Introduction to PETUS:

background, research and outcomes

Professor Phillip Jones

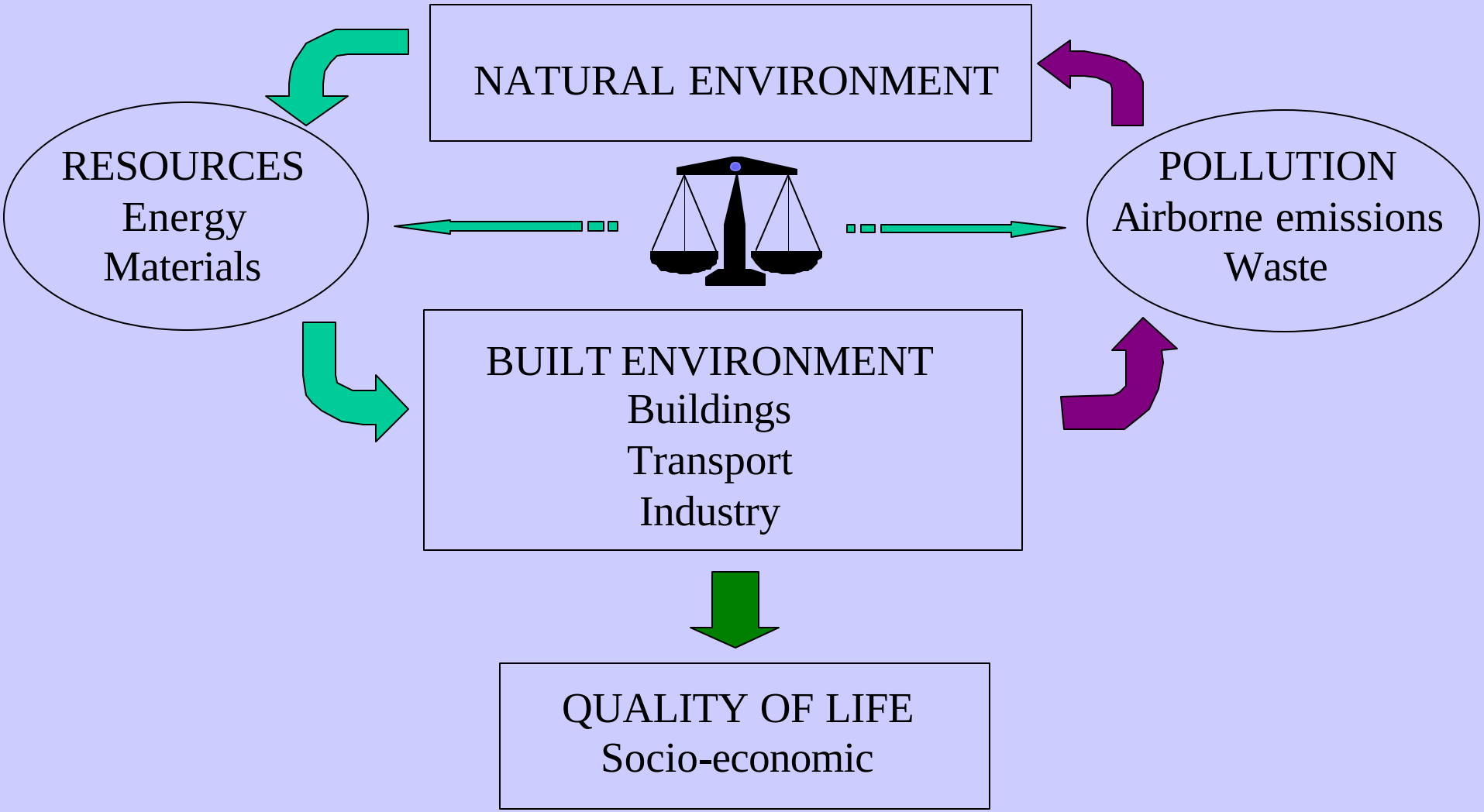
Cardiff University

CARDIFF UNIVERSITY
PRIFYSGOL CAERDYDD

Brundtland

‘meeting the needs of the current generation without compromising the needs of future generations’ (1987)

SUSTAINABLE DEVELOPMENT



DRIVERS FOR SUSTAINABILITY

Kyoto

• EU has agreed to make a 12.5% saving in carbon by 2010.
• UK government's policy is to aim for a 20% saving by 2010.

European directive

• The need to improve energy efficiency, especially in existing buildings.
• Common framework for calculating energy performance of buildings, and regular inspection of buildings and their energy systems.

UK Energy White Paper

• Longer term view of energy efficiency - 60% reduction in carbon by 2050 and 80% by 2100.
• To improve energy efficiency in response to climate change and also in relation to the future security of energy supplies.
• New buildings to form the basis of a low carbon future.
• Revsion to Building Regulations (January ? 2006). Sustainability and Security Bill (2004).

The built environment :

New build

Existing Buildings

Infra structure

Sustainability in the built environment

Triple bottom line.

