



International
SCHOOL OF LONDON
Qatar

Name: _____



DP DESIGN TECHNOLOGY

TOPIC 8

**SUSTAINABILITY
NOTES & GUIDANCE BOOKLET**

2021-2023



This booklet contains the Notes, and
teaching support material for Topic 8

DP DESIGN WITH
MR MONEEB



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Teaching & Learning Presentations



Topic 8: What is covered?

These are the topics covered in Topic 8:

HL TOPICS		Topic Covers	Approx Lessons hours on each topic	Total Lesson Hours	Checklist (✓)	Exam Mark	Exam (%)
8	Sustainability	8.1. Sustainable development	3.5	14			
		8.2. Sustainable consumption	3.5				
		8.3. Sustainable design	3.5				
		8.4. Sustainable innovation	3.5				

8.1. Sustainable Development

8.1 Sustainable Development

Essential idea: Sustainable development is concerned with satisfying human needs for resources now and in the future without compromising the carrying capacity of the planet.

Concepts and principles:

- Triple bottom line sustainability environmental, economic and social.
- Decoupling, disconnecting economic growth and environmental impact so that one no longer depends on the other.
- The use of international and national laws to promote sustainable development.
- Sustainability reporting.
- Product stewardship.

Guidance:

- How using resources more productively and redesigning production, it is technically possible to deliver the same or equivalent goods and services with lower environmental impact while maintaining social and equity benefits.
- Consider the benefits and limitations of decoupling as an appropriate strategy for sustainability.
- How international and national laws encourage companies to focus on something other than shareholder value and financial performance.
- Benefits of sustainability reporting for governments, manufacturers and consumers.
- Product stewardship examples include organic foods, genetically modified food, green cotton, forest stewardship & bio-plastics.

Aim:

Triple bottom line sustainability does not only focus on the profitability of an organization or product, but also the environmental and social benefit it can bring. Organizations that embrace triple bottom line sustainability can make significant positive effects to the lives of others and the environment by changing the impact of their business activities.

Nature of design:

Designers utilise design approaches that support sustainable development across a variety of contexts. A holistic and systematic approach is needed at all stages of design development to satisfy all stakeholders. In order to develop sustainable products, designers must balance aesthetic, cost, social, cultural, energy, material, health and usability considerations.

Theory of knowledge:

Design involves making value judgments in deciding between different ways of interacting with the environment. Is this the case in other areas of knowledge?

Notes / Activities

SUSTAINABILITY & SUSTAINABLE DEVELOPMENT

Sustainability is the long-term maintenance of responsibility, which has environmental, economic and social dimensions. It is the capacity to endure and maintain.

Sustainability



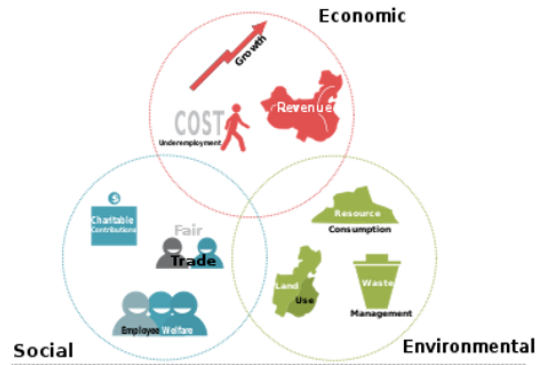
WHAT IS Sustainable Development



TRIPLE BOTTOM LINE SUSTAINABILITY

An expanded spectrum of values and criteria for measuring organizational success: economic, environmental and social.

- Does not only focus on the profitability of an organization or product, but also the environmental and social benefit it can bring.
- Organizations that embrace triple bottom line sustainability can make significant positive effects to the lives of others and the environment by changing the impact of their business activities.



TBL Sustainability graph

TBL SUSTAINABILITY - ENVIRONMENTAL



This is a recent concern relating to the need to manage scarce natural resources in a prudent manner, because human welfare ultimately depends on ecological service.

Ignoring safe ecological limits could undermine long run prospects for development.

Environmental sustainability involves maintaining the integrity of an ecosystem by assessing and working within its capacity while at the same time recognising and respecting biodiversity. It could incorporate air and water quality, energy consumption, natural resources, solid and toxic waste, and land use. land cover. Ideally having long-range trends available would help organisations identify the impacts a project or policy would have on a area. Specific examples include:



- | | |
|--------------------------------|--------------------------------------|
| - Sulfur dioxide concentration | - Electrical consumption |
| - Nitrogen oxide concentration | - Fossil fuel consumption |
| - Pollutants | - Solid + Hazardous waste management |
| - Excessive nutrients | - Changes in land use/land cover |

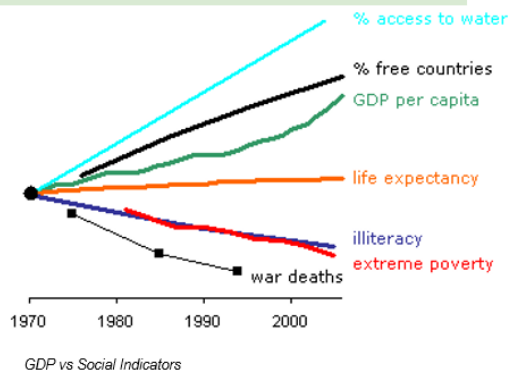
TBL SUSTAINABILITY - SOCIAL

There is a correlation between economic development and human well-being. See graph on the right.

Social sustainability includes empowering the local population through maintenance of cultural identities, implementation of equitable principles and practices - creating a stable environment.

Social sustainability includes :

- Designing to develop goods and services for the enhancement of human well-being,
- maintaining cultural identity,
- empowerment of local communities,
- accessibility to resources and services,
- stability of communities not placing them in upheaval
- social and gender equity



Commuting time, health provision + education levels post 18 are key to 3P's

TBL SUSTAINABILITY - ECONOMIC

Designing for sustainability is dependent upon an understanding of the short- and long-term goals and values of individuals, institutions and governments.

It is about the big picture that allows economic activity to rise while:

- reducing resource use and reducing environmental impact.
- maintaining economic growth,
- development,
- improving productivity,
- facilitates the economic trickle-down affect to local communities

Close cooperation is required between designer and manufacturer.

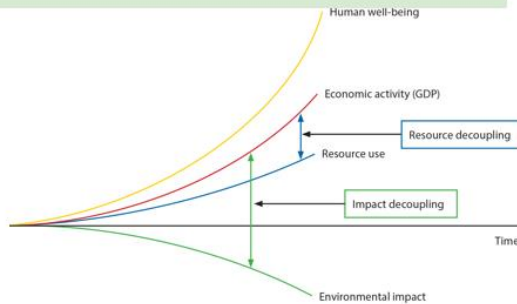
The importance of sustainability issues and strategies is critical to sustainable economic development.



DECOUPLING

Where as the previous strategy refer to the union between environmental, economic and social concerns to achieve sustainability **decoupling** emphasises the need to concentrate on economic considerations.

Decoupling involves the disconnection of economic growth as measured by GDP from environmental resources and social well-being. This is also known as 'dematerialisation of the economy' as the rate of the resource use is reduced per unit of economic activity. An economy that is able to sustain GDP growth without having a negative impact on environmental conditions - is said to be decoupled.



Decoupling impacts and resources – from the UNEP

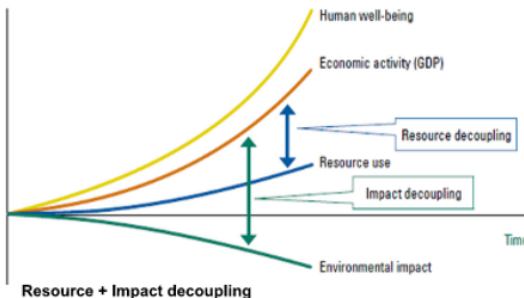


Technologies can be used to provide economic benefit. Greater than the environmental cost. Solar panels for electricity and bio-stoves for cooking

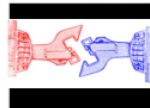
DECOUPLING

The UN Environment Programme noted that developed country citizens consume an average of 16 tons of key resources per capita (ranging up to 40 or more tons per person in some developed countries). By comparison, the average person in India today consumes four tons per year.

