

Perceptions regarding the difficulty of including green criteria

Figure 3 – Perceived level of difficulty of including green criteria in public procurement



Sustainable Public Procurement (UNEP, 2021)

- The notion of Sustainable Public Procurement combines two aspects of government endeavor:
 - public procurement
 - sustainable development: requires governments and organisations to consider the social, economic, and environmental aspects of their operations, with equal emphasis on all three dimensions

Sustainable Public
Procurement

A process whereby public sector organisations meet their needs for goods, services, works and utilities in a way that achieves value for money on a whole life basis in terms of generating benefits not only to the organisation, but also to society and the economy, whilst minimizing, and if possible, avoiding, damage to the environment.⁷

Yu et al., 2020

What Influences Adoption of Green Award Criteria in a Public Contract? An Empirical Analysis of 2018 European Public Procurement Contract Award Notices

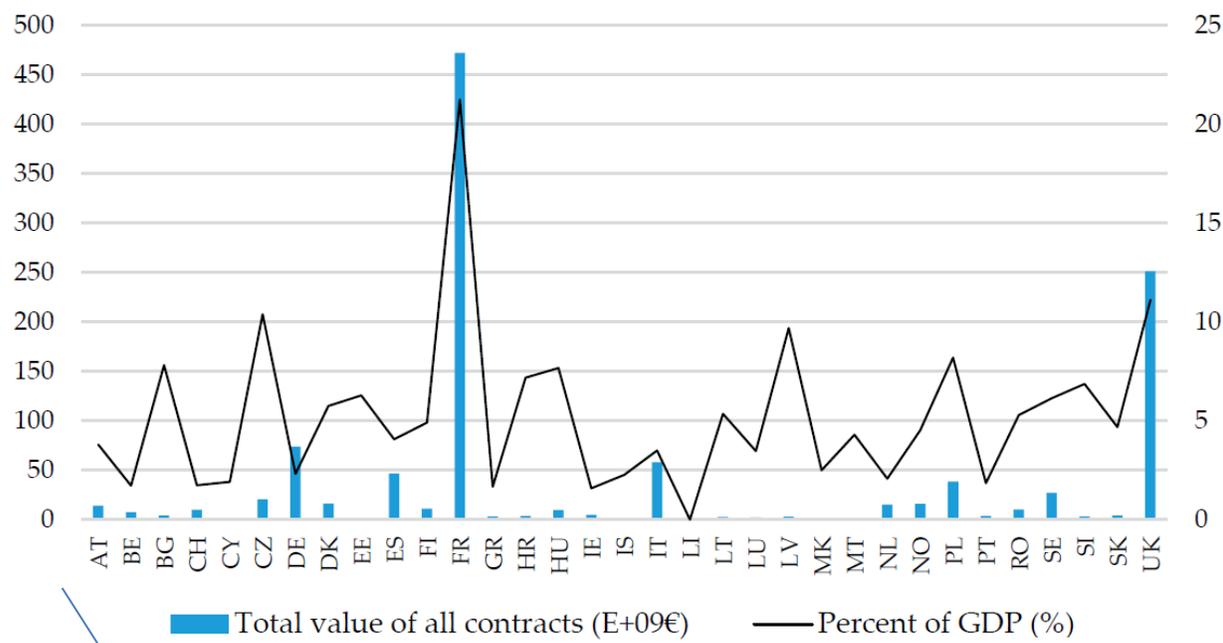


Figure 1. Public procurement of European countries
Average value **7.1% of the total GDP** of the countries

Overall, the value of green contracts takes 21.81% of the total procurement value and the green contract quantity accounts for 9.49% of all contracts.

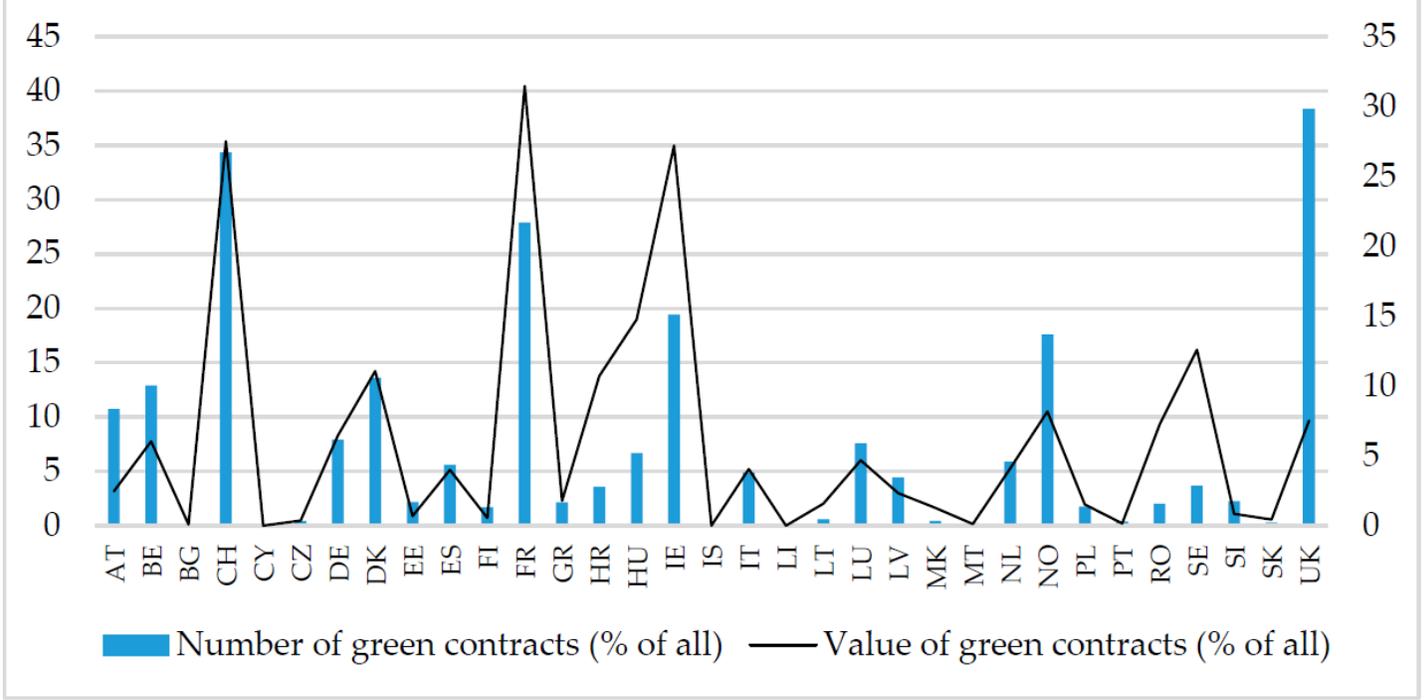


Figure 2. Green contracts in European countries. Source: authors' elaboration. AT: Austria; BE: Belgium; BG: Bulgaria; CH: Switzerland; CY: Cyprus; CZ: Czechia; DE: Germany; DK: Denmark; EE: Estonia; GR: Greece; ES: Spain; FI: Finland; FR: France; HR: Croatia; HU: Hungary; IE: Ireland; IS: Iceland; IT: Italy; LI: Liechtenstein; LT: Lithuania; LU: Luxembourg; LV: Latvia; MK: North Macedonia; MT: Malta; NL: Netherlands; NO: Norway; PL: Poland; PT: Portugal; RO: Romania; SE: Sweden; SI: Slovenia; SK: Slovakia; UK: United Kingdom.

- The basic concept of GPP relies on having clear, verifiable, justifiable and ambitious environmental criteria for products and services, based on a life-cycle approach and scientific evidence base.
- The criteria used by Member States should be similar to avoid a distortion of the single market and a reduction of EU-wide competition.
- Having common criteria reduces the administrative burden for economic operators and for public administrations implementing GPP (especially for companies operating in more than one Member State as well as SMEs).
- Since 2008, the Commission has developed more than 20 common GPP criteria. The criteria are regularly updated.

The EU GPP criteria are developed to facilitate the inclusion of green requirements in public tender documents. While the adopted EU GPP criteria aim to reach a good balance between environmental performance, cost considerations, market availability and ease of verification, procuring authorities may choose, according to their needs and ambition level, to include all or only certain requirements in their tender documents.

https://ec.europa.eu/environment/gpp/eu_gpp_criteria_en.htm

Cleaning products and services



- [Technical background report](#)
- [EU GPP criteria](#) (published in 2018)

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Data centres, server rooms and cloud services

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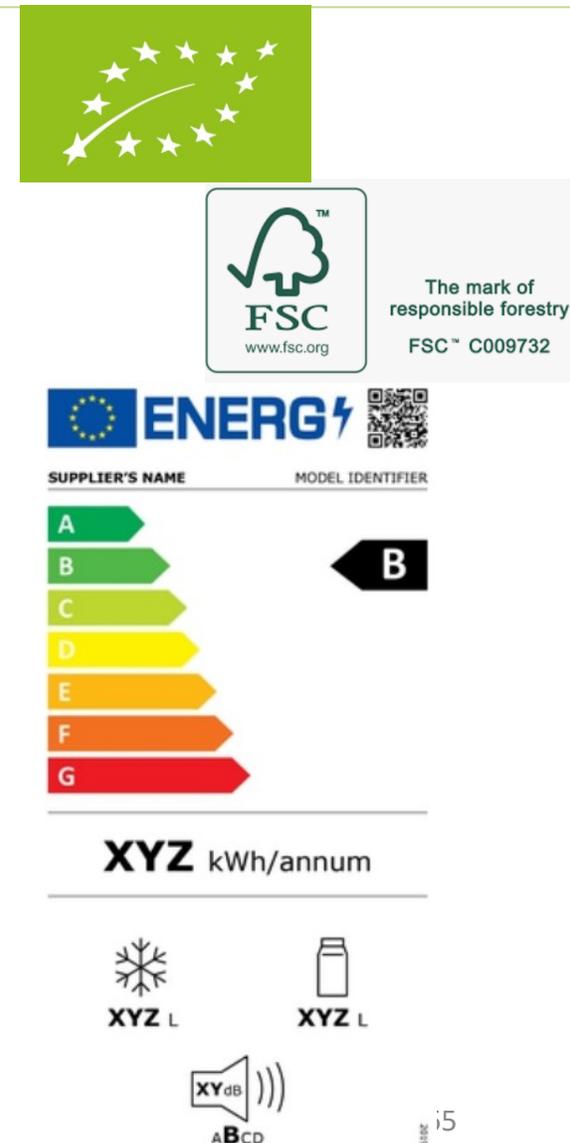
- The criteria are designed to be inserted directly into tender documents and include information on verification methods. Most of the criteria are available in all official EU languages. They are based on scientific information and data.
- The EU GPP criteria include two levels for each sector:
 - the “*core criteria*”: designed to allow easy application of GPP, focus on the key area(s) of environmental performance of a product or service, and aim to keep administrative costs for companies to a minimum;
 - the “*comprehensive criteria*”: take into account more aspects or higher levels of environmental performance, and are for use by authorities that want to go further in supporting environmental and innovation goals.

European Commission, EU GPP Criteria,
https://ec.europa.eu/environment/gpp/eu_gpp_criteria_en.htm

- In addition to the EU GPP criteria, a number of international, national and regional bodies have developed criteria sets covering a wide range of product and service groups.
 - These labels can play a particular role in developing technical specifications and award criteria, and in verifying compliance.
 - **Environmental labels:** aim to help purchasers identify sustainable products or services. The most valuable labels are those which are based on objective and transparent criteria and which are awarded by an independent third party.
1. **Multi-criteria labels:** the most commonly used in GPP - based on scientific information about the environmental impact of a product or service throughout its life cycle, from extraction of the raw materials, through production and distribution, the use phase, and final disposal. Examples: the EU Ecolabel, the Nordic Swan, the Blue Angel.

GPP Criteria in the EU

2. **Single issue labels** – These are based on one or more pass/ fail criteria linked to a specific issue, e.g. energy efficiency. If a product meets those criteria, then it may display the label. Examples: the EU Organic label or the Energy Star label for office equipment.
3. **Sector specific labels** – Include forestry certification schemes operated by organizations such as the FSC (Forest Stewardship Council) or PEFC (Programme for the Endorsement of Forest Certification).
4. **Graded product labels** – These grade products or services according to their environmental performance on the issue in question, rather than using pass/fail criteria. Examples: the EU Energy Label, which grades energy-related products according to their energy efficiency.



European Commission (2016) Buying Green! - A Handbook on green public procurement

To stimulate the adoption of GPP practices the EU Commission has developed the **GPP Training Toolkit (2019)**

- https://ec.europa.eu/environment/gpp/toolkit_en.htm

GPP Training Toolkit (2019)

The GPP Training Toolkit is designed for use by public purchasers and by GPP trainers, or integration in general public procurement training courses and workshops.

It consists of six independent modules and ten operational modules, with PowerPoint presentations (including trainer notes) and accompanying guidance.

