



# SUSTAINABILITY

FOR RICS APC CANDIDATES

BY

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# SUSTAINABILITY

## FOR RICS APC CANDIDATES



### Introduction (10 mins)

1. Sustainable development/ construction (10 mins)
2. National and International regulations related to sustainability (10 mins)
3. Environmental Assessment Methods (20 mins)
4. Building Regulations and Codes related to Sustainability (10 mins)
5. Contaminated land (5 mins)
6. Waste management (10 mins)

### Break (10 mins)

7. Recyclable Materials (15 mins)
8. Sustainable Materials (5 mins)
9. Building Environmental Management Systems (5 mins)
10. Water Conservation (10 mins)
11. Energy Generation (10 mins)
12. Energy Conservation (10 mins)

### Q & A (10 mins)

# What does RICS expect from you ?

**Level 1** – knowledge and understanding

**Level 2** – application of knowledge and understanding

**Level 3** – reasoned advice and depth of technical knowledge

The competencies are in three distinct categories:

**Mandatory competencies** – the personal, interpersonal, professional practice and business competencies common to all pathways and compulsory for all candidates.

**Core competencies** – the primary competencies of your chosen APC pathway.

**Optional competencies** – a set of competencies selected by the candidate from a list defined for the particular pathway. In most cases there is an element of choice. These are mostly technical competencies, but certain mandatory competencies also appear on the optional competency list and candidates are permitted to select one of these at a higher level.

## Mandatory competencies

You must achieve the minimum levels as set out in the mandatory competencies.

### Level 3

- Conduct rules, ethics and professional practice

### Level 2

- Client care
- Communication and negotiation
- Health and safety

### Level 1

- Accounting principles and procedures
- Business planning
- Conflict avoidance, management and dispute resolution procedures
- Data management
- Sustainability
- Team working



# What does RICS expect from you?

| Title          | Definition   | Level required |
|----------------|--|----------------|
| Sustainability | Demonstrate knowledge and understanding of why and how sustainability seeks to balance economic, environmental and social objectives at global, national and local levels, in the context of land, property and the built environment. | 1              |

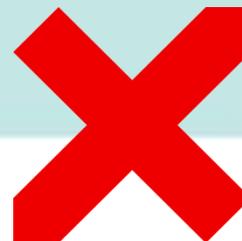
## Level 1

### Knowledge on:

- Balance between economic, environmental and social objectives in terms of **sustainability**
- Global, national and local levels of **sustainability**
- **Sustainability** in land, property and built environment

# What does RICS expect from you in APC as a potential Chartered Quantity Surveyor?

| Level 1  | Level 2  | Level 3   |
|--|--|---|
| Demonstrate knowledge and understanding of why and how sustainability seeks to balance economic, environmental and social objectives at global, national and local levels in the context of land, property and the built environment.  | Provide evidence of the practical application of sustainability appropriate to your area of practice, and of awareness of the circumstances in which specialist advice is necessary.   | Provide evidence of reasoned advice given to clients and others on the policy, law and best practice of sustainability in your area of practice.  |
| <p>Examples of knowledge comprised within this level are:</p> <ul style="list-style-type: none"><li>• The principles of sustainability within development and the construction process</li><li>• The relationship between property and the environment</li><li>• How national and international legislation, regulations and taxation relating to sustainability affect construction</li><li>• Criteria by which sustainability is measured in relation to finished buildings</li><li>• The principles of how design, technology and construction processes can contribute to sustainable building</li><li>• The principles of material resource efficiency within the supply chain.</li></ul> | <p>Examples of activities and knowledge comprised within this level are:</p> <ul style="list-style-type: none"><li>• Carrying out capital cost and value engineering exercises to determine the impact of sustainability issues on design and construction processes</li><li>• Carrying out life cycle cost exercises which take account of sustainability issues</li><li>• Understanding the measures undertaken by governments and international bodies to encourage the reduction of the environmental impact of development.</li></ul> | <p>Examples of activities and knowledge comprised within this level are:</p> <ul style="list-style-type: none"><li>• Giving reasoned advice to your client and members of the project team on the financial impact of sustainability on a project</li><li>• Giving reasoned advice on the application of environmental law and policy</li><li>• Interpreting environmental reports and giving reasoned advice on the financial impact and programme implications on a project</li><li>• Giving advice on sustainable material selection and how performance baselines can be estimated.</li></ul> |



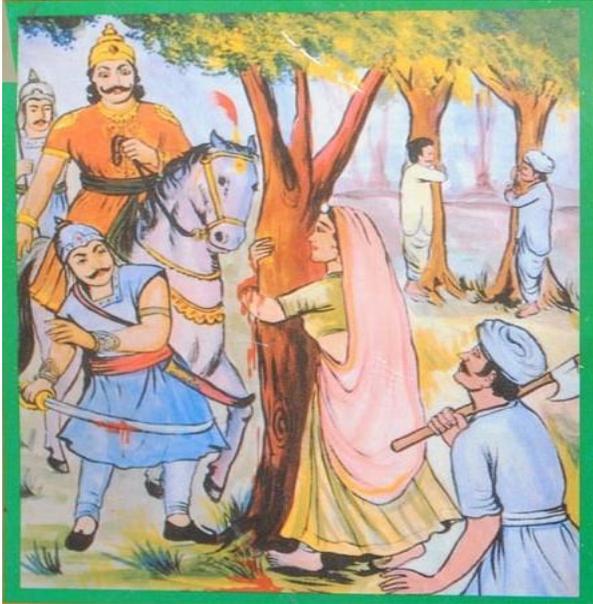
# Sustainability..... where is its origin?

Buddhist monks used their robe for five purposes (2600 years ago)

1. Robes as clothing
2. Bed spreads
3. Dusters and pillow cases
4. Doormat or foot mat
5. Shredded and used as patch material with mud in the walls of the monasteries



# Sustainability..... where is its origin?



Amrita Devi hugging a tree to save it

Bishnoi Movement in India (280 years ago) believes:

“Harming environment means harming oneself”



Sacred Khejri tree

# Sustainability..... where is its origin?



2,200 USD



500 USD

Burial is a plain wooden casket with no metal, that includes no metal handles or even nails. They are put together with wooden pegs. Actually, Jewish tradition is to bury the person without a coffin; if a coffin is mandatory by local law, tradition dictates choosing a simple one.

# Sustainability..... where is its origin?

King Parakramabahu had declared that “no drop of water should flow into the sea without serving the interest of man”.

Chronicles also have records such as “this irrigation system was undertaken for the benefit of the country and out of compassion for all living creatures”.

These statements have notions of optimal use of resources for the benefit of all living things, and demonstrate that ancient Sri Lankans had practised sustainable development



# Sustainability..... where is its origin?

Parakrama Samudraya consists three tanks and they are Thopa Wewa, Dumbutulu Wewa, and Erabadu Wewa.

These three tanks were Inter connected to form the Samudraya and this is fed by the Angemedilla anicut with its Inlet canal of 24 miles long in addition to its own catchment.

The total length of the bund is 9 miles and height varies from 40 to 90 ft.



# 1. Sustainable Development/Construction

A development that meets the needs of the present without compromising the ability of future generations to meet their own needs

United Nations, 1987

**IN SIMPLE TERMS:**

**SUSTAINABLE DEVELOPMENT IS USING WHAT YOU WANT AND USING THEM EFFICIENTLY**

# What are the characteristics of sustainable development? (WIPERRUU)

- Water efficiency
- Improve indoor environment quality
- Promote common transport
- Energy saving
- Reduce CO2 emission
- Re-cycle, re-use rain water and grey water
- Use of re-cycle, re-use rain water and grey water
- Use maximum materials in close vicinity

# Sustainable Construction

- Sustainable construction, also known as green construction, is concerned with the economic, social, and environmental impact of creating a usable structure.
- It requires designers and contractors to use building practices that will not cause long-term damage to the environment.
- Sustainable buildings are designed to be energy efficient, to be healthy for the people who live or work in them, and to reduce pollution and waste.
- Overall, this type of construction is based upon the triple bottom line (TBL) of "people, planet, and profit."