The OECD defines 'decoupling' as breaking the link between "environmental bads" and "economic goods." It explains this as having rates of increasing wealth greater than the rates of increasing impacts.



Disconnecting economic growth & environmental impact so that each no longer depends on the other



Resource decoupling means getting more efficiency from the resources we use, so that we can spread the use of our finite resources out over a longer time frame.

Impact decoupling means using processes that leave a smaller footprint on the ecosystem, so that our building and manufacturing do not harm the ecosystem. We need a healthy ecosystem for our own survival.

Impact decoupling is tied up to life cycle analysis in reducing waste. While this form of decoupling reduces environmental damage, it does not address issues of scarcity and sustainability.

INTERNATIONAL AND NATIONAL LAW

The use of international and national laws to promote sustainable development

- Nations need to adhere to the treaties/laws usually through enforceable domestic legislation.

International and national laws encourage companies to focus on something other than shareholder value and financial performance

Adopting a corporate strategy that has the support of shareholders/stakeholders can be difficult to achieve.

- International and national laws encourage companies to focus on aspects other than shareholder value and financial performance,
- These include transparency of corporate sustainability, transparent sustainability assurance and whether businesses, public services, national resources and the economy have the means to continue in the years ahead at a **micro and macro** level.

Paris Agreement under the United Nations Framework Convention on Climate Change

■ State parties
■ Signatories
■ Parties covered by EU ratification

Drafted	30 November – 12 December 2015 in Le Bourget, France
Signed	22 April 2016
Location	New York City, United States
Sealed	12 December 2015
Effective	4 November 2016 ^{[1][2]}
Condition	Ratification and accession by 55 UNFCCC parties, accounting for 55% of global greenhouse gas emissions
Signatories	195 ^[1]

SUSTAINABILITY REPORTING

A company report is a company report that focuses on four aspects of performance:

- Economic, Environmental, Social and Governance**

The reliability and acceptance of sustainability reporting requires accurate data gathering to be maintained over a lengthy period of time.

Benefits to Governments
 -sustainability information can be used by governments to assess the impact and contribution of businesses to the economy and to understand which issues are being tackled. It creates transparency; can help markets function more efficiently and indicate the health of the economy; and help drive progress by all organisations towards a smart, sustainable and inclusive growth.

Benefits to Manufacturers
 - Organisations can use reporting to inform their risk analysis strategies and boost their business systems. A growing number of companies see sustainability reporting as a means to drive greater innovation through their businesses and products to create a competitive advantage in the market. It can reduce their Compliance costs paid to the government.

Benefits to Consumers
 Builds trust. It reveals the company's contribution to a green economy. Consumers want to know whether a company is performing in a globally responsible manner from an environmental perspective (e.g., water use, emissions, waste), and a social perspective (e.g., labor practices, human rights, corruption, customer health and safety). It can also provide the consumer with greater innovation thus providing choice of new products.

Sustainability reporting is a vital step towards achieving a sustainable global economy

COCA COLA SUSTAINABILITY REPORTING

Link to 2018 **Coca Cola Sustainability Report**

<https://www.cocacola.co.jp/content/dam/journey/jp/ia/private/2018/pdf/coca-cola-sustainability-report-2018en.pdf>

COCA-COLA AT A GLANCE
 The Coca-Cola Company (NYSE: KO) is the world's largest beverage company, refreshing consumers with more than 500 sparkling and still brands. Our Company and bottling partners are dedicated to our 2025 Vision, a roadmap for doubling system revenues this decade, focused on five key areas—safe people, people, partners, products and planet.

127 refreshing consumers

200+ countries

PROFIT
 \$48B net income
 \$9B net income
 \$9.1B net income
 51 years of continuous dividend increase
 \$16.2B cash and cash equivalents
 21% increase in operating profit
 2.9% increase in operating profit

PEOPLE
 700K+ system associates worldwide
 We're honored. FORTUNE 2018
 We're innovative. Top 50 Most Innovative Companies
 We're diverse. Top 50 Most Diverse Companies
 We're creative. Creative Leader of the Year

PORTFOLIO
 3,500+ PRODUCTS WORLDWIDE
 18 OF OUR TOP 20 BRANDS have a low- or no-calorie alternative or are low- or no-calorie
 Our portfolio includes 16 billion-dollar brands

PARTNERS
 250 bottling partners WORLDWIDE
 900 plants
 23MM+ retail customer outlets
 investing \$30B+ with global bottling partners over the next five years

PLANET
 prevented 5MM metric tons of CO2 emissions across global manufacturing operations since 2005
 recovered 37MM pounds of aluminum and PET plastic beverage containers since 2005
 52% recycled content in 100+ countries
 15B+ plastic bottles and 1.8MM+ people supported
 support 280+ PHYSICAL ACTIVITY OR NUTRITION PROGRAMS IN 115+ COUNTRIES
 support 40+ SUSTAINABLE AGRICULTURE PROJECTS IN 25+ COUNTRIES

PRODUCT STEWARDSHIP

Product stewardship is an environmental strategy that means whoever designs, produces, sells, or uses a product takes full responsibility for minimising the product's environmental impact throughout all stages of the product's life cycle, including end of life management (disposal).

This includes using eco design or design for sustainability principles to make recycling easier.

Product stewardship legislation has been introduced in a number of countries - requiring certain industries to provide drop-off points for recycling. This legislation is present under the following products

- Paint
- Tyres
- Packaging
- Televisions and computers
- Mercury containing lamps
- Refrigerators and air conditioning
- batteries



Organic Foods

Locally grown, sustainably farmed and processed food choices are good for the environment and for people's



Forests

The Forest Stewardship Council, or FSC, is an international non-profit forest certification and labelling system that was established to offer a single, easily recognisable label for wood and forest products that consumers can trust.



Genetically Modified Food

Biotechnology offers unique potential for crop improvement. Delivering its benefits, however, requires a sustained commitment to stewardship.

PRODUCT STEWARDSHIP

Some more examples



Bio-plastics

The following areas should be explored through case studies in terms of product stewardship:

- [NYC programme](#)
- [Link to an AHA graphic](#)

Green cotton -

- Article on [Green Cotton in fashion](#)

INTERNATIONAL MINDEDNESS

Changes in governments sometimes result in the reversal of sustainable development policies leading to different approaches to international agreements.

See page 239

THEORY OF KNOWLEDGE

Design involves making value judgments in deciding between different ways of interacting with the environment. Is this the case in other areas of knowledge?

See page 239

Notes / Activities

SOMETHING EXTRA

1. Explain how sustainable development requires close cooperation between manufacturers and government.

1. Explain how a close relationship between manufacturers and government can be difficult to achieve because the two parties may have very different perspectives on sustainability and time-scales.

EXAM STYLE QUESTIONS

2018

25. Triple bottom line sustainability does not only focus on the profitability of an organization or product, but also the environmental and social benefit it can bring.

Which of the following refers to triple bottom line sustainability?

- A. Economic, political, social
- B. Environmental, political, social
- C. Economic, environmental, political
- D. Economic, environmental, social

2017

29. What are the three elements of triple bottom line?

- A. Economic, environmental, social
- B. People, planet, social
- C. Income, employment, growth
- D. Capital, resources, investment

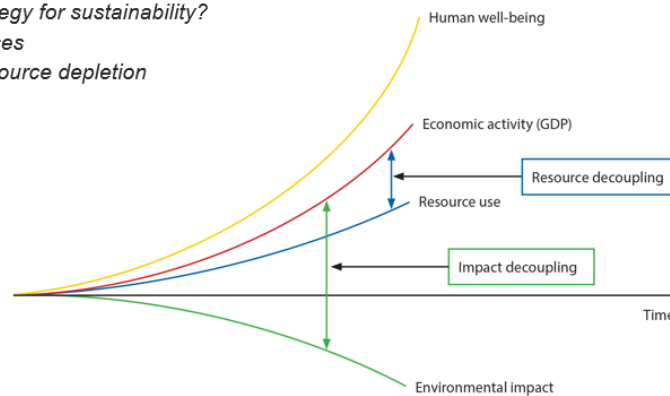
2016

25. Figure 10 shows a graphical representation of decoupling.

How would decoupling contribute to a strategy for sustainability?