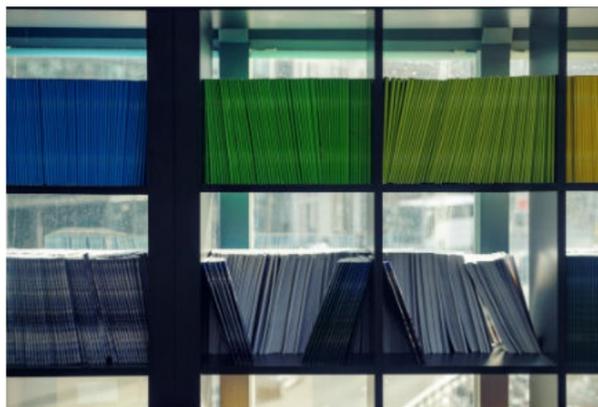


Photo by [Maarten van den Heuvel](#) on Unsplash

The materials are available in English, as well as the languages of ten EU member states in which GPP Training has recently been carried out.

3 Paper based on recovered fibres - GPP criteria

3.1 Recycled option - Core GPP criteria

Note: Where the criteria are different for paper for professional printing purposes, this is noted in the final column of the table.

Copying and graphic paper for normal office use	Paper for professional purposes
Subject matter	
Purchase of recycled office paper made from 100% recovered paper fibres.	Purchase of recycled office paper made from at least 75% recovered paper fibres.
Specifications	
<p>1. Paper must be made from 100% recovered paper fibres. Recovered paper fibres include both post-consumer recycled fibres and pre-consumer recycled fibres from paper mills, also known as broke. Post-consumer recycled fibres may come from consumers, offices, printing houses, bookbinders, or similar.</p> <p>Verification: All products carrying any type I ecolabel, such as the EU Ecolabel can serve as means of proof if it is specified that the paper is made from 100% recovered paper fibres. Any other appropriate means of proof, such as a technical dossier of the manufacturer or a test report from a recognised body will also be accepted.</p>	<p>1. Paper must be made from at least 75% recovered paper fibres. Recovered paper fibres include both post-consumer recycled fibres and pre-consumer recycled fibres from paper mills, also known as broke. Post-consumer recycled fibres may come from consumers, offices, printing houses, bookbinders, or similar.</p> <p>Verification: <i>Same</i></p>
<p>2. The paper must be at least Elementary Chlorine Free (ECF). Totally Chlorine Free (TCF) will also be accepted.</p> <p>Verification: All products carrying the EU Ecolabel will be deemed to comply. Other national type I ecolabels fulfilling the above criterion can also be accepted. Any other appropriate means of proof, such as a technical dossier of the manufacturer or a test report from a recognised body will also be accepted.</p>	<i>Same</i>
<p>3. In order to guarantee the suitability of the paper offered for office machines, a sample of the product must be provided to the authority to conduct quality tests.</p>	<i>Same</i>



3.2

Recycled option - Comprehensive GPP criteria

Note: Where the criteria are different for paper for professional printing purposes, this is noted in the final column of the table.

Copying and graphic paper for normal office use	Paper for professional purposes
Subject matter	
Purchase of recycled office paper made from 100% recovered paper fibres.	Purchase of recycled office paper made from 75% recovered paper fibres.
Specifications	
<p>1. Paper must be made from 100% recovered paper fibres, with a minimum of 65% post-consumer recycled fibres. Recovered paper fibres include both post-consumer recycled fibres and pre-consumer recycled fibres from paper mills, also known as broke. Post-consumer recycled fibres may come from consumers, offices, printing houses, bookbinders, or similar. Verification: All products carrying a type I ecolabel, such as the EU Ecolabel, can serve as means of proof if it is specified that the paper is made from 100% recovered paper fibres. Any other appropriate means of proof, such as a technical dossier of the manufacturer or a test report from a recognised body will also be accepted.</p>	<p>1. Paper must be made at least from 75% recovered paper fibres, with a minimum of 80% post-consumer recycled fibres. Recovered paper fibres include both post-consumer recycled fibres and pre-consumer recycled fibres from paper mills, also known as broke. Post-consumer recycled fibres may come from consumers, offices, printing houses, bookbinders, or similar. Verification: <i>Same</i></p>
<p>2. The ecological criteria of the EU Ecolabel, or other type I national ecolabels directly related to paper production (and not the management practices of the factory) must be met. Full criteria documents available at: • EU Ecolabel: http://ec.europa.eu/environment/ecolabel/product/pg_copyingpaper_en.htm Verification: All products carrying the EU Ecolabel will be deemed to comply. Other national type I ecolabels fulfilling the listed criteria can also be accepted Any other appropriate means of proof, such as a technical dossier of the manufacturer or a test report from a recognised body will also be accepted.</p>	<p><i>Same,</i></p>
<p>3. In order to guarantee the suitability of the paper offered for office machines, a sample of the product must be provided to the authority to conduct quality tests.</p>	<p><i>Same</i></p>



5 Cost considerations

The European Commission study on the “Costs and Benefits of Green Public Procurement in Europe”¹⁶ found that the purchasing costs for public authorities of green (including 100% recycled and eco-certified copying paper) and non-green copying paper are very similar. Comparing the four countries studied, ‘green’ versions of copying paper are significantly cheaper (23%) in Germany; in Spain and Sweden ‘green’ copying paper is slightly more expensive with a relative price difference of 3.5 to 4%; in the Czech Republic the average prices are nearly the same (0.2% difference). The table below presents these results.

Country	Price difference between green and non-green product (%)
Sweden	3.5%
Germany	-23.2% (i.e. the green product is cheaper than the non-green)
Spain	4%
Czech Republic	-0.2%

In conclusion, the variations between prices are, to a greater extent, due to differences between different brands and purchased amounts, than due to differences between green or non-green products. Therefore paper that complies with the criteria defined above is available at competitive prices.

Where environmental criteria may enter

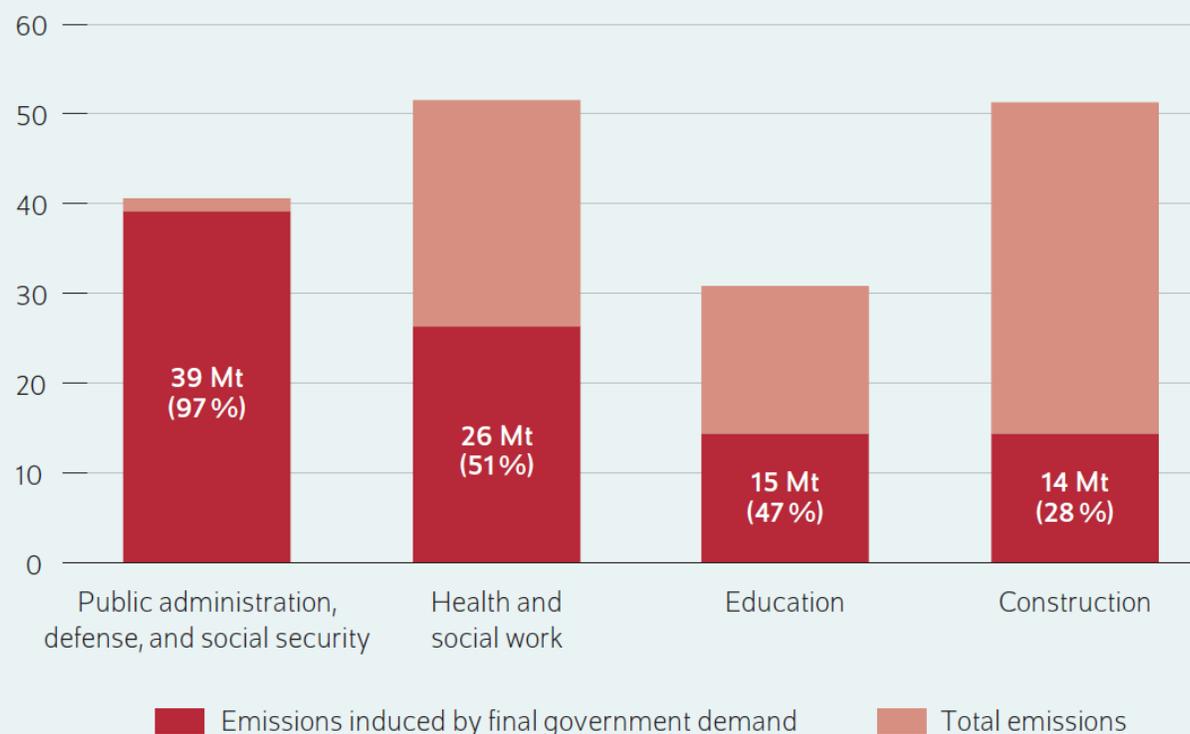
- Number of stages where green considerations can be applied:
 - Subject matter and technical specifications
 - Selection and exclusion criteria (e.g. compliance with environmental laws, technical and professional ability)
 - Award criteria
 - Contract performance clauses
-
- In deciding which procedure to use, and how best to include environmental criteria within the different stages, it is useful to have some knowledge of the market – e.g. the availability, cost and possible practical implications of greener alternatives.

The greenhouse gas emissions induced by public services account for direct emissions from fuel consumption on site and for all supply-chain emissions of all intermediate inputs procured to run these activities.

Example: education, these include emissions embodied in a variety of products, like school furniture, stationery, and heating fuel, as well as services, such as cleaning and canteen services, but exclude emissions from investments, for instance the construction of the school building. Construction emissions account for emissions embodied in materials used in buildings (residential and non-residential) and infrastructure (civil engineering).

Total greenhouse gas emissions and emissions induced by final demand of the government for the four most relevant product groups

In megatons CO₂ equivalents. Percentage values in parentheses indicate the share of emissions induced by the government.



Note: Emissions from construction calculated using emissions steel and cement inputs as a proxy.

Sources: Authors' calculations based on EXIOBASE 3.4 and further sources described in Box 1.

© DIW Berlin 2019

The government is responsible for 28 percent (14 megatons) of all construction sector emissions.

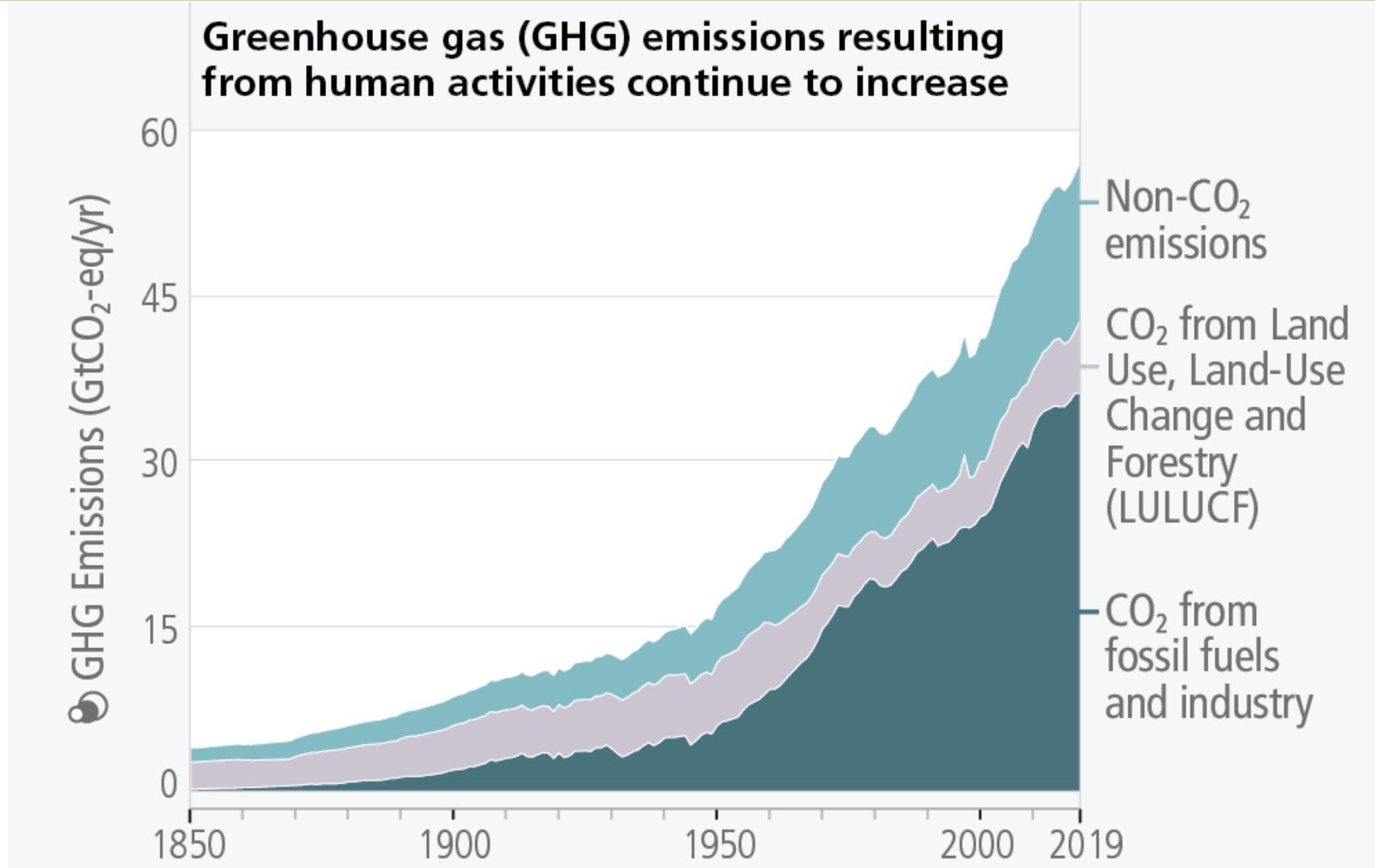
GPP as an environmental policy instrument

- Great potential of GPP under several aspects
- Focus on environmental benefits – Is it an environmental policy instrument? – Is it an efficient environmental policy instrument?
- What are environmental policies?
- Which are the characteristics of an (efficient) environmental policy instrument?
- Do we need environmental policies?
- Are markets «not enough»?

