

DP IB Environmental Systems & Societies (ESS): HL



Your notes

10.5 Ecological Economics

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Ecological Economics

Ecological Economics

The relationship between economy and environment

- Ecological economics is a way of looking at how the economy fits into the bigger picture of the **Earth's biosphere**
 - It sees the economy as just one part of the larger natural world
- Unlike environmental economics, which focuses on how economic activities affect the environment, ecological economics goes **further**
 - It sees the economy as a **subsystem** of the Earth's biosphere
 - The **social system**, including human societies and economies, is considered a smaller part of the bigger global ecological system

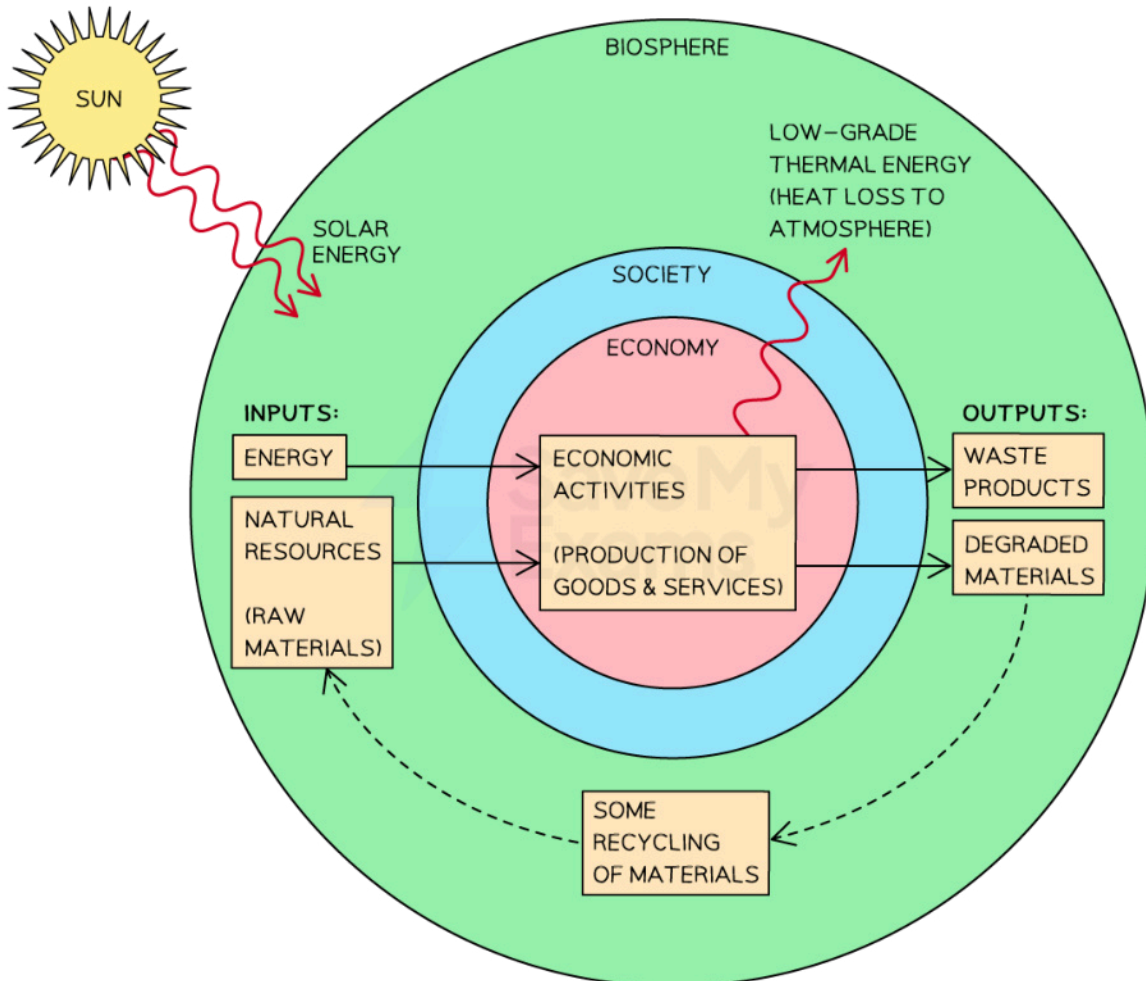
Flows of energy and matter in the biosphere

- In ecological economics, the biosphere is seen as a system fuelled by **solar energy**
 - This solar energy sustains natural resources like air, water and soil
- These natural resources then flow into the **economic subsystem**
 - The economy uses these resources to produce **goods** and **services**
 - However, this production also generates **waste** and releases low-grade **thermal energy** back into the biosphere
- **Generation of waste:**
 - When industries or human activities produce goods and services, there are often by-products or waste materials created in the process. For example:
 - Factories manufacturing goods might produce chemical waste or packaging materials that are not reused or recycled
 - Agriculture can generate agricultural runoff, which includes pesticides and fertilisers, polluting water sources
 - Industries use water and release polluted water back into rivers. This affects not only the environment but also communities relying on clean water sources
- **Release of low-grade thermal energy:**