- I. Increased efficiency in the use of resources
- II. Reduced environmental impact from resource depletion
- III. Increased human well-being

- A. I and II
- B. I and III
- C. II and III
- D. I, II and III



Specimen paper

What is true of the United Nations Environment Programme (UNEP) International Resource Panel's definition of decoupling?

- I. Economic growth and environmental impact are disconnected
- II. More resources are used per unit of economic output
- III. Reduced environmental impact per unit of resource

- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II and III

Notes / Activities

8.2 Sustainable consumption

SUSTAINABLE CONSUMPTION

Term: *The consumption of goods and services that have minimal environmental impact, promote social equity and economically viable, whilst meeting basic human needs worldwide.*

- Sustainable consumption is not about consuming less but consuming differently.
- Designers need to recognize the importance of consumerism in developed countries and as an ambition in many developing countries.
- Societies, particularly in developed countries, are [tend to be] a throwaway society.
- Consumers need to be encouraged to repair and reuse products rather than throw them away.
- [Sustainable design](#) and sustainable production contribute to sustainable consumption.
- This can be achieved in a number of ways, for example, not buying more food than needed and reducing waste; changing attitudes to water and energy use, for example, turning taps off when brushing teeth, aerated water in showers, less water per flush of the toilet, grey water.

Consumer Attitudes

Consumer attitudes and behaviours towards sustainability can be classified into 4 groups.

Eco-warriors:

Term: *Individuals or groups that actively demonstrate on environmental issues.*

- It is an individual who cares about our environment & the diversity of life forms so much that they want to take action.
- An eco-warrior can be someone such as non-confrontational as a tree sitter or someone who engages in direct action, ranging anywhere from planting tree spikes into trees on public lands, to keep the lumber industry from cutting them down, to sit-ins which occupy a corporate office.



Consumer Attitudes

Eco-champions:

Term: *Individuals or groups that champion environmental issues within organizations.*

- Champion environmental issues within organizations.
- Attempt to introduce or create change in a product, process, or method that takes into account green or environmental issues
- Is a person who fights or argues for a cause.



Consumer Attitudes

Eco-fans:

Term: Individuals or groups that enthusiastically adopt environmentally friendly practices as consumers.

- It is usually someone who accepts all green design products on the current market or its related objectives.
- An eco-fan will usually buy anything that is environmentally friendly and will never buy a harmful product.



Green Attitude to Buying Green – click on the image

Consumer Attitudes

Eco-phobes:

Term: Individuals or groups that actively recent talk of environmental protection.

- Eco-phobes are people who are against helping the environment and purposely go against the ecological movements.
- They believe that the environmental problems are irrelevant to their lives or are blown out of proportion.
- An example of an eco-phobe is a head of a country refusing to sign the Kyoto agreement which is based on controlling the CO2 output in a country and limit it in order to decrease global warming.

Eco-Labeling

Eco-labelling:

Term: The labelling of products to demonstrate that they are better for the environment than other products.

- Provides reliable information about how the product impacts the environment, considering all stages of the product's life cycle: manufacture, distribution, use and disposal. An example of this is Swan eco-label.
- Aids in the improvement of the workers have a role in the production's social and economic conditions, like the Fair Trade Labelling.
- Informs customers about how the energy is produced, and whether it meets certain requirements, like those of The FANC energy eco-labelling scheme.
- Allows consumers to make informed choices.

The European eco-label believes in sustainable development. They are based on the vision of greening non-food products all over Europe. The eco-label 'norms' are decided by the European Union Eco-labelling (EUEB).	In Australia, Good Environmental Choice Australia (GECA) is committed to credible product information for sustainable development. It is the only environmental labeling program in Australia which indicates the environmental performance of a product during its complete life cycle.	In the United States there is an eco label named Energy stars, which is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy that promotes energy efficient products and practices. The Nutriclean label means that products are tested

Eco-Labeling and Energy Labelling Schemes

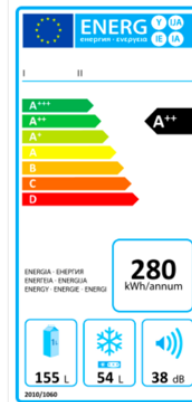
- For the designer such labels can help guide their designing in order to meet country regulations or the manufacturers design specifications.
- When designers design products they need to take into consideration the criteria that make up the different eco and energy labels for different labelling schemes.
- For the consumer they can make the appropriate purchase if they are environmentally concerned. Different countries have different contexts.
- International standardisation has resulted in many eco-and energy labelling schemes being similar thus easy for the consumer to understand.



Energy-Labeling

Term: The labelling of products to show how energy efficient they are. The label displays information in four categories: the product's details; Energy classification that shows the product's electrical consumption; Measurements relating to consumption, efficiency and capacity etc.; Noise emitted from the product when in use.

- The label provides/displays four pieces of information:
 - The product's details;
 - Energy classification that shows the product's electrical consumption;
 - Measurements relating to consumption, efficiency and capacity etc.;
 - Noise emitted from the product when in use.
- It shows the user how much energy is required/used by a product, as well as how efficient it is (how much heat-loss for example)
- By using such labels, consumers can make their choices in products, by taking into account how much energy (toll on the environment) is used by the product.
- By comparing these two labels, and with consumer help, more environmentally friendly products could be sold therefore making companies use greener design.
- As with Eco-labelling this label is given by a third party company



Market for Sustainable Products

Corporate strategies have an impact on the design brief or specifications, such as, market development, where we take an existing product and develop a new segment.

Creating a market for sustainable products:

- **pricing considerations:** ensuring the products provide value-for-money to the customer.
 - such as an eBikes that use cheaper lead-acid batteries vs lithium ion batteries.
- **long term costs**
 - For example incandescent bulbs are very cheap and long life bulbs tend to be more expensive. The Incandescent bulbs need regular changing
- **stimulating demand for green products**
 - consumers must be convinced that the green product is of similar or better quality
 - is competitively priced
 - promote their green products
- **production of green products**
 - taking into consideration triple bottom line sustainability
 - JIT manufacturing
 - end-of-pipe or better still radical change to manufacturing



Pressure Groups

Term: Collections of individuals who hold a similar viewpoint on a particular topic, for example the environment, who take action to promote positive change to meet their goals.

“Non-profit and usually voluntary organization whose members have a common cause for which they seek to influence political or corporate decision makers to achieve a declared objective. Whereas interest groups try to defend a cause (maintain the status quo), the pressure groups try to promote it (change the status quo).”

- Pressure groups are not a market segment but they can influence the market and product cycle.
- Some large organizations have evolved to inform consumers about environmental issues and ethical issues relating to the activities of certain multinational corporations.
- These pressure groups are able to exert considerable influence to press for changes on these issues and to support or undermine development of specific technologies, for example, GM food production.
- Consumer and environmental pressure groups can attract widespread support using the media (including social media).
- Consumers have become increasingly aware of information provided by these organizations and, as markets have globalized, so has consumer power.

Advantages and disadvantages of consumer and environmental pressure groups for the user, manufacturer and designer

User	Manufacturer	Designer	
Advantages	<ul style="list-style-type: none"> • new products (green or innovative) 	<ul style="list-style-type: none"> • in long run costs reduced • improve reputation of the company 	
Disadvantages	<ul style="list-style-type: none"> • new products may cost more • products become obsolete 	<ul style="list-style-type: none"> • forced to develop new products • add costs due to changes in design or manufacturing 	<ul style="list-style-type: none"> • forced to change design ideas • constrained in creativity

Pressure Groups

Other Advantages

- raise public awareness of environmental issues
- can have large numbers of members that can exert pressure on political parties (small smaller in numbers)
- can have expertise related to the issues

Other Disadvantages

- they may be biased towards their cause – not looking at both sides
- sometimes not objective
- make use extreme tactics or break the law
- opinions on issues may not be representative of the wider community

Lifestyle and Ethical Consumerism

Ethical Consumerism: The practice of consciously purchasing products and services produced in a way that minimises social and environmental damage, while avoiding those that have a negative impact on society and the environment.