# Models of Sustainability

## 3-Legged Sustainability Stool

### Sustainability



#### Economic Leg

- Good Jobs
- Fair wages
- Security
- Infrastructure
- Fair Trade

#### Environmental Leg

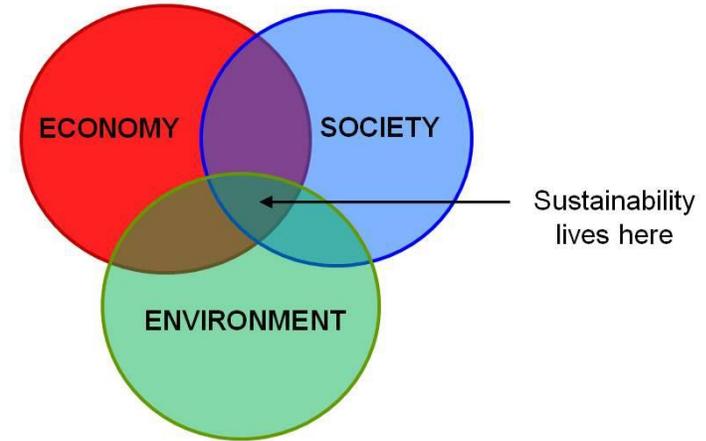
- 0 Pollution & Waste
- Renewable Energy
- Conservation
- Restoration

#### Social Leg

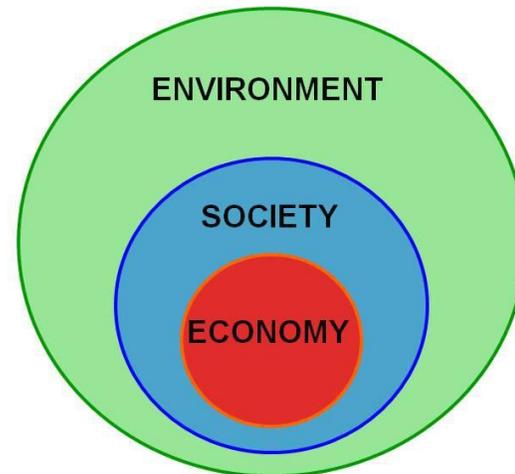
- Working conditions
- Health services
- Education services
- Community & Culture
- Social justice

Quality of Life / Genuine Wealth / Genuine Progress

## 3-Overlapping-Circles Model



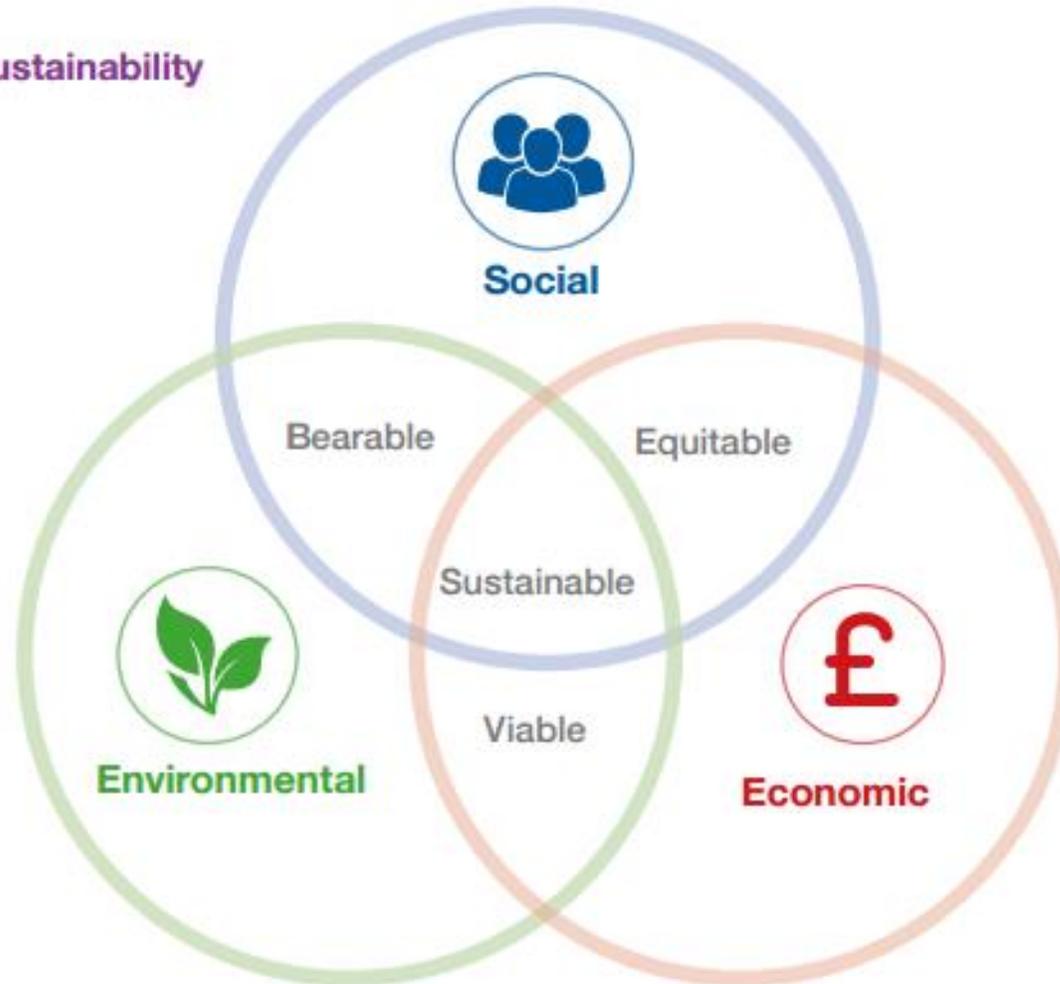
## 3-Nested-Dependencies Model



Based on Bob Doppelt, *The Power of Sustainable Thinking*;  
Peter Senge et al., *The Necessary Revolution*.

# Triple Bottom Line of Sustainability

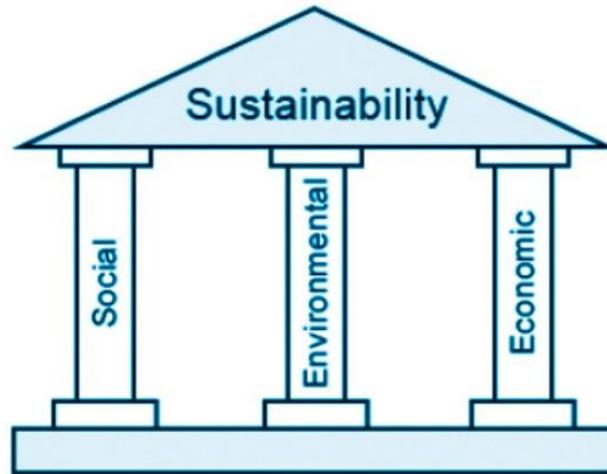
The three areas of sustainability



# Triple Bottom Line of Sustainability

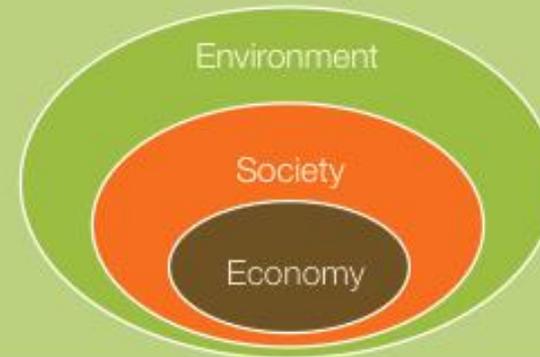


# Three Pillars of Sustainability



## BEYOND THE TRIPLE-BOTTOM-LINE

Many people think of the environment, economy and society as a 'triple bottom line' or a 'three-legged stool'. Instead, it is more useful to think of them as three nested and interdependent spheres. The largest sphere represents the environment, or earth, upon which all economic and social progress ultimately depends. That's our natural capital: it provides the ecosystem services and natural resources that we need to survive. The middle sphere represents society, or human capital. Our economy is the smallest circle because it is governed by the rules, regulations and structures of the other two spheres. The economy depends on human capital and natural capital to thrive. You can't have one at the expense of another.



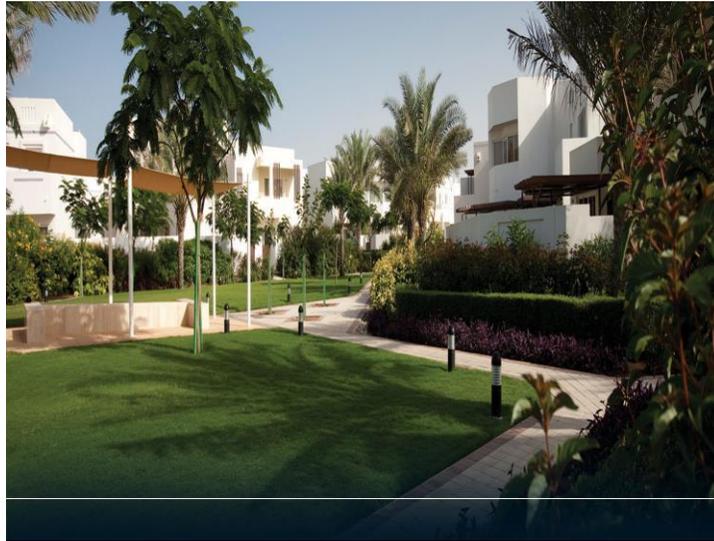
# Major Features of a Sustainable Economy

1. Ecological Protection
2. Density & Urban Design
3. Urban Infill
4. Village Centres
5. Local Economy
6. Sustainable Transport



7. Affordable Housing
8. Livable Community
9. Sewage & Storm water
10. Water
11. Energy
12. The 3 'R's

# Ecological Protection



Green space at  
your door step



No nearby green  
space

When green space is protected, studies show that nearby property values can increase from 5%-50%, as homeowners place value on the amenity.