Environment

Natural component.

pollution, water quality, noise, bio-diversity.

Economy

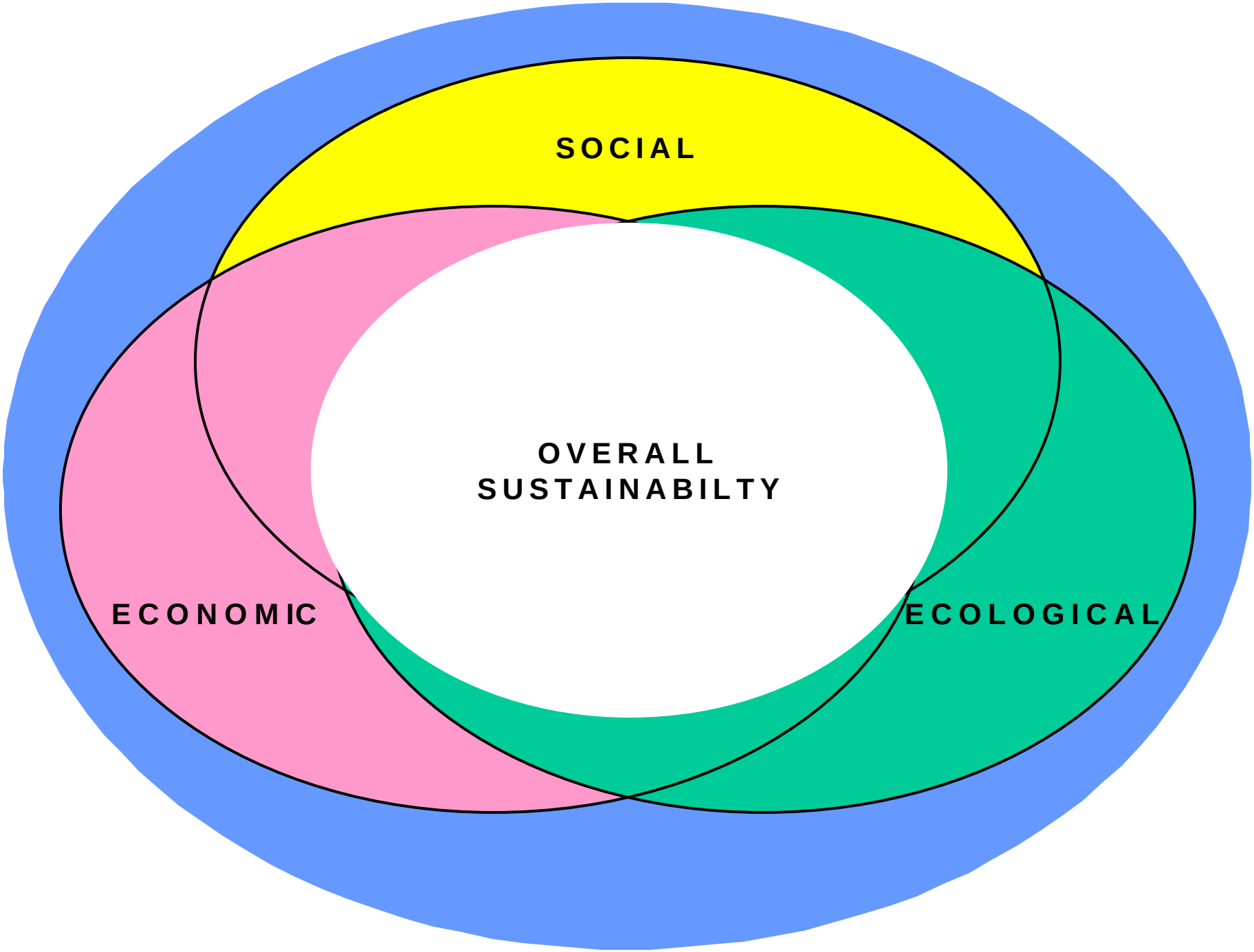
Effects that can be valued in monetary terms.

standard of living, competitiveness, inflation.

Society

Well being of the population.