Lifestyle Consumerism: A social and economic order and ideology that encourages the acquisition of goods and services in ever greater amounts.

- Consider strategies for managing western consumption while raising the standard of living of the developing world without increasing resource use and environmental impact.
- Some companies incorporate ethics into their corporate strategy and designers need to work within such constraints.
- They aim to curb and manage Western consumption while raising the standard of living of the developing world without increasing its resource use and environmental impact.

Notes / Activities

Take back legislation is the legislation that holds manufacturers responsible for the environmentally safe recycling or disposal of their end-of-life products. They are expected to provide a financial and/or physical plan to ensure that such products are collected and processed.

- Apple, in 2016, introduced a take back program where you can get a discounted price on a new phone.
- In Maine in the U.S.A., Car manufacturers have take-back legislation in the sense that they have to pay the collection and recycling of mercury switches from old cars.
- In March 2003 the UK government issued a legislation requiring that all car manufacturers and vehicle importers of new cars into the United Kingdom take back vehicles from their previous owner and guarantee that they are treated environmentally friendly.
- In Sweden, Producers and importers must take back for free a piece of old equipment (all electrical household appliance) when the customer buys a new product.
- In Japan, the end users are obliged to pay fees for collection, take-back and recycling at the time of disposal. The government sets the fees to cover industry's actual costs for take-back, transportation, and recycling. They are (in U.S. dollars): washing machine, \$24; air conditioner, \$35; refrigerator, \$46; and television, \$27.

The implications for the design cycle and product cycle depend on the nature of appropriate legislation.

- **Impact for the designer ... when designing**
 - Consider cradle to the grave or cradle to cradle
 - Consider recyclability or re-use of materials
 - Consider design for disassembly
 - Work within the cost constraints if manufacturer – make the process efficient
- **Impact for the manufacturer ...**
 - Added costs due to paying for it to be returned and recycled
 - Interested in design for disassembly and recyclability since they are most likely the ones pulling it apart and recycling or reusing
 - consider manufacturing techniques
 - consider material selection and reduction in products
 - collection systems need to be developed
 - manage the waste themselves or have a third party do it
- **Impact for the consumer ...**
 - The extra costs may be passed onto the consumer
 - Must return the product
 - can rest assured that the environment is considered

International Mindedness / Theory of Knowledge

International Mindedness

There are many different eco-labelling and energy-labelling schemes across the world that could be standardized

Theory of Knowledge

Eco-warriors sometimes break laws to express their views. Does the rightness or wrongness of an action depend on the situation?

8.3 Sustainable Design

Green Design versus Sustainable Design

Green design: is designing in a way that takes account of the environmental impact of the product throughout its life

Sustainable design is the philosophy of designing physical objects, the built environment, and services to comply with the principles of social, economic, and ecological sustainability. (Wikipedia)

Green Design	Sustainable Design
Products that have little or no affect on the environment.	Deals with TBL sustainability , economic, environmental & Social
Cradle to the grave approach	Cradle to cradle approach
Shorter (than sustainable design) therefore easier and cheaper to address environmental concerns in products.	Longer timescale which can affect the R & D stage (system wide research needed) of the design process increases costs therefore may not be feasible.
Incremental idea generating techniques are feasible as possibly only small changes need to be made.	Idea generating techniques are more radical to re-think (over-haul/redesign) the nature of the product and ho it works

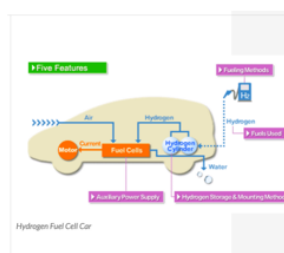
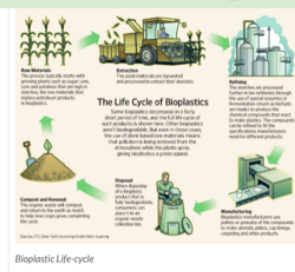
Datschefski's five Principles of Sustainable Design

Students need to develop an understanding of Datschefski's five principles of sustainable design (*The Total Beauty of Sustainable Products*, 2001). The five principles are a holistic approach to sustainable design but only selected principles will be possible/applicable to some products.



Datschefski's five Principles of Sustainable Design

- **Cyclic** – The product could not only be made from recyclable materials but is also compostable, of organic materials or from minerals that are recycled in a continuous loop such as bio plastics.
- **Solar** – The energy (both embedded and in use) the product requires comes from only renewable energy sources that is cyclic and safe.
- **Safe** – By-products products of the that are emitted into the environment (air, land & water) and 'space' are non-hazardous, i.e. non polluting. The by-products are "food" for other systems. Hydrogen fuel celled cars' by-product when in use is H2O.
- **Efficient** – Requiring 90% less energy, materials and water than equivalent products in 1990.
- **Social** – The products manufacture and usage should underpin basic human rights, safe work practises, fair trade principles and natural justice.



8.4 Sustainable Innovation

8.4 Sustainable innovation

Essential idea: Sustainable innovation facilitates the diffusion of sustainable products and solutions into the marketplace.

Concepts and principles:

- Complexity and timescale of sustainable innovation
- Top-down strategies
- Bottom-up strategies
- Government intervention in innovation
- Macro energy sustainability
- Micro energy sustainability.
- Energy security

Guidance:

- Examples of top-down and bottom-up strategies and the advantages and disadvantages for consumers/users
- Government intervention includes regulation, education, taxes and subsidies
- How macro energy sustainability can be influenced through international treaties and energy policies, instruments for change and disincentives, and national systems changing policy when government leadership changes
- How micro energy sustainability can be influenced by the role of the government in raising awareness and changing attitudes, and promotion of individual and business action towards energy sustainability
- How energy security can be influenced by energy demand/supply trends and forecasting, demand response versus energy efficiency, and smart grids

Aim:

As energy security becomes an ever more important issue for all countries, designers, engineers and inventors need to develop new ways of efficiently generating energy. As new energy production technologies become available, designers need to harness them to be used in new products to improve their energy efficiency.

Nature of design:

Sustainable innovation yields both bottom line and top line returns as developing products, services and systems that are environmentally friendly lowers costs through reducing the resources required. Designers should view compliance with government legislation as an opportunity for sustainable innovation

Theory of knowledge:

To what extent should environmental concerns limit our pursuit of knowledge?

Complexity and timescale of sustainable innovation

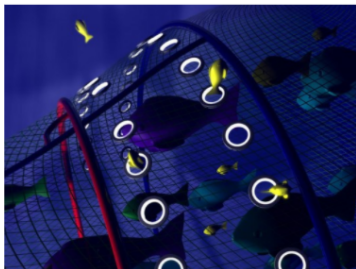
Manufacturers and governments have difficulty in achieving close relationships due to differing understandings of the concepts of sustainability and the timescales necessary for its achievement and maintenance.

Complexity

Sustainable innovation relies on cooperation between different stakeholders such as government and manufacturing. It is the broadest approach going beyond technical solutions. This approach is based on a socio-technical systems intervention rather than just considering product improvement.

Timescale

The huge timescale means that sustainability is difficult to maintain as conditions/criteria can change significantly, for example, a lengthy period of economic downturn. Sustainable innovation is a hugely complex concept that requires a long time for implementation, typically 20–40 years depending on the nature of the innovation.



Dan Watson - 2012 Dyson winner- A series of LED portals are woven throughout the net to guide small fish out and therefore prevent overfishing. Is it technical solution or a socio - technical systems intervention?

