Toward “a green Growth”

# 1- Economic Instruments for Protecting Environment: a Case Study of “EU ETS”

# 2- The Impact of Climate Change on the Arab Countries

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## What is green growth and how can it help deliver sustainable development?

- Twenty years after the first Rio Summit ( (UNCED) – 1992
- The world continues to face **a twin challenge**:

**1)** expanding **economic opportunities** for all in the context of a growing global population

**2)** addressing **environmental pressures** that, if left unaddressed, could undermine our ability to seize these opportunities.

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- Green growth is where these **two challenges** meet and it is about exploiting the **opportunities** to realize the two together.
- **Green growth** means fostering **economic growth** and **development** while ensuring that **natural assets** continue to provide the resources and environmental services on which our well-being relies.

**What does it aim to achieve?**

- Enhancing **productivity**
- Boosting investor **confidence**
- Opening up new **markets**
- Contributing to **fiscal consolidation**
- Reducing risks of negative shocks to growth

**There is no "one-size-fits-all" approach**

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## Two main economic principle:

1. Self-interested buyers and sellers neglect the **external costs** or **benefits** of their actions,

   **so the market outcome is not efficient.**

2. Another principle:
   Governments can sometimes improve **market outcomes.**

In presence of externalities, **public policy** can **improve efficiency**.

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# Externalities shows that,

Humans may misuse of the Earth's **productive capacity**,

which is measured by ecological footprints

**What are ecological footprints?**

Ecological footprints measure the extent to which humans are using the Earth's **bio-productive capacity,** which is affected to a large extent by the **utilization** of **Industrial Ecology**

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Definition **Industrial Ecology**

- It is a new science that aims to analyze **industrial** systems with the goal of finding ways to minimize their environmental impact.

✓ Thus, it is mainly about **Industrial Symbiosis**.

Definition **Industrial Symbiosis**

- An association between two or more **industrial** facilities or companies in which **the wastes** or **byproducts** of one become the raw materials for another.

A **byproduct** is a **secondary** product derived from a production **process**, **manufacturing** process or **chemical** reaction; it is not the primary product or service being produced. A byproduct can be useful and marketable or it can be considered waste.

**Circular economy ??**

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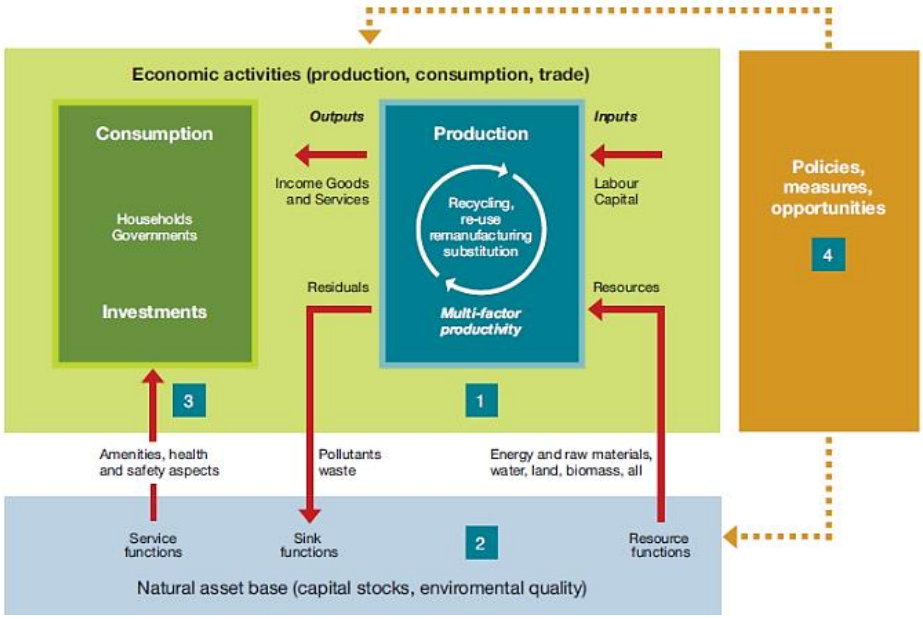
# Circular economy

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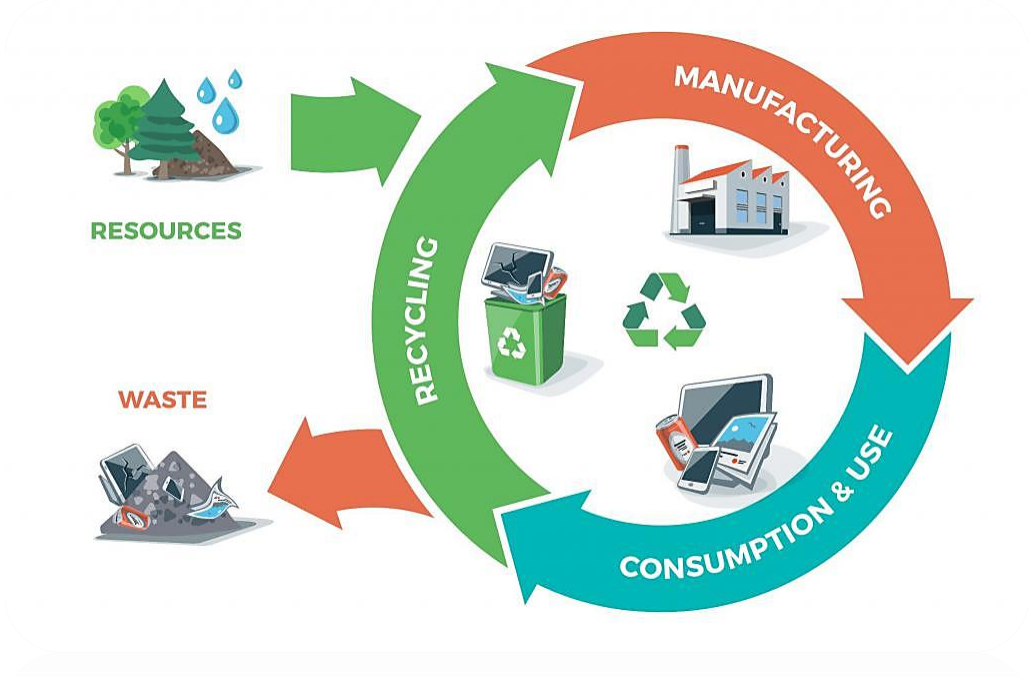