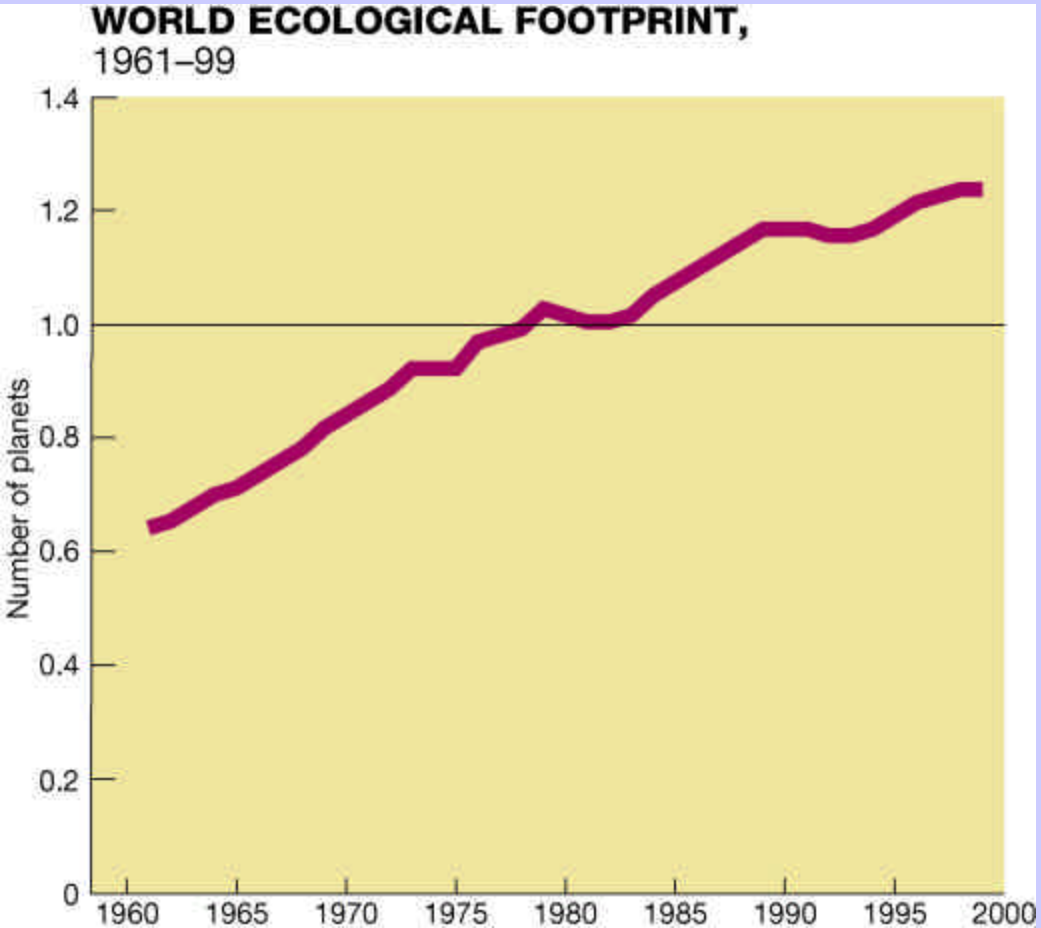
employment, crime, education, accessibility.


SOCIAL
OVERALL
SUSTAINABILTY
ECONOMIC
ECOLOGICAL

Built environment impacts:

- **Global impact** from burning fossil fuels and use of materials.
- **Local impact** through pollution, waste, associated transport.
- **Indoor impact** on health and well-being: people spend 90% of their time in buildings.

One Planet Living



One Planet Living Communities will adopt the following guiding principles:

1	Zero Carbon
2	Zero Waste
3	Sustainable Transport
4	Local and Sustainable Materials
5	Local and Sustainable Food
6	Sustainable Water
7	Natural Habitats and Wildlife
8	Culture and Heritage
9	Equity and Fair Trade
10	Health and Happiness

Building a future for Wales

A strategy for sustainable housing

Professor Phil Jones, Debbie Flint
Centre for Research in the Built Environment

February 2005

‘A sustainable home will be designed to have a minimum impact on the global, local and indoor environment in terms of carbon emissions, material and water use, and waste minimisation during its construction, operation and eventual disposal. It will contribute to a good quality of life for the occupants through the provision of internal conditions that promote health, comfort and a general feeling of well-being. It should be able to provide warmth in winter, it should not overheat in summer and it should have good indoor air quality all the year round. It should be affordable to purchase for its target income group and easy and economic to maintain and adapt for lifetime homes and dealing with disabilities. It should enhance the local built environment in terms of its aesthetic appearance and contribute and be part of a safe and supporting neighbourhood. It should be located where possible to encourage the use of sustainable transport systems. It should be integrated with green structures for leisure and food production and external air quality. It should have easy access to social, health, leisure and retail services.’

‘A sustainable home will be designed to have a minimum impact on the global, local and indoor environment in terms of carbon emissions, material and water use, and waste minimisation during its construction, operation and eventual disposal. *It will contribute to a good quality of life for the occupants through the provision of internal conditions that promote health, comfort and a general feeling of well-being. It should be able to provide warmth in winter, it should not overheat in summer and it should have good indoor air quality all the year round. It should be affordable to purchase for its target income group and easy and economic to maintain and adapt for lifetime homes and dealing with disabilities. It should enhance the local built environment in terms of its aesthetic appearance and contribute and be part of a safe and supporting neighbourhood. It should be located where possible to encourage the use of sustainable transport systems. It should be integrated with green structures for leisure and food production and external air quality. It should have easy access to social, health, leisure and retail services.’*