Technology doesn't just happen. Alan Maynard (2011)

I worry sometimes that focus too much on the successes of technology innovation in helping address issues, and neglect to contemplate our failures. Yet it is where we have failed to cure a disease, or to relieve poverty and hunger, or to increase someone's quality of life, that we have the most to learn. It's easy to match a new technology to a pressing need and claim success. It's much harder to start with a need, and develop technology-based solutions that will help resolve it – especially if timescales are long and profits are potentially marginal. How can we change the paradigm so we start with the problem, not the solution?

It takes years of targeted research and development to arrive at relevant and responsive technology innovations. Therefore we need to become increasingly forward-thinking and integrative.

As a society we need to move away from technology innovation being perceived as an off the shelf solution to problems, and toward it being understood as an integrated part of addressing issues?

Complexity - the state or quality of being intricate or complicated

Timescale - the time allowed for or taken by a process or sequence of events

Top-down strategies. Bottom-up strategies

Designers involved with bottom-up strategies are usually enthusiasts for the project and willing to make a commitment even though it may not be cost-effective to do so. When considering sustainable innovation, designers are usually more comfortable with top-down strategies as it means investment and resources are more predictable and reliable.

Sustainable Top-down strategies	Sustainable Bottom-up strategies
<p>At its most basic, this is the breaking down of a system into component parts. From a corporate strategy perspective, a top-down strategy means that the leadership level will determine the goals and how each department and/or individual employees will contribute to meet those goals. When considering sustainable innovation, designers are usually more comfortable with top-down strategies as it means investment and resources are more predictable and reliable.</p> <ul style="list-style-type: none"> • Top-down is controlled by government. E.g. ban plastic bags in shops in Singapore. • Management of resources, finances (controlling bank rates, etc) and so on. • It provides targets and measures for sustainability. 	<p>At its most basic, this is the piecing together of components or systems in order to give rise to a more complex system or product. From a corporate strategy perspective, a bottom up strategy methodology means that the leadership level will determine the overall goals, but the workforce will assist in developing the mechanisms and ideas to meet that goal.</p> <ul style="list-style-type: none"> • Strategies implemented from the 'bottom' such as regional or local (city or town) level. E.g. These include local initiatives like Planting Tree Campaigns • Designers are involved with bottom-up strategies are usually enthusiasts for the project and willing to make a commitment even though it may not be cost-effective to do so. Students are expected to be able to identify examples of bottom-up strategies and evaluate the advantages and disadvantages for consumers/users. • A potential problem for designers is the changing political scene and associated policies, for example, within the domain of renewable energy.

Government intervention in innovation

A potential problem for designers is the changing political scene and associated policies, for example, within the domain of renewable energy. There are various strategies that governments use to promote knowledge exchange and technology transfer by the four methods of regulation, education, subsidies and taxes.

Regulation

Setting and policing rules to avoid or limit environmental issues caused by undesirable technologies.
For example: Renewable Energy Law is a part of energy law, and relates to issues of development and implementation of renewable sources. Renewable energy law also relates to the land use, siting, and finance issues facing renewable energy projects.

Education

Providing consumers with information and guidance in the choice of products and services that are more sustainable

Subsidies

To stimulate and support sustainable innovations. Sustainable innovation can cast the company profits so governments offer financial help or tax breaks.

Taxes

To penalise environmentally damaging technologies and influence consumer choice of sustainable products and services

HOW THE ECO BILL ADDS UP

■ Fuel duty	£27.01bn
■ Vehicle excise duty	£5.71bn
■ VAT on fuel	£4.05bn
■ Air passenger duty	£2.09bn
■ Landfill tax on rubbish	£1.07bn
■ Climate change levy on businesses	£0.67bn
■ Renewable energy obligation on companies	£0.47bn
■ Aggregates levy on quarrying	£0.29bn
TOTAL	£41.36bn

Source: ONS

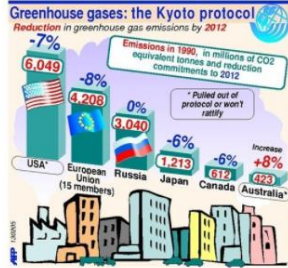
Macro and Micro energy sustainability

Macro energy sustainability

Macro energy sustainability focuses on **how a nation utilises energy in a sustainable manner.**

It can be influenced through **international treaties and energy policies**, instruments for change and disincentives, and national systems changing policy when government leadership changes.

Macro-sustainability is the area of sustainable development that focuses on how a nation, region or the entire world would establish large scale behaviors for sustainability; the Kyoto Protocol would fall into this category.



International treaties on energy sustainability
Earth Summit 1992,
Kyoto Protocol 1997,
World Summit on Sustainable Development 2002,
Copenhagen Accord 2009

Macro energy sustainability can be influenced through international treaties and energy policies, instruments for change and disincentives, and national systems changing policy when government leadership changes

Micro energy sustainability

Micro energy sustainability focuses on **local initiatives.** It can be influenced by the role of the government in raising awareness and changing attitudes, and promotion of individual and business action towards energy sustainability. Micro energy sustainability can be influenced by:

- the government raising awareness and changing attitudes
- promotion of individual and business action towards energy sustainability. E.g. Local governments installing Combined Heat and Power (CHP) or installation of solar roof panels.

Micro-sustainability is the area of sustainable development that focuses on how individuals, organisations and business decide what activities they should engage in and how to and where to allocate their resources. Jesse Stallone (2009)



Micro energy sustainability can be influenced by the role of the government in raising awareness and changing attitudes, and promotion of individual and business action towards energy sustainability

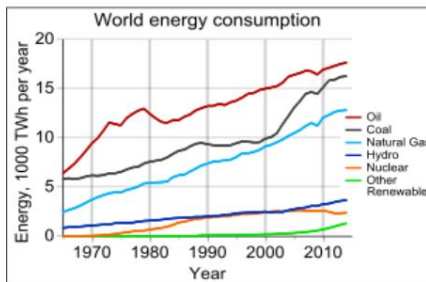
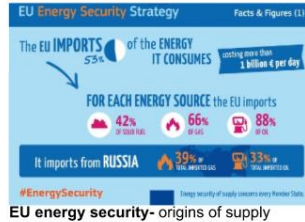
Energy security

The increasing reliance of many countries on the importation of fossil fuels such as coal, oil and gas means that interruptions to those supplies is a cause of concern. In order to reduce concerns, a number of actions are taken on how energy security can be influenced by energy demand, supply trends and forecasting.

Energy security is the association between national security and the availability of natural resources for energy consumption. Access to cheap energy has become essential to the functioning of modern economies. However, the uneven distribution of energy supplies among countries has led to significant vulnerabilities.



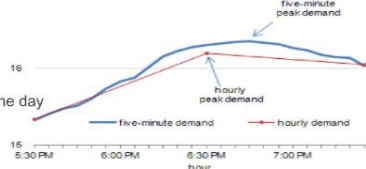
Oil pipelines- Eastern Europe



Energy demand is the flow of energy over the course of a day, year and is rarely constant and this puts a responsibility on those that generate and manage the flow of energy to understand when peaks and troughs of energy use occur over the course of days, weeks and years.

Energy forecasting, for example, in many countries, energy demand increases substantially during breaks and following popular TV shows as large numbers of people put the kettle on to enjoy a hot beverage. Also, there may be particular periods during the night where energy use is at a minimum. In these situations it is vital that the power-generating stations are informed when to start and stop energy generation. The difficulty arises as massive amounts of electricity cannot easily be stored, excess energy generated at these times is wasted. Demand/supply trends need to be predicted carefully to create a responsive and efficient energy supply.