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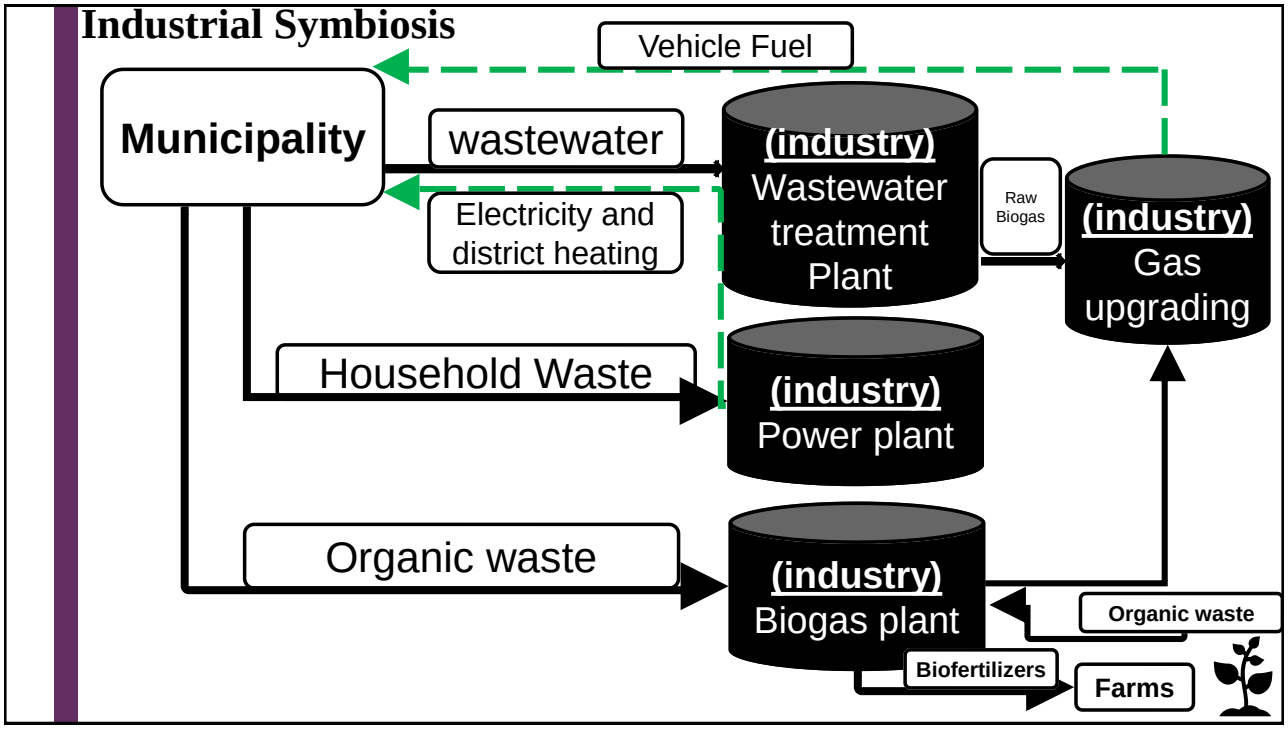
Industrial Symbiosis
Vehicle Fuel
Municipality
wastewater
Electricity and district heating
(industry) Wastewater treatment Plant
Raw Biogas
(industry) Gas upgrading
Household Waste
(industry) Power plant
Organic waste
(industry) Biogas plant
Organic waste
Biofertilizers
Farms

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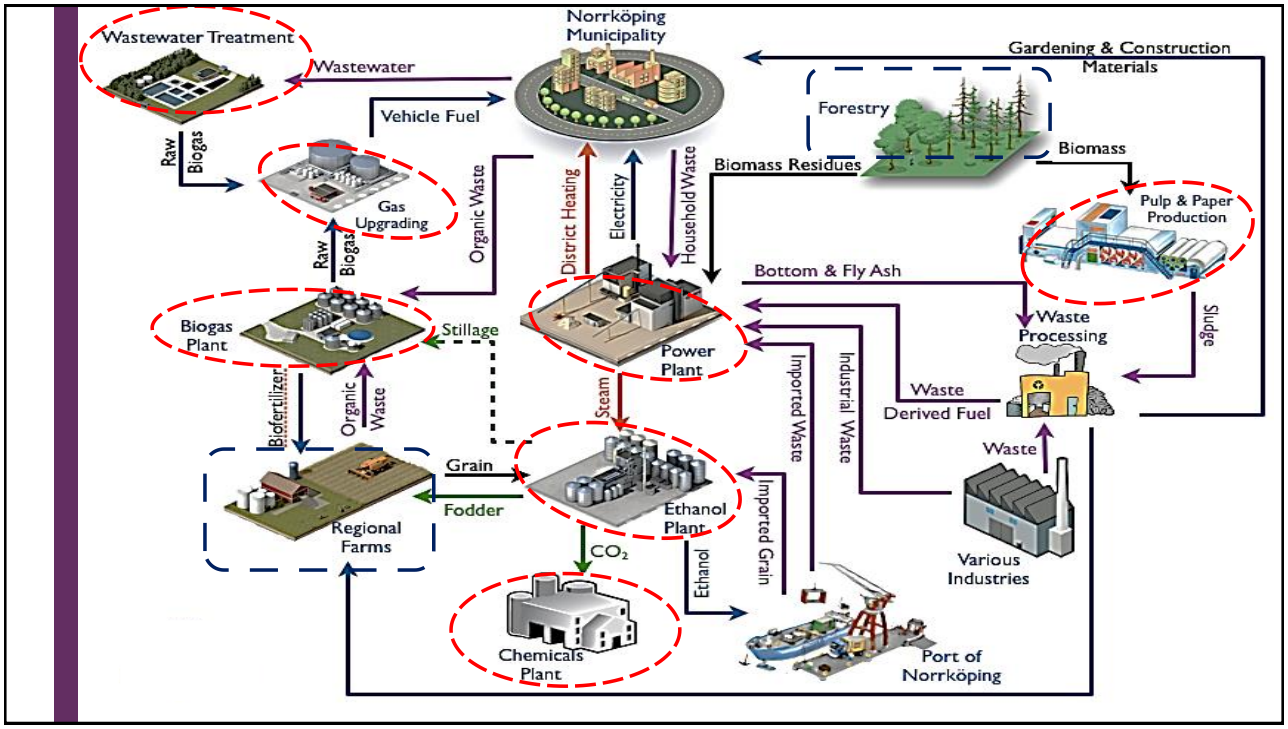
Wastewater Treatment
Norrköping Municipality
Gardening & Construction Materials
Wastewater
Vehicle Fuel
Forestry
Biomass
Raw Biogas
Gas Upgrading
Organic Waste
District Heating
Electricity
Household Waste
Biomass Residues
Pulp & Paper Production
Raw Biogas
Bottom & Fly Ash
Biogas Plant
Stillage
Power Plant
Waste Processing
Sludge
Biofertilizer
Organic Waste
Steam
Imported Waste
Industrial Waste
Waste Derived Fuel
Grain
Fodder
Ethanol Plant
Waste
Regional Farms
CO2
Imported Grain
Ethanol
Various Industries
Chemicals Plant
Port of Norrköping