# Sustainable Transport



## Dubai Metro

- Fully automated
- 75 km linking major cities like Dubai Abu Dhabi



## London Tube

- Built in 1863
- 400 km linking covering London and beyond

People do not use cars to travel around thus saving lot of time and money in terms of fuel and eliminating traffic

## 2.National and International regulations related to sustainability

### International Regulations

- 1987 Brundtland Report
- 1992 Rio Declaration of environment and development (Earth Summit)
- 2002 New Delhi Declaration

### National Regulations

- Green Building Regulations- Dubai
- The Building Regulations 2010- UK
- Sri Lanka Sustainable Energy Authority Act, No. 35 of 2007
- Oman's primary environmental law: Sultani Decree 114/2001
- Marine Pollution Law Sultani Decree No. 34/1974
- Omani Environmental Regulations-MECA

# Regulations in Oman on Sustainability

|     |   |     |
|-----|---|-----|
| 1.  | RD 46/1995 Law of Handling and Use of chemicals.....                                    | 5   |
| 2.  | RD 29/2000 Law of protection of water resources.....                                    | 9   |
| 3.  | RD 114/2001 Law on Conservation of the Environment and Prevention of Pollution.....     | 11  |
| 4.  | RD 115/2001 Law on protection of source of potable water from pollution.....            | 21  |
| 6.  | MD 18/2012 Issuance of the Executive Regulations for Management of Climate Affairs..... | 39  |
| 7.  | MD 118/2004 Air pollution from stationary sources.....                                  | 45  |
| 9.  | MD 248/1997 Registration of Chemical Substances and relevant Permits.....               | 51  |
| 8.  | MD 317/2001 Regulation for packing and labelling of hazardous chemicals.....            | 55  |
| 9.  | MD 25/2009 issuing the regulation for organization of handing and use of chemicals..... | 59  |
| 10. | MD 20/1990 Rules Regulation and Specifying Coastal Setbacks.....                        | 69  |
| 11. | MD 200/2000 Crushers Quarries & Transport of Sand.....                                  | 71  |
| 12. | MD 187/2001 Issuance of Environmental approvals and final Environmental Permit.....     | 75  |
| 13. | MD 39/2004 Marine Environmental Management Bylaws.....                                  | 79  |
| 14. | MD 159/2005 Discharge liquid effluent in Marine Environment.....                        | 83  |
| 15. | MD 79/1994 Noise pollution control in Public Environment.....                           | 95  |
| 16. | MD 80/1994 Noise Pollution control in Working Environment.....                          | 99  |
| 17. | MD 281/2003 control and management of radioactive materials.....                        | 103 |
| 18. | MD 37/2001 control and management of Ozone depleting substances.....                    | 111 |
| 19. | MD 243/2005 regulation for the control & management of ozone depleting substances.....  | 117 |
| 20. | MD 05/86 1998 REGULATIONS FOR EXTERNAL BUILDING DRAINAGE.....                           | 127 |
| 21. | MD 17/1993 Management of Solid non-hazardous waste.....                                 | 135 |
| 22. | MD 18/1993 Management of hazardous waste.....   | 139 |
| 23. | MD 421/1998 Regulation for septic tank, soakaway pits holding tanks.....                | 143 |
| 24. | MD 145/1993 Regulation for waste water re-uses and discharge.....                       | 153 |
| 25. | MD 342/1997 Regulation organizing the use of desalination units on walls.....           | 157 |

(Source: Soharportlandfreezone, 2013)

# Regulations in UK on Sustainability

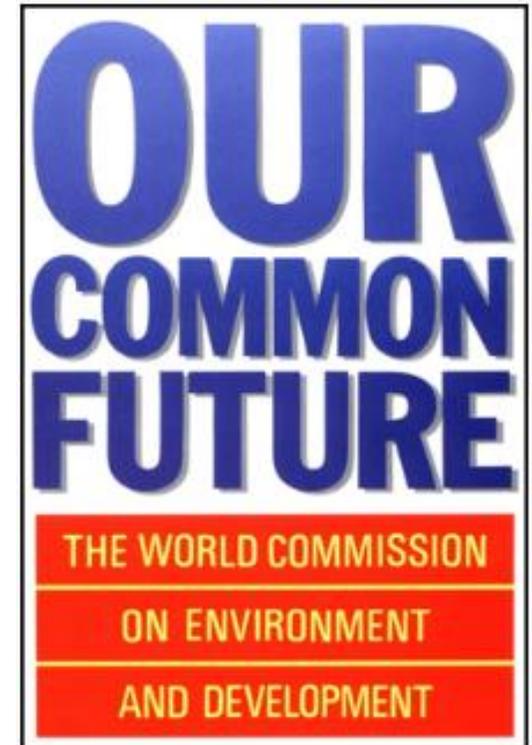
Examples of environmental legislation in the UK are:

- Conservation of Habitats and Species Regulations 2010
- Control of Pollution (Oil Storage) (England) Regulations 2001
- Environment Act 1995
- Hazardous Waste (England and Wales) Regulations 2005
- Hazardous Waste (Wales) Regulations 2005
- Land Drainage Act 1991
- Nitrate Pollution Prevention Regulations 2008 (England only)
- Producer Responsibility Obligations (Packaging Waste) Regulations 2007
- Site Waste Management Plans Regulations 2008
- Water Industry Act 1991
- Water Resources (Environmental Impact Assessment) (England and Wales) Regulations 2003
- Water Resources Act 1991

(Source: Environment Agency, 2011)

# 1987 Brundtland Report (Our Common Future)

- The Brundtland Commission's mandate was to:
- “ re-examine the critical issues of environment and development and to formulate innovative, concrete, and realistic action proposals to deal with them;
- strengthen international cooperation on environment and development and to assess and propose new forms of cooperation that can break out of existing patterns and influence policies and events in the direction of needed change; and
- raise the level of understanding and commitment to action on the part of individuals, voluntary organizations, businesses, institutes, and governments” (1987: 347). “The Commission focused its attention in the areas of population, food security, the loss of species and genetic resources, energy, industry, and human settlements - realizing that all of these are connected and cannot be treated in isolation one from another”



# 1992 Rio Declaration of environment and development (Earth Summit)

There are a number of principles to the Rio Declaration as follows:

- People are entitled to a healthy and productive life in harmony with nature.
- Development today must not threaten the needs of present and [future generations](#).
- Nations have the right to exploit their own [resources](#), but without causing environmental damage beyond their borders.
- Environmental protection shall constitute an integral part of the development process.
- Eradicating [poverty](#) and reducing disparities in living standards in different parts of the world are essential if we are to achieve sustainable development whilst meeting the needs of the majority of the people.
- Environmental issues are best handled with the participation of all concerned [citizens](#).
- The [polluter](#) should, in principle, bear the cost of pollution.
- Sustainable development requires better scientific understanding of the problems. Nations should share knowledge and technologies to achieve the goal of sustainability.

## 2002 New Delhi Declaration on the Principles of International Law Related to Sustainable Development

- The duty of States to ensure sustainable use of natural resources
- The principle of equity and the eradication of poverty
- The principle of common but differentiated responsibilities.
- The principle of the precautionary approach to human health, natural resources and ecosystems
- The principle of public participation and access to information and justice
- The principle of good governance
- The principle of integration and interrelationship, in particular in relation to human rights and social, economic and environmental objective

### 3. Environmental Assessment Methods

- LEED- Leadership in Energy and Environmental Design (USA, Canada, Mexico, India)
- BREEAM- BRE (British) Environmental Assessment Method (UK)
- Passiv Haus (Germany)
- Green Star (Australia)
- CASBEE (Japan)
- ESTIDAMA- Pearl Rating System (Abu Dhabi)
- GLS- Green Labelling System (Sri Lanka)

# Leadership in Energy and Environmental Design (LEED)

Point Distribution in LEED towards Sustainability

| Sr. No.      | Sustainability Aspect         | Points     | Percentage Contribution |
|--------------|-------------------------------|------------|-------------------------|
| 1            | Sustainable sites             | 26         | 24%                     |
| 2            | Water efficiency              | 10         | 9%                      |
| 3            | Energy and atmosphere         | 35         | 31%                     |
| 4            | Materials and resources       | 14         | 13%                     |
| 5            | Indoor environmental quantity | 15         | 14%                     |
| 6            | Innovation and design process | 6          | 5%                      |
| 7            | Regional priority credits     | 4          | 4%                      |
| <b>Total</b> |                               | <b>110</b> | <b>100%</b>             |