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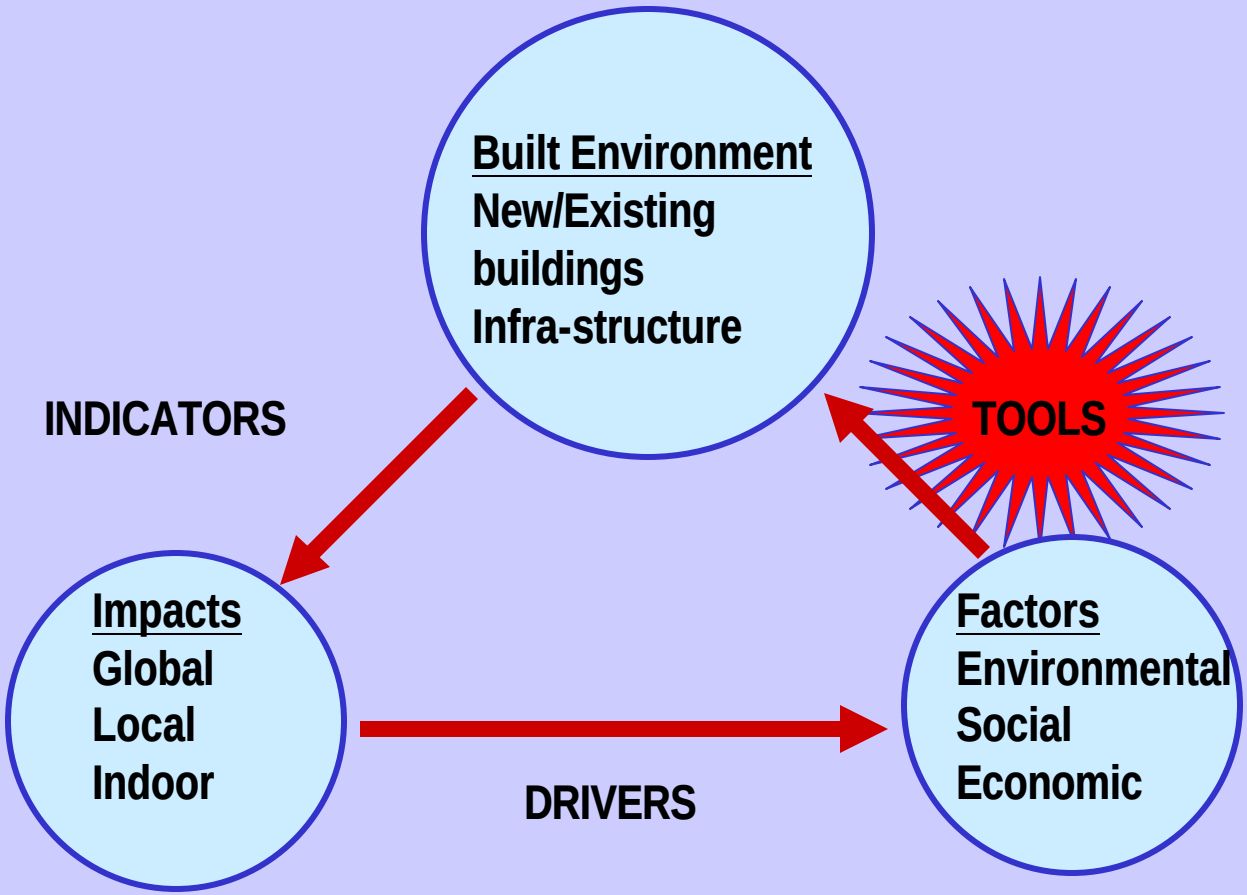
Conceptual framework



COST ACTION C8: Sustainable Urban Infra-structures

- Theory of sustainability

- Case studies

Urban Infra-structure and a sustainable built environment

Water and sewage systems, innovative systems for surface run off, rainwater harvesting, local sewage treatment, and the use of bio-gas.

City streams Switzerland

Kolding pyramid local sewage treatment

Biogas for cars and buses Sweden

Urban Infra-structure and a sustainable built environment

•***Green/blue structures***, access to green and blue facilities for leisure, which are often integrated with water/sewage management systems.