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**Does free market efficiently provide goods and services?**

- **Market** failure (externalities, public goods, etc.)
- **Market** power (monopolies inefficiently restrict production to raise prices)
- **Information** problems (damages uncertain, food safety, environmental quality)

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- It has been found predicted that **global energy use will grow by 53 per cent by 2030.** But, in spite of energy efficient and non-fossil fuel power pushing across the world as an alternative, the world is moving into a "dirty, insecure and expensive" energy future!

**The solution**

- The solution lies not only in the availability of alternative clean fuel, but **policies**.

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- It is unless the policies are changed, irrespective of all investments behind producing bio-fuels, **fossil fuels** will account for **83 per cent** of the increase.
- And **carbon emissions will grow by 55 per cent** in line with energy consumption.

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- Recent data has found that it is only **between 2000 and 2005; emissions grew four times faster than in the preceding 10 years:**

**But**,
Again if policies and guidelines are set, how far can the alternative **energies** satisfy both the consumption demand and the **environmental concerns**?

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# Types of questions in regulation

1. What is **Externalities**?
2. What is the "**optimal**" amount of pollution?
3. What **regulatory instrument**(s) should be used to achieve the optimal level?

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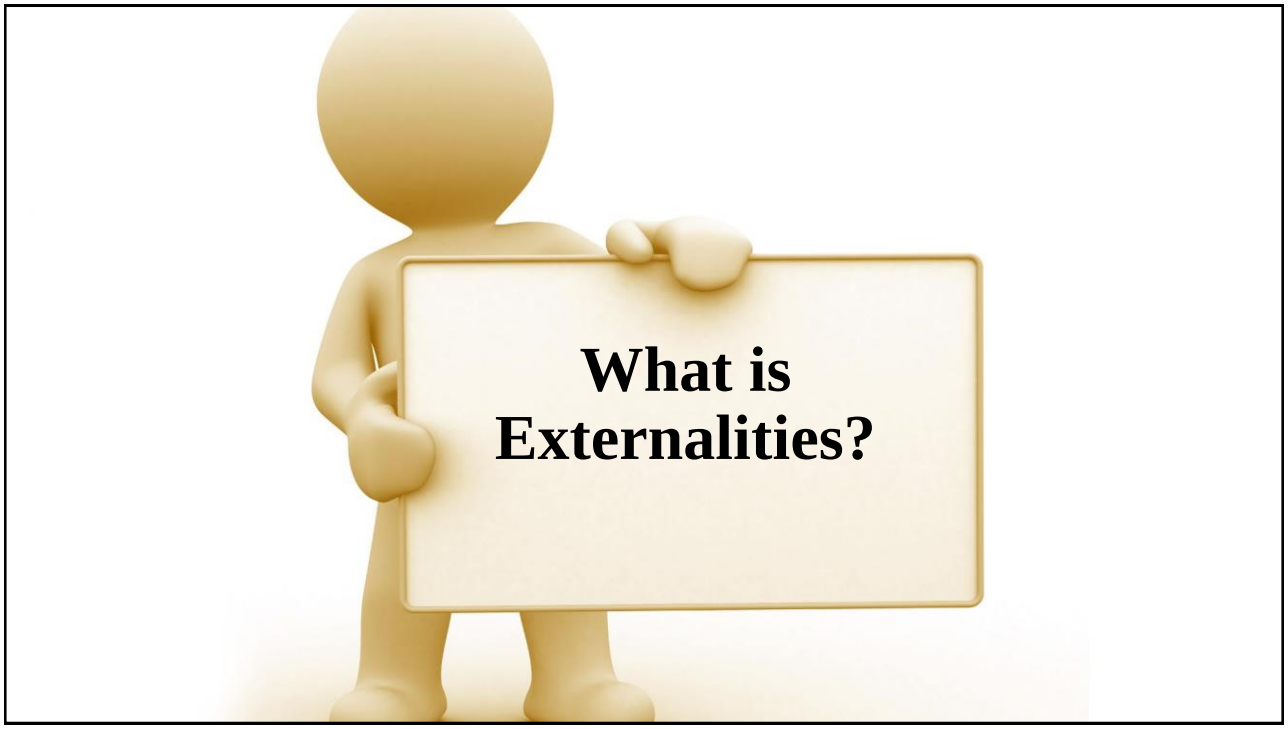


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## What is an Externality?