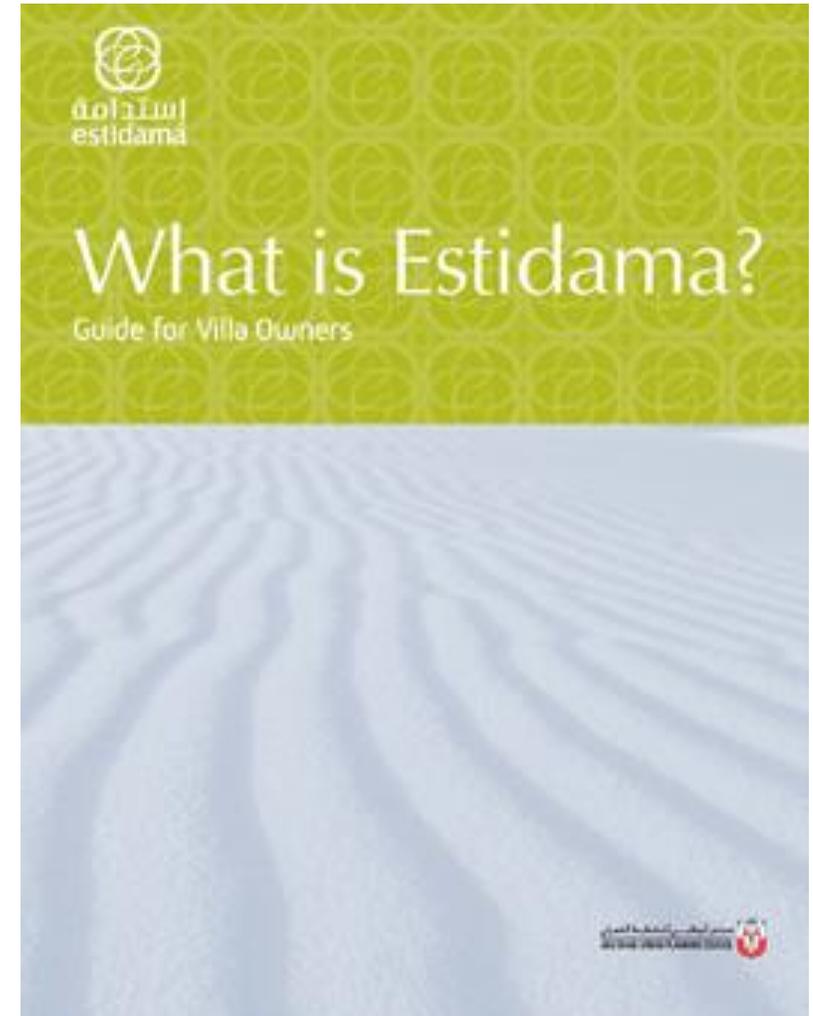


Source: LEED (2005)

# ESTIDAMA

Point Distribution in ESTIDAMA towards Sustainability

| Sr. No.      | Sustainability Aspect          | Points     | Percentage Contribution |
|--------------|--------------------------------|------------|-------------------------|
| 1            | Integrated development process | 13         | 7%                      |
| 2            | Natural systems                | 12         | 7%                      |
| 3            | Livable buildings: outdoors    | 14         | 8%                      |
| 4            | Livable buildings: indoors     | 23         | 13%                     |
| 5            | Precious water                 | 43         | 24%                     |
| 6            | Resourceful energy             | 44         | 24%                     |
| 7            | Stewarding materials           | 28         | 15.5%                   |
| 8            | Innovating practice            | 2          | 1%                      |
| 9            | Regional and cultural practice | 1          | 0.5%                    |
| <b>Total</b> |                                | <b>180</b> | <b>100%</b>             |



Source: Estidama (2011)

# PASSIVE HOUSE

|                       |  |
|-----------------------|--|
| Space Heating Demand  | not to exceed <b>15 kWh</b> annually OR <b>10W</b> (peak demand) per square metre of usable living space.  |
| Space Cooling Demand  | roughly matches the heat demand with an additional, climate-dependent allowance for dehumidification.  |
| Primary Energy Demand | not to exceed <b>120 kWh</b> annually for all domestic applications (heating, cooling, hot water, and domestic electricity) per square metre of usable living space. |
| Airtightness          | maximum of <b>0.6 air changes</b> per hour at 50 Pascals pressure (as verified with an onsite pressure test in both pressurised and depressurised states).           |
| Thermal comfort       | must be met for all living areas year-round with not more than <b>10%</b> of the hours in any given year over <b>25°C</b> .  |

**PASSIVE** A carafe's insulation helps maintain heat passively



**ACTIVE** A coffee machine requires constant, active energy input to maintain heat



Active for more comfort:  
Passive House

Information for property developers, contractors and clients

© Passive House Institute and Passivhaus Österreich GmbH

International  
**PASSIVE HOUSE**  
Association  
PHIA

A young child with blonde hair, wearing a red and blue plaid shirt, is blowing bubbles. The room is bright and modern, with a white sofa and a table visible in the background.

# EXAMPLE OF A PASSIVE HOUSE- AUSTRIAN EMBASSY IN JAKARTA



96 m<sup>2</sup> photovoltaic generator

sun protection by external screen of local timber

air tight and thermally insulated building shell

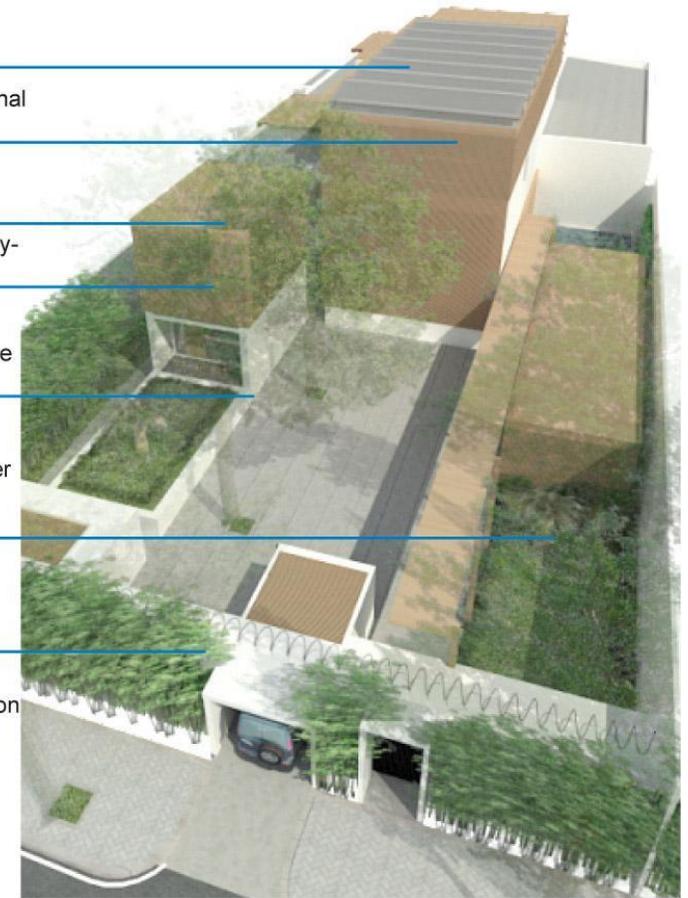
interior good natural daylight conditions

cooling by concrete core temperature control

green spaces with water seepage & rain water cistern

Bamboo stands :  
co<sub>2</sub> sequester

slow speed air ventilation with energy recovery



# GLS

Sri Lanka, like other countries around the world, is facing an immense challenge, to create sustainable buildings for the future. Building construction materials play a major role in converting construction industry into sustainable greener one. Each and every countries in the world more or less have its unique conditions with different resource availability. It emphasised the need of developing **GREEN<sup>SL</sup>® Labelling System, which adapt to Sri Lankan conditions while having a global recognition.**

Green Labels which are also called Eco labels are affixed to products that pass eco-friendly criteria laid down by government, association or certification bodies. The **GREEN<sup>SL</sup>® Labeling System (GLS®)** of Sri Lanka was initiated by the Lanka Institute of Eco labeling (LIOE) set up by a group of professionals engaged in environmental conservation and entrepreneurship with the inputs, encouragements and technical assistance from the **Global Eco labeling Network (GEN).**

The ultimate objective of these certifications is to ensure the creditability of use of proper products/materials with green features in construction industry, to promote the local manufacturing of green products/materials, to build increased awareness of benefits of green products/materials and to encourage the governmental authorities to grant concessions to green product manufacturers and importers. The main goal of developing the **GREEN<sup>SL</sup>® LABELLING** is to promote the standards of local strategies of a greener sustainable environment, while the conventional goal is to ensure that the products/ materials have a minimal detrimental impact to the environment compared to the products serving the same function.