Energy load curve- demands varies throughout the day

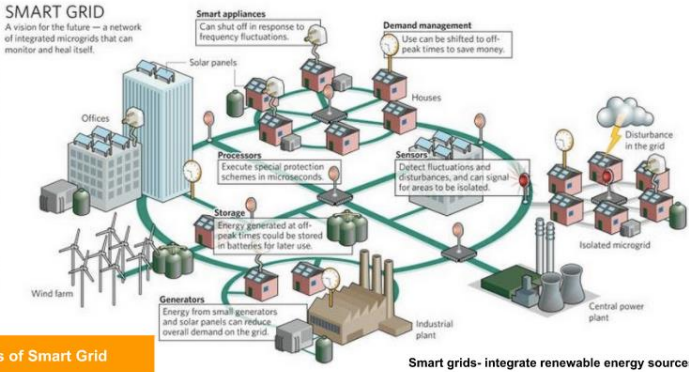


Smart grid

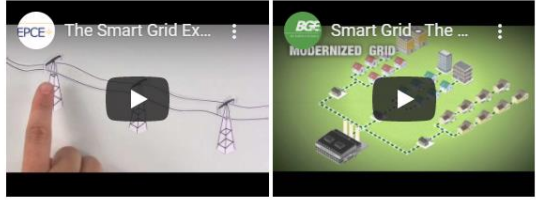
A **smart grid** is a modernised electrical grid that uses analogue or digital information and communications technology to gather and act on information, such as information about the behaviours of suppliers and consumers, in an automated fashion to improve the efficiency, reliability, economics, and sustainability of the production and distribution of electricity.

Smart grids permits greater penetration of highly variable renewable energy sources such as solar power and wind power, even without the addition of energy storage. Rapid fluctuations in energy use such as due to cloudy or gusty weather, present significant challenges to ensure stable power levels through varying the output of the more controllable generators such as gas turbines and hydroelectric generators.

Smart grid technology is a necessary condition for very large amounts of renewable electricity on the grid for this reason.



Advantages of Smart Grid	Disadvantages of Smart Grid
<ul style="list-style-type: none"> -Mostly electromechanical -One-way communication -Mostly centralised generation -Sensors are not widely used -Lack of monitoring: manual -Failures and blackouts -Lack of control -Less energy-efficient -Usually not possible to integrate with renewable energy -Customers have less scope to modify uses 	<ul style="list-style-type: none"> -Digital in nature -Two-way communication -Distributed generation -Sensors are widely used -Digital self-monitoring -Adaptive and intelligent -Robust control technology -Energy efficient -Possible integrate large scale renewable energy -Customers can check uses and modify



Notes / Activities

Summary Notes



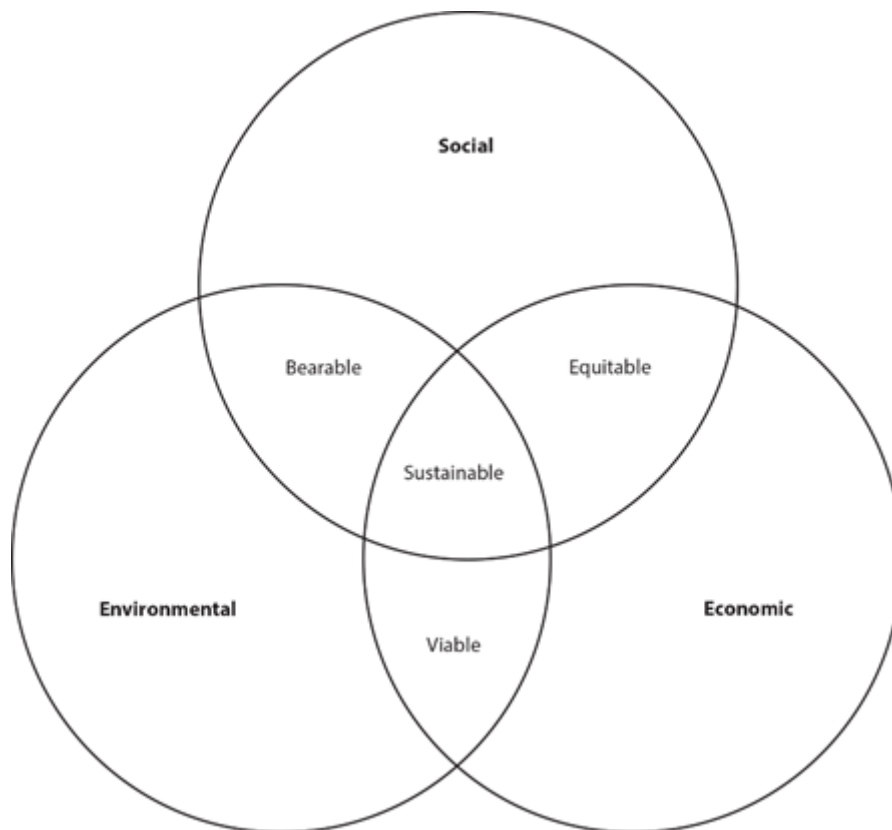
Topic 8. Sustainability

Sustainability is the capacity to endure and maintain. Sustainability is the long-term maintenance of responsibility, which has environmental, economic and social dimensions.

Sustainable development

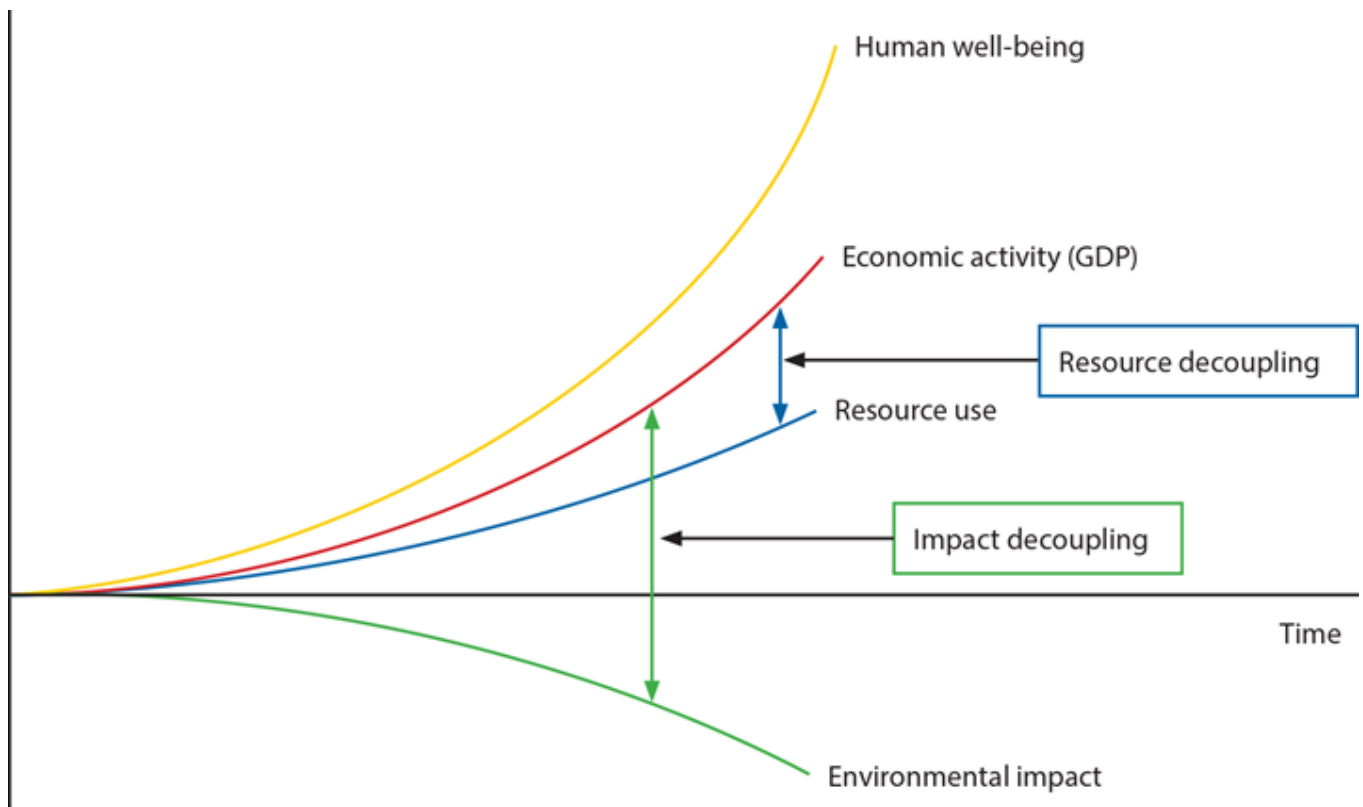
Historically there has been a close correlation between economic growth and environmental degradation—as economic prosperity increases so environmental quality decreases. This trend is clearly demonstrated on graphs of human population numbers, economic growth and environmental indicators. Sustainable development frameworks enable the evaluation of the complex and interrelated concepts that are associated with development.