What is climate change?

A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods (UNFCCC).

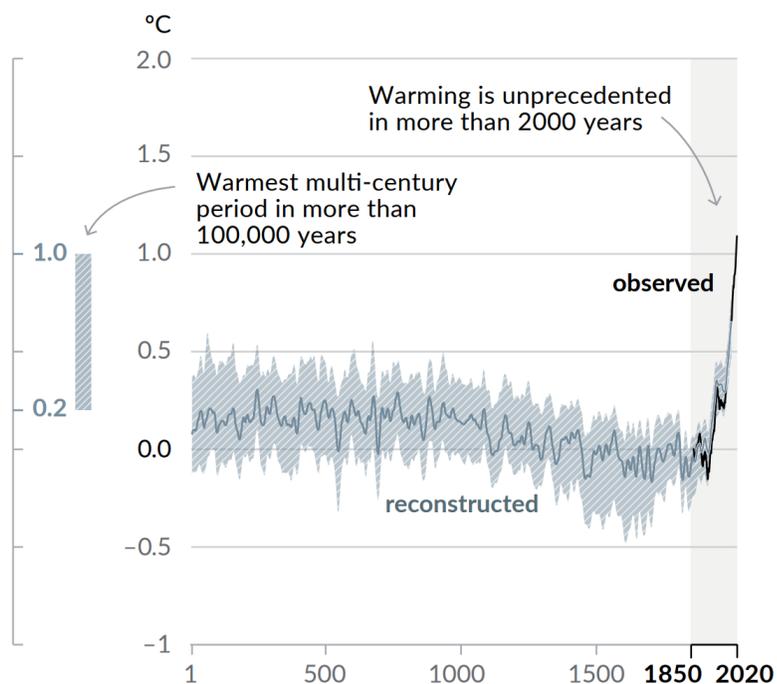




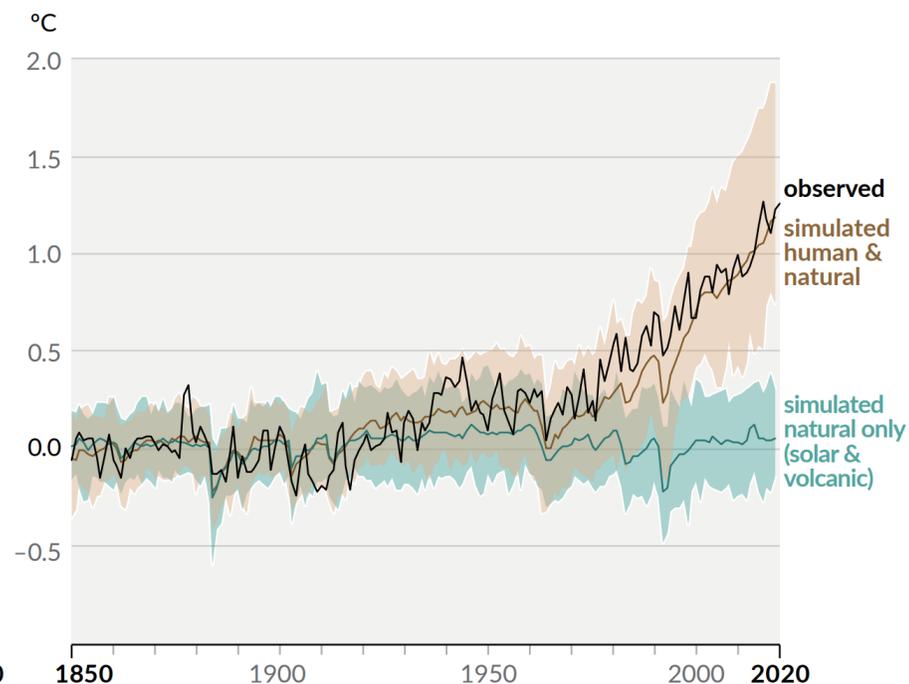
Due to human activity?

Changes in global surface temperature relative to 1850–1900

(a) Change in global surface temperature (decadal average) as **reconstructed** (1–2000) and **observed** (1850–2020)



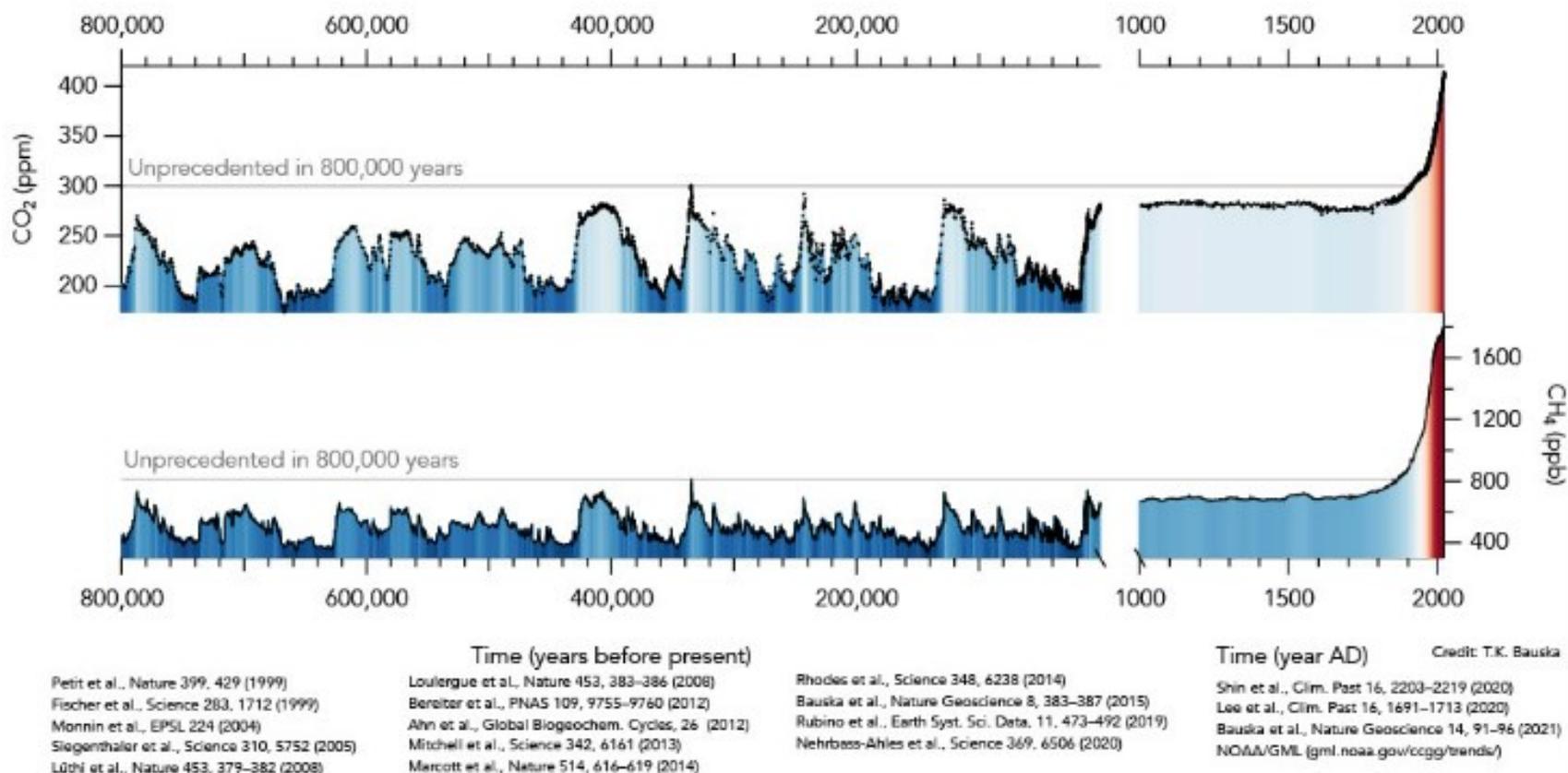
(b) Change in global surface temperature (annual average) as **observed** and simulated using **human & natural** and **only natural** factors (both 1850–2020)



Source: IPCC Sixth Assessment Report

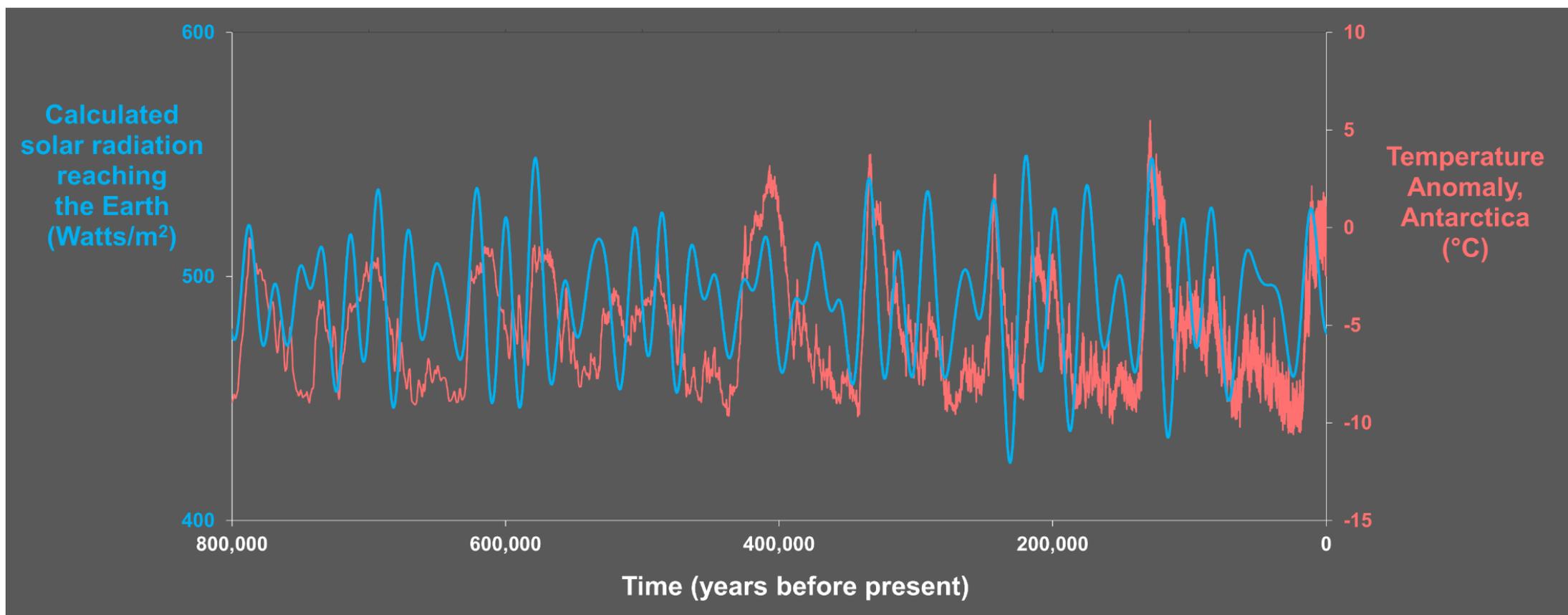
Due to human activity?