# GLS

Vario Systems Electronics (Pvt) Ltd, Badalgama



Central Engineering Consultancy Bureau



World Trade Center, Colombo-01



Department of National Archives



Hatton National Bank, Kalmunai



Holy Family Convent, Kaluthara



Aliya Resort & Spa - Habarana



## 4. Building Regulations and Codes related to Sustainability

- The Building Regulations 2010- Conservation of Fuel and Power L1A (Energy White Paper)
- Passive House Planning Package (PHPP)
- How to Build a Passive House Rules of Thumb
- Code of Practice for Energy Efficient Buildings in Sri Lanka 2008

## 5. Contaminated Land

**Contaminated land** is defined legally as **land** where substances could cause: significant harm to people or protected species. significant pollution of surface waters or groundwater.

Source: <https://www.gov.uk/contaminated-land>



# Identification and Labelling of Contaminated Land

The contaminating substances may pose a physical, chemical, biological or radiological hazard. The notion of 'pollution' in the context of contaminated land is generally used to indicate a situation where land is sufficiently contaminated such that it poses a demonstrable risk to human health or the environment, and so the land would be described as polluted.

The investigation of potentially contaminated land is essentially a forensic process that is undertaken in a series of phased steps through which a picture of the extent of the problem is built up. Internationally there is a standard approach to each phase of investigation that is followed that represents best practice and this is similarly followed in South Africa, although there are varying degrees of rigor applied by different specialists. Initial assessment of an issue involves review of historic aerial photographs, interviews with site staff and site inspections. If a potential contamination impact is identified from this initial phase, then a Site Characterization or Phase II investigation is undertaken.

The purpose of a Phase II investigation is to quantify through sampling and analysis the actual magnitude of the problem. From this the need for a health risk assessment and clean-up or remediation of the impact can be established. In South Africa, the most significant contamination impacts are from mining and industrial operations, in particular from abandoned or discontinued operations where there has been inadequate or no remediation on closure.

## Identification and Labelling of Contaminated Land

In addition to representing a major legacy liability, ongoing generation and seepage of impacted groundwater from these mines in the form of acid mine drainage is an issue which increasingly cannot be ignored despite the serious technical and financial constraints to adequately remedy the problem. Regulation of contaminated land issues in South Africa has historically been very poor.

However, regulations issued under the National Environmental Management Act (NEMA) of 1998 now include decommissioning of industrial property and remediation as listed activities that must be authorised.

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## Identification and Labelling of Contaminated Land

- Furthermore, the more recently promulgated National Environmental Management: Waste Act 59 of 2008 includes a chapter (Chapter 8) that clearly defines roles and obligations for the management of contaminated land. Draft norms and standards for investigation, assessment and reporting on contaminated land issues were developed in 2010 and are in the process of being promulgated, following which Chapter 8 of the Waste Act will be legally enforceable.

([http://www.enviropaedia.com/topic/default.php?topic\\_id=54](http://www.enviropaedia.com/topic/default.php?topic_id=54))

## 6. Waste Management

ONE MAN'S TRASH IS ANOTHER MAN'S TREASURE



# What is Waste Management?



**Waste**  
is a **Resource**  
at the wrong  
place, at the  
wrong time



**Waste**  
mixed up  
is called  
**Garbage**

# TOWARDS A SUSTAINABLE ECONOMY WASTE MANAGEMENT



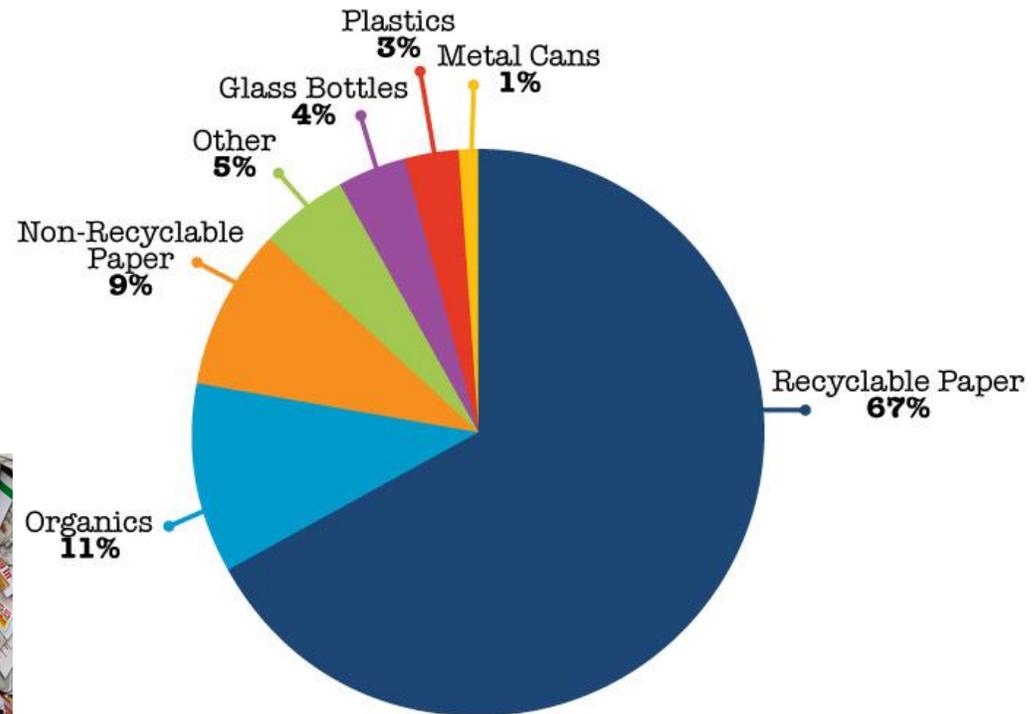
The  
**Secret**  
is  
Separation

# TOWARDS A SUSTAINABLE ECONOMY WASTE MANAGEMENT

**Waste**  
is a **Resource**  
at the wrong  
place, at the  
wrong time



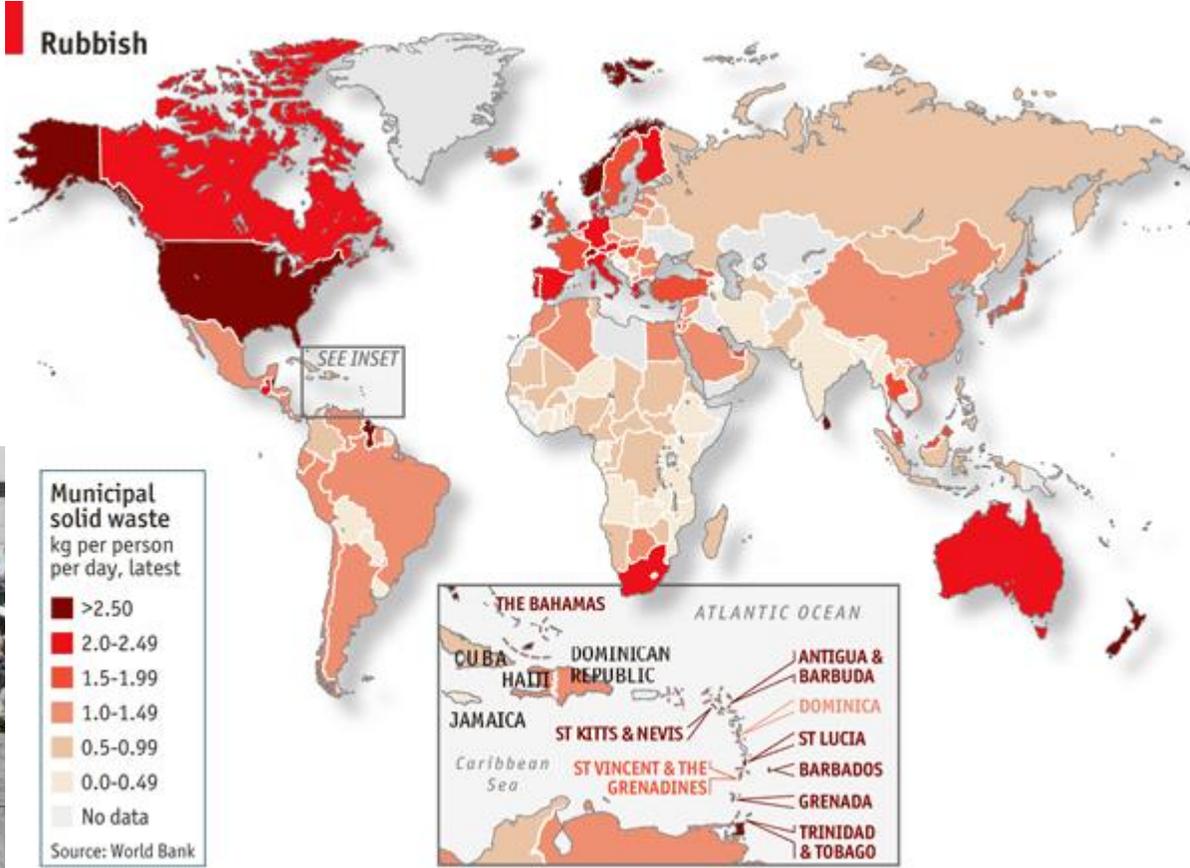
Office Building Waste Composition



Source: Federal Office Building Waste Composition, Public Works and Government Services

# TOWARDS A SUSTAINABLE ECONOMY WASTE MANAGEMENT

Waste  
mixed up  
is called  
Garbage



# Site Waste Management Plan (SWMP)

Under recent legislation in England and currently best practice in the devolved administrations, there is a requirement for the production of a Site Waste Management Plan for all projects in excess of £300,000.