When a firm does something that affects the **interests** of another firm without affecting prices.

When an exchange between a buyer and seller has an impact on a third party who is not **part** of the **exchange**.

Negative externalities increase **Social costs**

➡ **Social Costs** are costs that include both the private costs incurred by firms and also **additional external costs** incurred by third parties outside the production process.

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An externality implies:

Social Cost ≠ Individual Cost

Social Benefit ≠ Individual Benefit

**As a result:**

too much of **socially costly goods** are produced

too little of **socially beneficial goods** are produced.

**Pollution is considered a negative externality**

**e.g., flat-screen TVs causes negative externality**

**This means:** You **cannot** use markets to give people incentives to do the right thing.

"Market Failure"

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Humans can be adversely affected by exposure to various types of pollutants

**Pollution control instruments**

In thinking about pollution policy, economists are interested in two issues:

- ✓ **What should be the target level of pollution?**
- ✓ **What is the best (cost-effective) method of achieving that level?**

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## What should be the target level of pollution?

**Pollution** is bad but **prevention** is costly

must **balance benefits** of prevention vs. **costs**.

**Abatement of pollution is costly for the polluter: Why?**

- ✓ Purchase and installation of **pollution control equipment**
- ✓ More radical **changes of the production process** towards cleaner production processes
- ✓ Reduction in **the level of production**

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## The Target Level of Pollution

**- Identify the social benefits and social costs of pollution**

**social costs of pollution** describes the relationship between pollution and damage ($)

**Marginal Cost of Pollution**

- ✓ Identifies the extra cost arising from additional pollution (emissions)
- ✓ It is increasing function in level of emissions
- ✓ damages include any type of damage caused
  - Decrease in the value of other activities due to the pollution;
  - Estimated value of health effects.
  - Value of a less beautiful landscape

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## Marginal Abatement Costs (MAC):

**Abatement costs** → costs of reducing pollution (emissions).

- Increase in a **firm's production costs** resulting from efforts to reduce pollution.
- Costs of a recycling program, increase in costs due to a change in technology, etc.

Increase in abatement costs caused by lowering emissions (raising abatement) by one unit.

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**Assume that**

- Firm uses the least cost way of lowering emissions
- Firm's objective: maximizing profits

■ MAC curve as downward sloping in emissions (**pollution**).

**This implies**

➥ low marginal cost of abatement for the first reductions in emissions.

MAC rises with more abatement activity.

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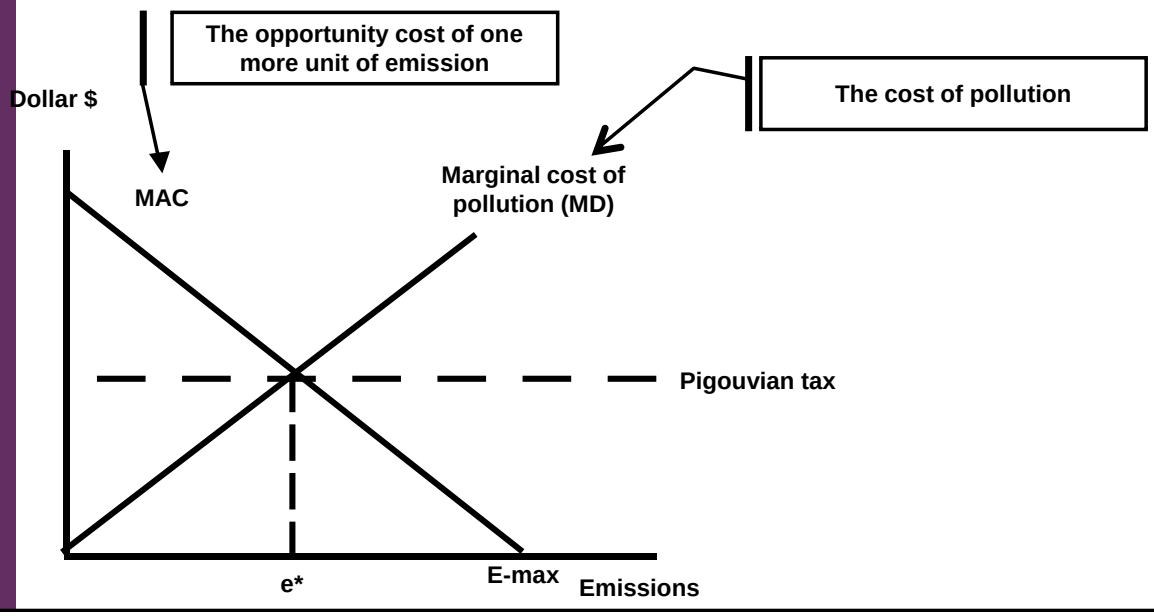
## The Efficient level of Pollution

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## Efficient level of emissions (abatement):

- **Start at the level of emissions with no abatement activity (E-max).**

In this case, costs are too high (no abatement reductions)

This is considered as the maximum level of pollution that occurs if the costs or damages of pollution are ignored in the society

**If MD >MAC**

➡ Emissions should be reduced

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- Keep reducing emissions until level where

**MD = MAC**

- The resulting level of emissions is **e***

⟹ the efficient level of emissions.

- Any further reductions cost more than the damages avoided (MD < MAC):

⟹ creates a loss to society.

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- In general the **greater** the level of **pollution** the greater the level of **damages** and the greater the **abatement costs** required.
- **More pollution** is desirable as long as its **marginal benefits** outweigh its **marginal costs**.
- **Less pollution** is desirable whenever its marginal costs outweigh its marginal benefits.