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- When energy is used in economic activities, not all of it gets converted into useful forms like electricity or mechanical energy
- Some of this energy dissipates as heat, known as low-grade thermal energy
- Examples include:
 - Burning fossil fuels for energy production in power plants—while some energy is converted into electricity, a significant portion is lost as heat during the process
 - The operation of vehicles and machinery also generates heat as a **by-product**
- Once waste materials and low-grade thermal energy are generated in economic activities, they are released back into the biosphere, which includes the Earth's atmosphere, land, and water bodies
- This can have various impacts on the environment, such as **pollution** of air, water and soil, as well as contributing to **climate change**



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Ecological Economics



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Sustainable use of natural resources

- Ecological economics emphasises the importance of using natural resources **sustainably**
 - This means ensuring that we don't use up all our resources, leaving nothing for future generations
 - For example, many companies are increasingly adopting sustainable practices like using **renewable energy sources** or **reducing waste** to protect natural resources
- This approach applies the **precautionary principle**
 - This means being cautious and taking preventive action before extracting or using natural resources, particularly if the full impact of the particular activity is not known
 - This can help minimise the unforeseen environmental and social impacts of economic activities

Value of natural capital

- Ecological economics doesn't just focus on traditional forms of capital like money, land or property
 - It also considers natural capital, human capital (like skills and knowledge), and physical capital (like machinery)
- In ecological economics, natural capital—things like **forests**, **oceans**, and **biodiversity**—is considered just as valuable as human-made resources like electronic gadgets, clothing or other products
 - Recognising the full value of natural capital helps make decisions that **benefit both the economy and the environment**
 - National parks and reserves are examples of how countries prioritise protecting natural capital for the benefit of future generations and biodiversity conservation

Valuation of Ecosystem Services

- While environmental economics also considers the economic value of **ecosystem services**, ecological economics places even more emphasis on this
 - Ecosystem services are the **benefits** that people receive from nature, like clean air, water, and food

Global resource dynamics

- In ecological economics, it is recognised that there is an **unequal distribution** of natural resources between different countries
 - Some countries have lots of resources, while others have fewer
- "Resource-depleted" countries might pay "resource-rich" developing countries to protect their natural assets (also ensuring the protection of the valuable ecosystem services they provide)



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- This sometimes happens when developing countries risk using up their resources for **economic development**
- For example, Norway pays Brazil to help protect the Amazon rainforest, which provides vital ecosystem services like carbon sequestration and biodiversity preservation
- Another example might be wealthy nations in Europe paying nations in Africa to conserve wildlife habitats, such as savannahs and grasslands, to preserve biodiversity and support ecotourism
 - This helps prevent the overexploitation of natural resources in these developing countries, whilst also promoting conservation efforts and sustainable development

Looking beyond material value

- Ecological economics sees natural assets and resources as having value beyond just the material goods that can be extracted from them
 - For example, ecological economics sees forests as having value beyond just the timber they provide
 - Forest also provide ecological services, like habitat for wildlife, carbon storage and erosion protection
 - They also have **aesthetic value** for tourism and recreation, and **ethical value** for biodiversity conservation
- This can have **economic benefits**
 - For example, the tourism industry in countries like Costa Rica benefits from the preservation of their natural assets, including forests and biodiversity, contributing significantly to their economy

Tensions between countries

- Paying for ecosystem services can create tensions between countries
 - Countries that have depleted their natural assets in the past may pay others to preserve theirs
 - This can lead to debates about **sovereignty** and **fairness**
- Disputes often arise between developed countries, who are seeking to conserve global biodiversity and slow down climate change, and developing countries, who are prioritising their own economic development

Issues Caused by Payments for Ecosystem Services

Issue	Explanation	Example



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Sovereignty	Some nations may view external interventions, such as payments from other countries, as infringing on their sovereignty—their right to govern themselves without interference	For example, they might argue that decisions about their natural resources should be made independently, without external influence
Fairness	Questions about fairness can emerge regarding who benefits from these transactions and who bears the costs	For example, if a wealthy nation pays a developing country to preserve its forests, there may be concerns about whether the payments are enough to compensate for the economic opportunities missed by the developing nation. Additionally, local communities within the developing country may feel that they are not adequately compensated for their role in preserving the natural assets
Distribution of benefits	There can be debates about how the benefits of preserving natural assets are distributed within a country	For example, if payments for ecosystem services mainly benefit national governments or large landowners, marginalised communities and indigenous groups may feel excluded from the benefits of conservation efforts