In minimizing materials usage there is a need to address this issue at design stage, but on appointment of the contractor responsibility for the Plan is transferred. This then is likely to act as the prime vehicle for implementing measures to minimize the generation of wastes on site.

Key aspects of this relate to logistics, material and waste segregation, procurement and take-back arrangements and sourcing of materials and products with recycled content. The latter can make a significant contribution to diverting material away from landfill as well as minimizing the need for extraction of virgin materials – with its subsequent impact on resource depletion, water resources, ecology and biodiversity and energy usage in extraction and manufacture (so-called embodied energy). There are also a myriad of other environmental impacts arising from the choice of construction materials and increasingly information about these impacts is available via technical data sheets provided by manufacturers. This agenda can be client led, but there is a significant opportunity for the contractor to implement best practice measures in this area and in so doing maximize cost savings as well as promoting good environmental practice.

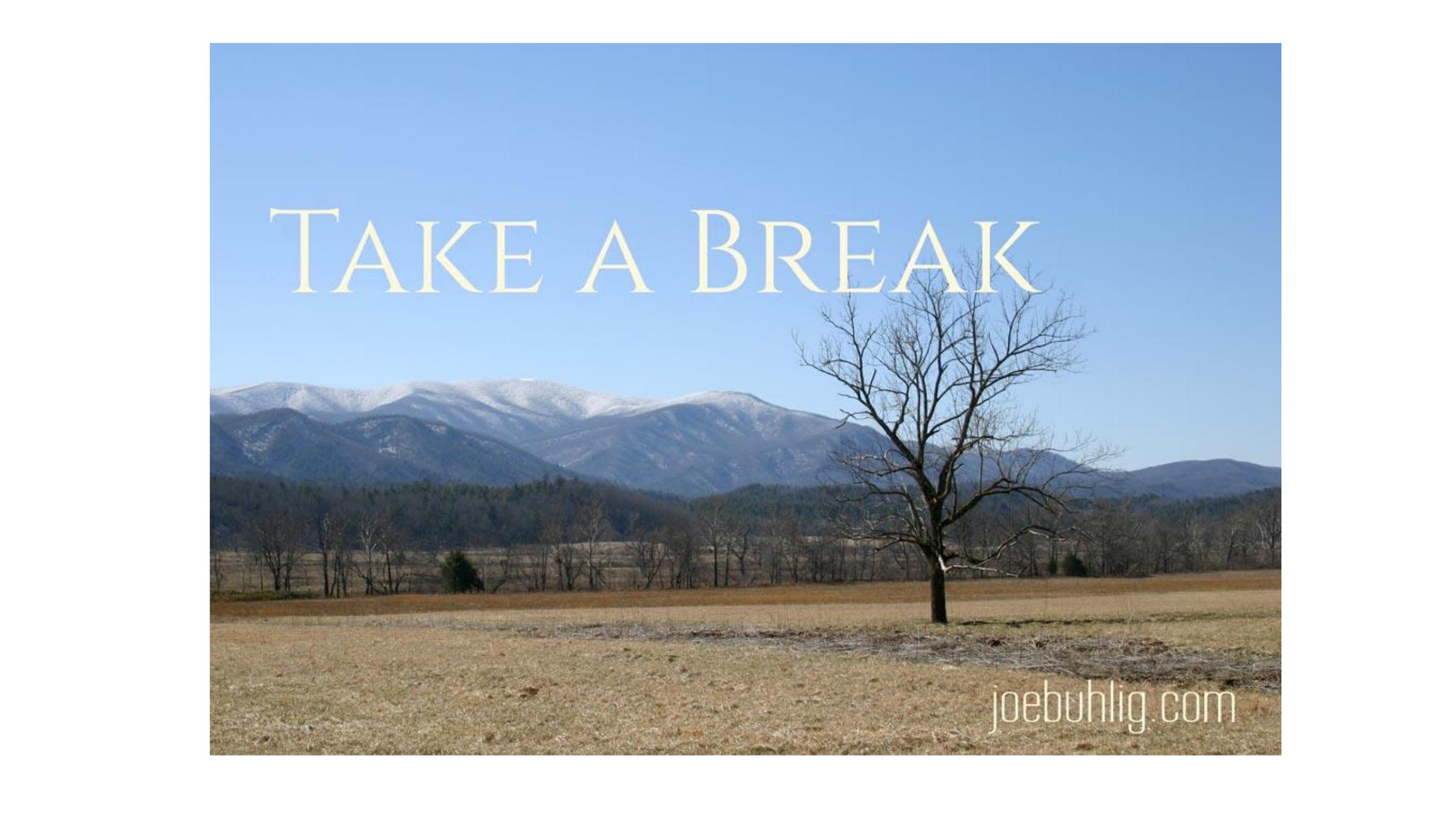
(Source: RICS Guidance Note)

# Site Waste Management Plan (SWMP)

There is a Statutory requirement in UK for every project in excess of £300,000 for the production of a Site Waste Management Plan (SWMP)

## Key aspects of SWMP

- logistics
- material and waste segregation
- procurement and take-back arrangements
- sourcing of materials and products with recycled content

A landscape photograph featuring a large, leafless tree in the foreground on the right side. The ground is covered in dry, yellowish-brown grass. In the background, there are rolling mountains with patches of snow on their peaks. The sky is a clear, bright blue. The text "TAKE A BREAK" is overlaid in the upper center of the image.

TAKE A BREAK

[joebuhlig.com](http://joebuhlig.com)

# DINNER V BREAKFAST THEORY

WHAT DOES YOUR DINNER PLATE LOOK LIKE?



A



B

# DINNER V BREAKFAST THEORY

WHAT DO YOU DO AFTER DINNER?



# DINNER V BREAKFAST THEORY

WHAT DOES YOUR BREAKFAST PLATE LOOK LIKE?



Download from  
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43733540  
Warangkana Charuyodhin | Dreamstime.com

A



B

# DINNER V BREAKFAST THEORY

WHAT DO YOU DO AFTER BREAKFAST?



## DINNER V BREAKFAST THEORY

- YOU SIMPLY NEED MORE FUEL AT MORNING THAN AT NIGHT
- THE MORE YOU EAT AT NIGHT THE MORE YOU DEPOSIT AND YOU WILL SPEND YEARS AND YEARS TO BURN THAT DEPOSIT
- THEREFORE EAT LESS FOOD AT NIGHT AND MORE FOOD AT MORNING

THIS IS SIMPLY USING WHAT YOU NEED EFFICIENTLY

## 7. Recyclable Materials

What are the recyclable materials (**Green Building Materials**)?

- Rapidly renewable plant materials (E.g: bamboo)
- Reconstituted stones (E.g: artificial marble)
- Recycle materials (E.g: glass, PVC)
- Non toxic materials (E.g: Earth cut blocks, clay)
- Materials at close proximity to site
- AAA rated appliances

# AAA Rated Appliances

- When you come across ratings on appliances such as “Dishwasher AAA”, you may wonder what the letters stand for. Even if you paid attention to nothing else in school, you’ll be aware that at A grade is generally considered excellent. But what do the As on appliances stand for?
- The first A refers to **wash performance** – so how well does the appliance clean? So how long does it take for the appliance to thoroughly
- The second A is **energy efficiency** – how much electricity does your dishwasher use and how much will it cost to run?
- The third and final A points to the **machine’s drying performance** – this often depends on whether residual or active drying is used, and therefore how dry your pots are when they are taken from the dishwasher.
- A dishwasher AAA rated should be the first choice for buyers looking for a high performance, low energy appliance. Although it may typically cost more at the outset you will quickly make up (and exceed) the difference through energy efficiency. An A rated appliance is 10% more energy efficient than a B rated one.



## Products carrying an EU energy efficiency label

- Washing machines, washer-dryers and tumble dryers
- Fridges, freezers and fridge freezers
- Dishwashers
- Electric ovens
- Energy-saving light bulbs
- Air conditioners

## Green building materials offer specific benefits to the building owner and building occupants (GIRLE):

- Greater design flexibility.
- Improved occupant health and productivity.
- Reduced maintenance/replacement costs over the life of the building.
- Lower costs associated with changing space configurations.
- Energy conservation.