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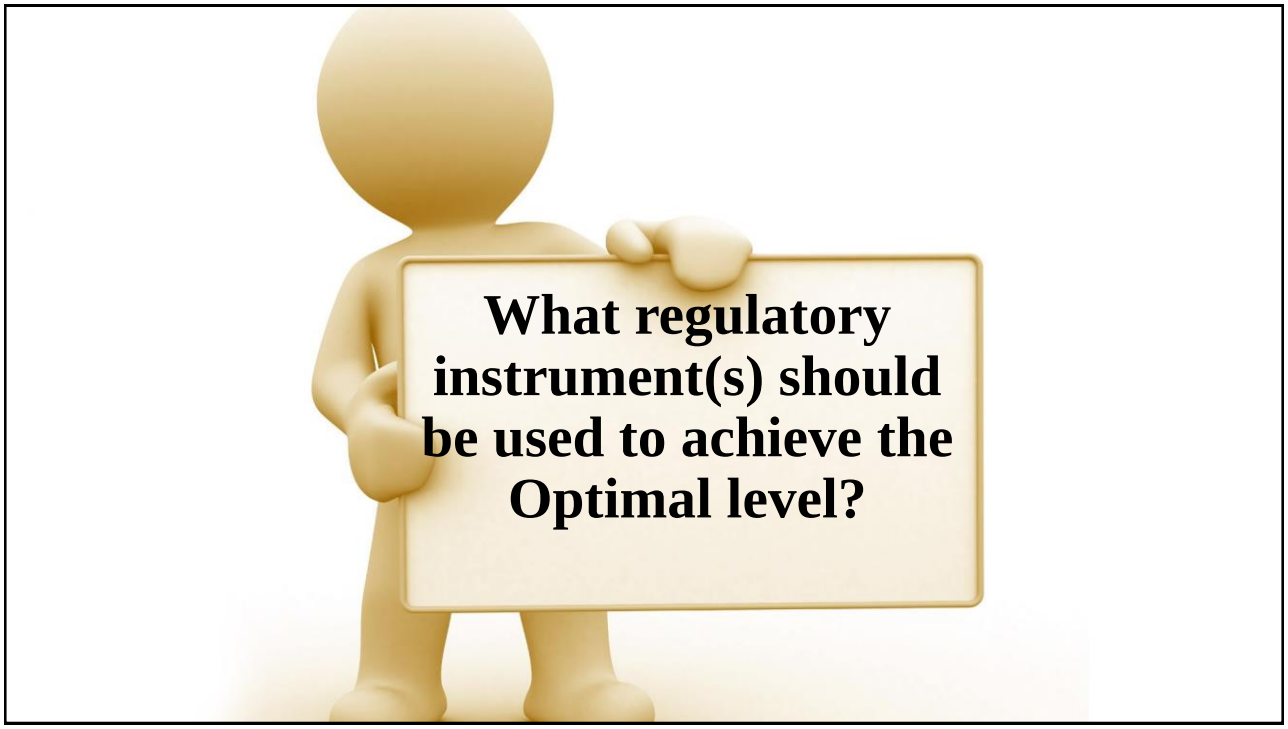


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## Some Solutions to the Pollution/Externality Problem

Several regulatory and non-regulatory approaches used in environmental policy making

Four general approaches to environmental policy making:

**(1) Command-and-control regulation**
**(2) Market-Based Policies**
**(3) Hybrid Approaches**
**(4) Voluntary Initiatives**

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## (1) Command-and-control regulation

**A prescriptive regulation:** a policy that prescribes how much pollution an individual source or plant is **allowed to emit** and/ or what types of **control equipment** must be used to meet such requirements.

- ✓ Such a **standard** is often defined in terms of **a source-level emissions rate.**
- ✓ Despite the introduction of potentially **more cost effective methods** for regulating emissions, this type of regulation **is still commonly used** and is sometimes statutorily required.

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- **Note that**

Regulators can at least partially account for **some variability** in costs by allowing **prescriptive standards** to vary according to:

- ✓ Size of the **polluting entity**,
- ✓ **Production** processes,
- ✓ **Geographic** location.

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## (2) Market-Based Policies

**By creating an incentive for the private sector** to incorporate pollution abatement into production or consumption decisions and to innovate in such a way as to continually search for the least costly method of abatement.

✓ This allows firms **more flexibility** than more traditional regulations.

✓ Environmental economists generally **favor market-based policies** because they tend to be **least costly**, they place **lower information burden** on the regulator, and they provide incentives for **technological advances**.

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Four classic market-based approaches:

1. **Marketable Permit Systems** (cap-and-trade systems, project-based trading systems and emissions rate trading systems);
2. **Emission taxes**;
3. **Environmental Subsidies;**
4. **Tax-subsidy combinations.**

■ **Notes:**

Taxes and subsidies are **price-based** while marketable permits are **quantity-based**.

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## Cap-and-Trade Systems

- The **cap** on greenhouse gas emissions is a **limit**.
- **Companies** pay **penalties** if they exceed the cap, which gets stricter over time.
- The **trade** part is a market for companies to buy and sell **allowances** that permit them to emit only a certain amount.
- Trading gives companies **a strong incentive to save money by cutting emissions.**

E.g. **The Acid Rain Program** by **EPA** (The program is an implementation of emissions trading that primarily targets **coal-burning power plants**, allowing them to buy and sell emission permits (called "allowances") according to individual needs and costs)

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## Project-Based Trading Systems

Plant managers can propose their **own emission standards: tightening them** in places where it is least costly, and **relaxing or even eliminating them** where pollution control costs are high.

### Emissions Rate Trading Systems

The regulatory authority establishes **a performance standard** or **emissions rate**.

Sources with emission rates below the performance standard can **earn credits** and **sell them to sources** with emission rates above the standard.

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## (3) Hybrid Approaches

These approaches combine aspects of **command-and-control** and **market-based incentive** policies.

✓ Such approaches are appealing to policy makers because they often combine **the certainty associated with a given emissions standard** with **the flexibility** of allowing firms to pursue the least costly abatement method.

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## (4) Voluntary Initiatives (Non-Regulatory Approaches)

Voluntary programs can use the following **four** general methods to achieve environmental improvements:

(1) Require firms to set **specific environmental goals**;

(2) Promote firm **environmental awareness**;

(3) Publicly recognize **firm participation**;

(4) Support **advertising** campaigns that support environmental issues.

(5) Use **labeling** to identify environmentally responsible products.