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Alternative Economic Models

Sustainable Economic Models

Ecological economics

- Ecological economics supports the idea of degrowth, zero growth, or slow growth
 - This means **reducing** how much we consume and produce, especially in wealthy countries
- The goal of ecological economics is to balance the ecological footprint of a country with its biocapacity
 - This balance leads to **sustainability**, where we don't harm the environment at a faster rate than it can recover, or remove resources faster than they can **regenerate** and be **replaced**

Challenges and solutions

- It's not easy to change long-standing and deeply embedded economic systems
 - Ecological economists are constantly working on finding ways to measure social and environmental well-being accurately
- They focus less on GDP (gross domestic product), which only measures economic activity, and instead focus more on **sustainable balance** (i.e. the extent to which the ecological footprint of a country is sustainably balanced by its biocapacity)
 - For example, instead of just looking at how much a country, industry or business produces, they also consider how much this economic output is harming the environment
- This means looking at how much a country consumes compared to the capacity of its natural resources to regenerate
 - For example, if a country's biocapacity (how much it can renew resources) is **lower** than its ecological footprint (how much it consumes), it is **not sustainable**

Circular Economy & Doughnut Economics

- The circular economy and doughnut economics are two **different** economic systems
- Both the circular economy and doughnut economics models are based around the principles of ecological economics
 - They aim to **increase sustainability** by addressing environmental and social challenges within economic systems

- While the circular economy emphasises the efficient use of resources through product stewardship, doughnut economics considers how much economic activity can happen without permanently damaging the planet or causing social problems

Circular economy

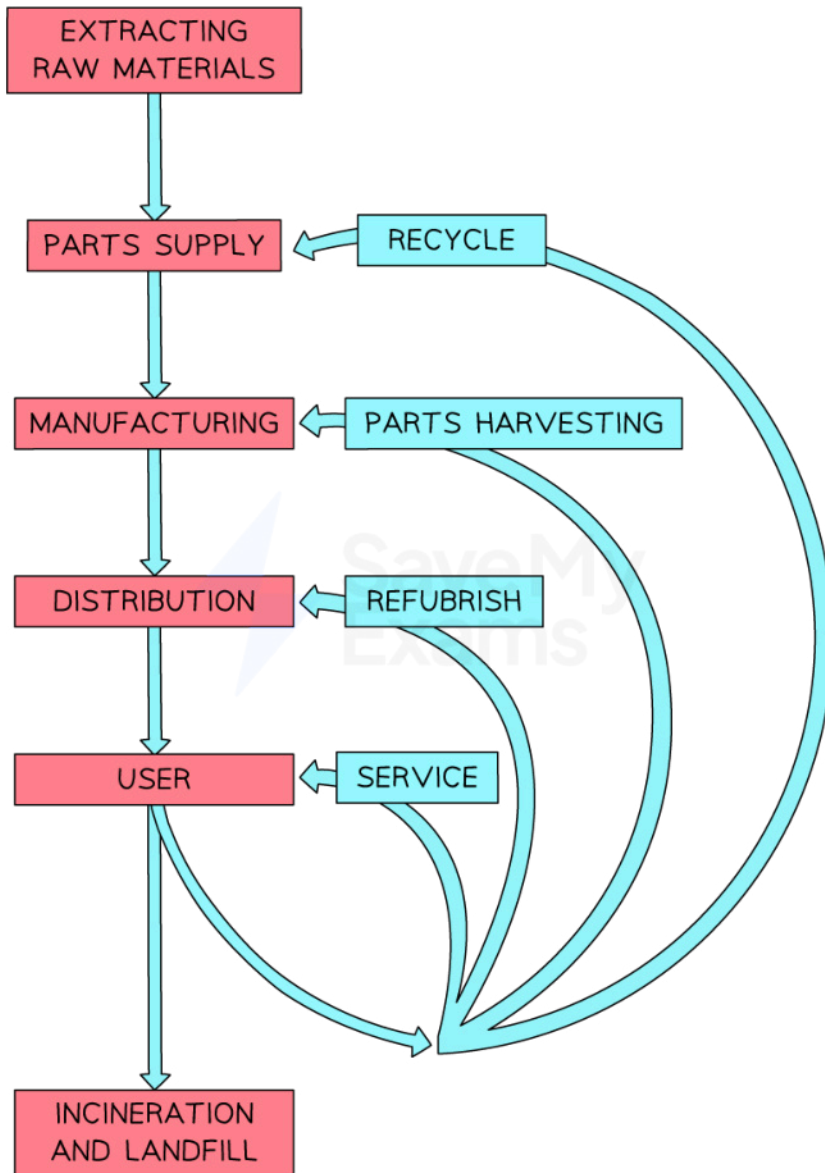
- Currently, most resources are part of a **linear system** where:
 - Finite resources are used to make products
 - The products are used
 - At the end of their lifecycle, the products are thrown away
- This leads to increasing amounts of waste
- Recycling is considered to be the first step towards the ambitious goal of a '**circular**' **economy**