Green structure in Stockholm

Storm management in Lyon

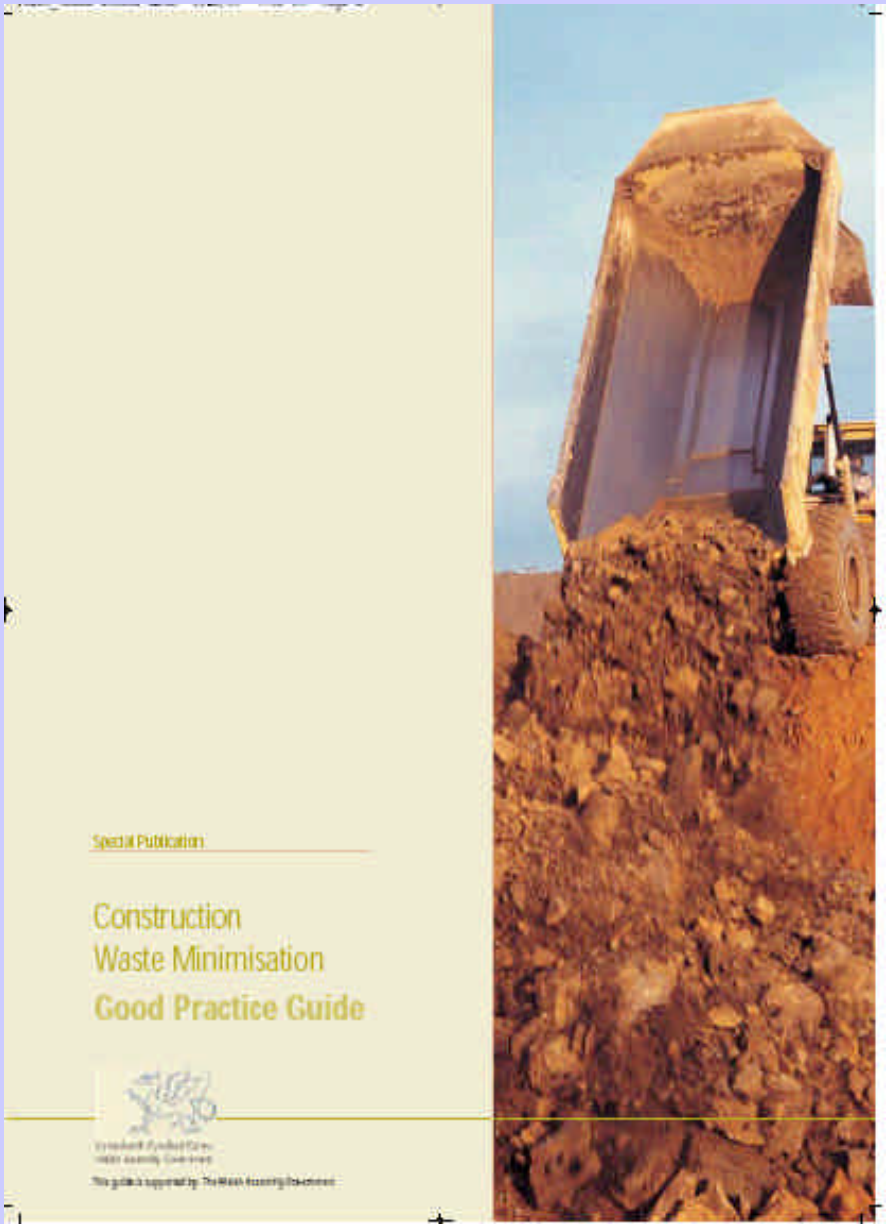
Urban Infra-structure and a sustainable built environment

•***Transportation***, good access to public transport systems, safe cycle and pedestrian routes, encourage a model shift from private transport.

Urban Infra-structure and a sustainable built environment

•***Waste management systems***, efficient collection and recycling.

Solid waste systems Leon

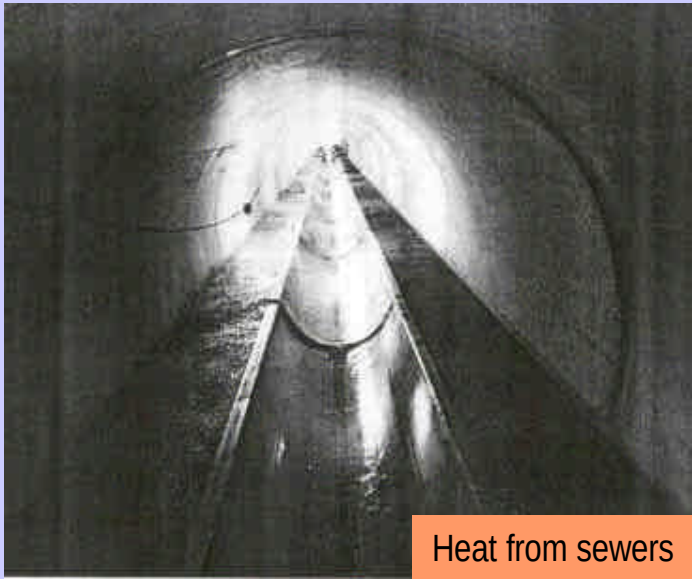


Urban Infra-structure and a sustainable built environment

•***Localised energy generation*** distribution, district heating and cooling systems associated with CHP, and renewable energy systems, wind, photo-voltaic and bio-mass.

PV's along roads and rail Switzerland

Wind farm Wales



Heat from sewers

Conclusions from COST C8

There are a range of good case studies across Europe that demonstrate the application of sustainability.

However there is a lack of rigorous evaluation and comparison with benchmark data.

Such evaluation methods need to cover the full social and economic aspects of the scheme and how institutional barriers have been dealt with.

Gap between theory and practice – theoretical tools not used in practice.