# Recycling



# TOWARDS A SUSTAINABLE ECONOMY PAPER V PLASTIC MYTH AND TRUTH



**Simple Ecology™**  
Shopping Bag Analysis

|         | Renewable Resource | Energy Required to Make | Water Pollution Created | Air Pollution Created | Chemicals Used | Recycle-ability | Landfill Space (Disposal) | Degrade-ability | Consumer Cost |         |
|---------|--------------------|-------------------------|-------------------------|-----------------------|----------------|-----------------|---------------------------|-----------------|---------------|---------|
| Paper   | Yes                | Very High               | Very High               | High                  | Very High      | Med.            | Very High                 | High            | Free          | Paper   |
| Plastic | No                 | Med.                    | Low                     | Med.                  | High           | Low             | Med.                      | Very Low        | Free          | Plastic |

# PLASTIC BAG FACTS

- Each year the United States uses

**30 billion plastic bags- 12 million barrels of oil**

**10 billion paper grocery bags -approximately 14 million trees**

**US population is about 220 million**

**Plastic bags cause over 100,000 sea turtle and other marine animal deaths every year when animals mistake them for food.**



# A MESSAGE



PETE

polyethylene  
terephthalate

soft drink  
bottles,  
mineral water,  
fruit juice  
container,  
cooking oil



HDPE

high-density  
polyethylene

milk jugs,  
cleaning  
agents,  
laundry  
detergents,  
bleaching  
agents,  
shampoo  
bottles,  
washing and  
shower soaps



PVC

polyvinyl  
chloride

trays for  
sweets, fruit,  
plastic packing  
(bubble foil)  
and food foils  
to wrap the  
foodstuff



LDPE

low-density  
polyethylene

crushed  
bottles,  
shopping bags,  
highly-  
resistant sacks  
and most of  
the wrappings



PP

polypropylene

furniture,  
consumers,  
luggage, toys  
as well as  
bumpers,  
lining and  
external  
borders of the  
cars



PS

polystyrene

toys, hard  
packing,  
refrigerator  
trays, cosmetic  
bags, costume  
jewellery,  
CD cases,  
vending cups

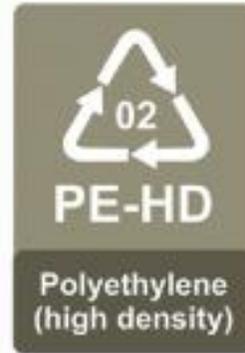


OTHER

other plastics,  
including  
acrylic,  
polycarbonate,  
polyactic  
fibers, nylon,  
fiberglass

# IS EVERY PLASTIC YOU BUY RECYCLABLE ?

Yes – Recycle these

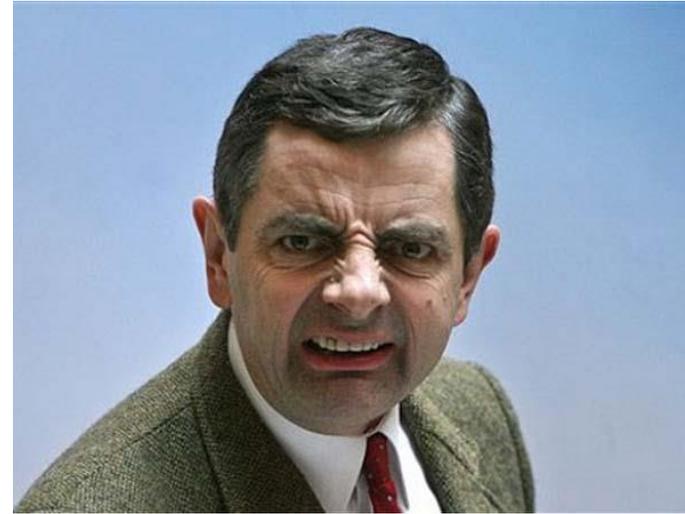


# IS EVERY PLASTIC YOU BUY RECYCLABLE ?

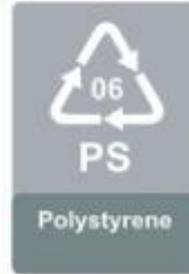
Maybe – Call your recycler



# IS EVERY PLASTIC YOU BUY RECYCLABLE ?



No – Put these in the trash



# MESSAGE TO YOU



## 8. Sustainable Materials

- What are sustainable materials?

Sustainable materials are materials from renewable sources that can be produced at high volumes without adversely affecting the environment or critical ecologies. We are a Center of scientific inquiry and learning that seeks to expand the scope of practically useful materials via scientific discovery and engineering development with an eye towards commercial implementation. (<http://sustain.rutgers.edu/>)

## 9. Building Environmental Management Systems

- What is an environmental management system?
- An Environmental Management System (EMS) is a set of processes and practices that enable an organization to reduce its environmental impacts and increase its operating efficiency. (<http://epa.gov/ems/>)
- ISO 14001- Family of standards related to environmental management
- ISO 14001 Environmental Management System in Construction
- Although the topic of environmental management systems is fairly new to the construction industry, recent literature supports the need for construction firms to consider developing and implementing such systems. (<http://www.cmu.edu/gdi/docs/environmental-management.pdf>)

# 10. Water Conservation

## Water Saving Tips for Commercial Buildings

### GENERAL SUGGESTIONS

Increase EMPLOYEE awareness of water conservation, Install signs encouraging water conservation in EMPLOYEE and customer restrooms, When cleaning with water is necessary, use BUDGETED amounts, Determine the quantity and purpose of water being used, Read water meter weekly to monitor success of water conservation efforts, Assign an EMPLOYEE to monitor water use and waste, Seek EMPLOYEE suggestions on water conservation; locate suggestion boxes in prominent areas, Get creative! Determine other methods of water conservation specific to your situation.

### BUILDING MAINTENANCE

Check water supply system for leaks, Turn off any unnecessary flows, Repair dripping faucets, showers and continuously running or leaking toilets, Install faucet aerators where possible, Reduce the load on air conditioning units by shutting off air conditioning when and where it is not needed, Reduce toilet water by adjusting flush valves or installing dams and flapper mechanisms, As appliances or fixtures wear out, replace them with water-saving models, Shut off water supply to equipment rooms not in use, Minimize the water used in cooling equipment in accordance with MANUFACTURERS recommendations, Shut off cooling units when not needed.

# Water Conservation Tips

## CAFETERIA AREA

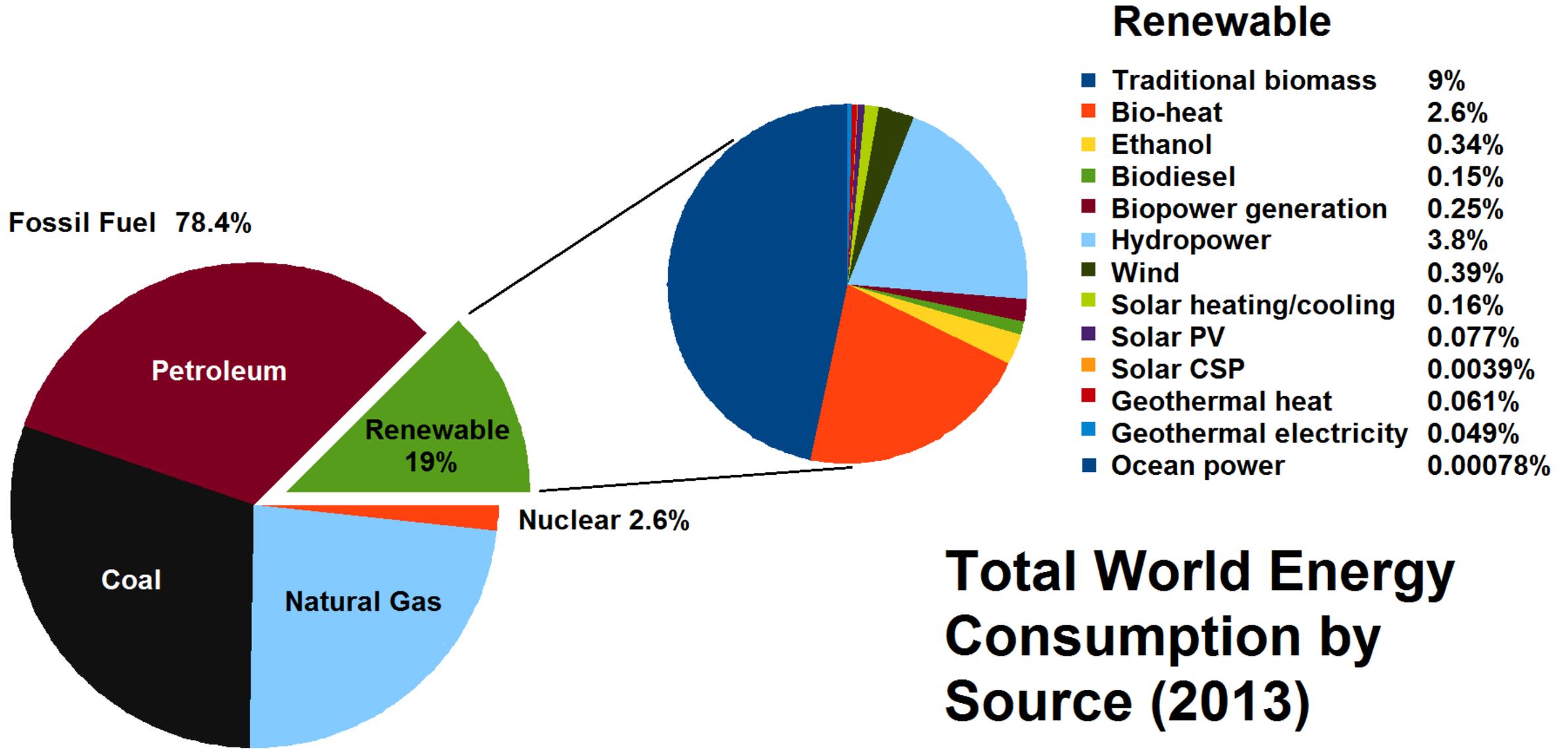
- Turn off the continuous flow used to clean the drain trays.
- Turn dishwasher off when not in use. Wash full loads only.
- Use water from steam tables to wash down cooking area.
- Do not use running water to melt ice or frozen foods.
- Use water-conserving ice makers.