Figure 2: 800,000 years of atmospheric CO₂ and CH₄ as recorded in ice cores and atmospheric sampling



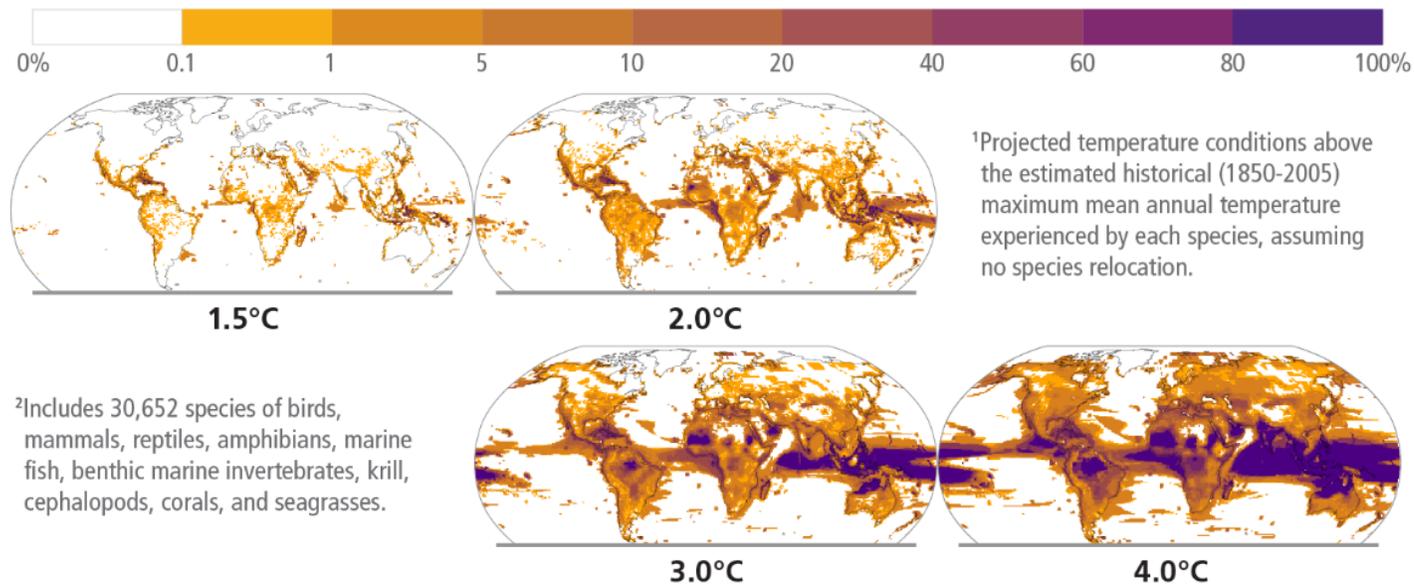
Source: <https://www.bas.ac.uk/data/our-data/publication/ice-cores-and-climate-change/>

Is it cycles?

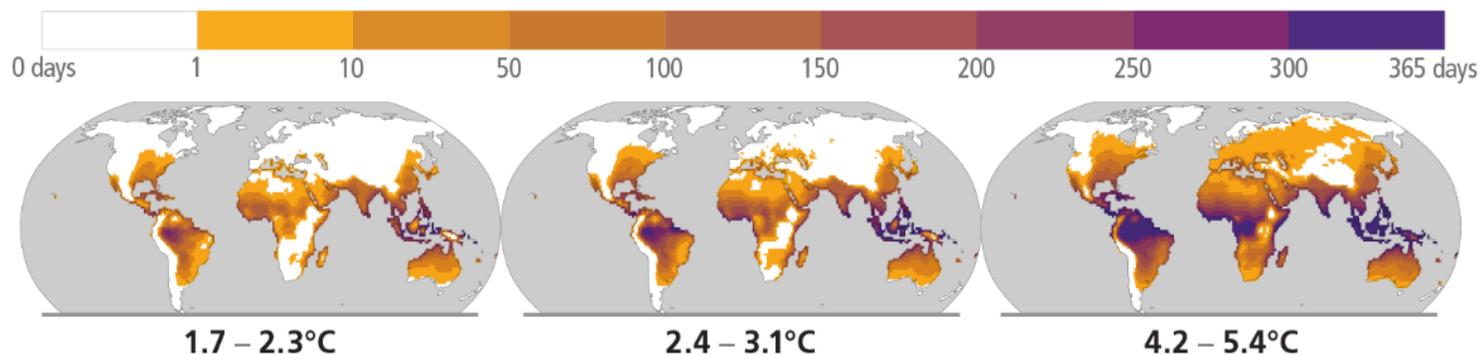


- in the last 10,000 years Milankovitch cycles have been in a phase of *decreasing* solar radiation reaching the Earth.
- This “should” lead to cooling, not warming
- Milankovitch cycles lead to climate changes on the order of a few degrees in thousands of years (much slower than today).

a) **Risk of species losses**
 Percentage of animal species and seagrasses exposed to potentially dangerous temperature conditions^{1,2}

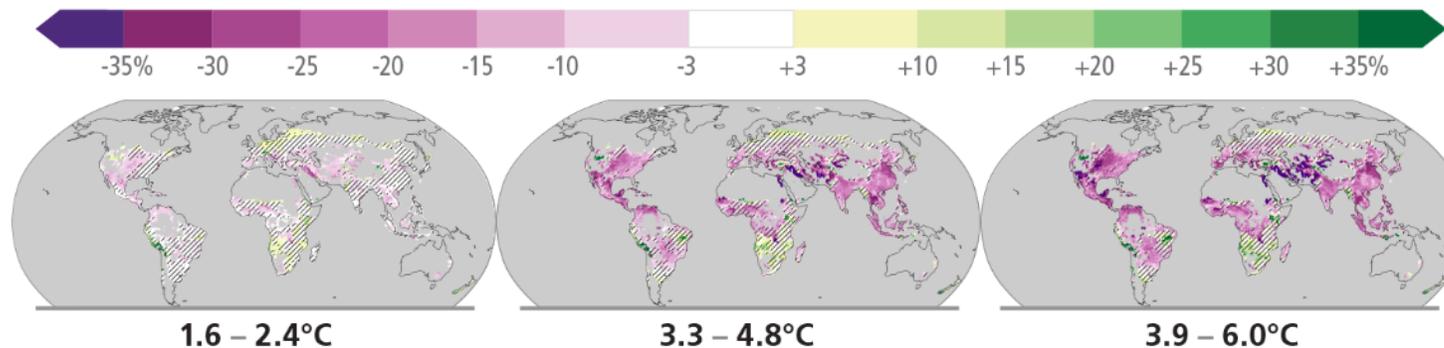
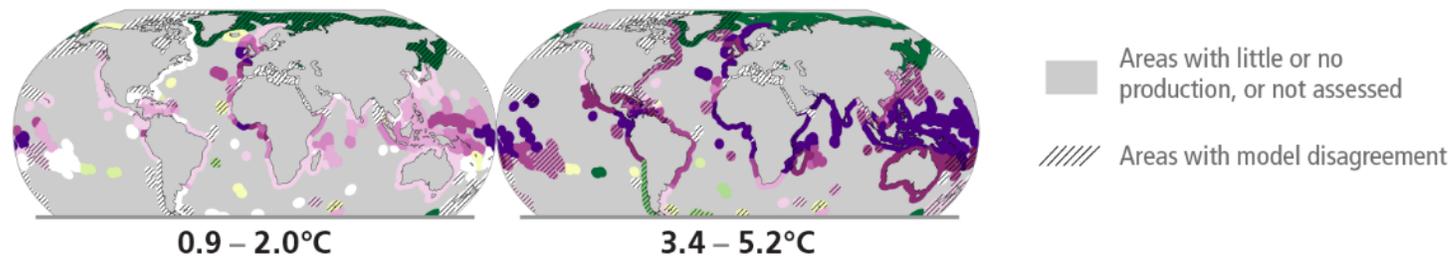


b) **Heat-humidity risks to human health**

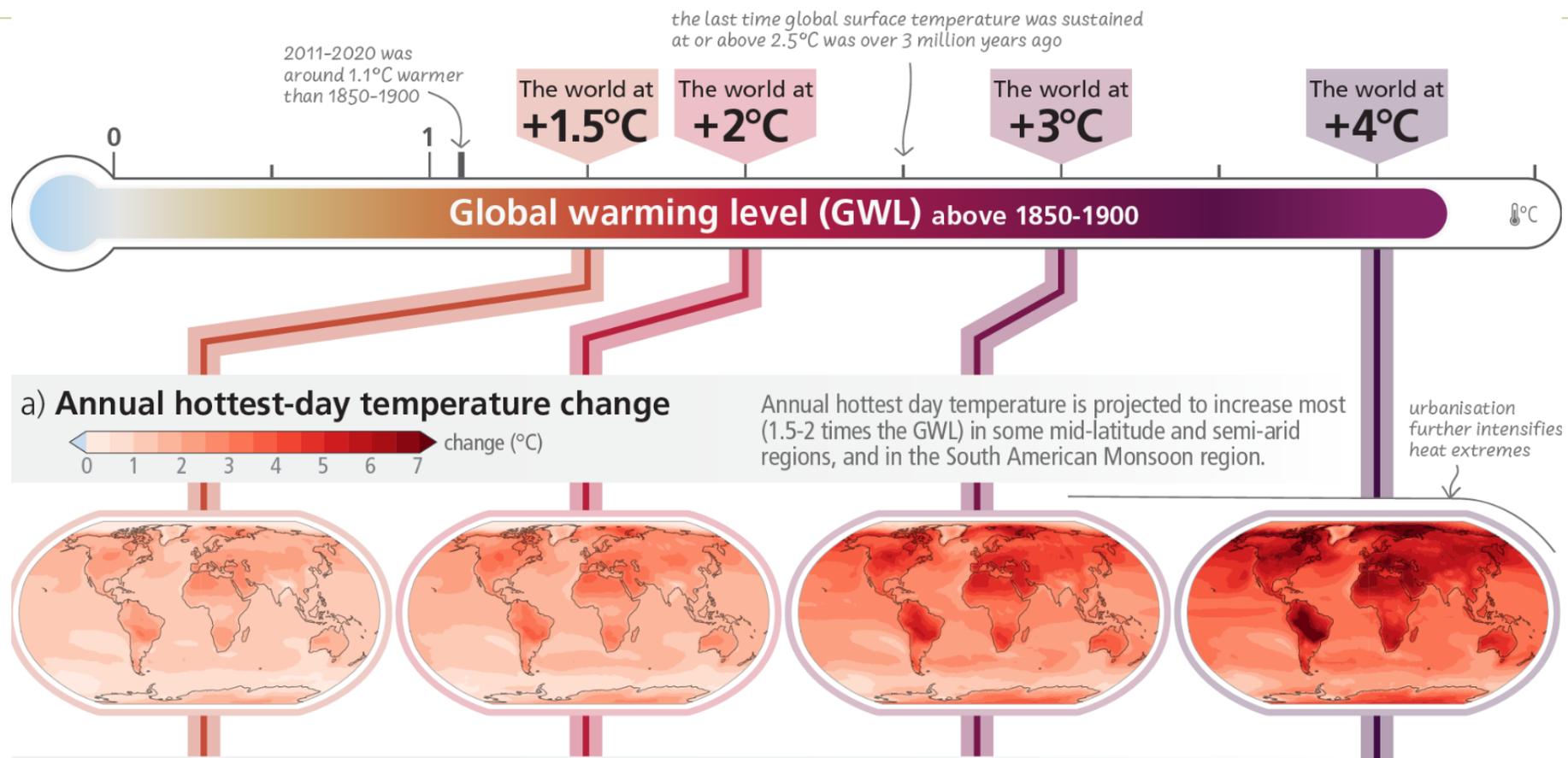


Source: IPCC, 2023

c) Food production impacts

c1) Maize yield⁴
Changes (%) in yieldc2) Fisheries yield⁵
Changes (%) in maximum catch potential

⁴Projected regional impacts reflect biophysical responses to changing temperature, precipitation, solar radiation, humidity, wind, and CO₂ enhancement of growth and water retention in currently cultivated areas. Models assume that irrigated areas are not water-limited. Models do not represent pests, diseases, future agro-technological changes and some extreme climate responses.



Due to human activity?

IPCC Second Assessment Report (1995):

“The balance of evidence suggests a discernible human influence on global climate”

IPCC Third Assessment Report (2001):

“There is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities”

IPCC Fourth Assessment Report (2007):

“Most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic GHG concentrations”

IPCC Fifth Assessment Report (2014):

“Human influence on the climate system is clear, and recent anthropogenic emissions of greenhouse gases are the highest in history. Recent climate changes have had widespread impacts on human and natural systems.”

Climate change risks are economic shocks.

- **Supply-side** shocks: affect the productive capacity of the economy: e.g. the price volatility caused by shortages of commodities such as food and energy
 - The supply-side risk from the transition to a low-carbon economy is the *trade-off* between the need to limit the future damage from global temperature increases and the present cost of reducing emissions.
- **Demand-side** shocks: reduce household wealth and private consumption.
 - They can be caused by a reduction in business activities but also by transition to a low carbon economy. Tighter climate policy could cause dislocations in high carbon sectors, including a large and sudden reduction in investment.

Type of shock/impact	Physical risks		Transition risks	
	From extreme weather events	From gradual global warming		
Demand	Investment	Uncertainty about climate events	‘Crowding out’ from climate policies	
	Consumption	Increased risk of flooding to residential property	‘Crowding out’ from climate policies	
	Trade	Disruption to import/export flows due to natural disasters	Distortions from asymmetric climate policies	
Supply	Labour supply	Loss of hours worked due to natural disasters	Loss of hours worked due to extreme heat	
	Energy, food and other inputs	Food and other input shortages	Risks to energy supply	
	Capital stock	Damage due to extreme weather	Diversion of resources from productive investment to adaptation capital	Diversion of resources from productive investment to mitigation activities
	Technology	Diversion of resources from innovation to reconstruction and replacement	Diversion of resources from innovation to adaptation capital	Uncertainty about the rate of innovation and adoption of clean energy technologies

Source: Batten (2018)

Why is it so difficult to reach an international agreement?

Common pool and Free-rider problems

Finding a global solution to climate change is one of the most challenging and pressing problems of our time.

Barriers to finding a solution:

- Actions taken to moderate climate change provides a **global public good**, implying the strong possibility of **free-rider actions**.
- The damage caused by greenhouse pollutants is an **externality in both space and time**.