PETUS

Practical Evaluation Tools for Urban Sustainability

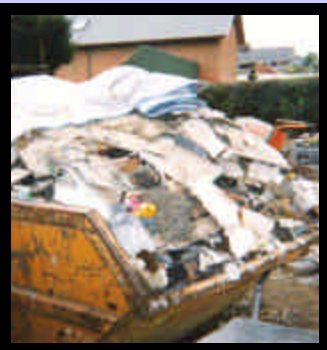
The European Commission
Community Research
Energy, Environment and Sustainable Development

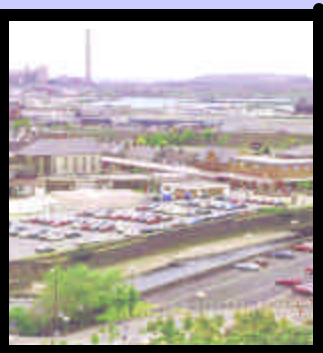
Urban Infrastructure

- **Energy**
- **Waste**
- **Water / sewage**
- **Transport**
- **Green / blue structures**
- **Holistic / planning projects**

EU FP5 Partnership: UK, Belgium, France, Holland, Bulgaria, Denmark, Finland, Austria





PETUS

3 year project

Close links with end users (57 organisations)

Stages:

-reviewing tools,

-case studies (60),

-development of PETUS framework,

-decision making,

-evaluation

PETUS framework

Information source

Legal situation
Directives
Legislation
Policies
Regulations
Guidelines
EU, National, regional

Links to other procedures
SEA
SIA
EIA

Sustainability definitions

Conflicts
Information on conflicts and opportunities between sectors

Case studies
Examples of good practice

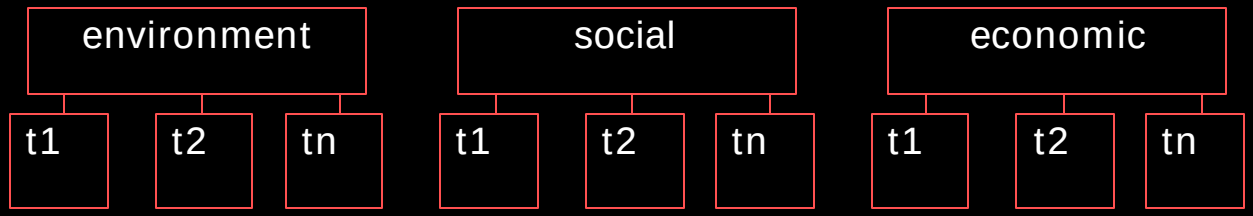
Identify sustainability problem

To include main topic, programme, goals, problems, stakeholders, public participation, basic components. Baseline environmental, social and economic data.

Sustainability statement

Identify a set of objectives and clarify the concept of sustainability between all stakeholders.

Application of appropriate tools and methods



Output

Relate to original qualitative and quantitative objectives

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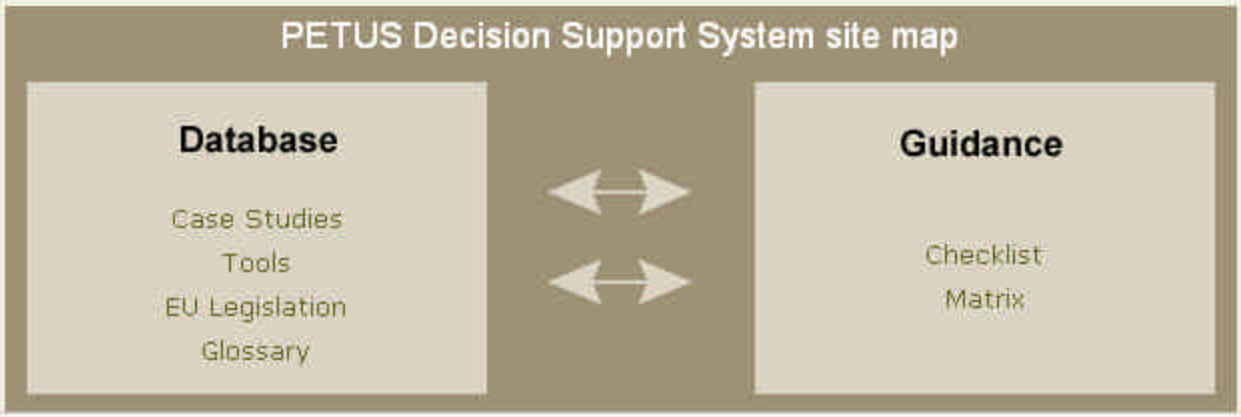
Practical Evaluation Tools for Urban Sustainability

This website has been developed to help people who are involved with, or affected by building and infrastructure to consider impacts on the environment, economy and society. This website therefore includes information that can be used to analyse and improve the sustainability of urban infrastructure, whatever the size or type. The information on the website includes:

- case study projects from across Europe that illustrate where sustainability has been considered,
- methods that can be used to guide and analyse consideration of sustainability in a practical way,
- EU legislation that has to be followed in member countries.
- a monitoring process to enable YOU to track the inclusion of sustainability in YOUR project.

The following diagram provides a guide to the layout of the PETUS website.