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**Cost-effectiveness**

- Does the instrument attain the target at **least cost**?

**long-run effects**

- Does the influence of the instrument **strengthen**, **weaken**, or **remain** cost over time?

**Dynamic efficiency**

- Does the instrument create continual incentives to improve products or production processes in pollution-reducing ways?

**Ancillary Benefits**

- Does the use of the instrument allow for a double dividend to be achieved?

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**Equity**

- What implications does the use of an instrument have for the **distribution** of **income** or **wealth**?

**Dependability**

- To what extent can the instrument be relied upon to achieve the target?

**Flexibility**

- Is the instrument capable of being adapted quickly and cheaply as new information arises, as conditions change, or as targets are altered?

**Costs of Use Under Uncertainty**

- How large are the efficiency losses when the instrument is used with incorrect information?

**Information Requirements**

- how much information does the instrument require that the control authority possess, and what are the costs of acquiring it?

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# Background

**The Kyoto Protocol**

Agreed upon in 1997

The first commitment period (2008–2012).

- ✓ Extends the 1992 **UN Framework Convention for Climate Change** (UNFCCC),
- ✓ Set legally-binding GHG reduction targets, or caps, for 37 industrialized countries

This led to the need for **policy instruments** by EU to meet the Kyoto commitments.

**The first step was in 2000**

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# Background

In **2000** a green paper with some first ideas on the designs of the **EU ETS** was presented.

**By the European Commission**

**It served as:**

a basis for numerous **stakeholder discussions** that helped shaped the EU ETS in the first phases.

This led to the adoption of the EU ETS Directive in 2003 and the introduction of the EU ETS in **2005**.

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# The EU Emissions Trading System (EU ETS)

- **What is the EU ETS?**

✓ The system was first introduced in 2005.

✓ The EU ETS is **a major tool** of the European Union in its efforts to meet **emissions reductions targets**.

✓ The EU ETS is **a 'cap** and **trade'** system.

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✓ It caps the total volume of GHG emissions from installations and aircraft operators

→ responsible for around **50%** of EU GHG emissions.

✓ The system allows trading of **emission allowances**

→ so that the total emissions **stays within the cap** and **the least-cost measures** can be taken up to reduce emissions.

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- ✓ The trading approach helps to combat climate change in a cost-effective and economically efficient manner.

AS, the EU ETS covers more than **11,000 power stations** and **industrial plants** in **31 countries**, and flights between airports of participating countries.

- ✓ The implementation of the system has been divided up into distinct trading periods over time, known as phases.

2013-2020 (The current phase of the EU ETS)

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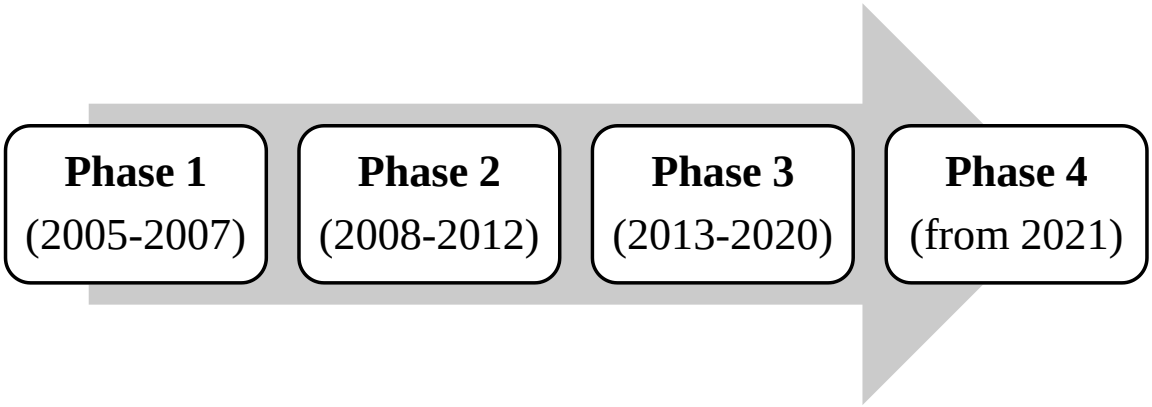
# EU ETS-Phases

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## The EU chose a "cap-and-trade" structure

**Why?**

- A traditional c**ommand-and-control** approach may mandate a **standard limit** per installation,

  **but** provides **little flexibility** to companies
  (as to where or how emissions reductions take place)

- **A tax** does not guarantee that the GHG emissions reduction **target** will be achieved.

  and in a multi-national system, **agreement** would be required **across all countries** on the **right price** for carbon.

  Difficult to determine the "right price" to obtain **the cut in emissions** required without under- or overcharging companies.

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- cap-and-trade allows a set **environmental outcome** to be achieved at lowest costs.
- Trading allows companies to determine

  what **the least-cost option** is for them to meet a fixed cap

- The carbon price is then set by the market through trading

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## In addition, cap-and-trade provide:

- **Certainty about quantity**
- **Cost-effectiveness**
- **Revenue**
- **Minimizing risk to Member State budgets**

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## Certainty about quantity

- Emission Trading directly limits **GHG emissions**

by setting **a system cap** that is **designed** to ensure **compliance** with the relevant **commitment.**

There will be certainty about **the maximum quantity of GHG emissions** for the period of time over which system caps are set.

- This is relevant for supporting the EU's international objectives and obligations and achieving environmental goals.

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## Cost-effectiveness

Trading reveals the carbon price to meet the desired target.

The flexibility that trading brings means that all firms face the same carbon price

and ensures that emissions are cut where it costs least to do so.

## Revenue

If GHG emissions allowances are auctioned

this creates **a source of revenue** for governments

at least 50% of which should be used to fund measures to tackle climate change in the EU or other Member States.

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## Minimizing risk to Member State Budgets

The EU ETS provides **certainty** to **emissions reduction** from installations responsible for around **50%** of EU emissions.

This reduces **the risk** that Member States will need to

purchase **additional international units** **(**to meet their international commitments under the Kyoto Protocol).