There is a correlation between economic development and human well-being. Design involves problem-solving to develop products and services to enhance human well-being. The importance of **sustainability** issues and strategies is critical to sustainable **economic** development. **Economic** development consumes resources, resulting in environmental impact. Designing for **sustainability** is dependent upon an understanding of the short- and long-term goals and values of individuals, institutions and governments. It is about the big picture that allows economic activity to rise while reducing resource use and reducing environmental impact which, in turn has **social** consequences for consumers.



Close cooperation is required between designer and manufacturer.

Decoupling refers to disconnecting two trends so that one no longer depends on the other. Through the act of decoupling (*using resources more productively and redesigning production systems*), it is technically possible to deliver the same or equivalent goods and services with lower environmental impact while maintaining social and equity benefits.



Decoupling impacts and resources

Adopting a corporate strategy that has the support of shareholders/stakeholders can be difficult to achieve. International and national laws encourage companies to focus on aspects other than shareholder value and financial performance, which include transparency of corporate sustainability, transparent sustainability assurance and whether businesses, public services, national resources and the economy have the means to continue in the years ahead at a **micro** and **macro** level.

A sustainability report is a company report that focuses on four aspects of performance.

- Economic
- Environmental
- Social
- Governance

The reliability and acceptance of sustainability reporting requires accurate data gathering to be maintained over a lengthy period of time. Students need to be able to explain the benefits of sustainability reporting for governments, manufacturers and consumers.

Designers may need to respond to consumer pressure as more consumers become aware of resource issues and product labelling. Product stewardship requires all stakeholders involved in making, buying, selling or handling equipment to take responsibility for minimizing environmental, health and safety impact at all stages of the life cycle. The following areas should be explored through case studies in terms of product stewardship:

- organic foods
- genetically modified food
- green cotton
- forest stewardship
- bioplastics.

Sustainable consumption

Sustainable consumption is **not about consuming less but consuming differently**. Designers need to recognize the importance of **consumerism** in **developed countries** and as an **ambition** in many **developing countries**. Societies, particularly in developed countries, are throwaway. Consumers need to be encouraged to **repair** and **reuse** products rather than throw them away.

Sustainable design and sustainable production contribute to sustainable consumption. This can be achieved in a number of ways, for example, **not buying more food than needed** and **reducing waste; changing attitudes to water and energy use**, for example, turning taps off when brushing teeth, **aerated water** in showers, less water per flush of the toilet, **grey water(filtered rainwater)**

People can be broadly classified according to their attitudes to sustainable consumption.

- **Eco-warriors** actively demonstrate on environmental issues.
- **Eco-champions** champion environmental issues within organizations.
- **Eco-fans** enthusiastically adopt environmentally friendly practices as consumers.
- **Eco-phobes** actively resent talk of environmental protection.

Designers need to be aware of the criteria for different **labelling** schemes in order to design products that satisfy the criteria. Many eco- and energy labelling schemes have similarities, and international standardization makes it easier for consumers to understand their meaning and compare products from different contexts. Students are expected to be familiar with eco- and energy labelling schemes from different countries. (look for examples)

Company corporate strategies impact on the design brief, for example, market development. When **creating a market for sustainable products**, students need to consider the following approaches.

- Pricing considerations
- Stimulating demand for green products
- Production of green products

Pressure groups are not a market segment but they can influence the **market** and **product cycle**. Some large organizations have evolved to inform consumers about **environmental issues and ethical issues** relating to the activities of certain multinational corporations. These pressure groups are able to exert considerable influence to press for changes on these issues and to support or undermine development of specific technologies, for example, GM food production. **Consumer and environmental pressure groups can attract widespread support using the media (including social media)**. Consumers have become increasingly **aware** of information provided by these organizations and, as markets have globalized, so has **consumer power**.

Some companies incorporate **ethics** into their **corporate strategy** and **designers need to work within such constraints**. They aim to curb and manage Western consumption while raising the standard of living of the developing world without increasing its resource use and environmental impact.

The implications for the design cycle and product cycle depend on the nature of **appropriate legislation**. There are many implications of **take-back legislation for designers, manufacturers and consumers**.

Sustainable design

When considering the nature of sustainable design, idea-generating techniques need to reflect the **radical** nature of the design process in order to re-think the nature of the product and how it may work. Students need to be able to explain the differences between green design - **product** and sustainable design - **systems**

One of the major differences relates to the timescale to implement green design compared with sustainable design. The **increased timescale of sustainable design** has implications for the research and development phase of the design process and may not make it feasible to work within cost constraints. **Why is there a difference?**

Students need to develop an understanding of Datschefski's five principles of sustainable design (*The Total Beauty of Sustainable Products*, 2001). **The five principles are a holistic approach to sustainable design but only selected principles will be possible/applicable to some products.**

- **Cyclic:** The product is made from compostable, organic materials or from minerals that are *recycled in a continuous loop*.
- **Solar:** The product in use consumes only renewable energy that is cyclic and safe.
- **Safe:** All releases to air, water, land or space are "food" for other systems.
- **Efficient:** Requiring 90% less energy, materials and water than equivalent products in 1990.
- **Social:** Its manufacture and use support basic human rights and natural justice.

Sustainable innovation

Sustainable innovation relies on cooperation between different stakeholders such as government and manufacturing. It is the broadest approach going beyond technical solutions. This approach is based on a socio-technical systems intervention rather than just considering product improvement.

The **huge timescale** means that **sustainability is difficult to maintain as conditions/criteria can change** significantly, for example, a lengthy period of economic downturn.

Sustainable innovation is a hugely complex concept that requires **a long time for implementation**, typically 20–40 years depending on the nature of the innovation.

When considering sustainable innovation, designers are usually more comfortable **with top-down strategies** as it means investment and resources are more predictable and reliable.

Designers involved with **bottom-up strategies** are usually **enthusiasts** for the project and willing to **make a commitment even though it may not be cost-effective to do so**. A potential problem for designers is the changing political scene and associated policies, for example, **within the domain of renewable energy**. There are various **strategies** that governments use to promote knowledge exchange and technology transfer, including:

- **Regulation**—setting and policing rules to avoid or limit environmental issues caused by undesirable technologies
- **Education**—providing consumers with information and guidance in the choice of products and services that are more sustainable
- **Taxes**—to penalize environmentally damaging technologies and influence consumer choice of sustainable products and services
- **Subsidies**—to stimulate and support sustainable innovations.

Macro (global) energy sustainability concerns can be influenced through international treaties and current international energy policies, instruments for change and disincentives, and national systems changing policy when government leadership changes.

Micro (local) energy sustainability can be influenced by government, through their role in raising awareness and changing attitudes related to energy use and the promotion of individual and business action towards energy sustainability.

Students are expected to consider the implications of how macro and micro energy sustainability can be influenced.

Energy demand is rarely constant and this puts a responsibility on those that generate and manage the flow of energy to understand when peaks and troughs of energy use occur over the course of days, weeks and years. For example, in many countries, energy demand increases substantially during breaks and following popular TV shows as large numbers of people put the kettle on to enjoy a hot beverage. Also, there may be particular periods during the night where energy use is at a minimum. In these situations it is vital that the power-generating stations are informed when to start and stop energy generation. The difficulty arises as massive amounts of electricity cannot easily be stored, excess energy generated at these times is wasted. Demand/supply trends need to be predicted carefully to create a responsive and efficient energy supply.

Topic Questions & Exam Practice



End of Topic Questions

Answer the questions in this section as best as you can. The marks are shown in brackets next to each question. All multiple-choice questions hold 1 mark each.