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Recycling system

- The circular economy is an economic system designed to **minimise waste production** and **resource depletion** by promoting the reuse, repair and recycling of products
 - It promotes product stewardship, which means that the responsibility for the sustainable management of a product lies with the manufacturer, seller, and user of that product

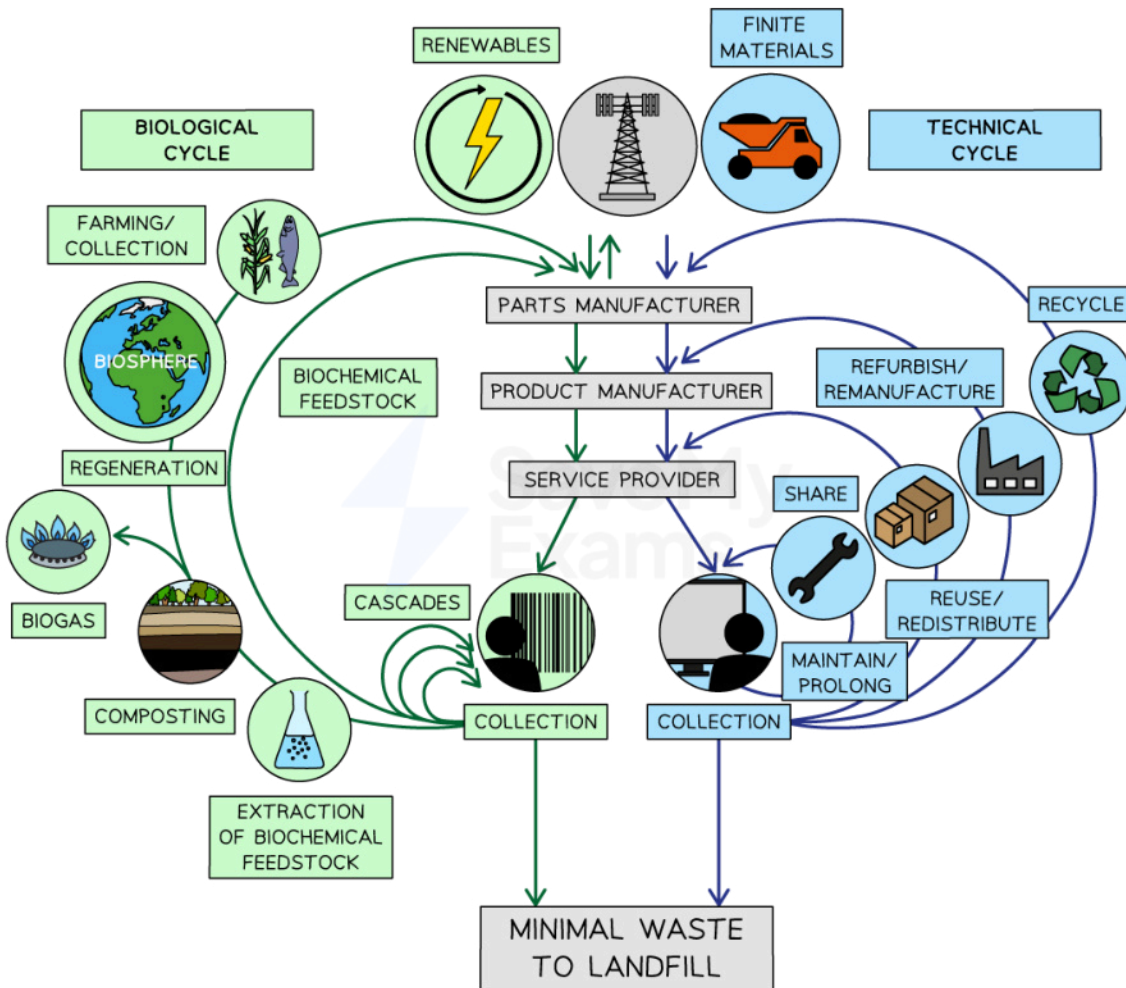
- This includes considerations such as product design, manufacturing, use and disposal, with the aim of promoting sustainability and reducing environmental harm
- By extending the **lifespan** of products and materials, the circular economy aims to reduce environmental impact and create a more sustainable system of consumption and production
 - For example, companies like IKEA have implemented furniture leasing schemes to encourage reuse and minimise waste generation, contributing to the circular economy mindset
 - Furniture leasing schemes involve renting furniture instead of purchasing it outright
 - Customers pay a periodic fee to use the furniture for a specified period, after which they may return it or renew the lease
 - This model promotes resource conservation by extending the lifespan of furniture and reducing waste generation
- Within the circular economy, there are two cycles:
 - The **biological cycle** is where the biodegradable products are returned to the natural environment
 - The **technical cycle** where products are recycled, reused, repaired or remanufactured