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Energy

This section provides information regarding developments related to energy infrastructure. Infrastructure within this sector is likely to be associated with

- increase in supply of energy from renewable sources,
- reduction of energy use,
- maintenance of current energy supply systems to ensure that a constant supply of energy is provided.

Introduction | Important issues | Indicators + benchmarks | Cross Sector links | References

Guidance

This section of PETUS provides a guide and monitoring facility to encourage action taken towards sustainability in a project, plan or programme.

To be able to access information that has been entered into PETUS for your project/s over time you need to register onto the website.

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Energy case studies

These case studies are energy related projects that have used at least one tool to assess sustainability. This has enabled an investigation of the usefulness of tool in highlighting sustainability and its role in the decision making process. Case studies that have been chosen could be complete, ongoing or due to take place in the next couple of years and can be of a building, neighbourhood, city or regional scale.

The information included has be obtained from interviews with project staff, other literature and websites.

Two levels of information are included; a brief description of the case study, the tools used and how they have had an impact on the project and also a more indepth description which provides more detail and sources of information, this is presented in .pdf format.

North Hoyle Offshore wind farm
UK
Development of the UKs first major offshore wind farm.

Awel Aman Tawe Community Energy Project.
UK
A community based scheme established to incorporate renewables and increase energy efficiency to contribute towards regenerating a community.

Middelgrunden Wind Farm
Denmark
Offshore wind farm, situated close to Copenhagen Harbour

Municipal Energy Efficiency Programme
Bulgaria

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Name of the case study
North Hoyle Offshore wind farm

Where is it located?
UK

What type of activity is it?
New development.

Short description of the case study

The North Hoyle Offshore wind farm, located off the North Wales coast, is the UK's first major offshore wind farm. Constructed between April and November 2003, the 30 turbine wind farm produces electricity for up to 50,000 homes each year, and prevents the release of about 160,000 tonnes of carbon dioxide per year. The turbines are approximately 7.5 km (4 nautical miles) from the North Wales coast, and a maximum height of 130 m above Mean Sea Level.

Installation of a wind turbine at North Hoyle (left) and an overhead photograph of North Hoyle

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Energy tools

These tools have been used in the case studies relating to the energy sector.

Two levels of information are included; a brief description of the tool, where it can be obtained from and the type of data that is output by the tool, and also a more indepth description which provides more detail which is presented in .pdf format.

Tools that specialise on energy

Standard Assessment Procedure (SAP)

Framework of Guidelines for Wind Energy development in Wallonia ("Cadre de reference pour l´implantation d'éoliennes en Région wallonne")

EiEolienne planning-map

Ranking Criteria for Priority Assessment

General tools that include energy

Movement for Innovation (M4I) Sustainability Indicator Assessment Tool

BRE Sustainability Checklist for developments: A common framework for developers and local authorities

Partnering

Contract Evaluation (Contractor Selection Matrix)

Guidance

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Energy legislation

EU legislation relating to energy have been collected together to give an overview of laws guiding the sector on a Europe wide scale.

An Energy Policy for the European Union

Cogeneration

Community framework for the taxation of energy products and electricity

Community heat and power

Energy efficiency

Energy Efficiency or Doing More With Less

Energy efficiency: Action Plan

Energy for the Future: Renewable Sources of Energy

Energy for the future: Renewable sources of energy

Energy labelling of household appliances

Energy performance of buildings

Environmental Impact Assessment

Guidance

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Water and sewage

This section of the website provides information regarding developments associated with water and sewage infrastructure including:

- improving water quality and availability,
- assisting with water and sewage management in cities.

Introduction | Important issues | Indicators + benchmarks | Cross Sector links | References

Guidance

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Introduction

"Water is a basic human need and a key component of development - it is a fundamental resource for food production as well as for enhancing social well-being and providing for economic growth. It is also the lifeblood of the environment. Already today, it is a scarce resource in large parts of the world." (G8 Initiative on Conflict and Development)".

Water sector deals with relations between water and the different human activities in urban area. It concerns the part of the water cycle affected by urbanisation or which affects city operation: water infiltration into ground and watertable operation, surface waters runoffs and flows into natural (streams, rivers) or artificial (canals, pipes) reaches. It includes at the same time Waste Water, Storm Water and Drinking Water.

Traditionally the sector has:
- provided water supply for the community,
- provided safe transport of waste water and storm water,
- treated the wastewater to a hygienic and environmental acceptable standard,
- provided preservation of aquatic ecosystems.

Provision of safe drinking water, flood protection, drainage and sanitation rank highly among the needs of societies. By now, most of cities of the developed world rely on "all by networks". These systems are now proving not to be effective or efficient in the developed world. Further more, they are very expensive. Nevertheless, holistic approaches, based on a sustainable urban management could offer a way out. This will imply to find new ways of dealing with water in the cities. Even if essential, the required scientific and technological changes will be inefficient without more flexible institutional arrangements and increased water awareness among all stakeholder groups.