1 State what is meant by the term 'Sustainability'
.....
.....
.....
.....1

2 State 3 factors that help to explain Sustainable Development
a.....
.....
.....1

b.....
.....
.....1

c.....
.....
.....1

3 Draw a diagram to help you to explain the term 'Triple Bottom Line Sustainability and state its 3 key dimensions 3

1.....1

2.....1

3.....1

4. Describe the term 'Decoupling'

.....3

5. Draw a graph to represent Decoupling trends 3

6. Describe 4 aspects of Decoupling that represent Corporate sustainability

.....3

.....3

.....3

.....3

7. What is true of the United Nations Environment Programme (UNEP) International Resource Panel's definition of decoupling? 1

I. Economic growth and environmental impact are disconnected

II. More resources are used per unit of economic output

III.Reduced environmental impact per unit of resource

- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II and III

8. Which group of people might break laws to express their views on the environment? 1

- A. Eco-warriors
- B. Eco-champions
- C. Eco-fans
- D. Eco-phobes

9. Which of Datschefski's principles relates to the use of renewable energy by a sustainable product? 1

- A. Cyclic
- B. Solar
- C. Safe
- D. Super-efficient

10 Explain why the use of thermoplastic renders a product green but not sustainable.

.....
.....
.....
.....
.....3

Figure 1 shows the Fabsie self-assembly stool manufactured from timber.

Figure 1:



Fabsie is an organization that has developed a production system that integrates consumers into the design and manufacture of products. Designers upload their three-dimensional computer-aided design (CAD) files of self-assembly furniture to a website. Customers can choose a product and customize it. The customized design is then sent electronically to be manufactured close to the consumer and made using computer numerical control (CNC) machinery. These companies are part of a global network of manufacturers. Customers pay Fabsie and either collect the finished product from the local manufacturer or have it sent to them. Fabsie pays the designer and manufacturer for their services and retains a percentage of the sale price.

(a) Outline how the sustainable design demonstrated by the Fabsie self-assembly stool meets Datschefski's social principle.

.....

3

(b) Outline why the Fabsie production system would have resulted from a top-down strategy.

.....

2

(c) Explain how the Fabsie production system satisfies the principles of sustainable consumption.

.....

2

Exam Practice Questions

7. **Figure 2** shows a bag manufactured from an obsolete fire hose and fasteners. The company Fire-hose.co.uk makes bags and belts from hoses discarded by the fire brigade. The hoses are made from a thermoplastic material. Half the profits for products made from the hoses go to the Fire Fighters charity.

Figure 2: fire-hose.co.uk bag



- (ii) Discuss how the company which manufactures the Fire-hose.co.uk bag promotes three different aspects of triple-bottom-line sustainability.

[9]

Figure 8 shows the Natural House, an environmentally friendly home in the UK, built by the Prince's Foundation for Building Community. The house utilizes natural, locally-available materials, traditional building crafts and local labour. The roof is made from clay tiles and along with the floors, is insulated with sheep's wool. The walls are made of clay blocks with a honeycomb structure (**Figure 9**). The house is designed with high ceilings and large triple-glazed windows that allow a large amount of daylight into the building.

Figure 8: The Natural House



[Source: Courtesy of The Prince's Foundation for Building Community]

Figure 9: Clay blocks with a honeycomb structure



[Source: www.ziegelwerk-bellenberg.de.
Used with permission.]

Explain how the Natural House satisfies the three categories of triple bottom line sustainability.

[9]

Figure 5 shows the Ventura Commute 2010 folding bicycle. It has a metal (steel) frame and 51 cm wheels with an integral carrying rack and bike stand. The maximum seat height is 84 cm and the bicycle weighs 13.8kg. It folds down to 82 cm×66 cm×15 cm and is available in a finish of black, silver or white.

Figure 5: Ventura Commute 2010 folding bicycle



Figure 6: Bicycle when folded down



- i) Discuss benefits of the increased use of folding bicycles in relation to social, economic and environmental factors.

[9]

Exam questions and Sub-topic Links

Table demonstrating the times each sub-topic has appeared in exam papers and at which question.

TOPIC	P1 Nov-09	P1 Nov-10	P1 May-10	P1 NOV 11	P1 May-11	P1 May-12	P2 Nov-09	P2 Nov-10	P2 May-10	P2 Nov-11	P2 May-11	P2 May-12
8.1	33											
8.2	9			10	25	9						
8.3												
8.4							3b					

Glossary of Terms



Glossary of Terms

Topic 8: Sustainability

Term	Definition
Bottom-up strategies	At its most basic, this is the piecing together of components or systems in order to give rise to a more complex system or product. From a corporate strategy perspective, a bottom up strategy methodology means that the leadership level will determine the overall goals, but the workforce will assist in developing the mechanisms and ideas to meet that goal.
Datschefski's five principles of sustainable design	Five principles that facilitate a holistic approach to sustainable design: Cyclic; Solar; Safe; Efficient; Social.
Decoupling	Disconnecting two trends so that one no longer depends on the other. Through the act of decoupling (using resources more productively and redesigning production systems), it is technically possible to deliver the same or equivalent goods and services with lower environmental impact while maintaining social and equity benefits.
Eco-champion	Individuals or groups that champion environmental issues within organizations.
Eco-fan	Individuals or groups that enthusiastically adopt environmentally friendly practices as consumers.
Eco-labelling	The labelling of products to demonstrate that they are better for the environment than other products.
Eco-phobe	Individuals or groups that actively resent talk of environmental protection.
Eco-warrior	Individuals or groups that actively demonstrate on environmental issues.
Energy labelling	The labelling of products to show how energy efficient they are. The label displays information in four categories: the product's details; Energy classification that shows the product's electrical consumption; Measurements relating to consumption, efficiency and capacity etc.; Noise emitted from the product when in use.
Energy security	The uninterrupted availability of energy sources at an affordable price.
Ethical consumerism	The practice of consciously purchasing products and services produced in a way that minimises social and environmental damage, while avoiding those that have a negative impact on society and the environment.
Lifestyle consumerism	A social and economic order and ideology that encourages the acquisition of goods and services in ever greater amounts.
Macro energy sustainability	Macro energy sustainability involves large scale energy generation from non-exhaustive sources for international, national or large community use. Examples include hydroelectric power, wind, wave and geothermal energy generation.
Micro energy	Micro energy sustainability involves small scale energy generation

sustainability	from non-exhaustive sources for individual, household or small community use. Examples include roof mounted solar power or water heating panels, combined solar and wind turbine generated power for illuminated traffic signs, and wearable thermoelectric materials.
Pressure groups	Collections of individuals who hold a similar viewpoint on a particular topic, for example the environment, who take action to promote positive change to meet their goals.
Product stewardship	Everyone involved in making, selling, buying or handling electronic equipment takes responsibility for minimizing environmental impact of the equipment at all stages in the life cycle.
Smart grids	A modernised electrical grid that uses analogue or digital information and communications technology to gather and act on information (such as behaviours of suppliers and consumers) in an automated fashion to improve the efficiency, reliability, economics and sustainability of the production and distribution of electricity. They can be national or international. International grids allow electricity generated in one country to be used in another.
Sustainability reporting	A company report that focusses on four aspects of performance: Economic; Environmental; Social; and Governance.
Sustainable consumption	The consumption of goods and services that have minimal environmental impact, promote social equity and economically viable, whilst meeting basic human needs worldwide.
Sustainable design	Designing physical objects and services in accordance with the principles of social, economic, and environmental sustainability
Sustainable development	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
Take-back legislation	Laws that require manufacturers to 'take-back' packaging and products at the end of use, requiring manufacturers to take responsibility for their disposal. Reasons for this legislation include to encourage the design of products and packaging that are easily and efficiently recycled, and to reduce waste.
Top-down strategies	At its most basic, this is the breaking down of a system into component parts. From a corporate strategy perspective, a top-down strategy means that the leadership level will determine the goals and how each department and/or individual employees will contribute to meet those goals.
Triple bottom line sustainability	An expanded spectrum of values and criteria for measuring organizational success: economic, environmental and social.

DP DESIGN TECHNOLOGY

WITH

Mr Moneeb