- Decentralized actions by markets and individual governments are likely to violate efficiency and sustainability criteria.

GPP in the EU and Climate Change: an example

- To increase the number of tenders that take carbon emissions into account, the EU funded the “GPP 2020” project from September 2013 to April 2016.
- Over the course of three years, more than 100 low-carbon tenders were implemented by over 40 public authorities in eight countries (Austria, Croatia, Germany, Italy, the Netherlands, Portugal, Slovenia, and Spain), resulting in calculated savings of over 900,000 tonnes CO₂e and 140,000 toe.

Our buyers

GPP
2020 | procurement
for a low-carbon
economy





GPP 2020 tenders translated

For each tender that was published within the GPP 2020 project, savings were measured in the form of CO₂e and tonnes of oil equivalent (toe).

In order to show the scale of the savings for each tender, we have shown how these savings would look in terms of tangible experiences such as car journeys, flights or lighting of football stadiums.

For more information on how we did these calculations, please visit www.gpp2020.eu/low-carbon-tenders/measuring-savings

Our savings*

In total, GPP 2020 partners saved **922,932 t CO₂e**
147,077 toe

equal to

184,586 x  per year

15 x 

Through GPP 2020:

- over 100 low carbon tenders were published
- 670 people were trained
- 38 associate partners joined
- 7 GPP Helpdesks were supported

Barcelona, Spain

Rental of electric police scooters
Saved 23.5 toe
That's enough oil to fill 152 barrels.



OesteCim, Portugal

Rental and purchase of electric vehicles
Saved 88 t CO₂e
That's the same as 154 flights from Barcelona to Ljubljana.



Rijkswaterstaat, Netherlands

Reconstruction of the A12 motorway
Saved 8,944 t CO₂e
That's the same as 6,880 car journeys from Paris to Berlin.



Federal Procurement Agency, Germany

Purchase of an energy efficient commercial dishwasher
Saved 62.8 toe
That's enough oil to fill 408 barrels.



Consp, Italy

Joint Procurement of Energy performance contract
Saved 205,767 t CO₂e
That's enough to light 341 football stadiums for a year.



Federal Procurement Agency, Austria

Contract for heat supply with wood as fuel source
Saved 23,120 t CO₂e
That's enough to light 38 football stadiums for a year.



Central Procurement Office, Croatia

Supply of electricity from renewable resources
Saved 126,310 t CO₂e
That's the same as 221,597 flights from Barcelona to Ljubljana.

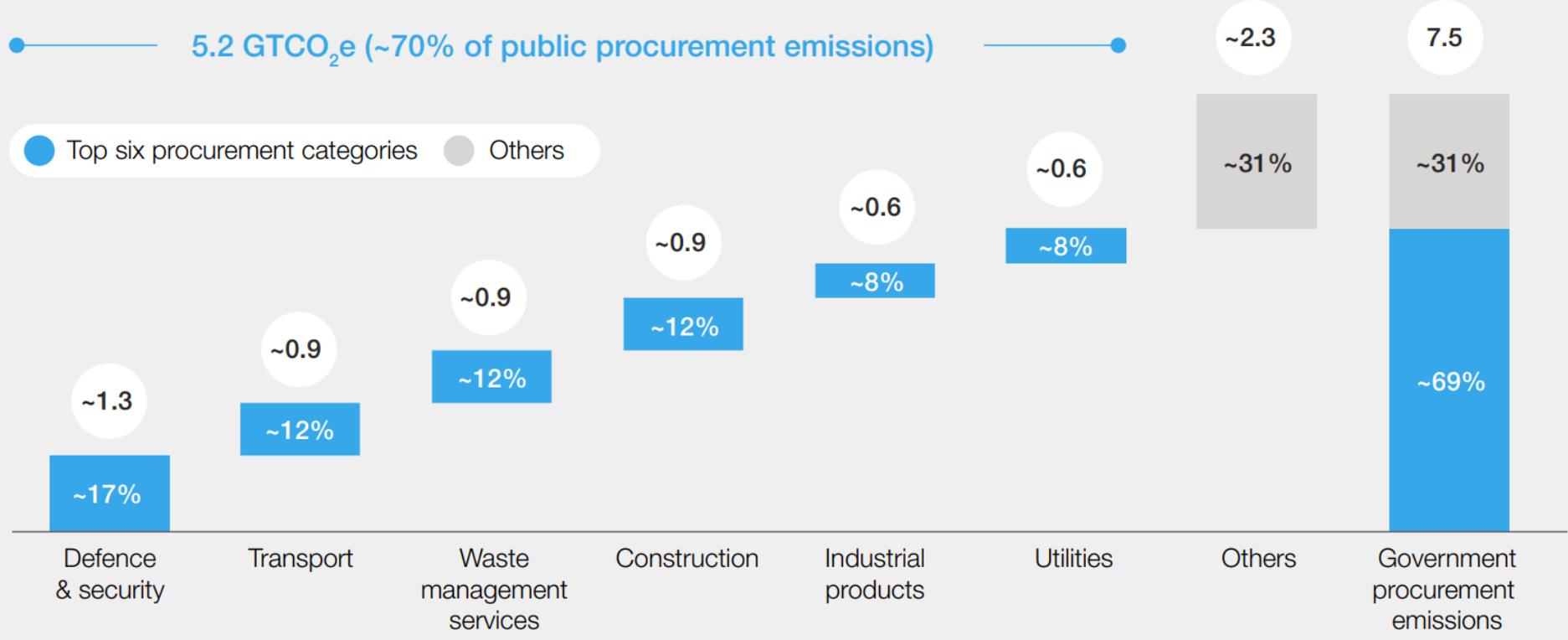


Ljubljana, Slovenia

Contract for 100% green electricity
Saved 45,536 t CO₂e
That's the same as 12,629 car journeys from Paris to Berlin.

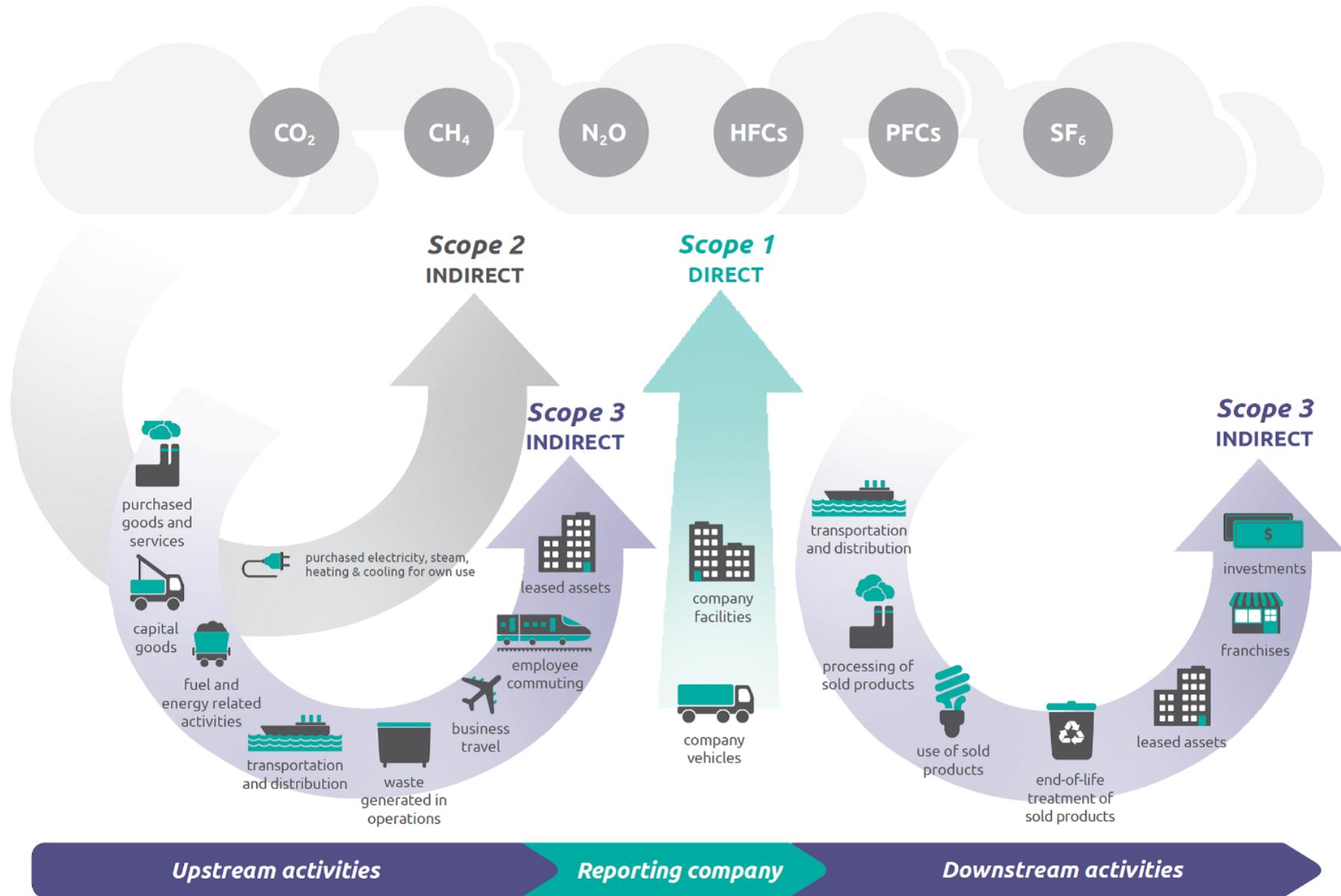


Contribution to government procurement emissions (GTCO₂*)