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The circular economy

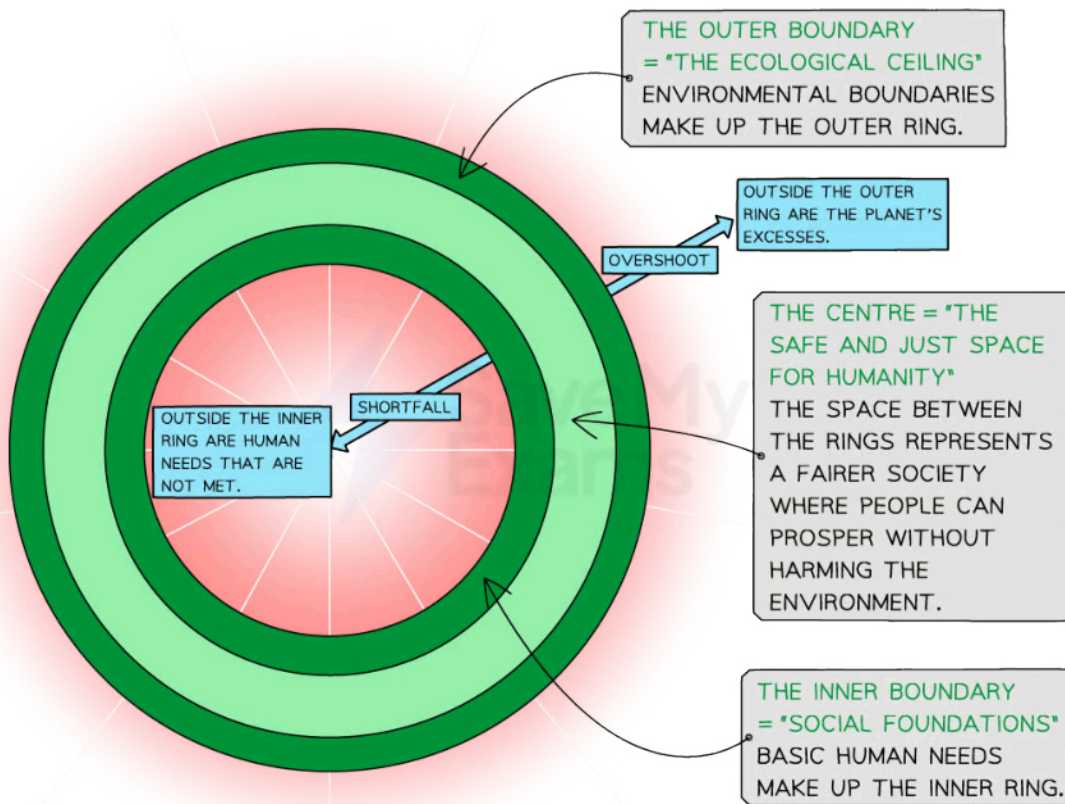
Doughnut economics

- Doughnut economics provides a framework for ensuring that economic activity remains within the **ecological limits** of the planet whilst attempting to address social inequality and injustice at the same time
 - The model visualises a "doughnut" shape (a ring with a hole in the middle of it), representing the space between planetary boundaries (environmental constraints) and social foundations (basic human needs)
 - This has been described as a "safe and just space for humanity" (*Doughnut Economics: Seven Ways to Think Like a 21st-Century Economist*, Kate Raworth)

- By aiming to operate within this space, the doughnut economics model seeks to achieve **sustainable development** that meets the needs of both present and future generations
 - For example, cities like Amsterdam have adopted the doughnut model to guide policymaking, prioritising environmental sustainability and social equity in urban development plans