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## How does the EU ETS contribute to meeting the EU's climate policy goals?

- The international community has agreed that global warming should be kept below **a 2ºC increase**, as compared to the temperature in **pre-industrial times.**
- In 2008, the EU set a series of climate and energy targets to be met by 2020 in its pathway towards **a low-carbon competitive economy**, known as the "20-20-20" targets. These are:
  - A reduction in **EU greenhouse gas emissions** of at least 20% below 1990 levels.
  - 20% of **EU energy consumption** to come from renewable resources
  - A 20% reduction in **primary energy use** compared with projected levels, to be achieved by **improving energy efficiency**.

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## How does the EU ETS contribute to a competitive economy?

- EU leaders envisage that the European economy can cut most of its GHG emissions by 2050 through smart, sustainable and inclusive growth.
- The Commission's roadmap for moving to a low-carbon economy by 2050 includes a key role for the EU ETS in promoting decarbonization (reducing its carbon intensity) throughout the European economy.

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## How does the EU ETS contribute to a competitive economy?

- The EU ETS contributes to the creation of jobs, generation of green growth and strengthening long-term competitiveness of the European economy by putting a price on carbon. Specifically:
  - It stimulates investments in energy efficiency measures, reducing energy costs and financial risks associated with increasing energy prices
  - It offers an incentive to invest in renewable energy technology, reducing the energy dependency on fossil fuel imports and enhancing energy security
  - It strengthens the EU ambition to decarbonize the European economy, providing a long-term stable policy environment for low carbon investments and clean *technology.*

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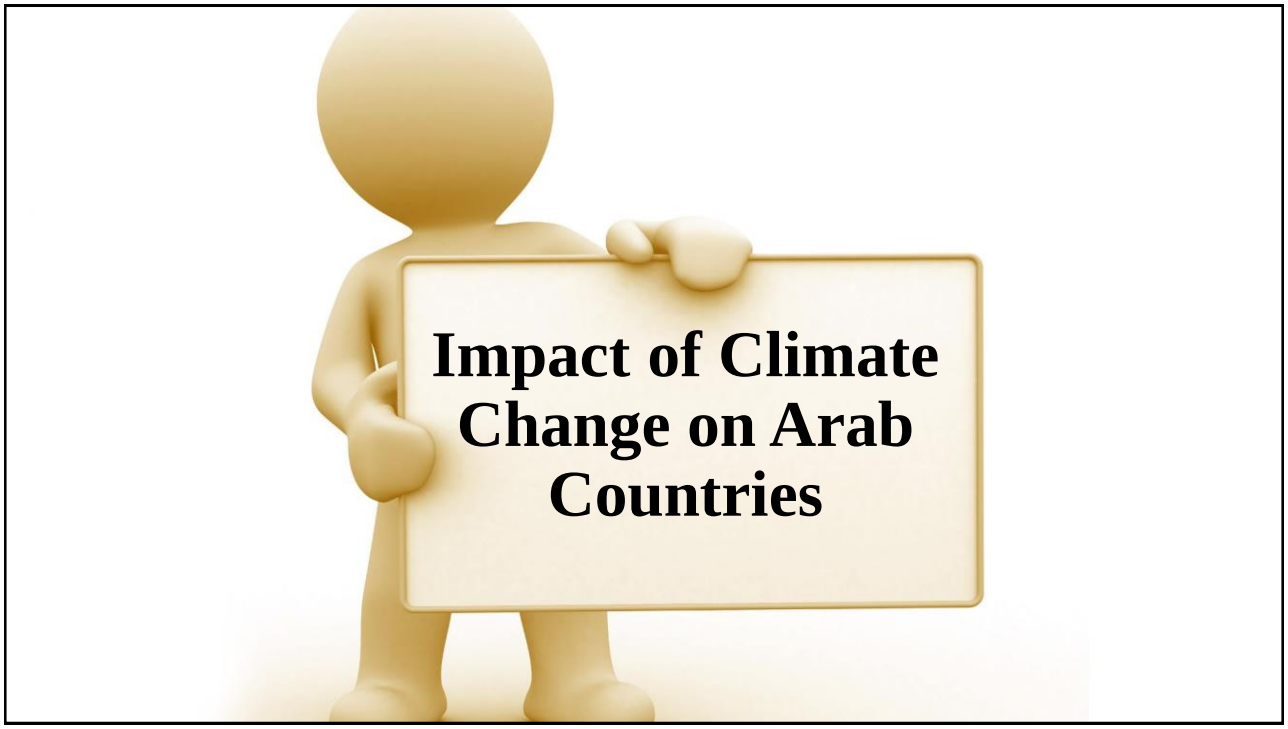


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# Millennium Development Goals

**"By 2015, cut in half the proportion of people without sustainable access to safe drinking water and sanitation."**

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## Impact of Climate Change on Arab Countries

- Arab countries, though not primary contributors to atmospheric greenhouse gas emissions, will have to undertake mitigation efforts as part of global action.
- Specific examples in the Arab world are:
  - *The commercialization of wind energy in Egypt;*
  - *Widespread use of solar heating in Palestine, Tunisia, and Morocco;*
  - *The introduction of compressed natural gas (CNG) as a transport fuel in Egypt;*
  - *The first concentrated solar power projects in Egypt, Tunisia, Morocco, and Algeria;*
  - *The first two Arab green building councils in The UAE and Egypt;*
  - *The massive forestation program in the UAE; Masdar,*
  - *The first zero-carbon city in Abu Dhabi;*
  - *The pioneering carbon capture and storage project in Algeria;*
  - *and Jordan's introduction of duty and tax exemptions to encourage the import of hybrid cars.*

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In a particularly promising development, the newly established **International Renewable Energy Agency** (IRENA) has chosen Masdar City in Abu Dhabi as the agency's first headquarters. This is not only very important for the developing world as a whole but will hopefully also lead to significant research and investments into renewable energy in the Arab region.

**However**, most of these initiatives are fragmented and do not appear to have been implemented as part of a comprehensive policy framework at the national level, let alone at the regional one.