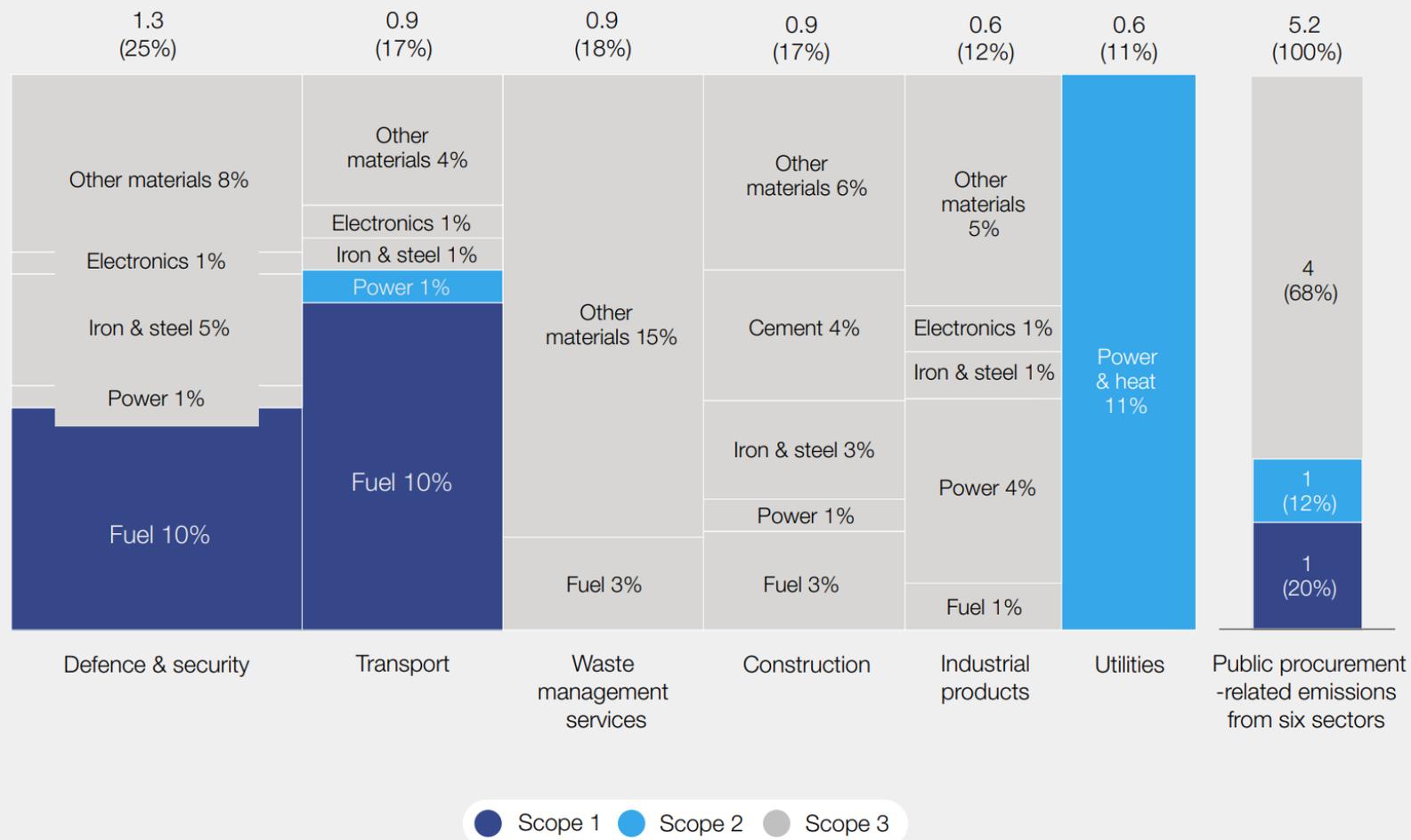


* Emissions in gigatonnes of CO₂ equivalent

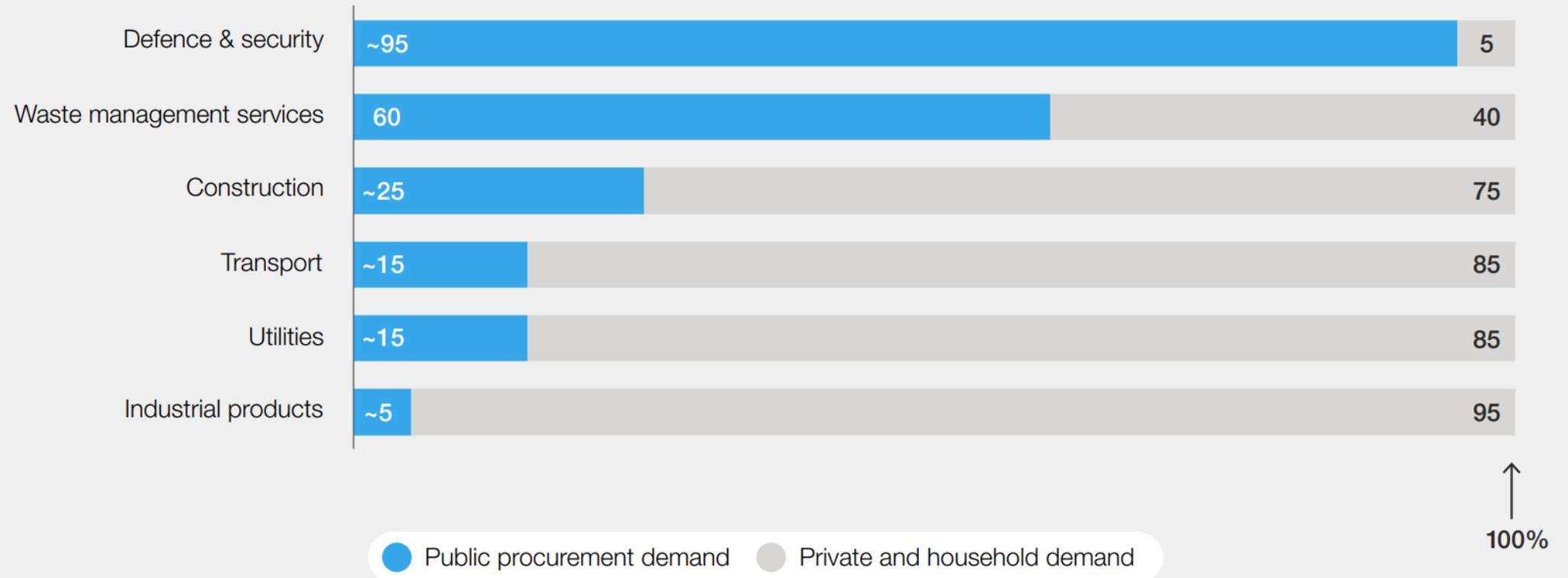
Source: United Nations Framework Convention on Climate Change (UNFCCC) greenhouse gas (GHG) data (2019); Our World in Data Emissions by Sector (2020); BCG analysis



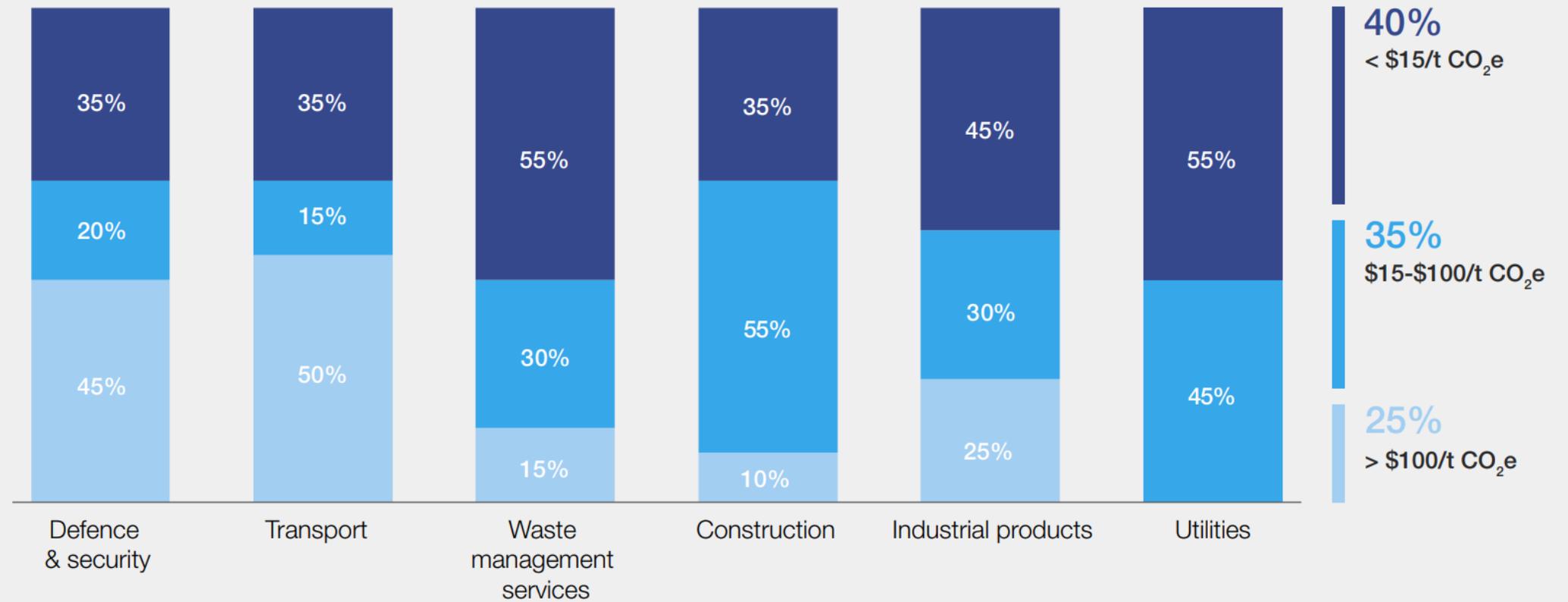
Emissions (GtCO₂e*) and share (%) by sector and scope



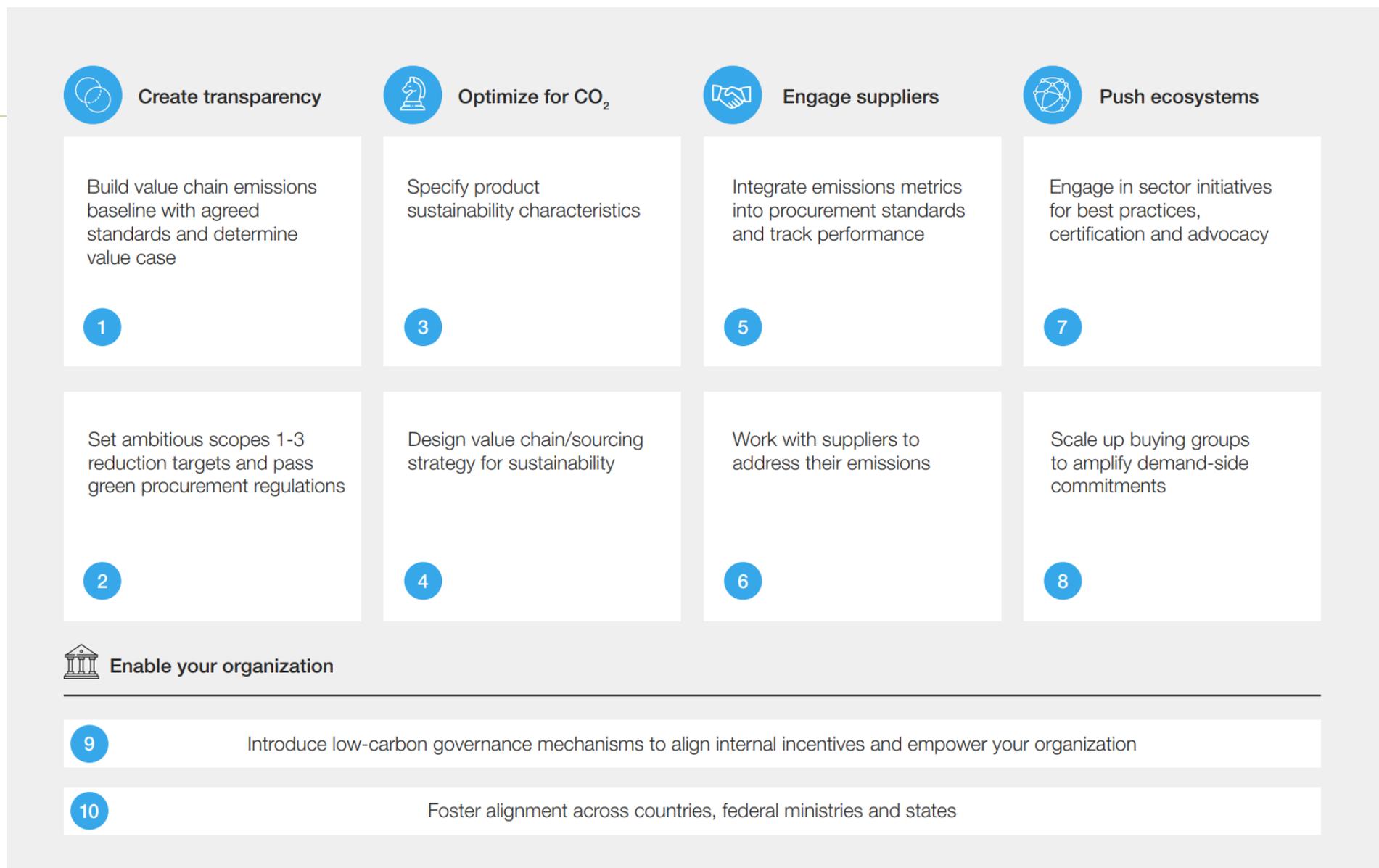
Source of revenues for each sector (%)



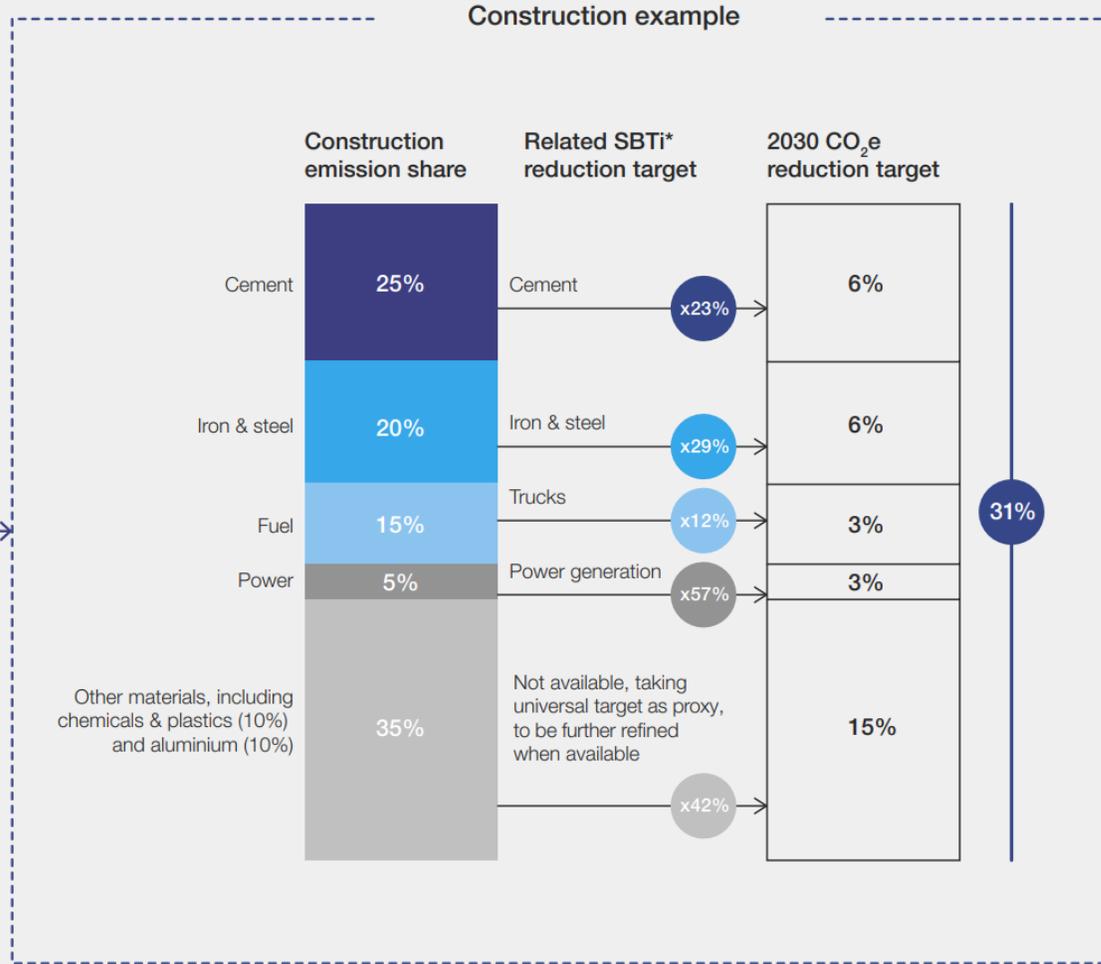
Cost of abatement by key sectors (%)