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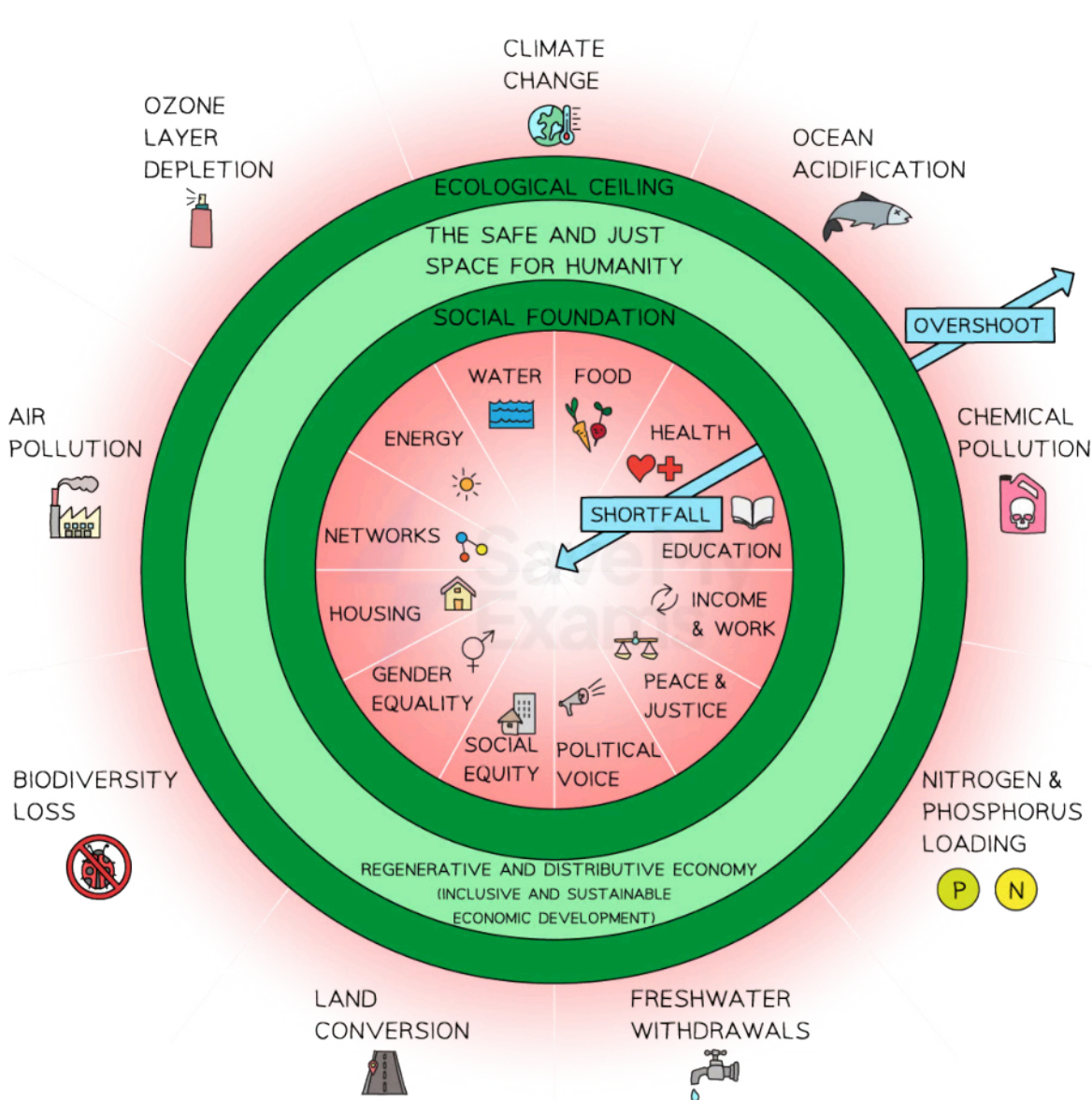


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The Key Principles of Doughnut Economics



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The Doughnut Economics Model

Other economic models

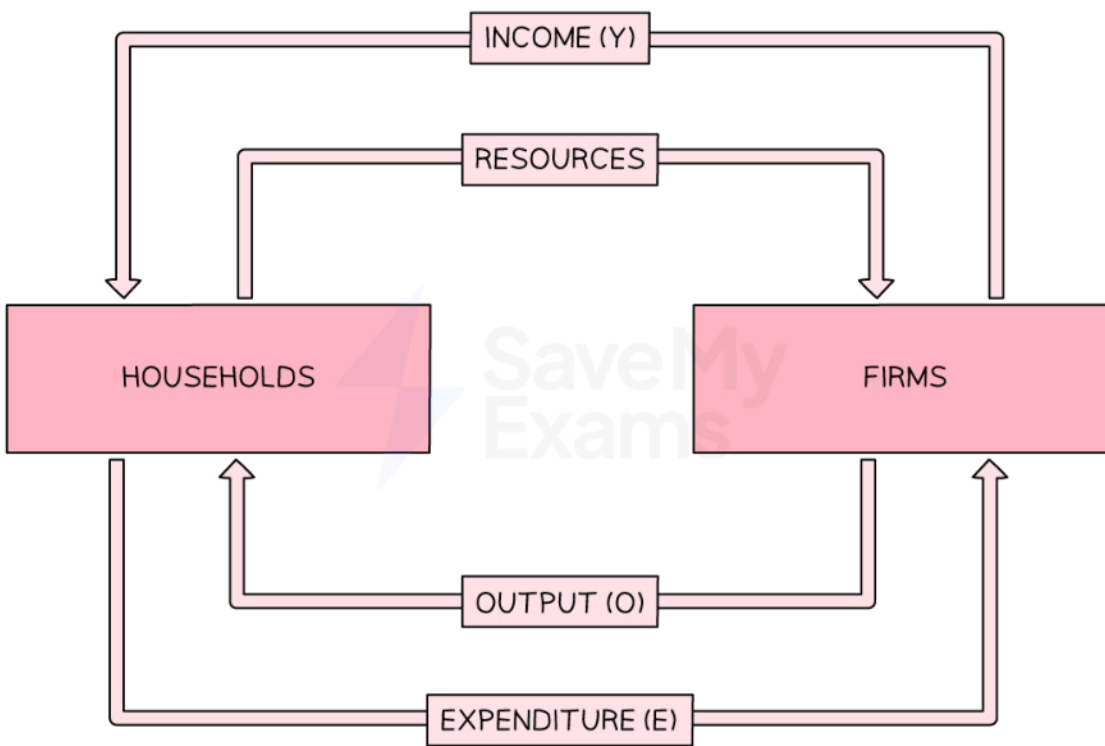
Circular flow model

- This model should not be confused with the circular economy system
- This circular flow model is either studied using:



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- The **two**-sector model (**isolated** model)
- The **five**-sector model (**open** model)
- Two-sector circular flow model:
 - Income (Y)—wages, rent, dividends and profit
 - Resources—factors of production
 - Output (O)—goods and services
 - Expenditure (E)—consumer spending
 - There are only two economic agents/actors—“households” and “firms”
 - The system boundary is drawn very tightly around the main agents/actors—households and firms only
 - Households provide “resources” (factors of production) to firms, most notably labour
 - In return, households receive “income” from firms
 - Firms use the resources to create goods and services (output)
 - Households spend money (“expenditure”) to buy these goods and services



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Two Sector Circular Flow Model

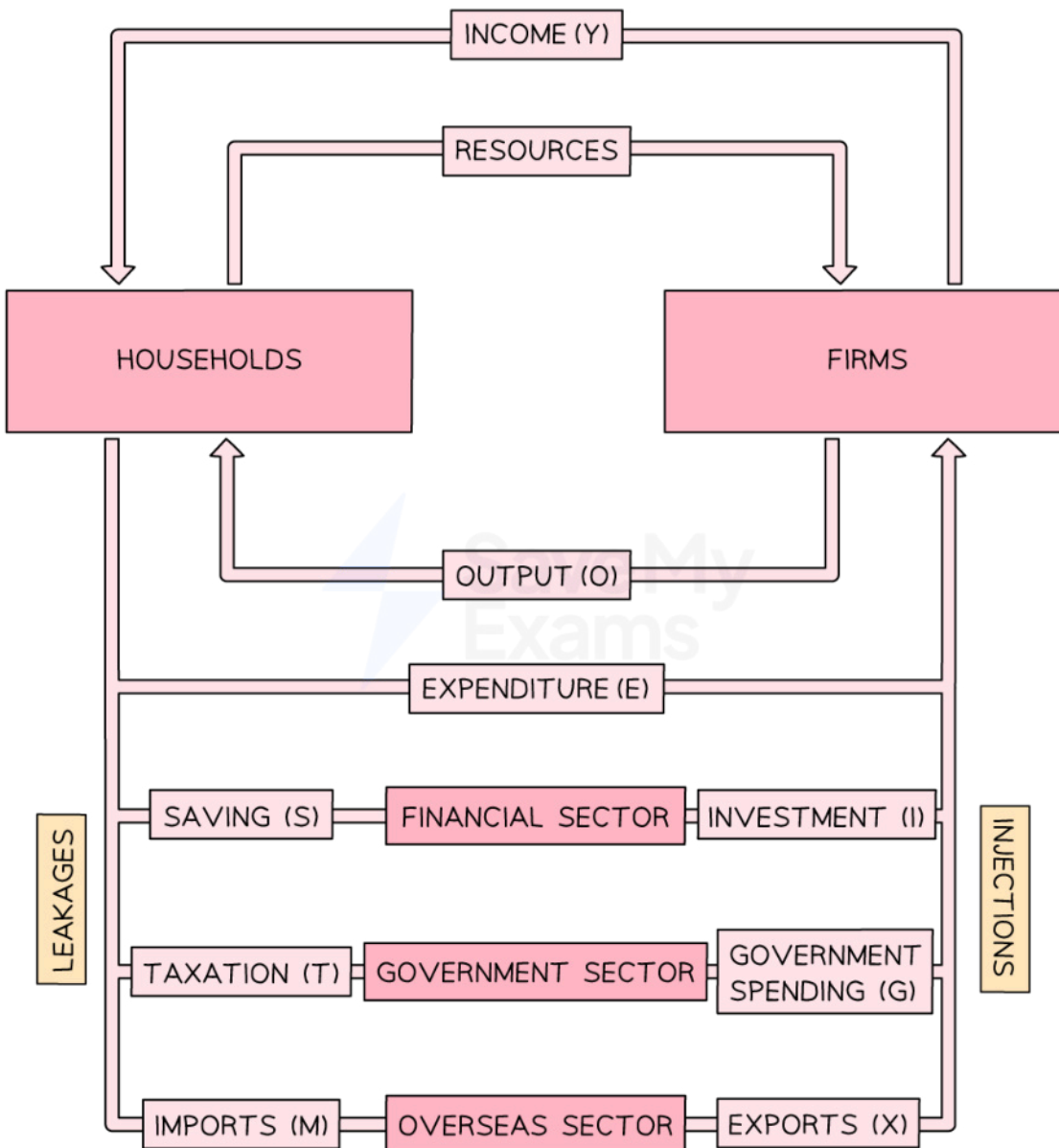


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- Five-sector circular flow model:
 - Three additional economic agents/actors are included: “financial sector” (firms such as banks), “government sector” and the “overseas sector” (international trade or foreign firms)
 - Each of these three additional sectors either provide money to (“injections”) or receive money from (“leakages”) the core exchange between households and firms
 - For example, both households and firms pay taxes to the government (leakage), but the government also spends money in the core economy (injection).