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Tools

What is a tool?
A tool is a procedure, guidance, method, evaluation or assessment to accomplish an objective or achieve a result.

In the PETUS research project tools are included that assist in incorporating sustainability into urban infrastructure projects.

How can tools help you ?
Tools can be used to help incorporate sustainability into urban infrastructure in an organised and methodological manner. Tools can help different stakeholders to understand and agree what sustainabililty issues are important for a particular project. Tools can help to provide a consistent approach to sustainability over time and within and between organisations.

What are the different characteristics of tools ?
It is often difficult to identify the most appropriate tool for use in practice and for this reason many tools are not used as often as they could be. Tools are often rejected for fear that they will take too long to complete or may not be the 'right tool for the use'.

The PETUS team have identified many tools during our research that are being used in practice. In order to a simplify the selection of a tool or group of tools that may be useful for your project we have grouped tools into a number of different types. For each type we have provided a summary of the type of tool, the stage of a project when the type of tool could be used, the type of output that is produced when using the tool and some comments on experiences from using each type of tool.

The list of the types of tools that we have identified can be seen below:
(Click on name of tool type for further information).

Process Guides

Guidance

This section of PETUS provides a guide and monitoring facility to encourage action taken towards sustainability in a project, plan or programme.

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The list of the types of tools that we have identified can be seen below:
(Click on name of tool type for further information).

Process Guides
1a Frameworks
1b Environmental Impact Assessment and Strategic Environmental Assessment procedures
1c Schemes and policies
1d Checklists and guidelines

Calculation Tools
2a Life Cycle Analysis
2b Other environmental calculations
2c Economic and social evaluation tools
2d System Simulation tools

Assessment methods
3a Multi-Criteria Assessment tools
3b Evaluation procedures
3c Surveys

Monitoring tools
4a Indicators and benchmarks
4b Accounting tools

What tools are included within PETUS ?
Tools that have been identified and described within the PETUS project have come from two main sources:
1) Tools that have been used within case studies – for these tools, a comprehensive set of information has been collected including a summary of the tool, the characteristics of the tool,

Guidance

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2d System simulation tools

Short summary of characteristics

System simulation tools enable users to calculate the consequences for a system, when inputs or conditions are changed. These are undertaken to assess the potential of different technical solutions/modifications of a system, such as transport network, sewage network, buildings, etc..

Simulation is a process which consists on studying the functioning of a system with an imitative model which has similar behaviours. Models can be physical, such as a scale model for dam/river or numerical. Numerical models, used most often can be microscopic, which includes the representation of the system comes from the combination of phenomenon of macroscopic (conceptual) that considers the functioning of the system as a whole.

The use of system simulation tools requires both entry variables which describe the system specifications and events which will affect the system that the user wants to know the consequences of. It is also necessary to calibrate the models, adapting

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http://u001.arch.cf.ac.uk/petus/index_p.php

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Energy | Waste | Water & Sewage | Transport | Green Blue | Buildings Land us

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Practical Evaluation Tools for Urban Sustainability

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- a monitoring process to enable YOU to track the inclusion of sustainability in YOUR project.

The following diagram provides a guide to the layout of the PETUS website.

PETUS Decision Support System site map

My accounts

Hello Phil

The projects in your account are as follows

new project matrix checklist

New project name

Add project

The European Commission Community Research Energy, Environment and Sustainable Development

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Local intranet

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My accounts

	Project details 1	Tools methods indicators 2	Public / stakeholders participation 3	Decision making 4	Communication 5	Outputs 6
A Baseline - gathering information						
B Objectives identify alternatives						
C Key impacts						
D Evaluate alternatives						
E Propose improvements						
F Reporting						
G Monitoring						

These questions will help you to answer;
What decisions need to be made at each stage?
Have you considered relationships between different stages?

- What is the the baseline situation?
- What is the context?
- What are the key problems?
- What are the urgent priorities?
- How would you define sustainable development within the context?

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My accounts | Print checklist

Section	Question
Project definition General questions for this section	What is the name of the project? What are the predicted key dates of the project? Start date? End date? Key stages or target dates? What are the main infrastructure changes that are proposed? Who is responsible for the project? Who else is involved in the project? Name and role.
Establishing baseline information General questions for this section	What is the overall aim of the project? What are the key problems to be solved by the project? What are the main sustainability aims set by the project team? What opportunities are likely to arise as a result of the project? What methods of assessment are planned to be used such as tools, indicators? See tools in database. What information/statistics are available on the current state of the environment, society and the economy in the impact area of your project? Who might be affected by the project ? directly and/ or indirectly? Is there a need for external experts, if so where who/what organisation could provide these? What conflicts may occur between different groups of interest been identified? What are the likely impacts of the project on: I)?Biodiversity, fauna and flora II)? Population and human health III)Water and soil IV) Air V)Climatic factorsVI????? Cultural heritage and landscape VII???? Social inclusiveness VIII?? Economic development? ? What municipality, regional, national or European plans or programmes will the project affect? What environmental, social and economic objectives and issues

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Local intranet

Thank You