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## Water and Conflict

- **"The next war in the Middle East will be over water, not politics."** (Boutros Boutros-Ghali, Secretary General, United Nations)
- **"The only matter that could take Egypt to war again is water."** (Anwar Sadat, President of Egypt)
- **"Water is the one issue that could drive nations of the region to war."** (King Hussein, Jordan)
- **"Many of the wars in this century were about oil, but wars of the next century will be about water."**(Ismail Serageldin, Vice President, World Bank)

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- Southwest Asian countries often get into disputes over their policies on water rights and other natural resources.
- Water rights are agreements about how countries can use the water in a region.
- Water rights often cause political disputes.
- According to the World Bank the amount **one** human needs in order to remain alive and healthy is **100 to 200 litres per day.**
- Less than 3 percent of world's overall water is fresh water, less than 1 percent of the fresh water supply is accessible to humans.
- World Bank: Eleven countries in the ME have annual per capita supplies at or less than 100 cubic meters:
  - *Algeria, Egypt, Israel, Jordan, Libya, Morocco, Saudi Arabia, Syria, Tunisia, the United Arab Emirates and Yemen*

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- Only 3 countries in the Middle East do not need to depend on outside fresh water:
  - *Iran, Egypt, and Turkey*
- 2/3 of the Middle East depend on water from outside their borders
- Jordan is one of the most water scarce countries in the world.
- More than 90% of population growth will be in developing countries where clean water supplies are low.
- Nine countries in the Middle East use >100% of their renewable water supply (depleting groundwater).
- Egypt depends entirely on the Nile to irrigate crops. Ethopia controls 80% of Nile's flow upstream and plans to divert water for itself. Could be catastrophic for Egypt.

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- **Saudi Arabia**, have almost no water.

They are mostly made up of desert.

- **Iran** has areas with access to rivers and areas that are made up of deserts.
- Because water is in short supply in so many parts of Southwest Asia, irrigation has been necessary for those who want to farm and raise animals for market.
- People must live where there is water.
- There are many serious environmental problems in the **Middle East**.
- The water supply is very limited and finding fresh water for farming or drinking is a struggle throughout the region.
- **Israel** has very few fresh water sources and the Sea of Galilee provides its primary supply of drinking water.

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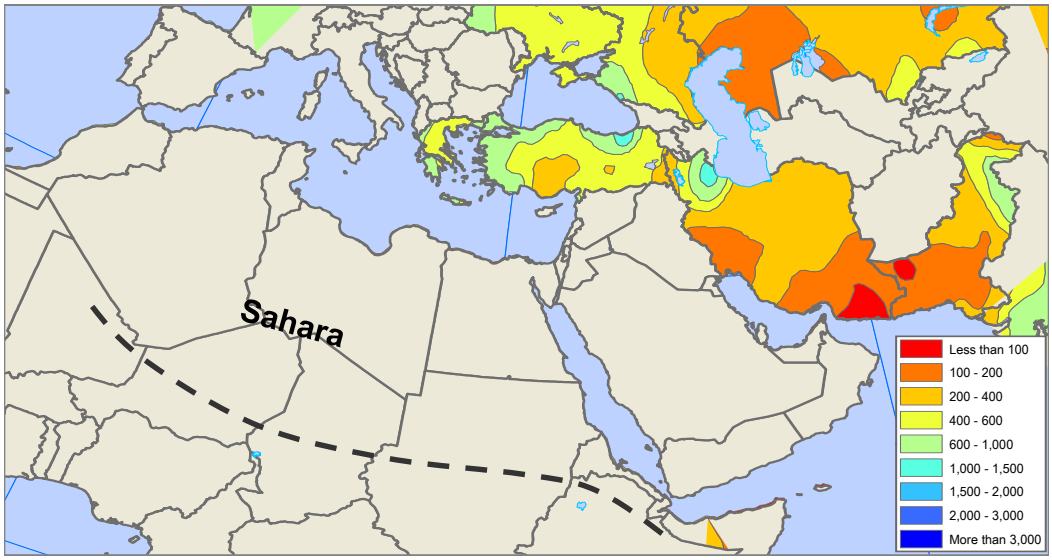
# North Africa / Middle East, Mean Annual Precipitation (mm)

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## Water Conflict between Israel and Jordan and Palestinians

- Most countries in the Middle East suffer from an ongoing shortage of water. The situation is felt most acutely in Israel, Jordan and the Palestinian Authority, and is worsening due to the decrease in useable water reserves as a result of pollution and climatic changes, as well as population growth and the rising demand for water.
- Israel, Jordan, and the Palestinians on the West Bank, all depend on many of the same scarce water resources.

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The Jordan River is the major source of water for both Israel and Jordan

**Early 1950s:** Israel wanted to cultivate additional desert land → built a new pipeline to bring water from the Jordan River to the **Negev Desert**

Pipelines became the central water supply for Israel but pipeline was a threat to **Jordan's water supply**

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- Many people in Jordan could not get the water they needed.
- Border clashes between Jordan and Israel.
- 1967 Israeli – Jordanian War: Israel won and occupied the Golan Heights
- Israel also
  - Gained complete control of the Upper Jordan River
  - Jordan could not tap as much water from the Jordan River

**Critical shortage of water in Jordan**

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**Israel also**

- Destroyed a dam Jordan was constructing on the **Yarmouk River** during the war
- Diverted large amounts of water from the Yarmouk River into Lake Tiberias
- Obstructed all attempts by Jordan to build a water storage system to improve its water supply

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- Israel has the most power, so it has been most effective in claiming water.
- Much Israeli water is also cleaned after it is used, and is then reused.
- Also further tension due to Palestine's claims to share of Jordan river.
- We can observe huge discrepancies between water allocated to Palestinians and Israelis.

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**Steps Taken**

Jordan and Israel signed a peace treaty

- Both agree to share the Jordan River and provide each other with water
- Both agree to build dams and create storage facilities to hold excess rainwater

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Thank you

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