		Share in public procurement's emissions	Share in public procurement's spend	2030 product price impact* (%)	Public procurement budget impact (\$)
	Defence & security	~17%	15-20%	7-9%	\$100-140bn
	Transport	~12%	5-10%	23-25%	\$80-120bn
	Waste management	~12%	2-5%	10-12%	\$40-60bn
	Construction	~12%	20-25%	1-3%	\$40-60bn
	Industrial products	~8%	5-10%	1-3%	\$20-40bn
	Utilities	~8%	2-5%	7-9%	\$5-15bn
Total		~69%	50-75%	3-6%	\$300-450bn



Top 6 most emitting public sectors	2030 CO ₂ e reduction target
Defence & security	35-40%
Transport	30-35%
Waste management	50-55%
Construction	30-35%
Industrial products	40-45%
Utilities	55-60%





Development and design

Design for minimum energy use

E.g. leveraging best practice insulation

Design for low-carbon heating/cooling

E.g. district heating, energy capture

Design for low-carbon materials

E.g. green cement

Design for disassembly

E.g. easy separation of building materials



Building materials manufacturing

Energy and process efficiency

E.g. lower temperature processes

Fuel switch

E.g. renewable energy

Materials input

E.g. switching to recycled inputs

Leveraging new technologies

E.g. green H₂ or CCUS*

Greener primary packaging

E.g. recycled plastics



Transport and logistics

Energy and process efficiency

E.g. optimized routes and vehicle loading

Modal shift and alternative fuels

E.g. using electric vehicles



On-site construction

Sourcing

E.g. commit to sourcing sustainable materials such as green cement

Alternative fuels

E.g. switch to electric powered construction vehicles

Improved waste management

E.g. recycle building materials at end of building use



Operations, maintenance and end-use

Fuel switch

E.g. sourcing renewable energy

Energy and process efficiency

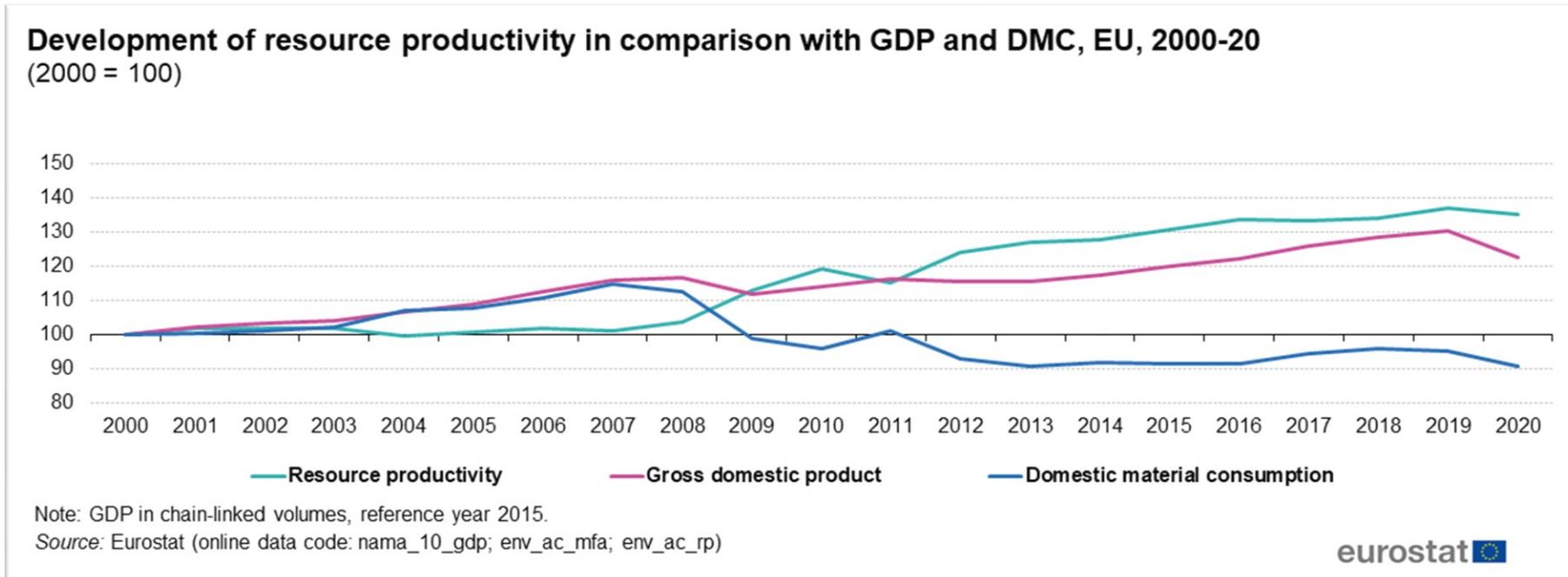
E.g. smart tech, improved appliances

Macro indicators of resource efficiency

- Based on material flow accounts, see Eurostat
http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Material_flow_indicators
- **DMC: Domestic Material Consumption** = domestic extraction + imports – exports (in physical or weight terms)
- DMC is used by the EU Commission to monitor resource use and productivity of EU economy
- **Resource productivity: GDP / DMC:** amount of € produced by one ton of material
 - Resource productivity is rising in EU and most advanced economies
 - Decoupling between economic growth and material use?

CE indicator 1: Resource productivity

- EU total (all materials: bio + energy + minerals + metals)
 - 30% improvement in resource productivity since 2000



The need for government intervention

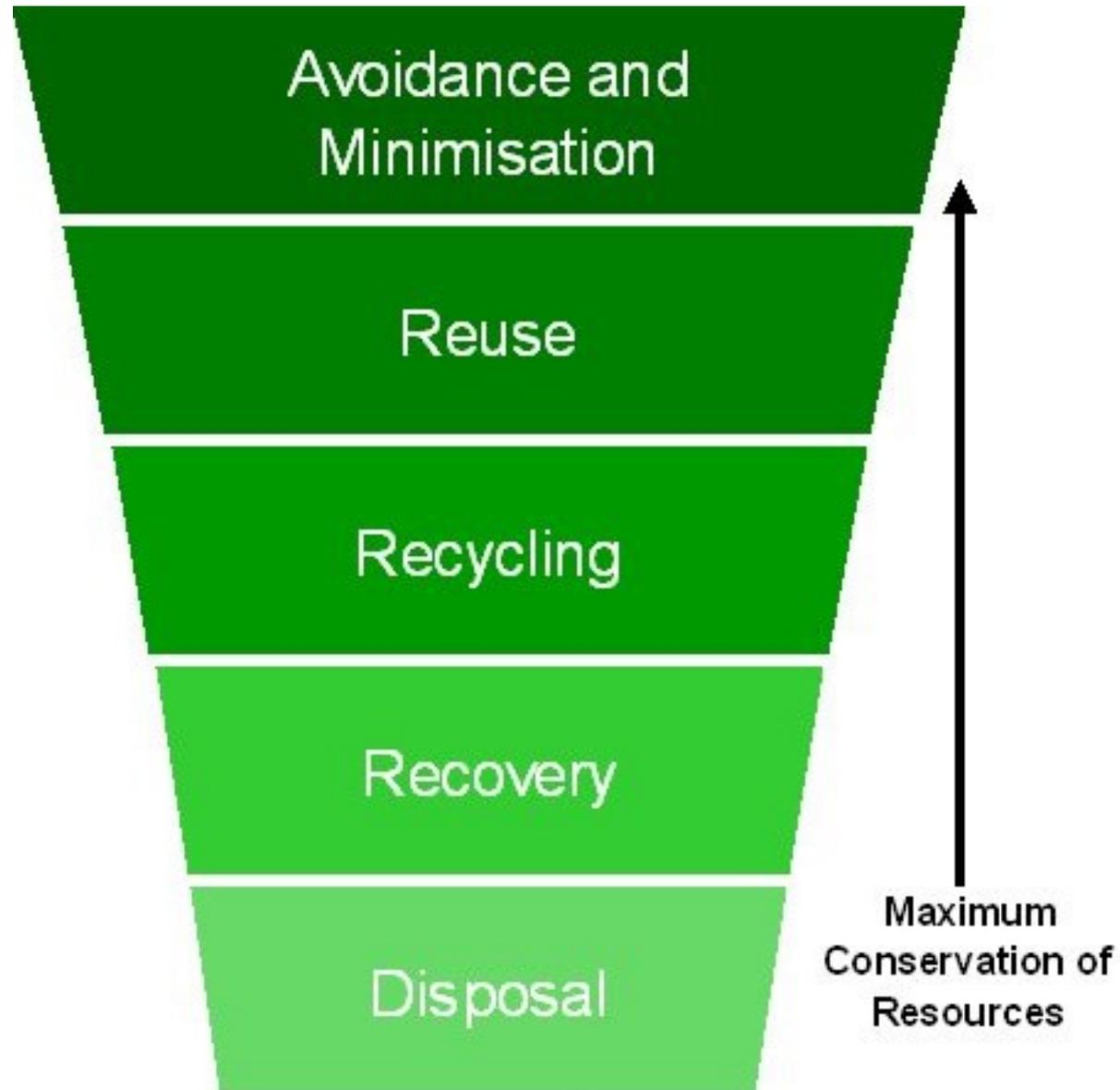
Government intervention in waste management is rationalized because many of the costs of waste generation and disposal are external - decentralized markets cannot fully internalize them.

The choice and combination of economic instruments and environmental regulation employed is relevant.

Incorrectly chosen policy instruments can defeat the objectives of well-conceived policy: e.g. kerbside charges vs flat-rate payments.

It is necessary to analyse the basic economic principles underlying hh waste management and categorisation of policy instruments.

The Waste Hierarchy (Directive 2008/98/EC)



- There are still too few scientific papers on the efficiency and effectiveness of GPP in theory.
- The few papers do not find encouraging results:
- Lundberg et al: the effectiveness and efficiency of GPP as an environmental policy tool are questioned, due to its similarities to a command and control instrument.
- BUT they are based on very specific assumptions
- They contrast with the empirical evidence

Is GPP a cost-effective policy instrument?

- Lundberg and Marklund (2013):
 - Analyze whether GPP can work as a cost-effective environmental policy instrument in terms of leading firms to reduce emissions at least cost to society.
 - Not reducing emissions cost-effectively is a waste of resources.
 - The main finding shows that GPP does not generate cost-effective outcomes, The EU and other countries, like the U.S., should take into account it when considering conducting environmental policy via GPP.

Is GPP a cost-effective policy instrument?

Conclusion:

- GPP should not be considered as a cost-effective environmental policy instrument and, therefore, the cost-effectiveness argument should be used more carefully when advocating GPP.
- This is because GPP works (through certificates or standards) like a CAC instrument.
- «This does not necessarily mean that GPP should be categorically denied as a policy instrument. As the political ambition in EU is to practice GPP extensively, there is an urgent need for further research on the topic of when to actually implement GPP».

- creation of an *idea* of how to do or make something (usually by an individual)
 - Product innovation
 - Smartphone
 - Personal computer
 - “Organic” PV energy
 - It is determined by basic research
 - Highly uncertain
 - Least “appropriable”

- making an *idea* for a new product or process real, putting it into practice
 - first commercialization
 - The new idea becomes something that can be sold
 - More appropriable, but still features uncertainty

Diffusion

The spread of a new product or process throughout society or at least throughout the relevant part of society

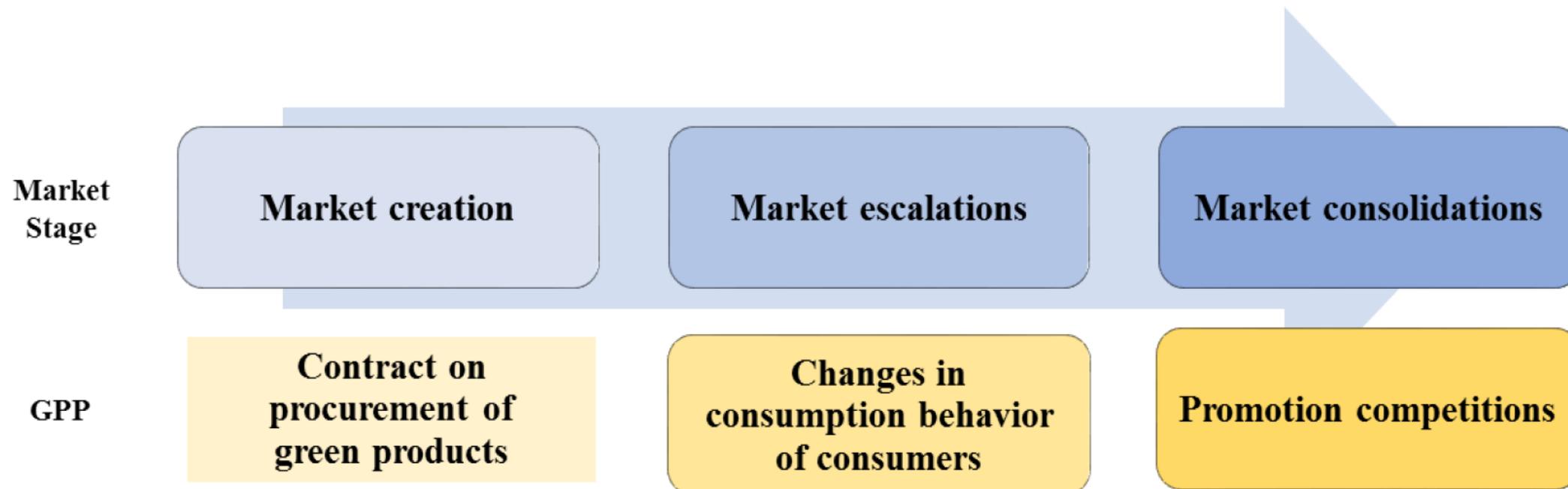
What drives innovation?