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Five Sector Circular Flow Model

- These traditional economic models visualise economic activity as a closed system of resource and product creation, and financial exchanges between households and businesses
- However, these models often overlook the role of nature in economic processes, presenting an over-simplified view of the economy that does not take into account how dependent these economic processes are on the environment

- In other words, these models see economic activity as separate from the natural world, i.e. nature is invisible in these models
- This human-nature dualism has historically played a large role in the overexploitation and degradation of the natural environment

Embedded economy model

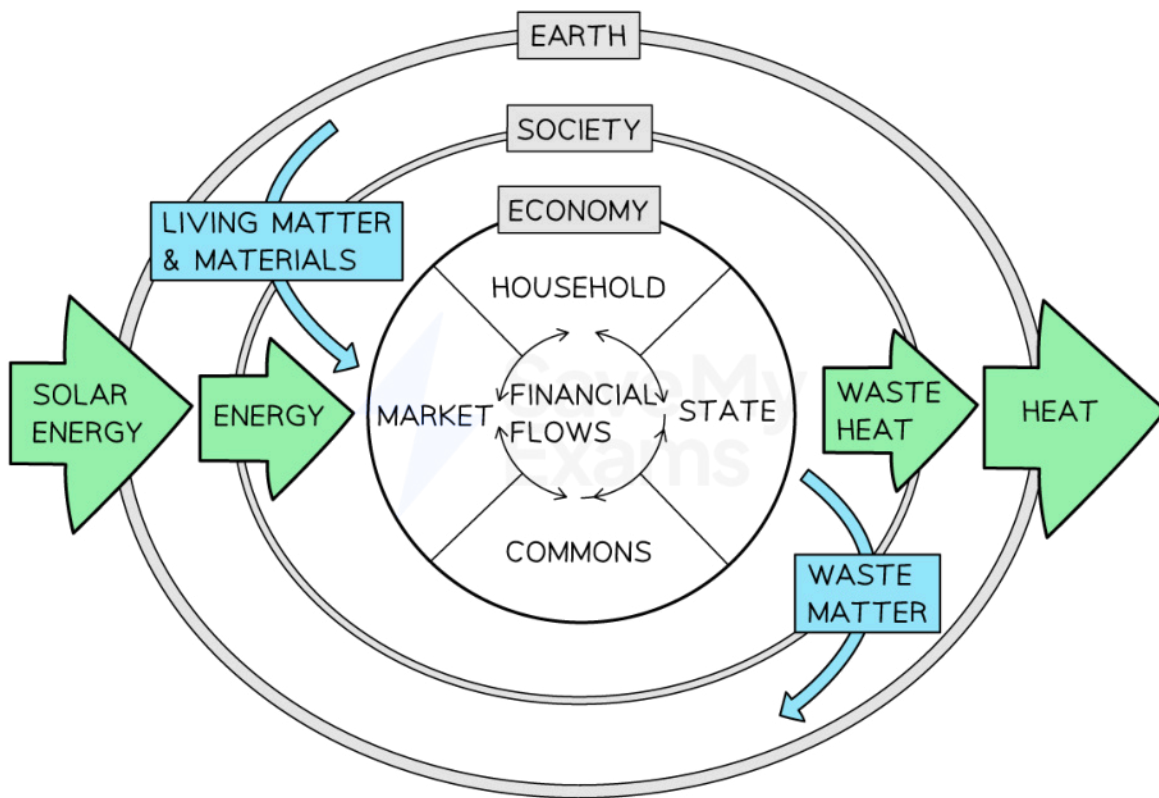
- In contrast to the isolated two-sector model, socio-ecological economics uses a more open model of the economy
- The embedded economy model (proposed by ecological economist Herman Daly in the 1970s) acknowledges the interconnectedness of the economy, society **and the environment**
 - The model shows the input of solar energy and material resources, as well as heat loss and waste into Earth's sinks
- It recognises that economic activity is **embedded within** and **dependent upon** the natural environment, with inputs from nature and societal contributions, such as unpaid care work, playing integral roles
 - In other words, the economy is "contained" within society and within nature
- This model provides a more complex but more complete understanding of the economy's relationship with society and the environment, highlighting the need for sustainable resource management and social equity



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Embedded Economy Model



Examiner Tips and Tricks

You do not need to be able to draw these diagram models for your exams. However, you do need to know what these circular flow of income models include and what they exclude, and the significance of these choices.