- Economic factors (supply and demand)
- Supply is (partly) unpredictable
- Demand suffers of lack of information (labelling, signaling, adverse selection)
- Policy can play a role

What is eco-innovation?

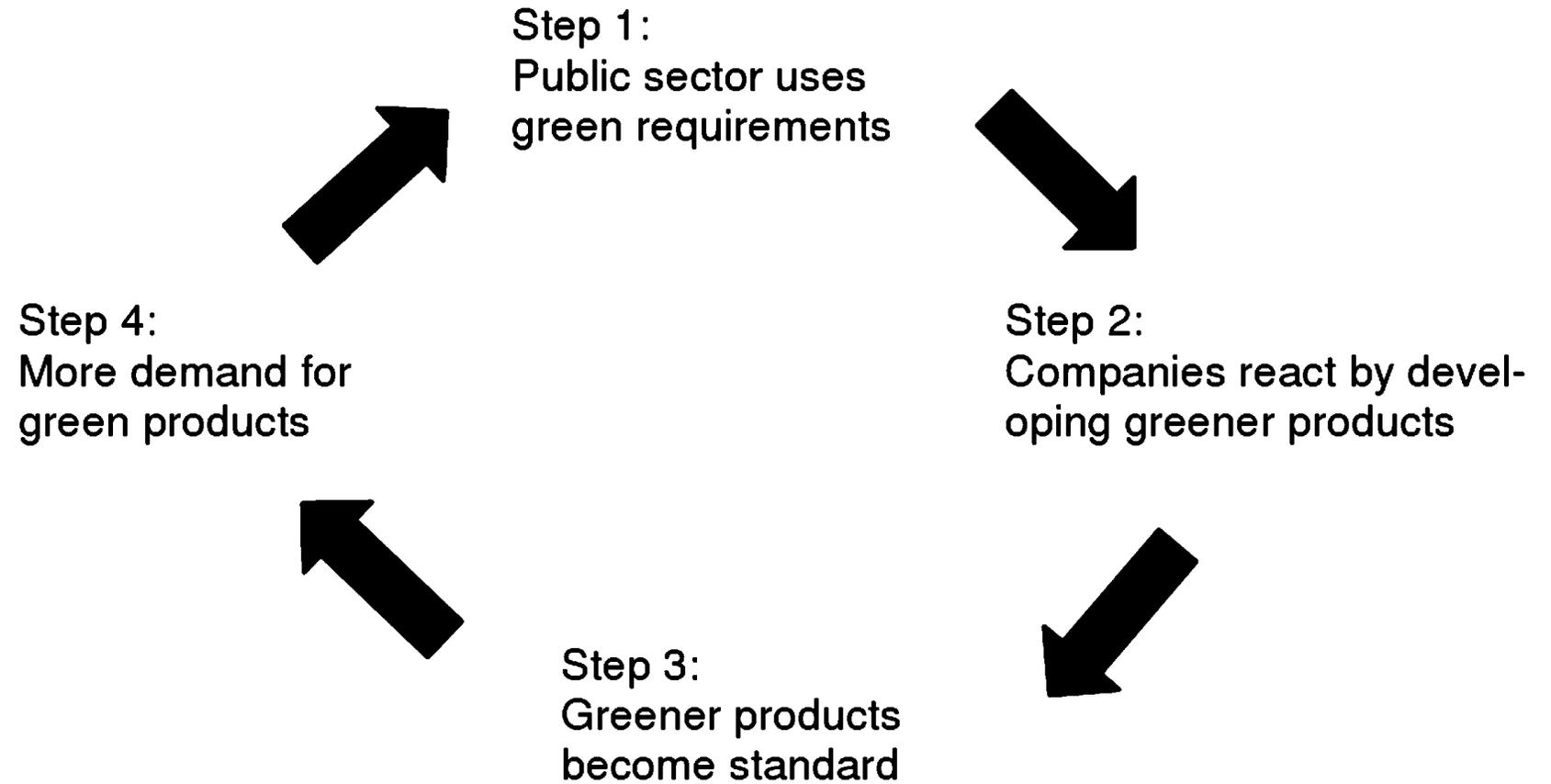
- Eco-Innovation is a new knowledge, device or process which can be viewed as the application of better solutions that meet new requirements, inarticulated needs, or existing market needs.
- This is accomplished through more effective products, processes, services, technologies, or ideas that are readily available to markets, governments and society.

Impact on markets for green products (Edquist et al., 2015)



Impact on markets for green products

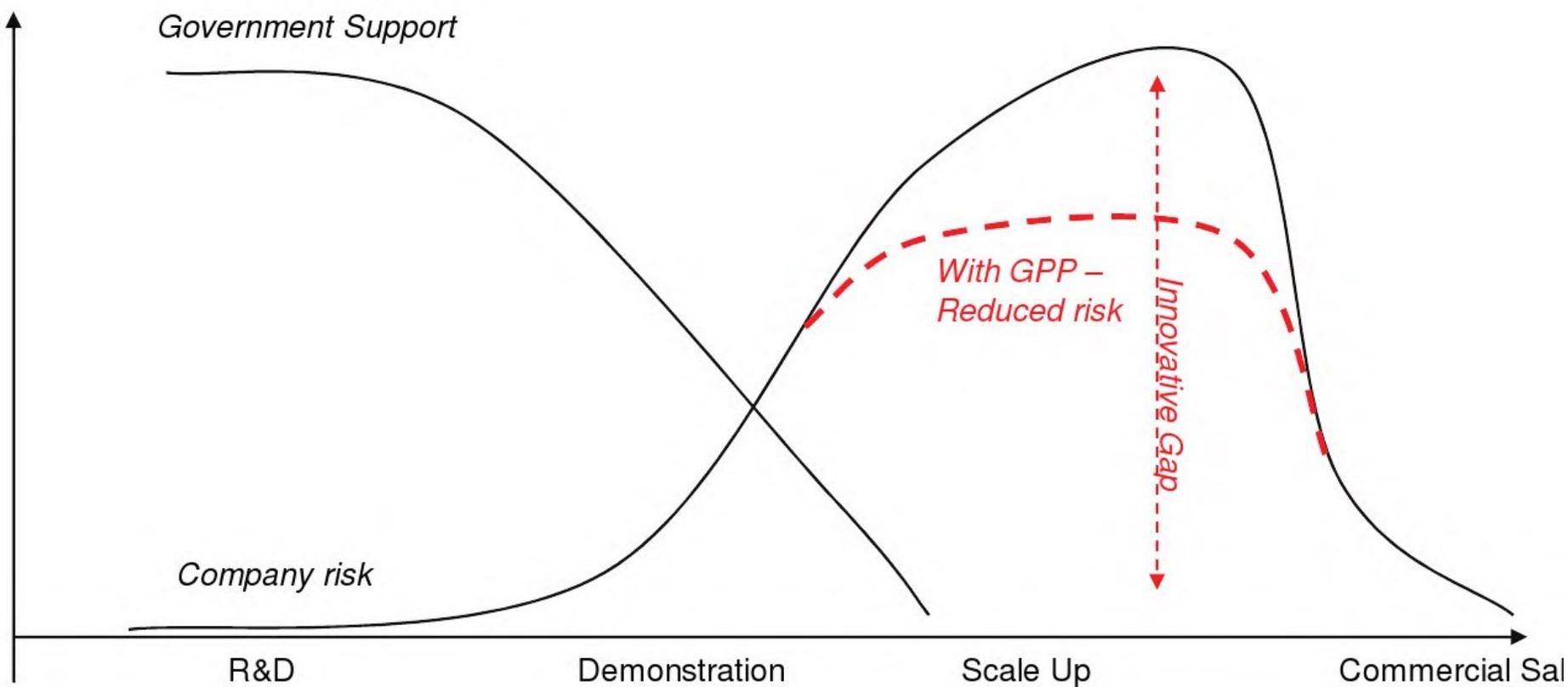
How GPP stimulates greener products and services



Bauer et al. 2009

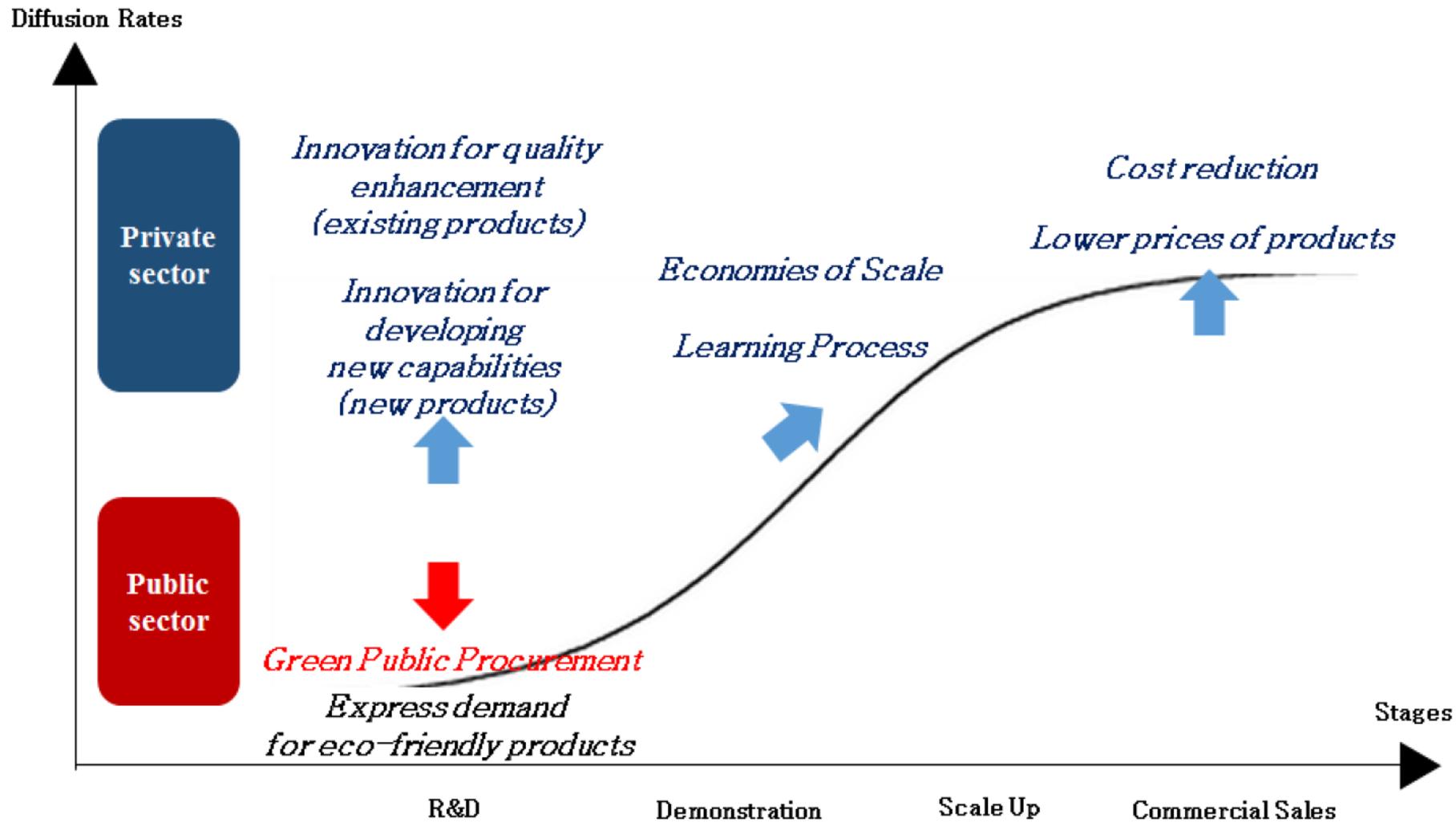
Impact on markets for green products

GPP helps closing the “innovative gap”



Bauer et al. 2009

Economic benefits (Yeo et al., 2016)



The impacts of risk reduction and innovation stimulus

THANK YOU!

For questions, comments, etc please contact me at:
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