## EXTERIOR AREAS

- INVENTORY outdoor water use for landscaped areas.
- Water landscapes only when needed. Two-to-three times a week is usually sufficient.
- Water in the early morning or evening.
- Make sure that water does not run into the streets or alleys.
- Stop hosing down sidewalks, driveways, and parking lots.

## 11,12. Energy Generation and Energy Conservation





Remember the three fossil fuels are:

coal



crude oil



natural gas



# Renewable energy



## What is renewable energy?

- Renewable energy comes from sources that won't run out, including:
  - the wind
  - the sun
  - the waves and tides
  - natural underground heat
  - energy crops, wood and waste.
- We can use renewable energy to provide electricity and heat for homes and businesses.

## Why do we need renewable energy?

- Most of the electricity we use in the UK comes from non-renewable sources, such as coal and gas.
- These 'fossil fuels' are running out.
- Burning them to provide energy also releases gases that contribute to climate change.
- Renewable sources of energy don't run out or pollute the environment.

## Why don't we get all our electricity from renewable energy?

- It is important to have a mix of energy sources so, if one fails, another can be used. Also, many renewable technologies are still being developed.

## Wind energy

Giant machines, called wind turbines, can be used to make electricity in windy places.

Groups of wind turbines – or wind farms – are being built on land and out at sea.

## Hydroelectric energy

Hydroelectric energy means energy from moving water.

Water flowing from a reservoir to a river through a hydroelectric dam can be used to make power.

## Biomass energy

Biomass is plant and animal matter (e.g. wood, straw, sewage and waste food), or trees grown for fuel.

We can burn biomass to produce heat and electricity.



## Solar energy

Solar energy means energy from the sun.

The sun's light and heat can be captured by solar panels and turned into electricity or used to heat water.



## Hydrogen fuel cells

Hydrogen fuel cells make 'clean' electricity from hydrogen gas.

They work like batteries, and can power cars or buses.



## Geothermal energy

Geothermal energy means the natural heat of the Earth.

Geothermal power stations use heat from deep underground to generate electricity.



## Tidal energy

Every day, the tide at the seaside goes in and out, as the sea rises and falls.

Marine turbines can use this movement to generate electric power.



## Wave energy

Waves are made when wind blows across the sea.

The energy in waves can be used to make electricity by new technology such as the Pelamis wave machine.



It's Only Natural

See [www.dti.gov.uk/renewables/schools](http://www.dti.gov.uk/renewables/schools)



Main sources of  
energy in  
Middle East





Solar power plant

Wind power plant



Tidal power plant





Dubai



Doha, Qatar



Bahrain



Muscat, Oman

# World's Best Sustainability Ideas

## Pixel Building- Australia



**PIXEL** makes use of several innovations for sustainability, including a sun shade system that lets natural light into the office whilst reducing glare and heat. The building even generates its own electricity through the use of wind turbines.





Pixel Building  
Sun Shade  
System

Pixel Building  
Wind Turbines



# World's Best Sustainability Ideas

## Shanghai Tower- China



Wind turbines located near the top of the structure power its outer lighting as well as park areas, while transparent inner and outer "skins" will allow natural light to flood the building, cutting down the need for artificial lighting.



# World's Best Sustainability Ideas

## Shanghai Tower- China

Sustainable design is at the core of Shanghai Tower's development.

**DAYLIGHTING**  
The glass skin admits maximum daylight, reducing the need for electric lighting.

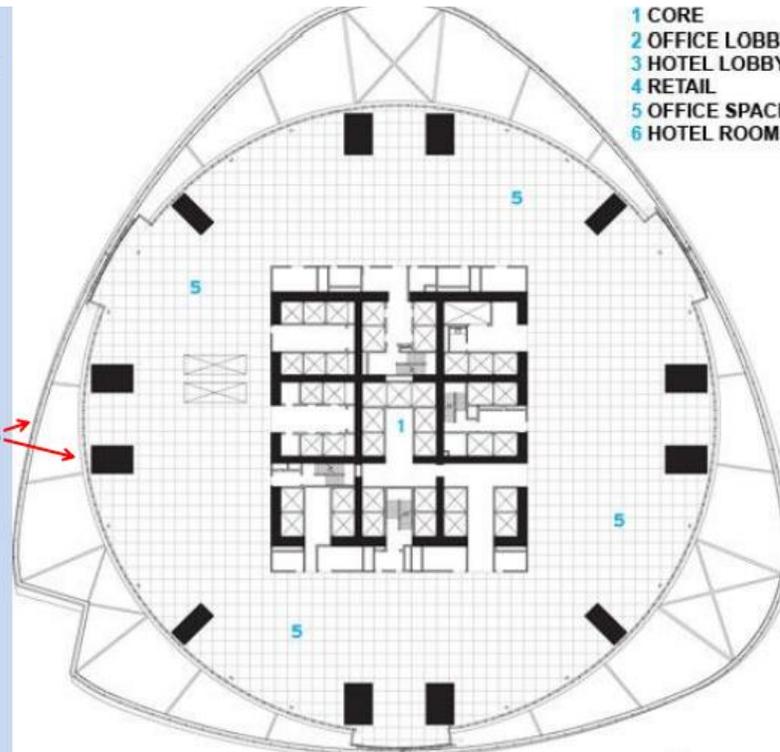
**LANDSCAPING**  
One-third of the site is green space, with extensive landscaping that cools the site.

**WIND TURBINES**  
Exterior lighting for the tower will be powered by 270 wind-driven generators.



Shanghai Tower  
VERTICAL CITY, China

Double outer walls allows for internal open spaces

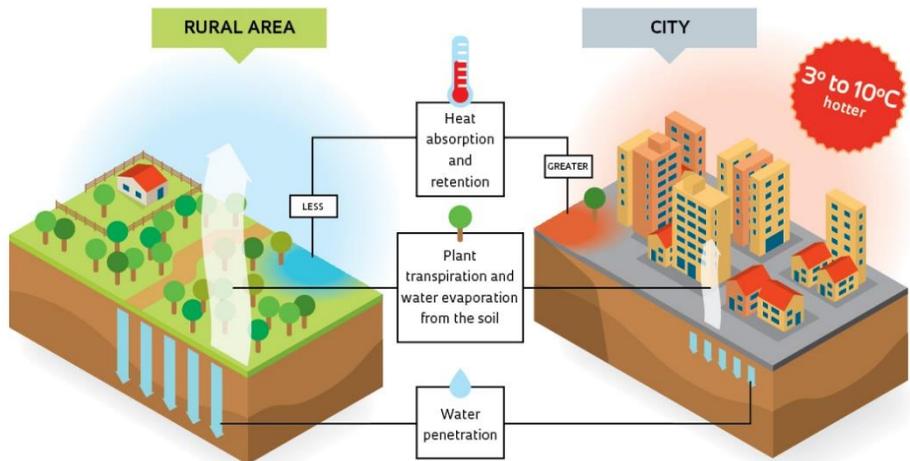


# World's Best Sustainability Ideas

## Heritance Kandalama- Sri Lanka



### Why the urban heat island effect occurs



# World's Best Sustainability Ideas

## Heritance Kandalama- Sri Lanka



# GREEN BUILDING RATINGS THE MYTH AND THE TRUTH

Does Green Building Rating Mean Achieving Sustainability? Hmmm Not Always

## LEED Credits for Bicycle Parking

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LEED points are applied to the Sustainable Sites (SS) category and qualify under SS Credit 4.2: Alternative Transportation: Bicycle Changing and Storage Rooms for 1-2 points.

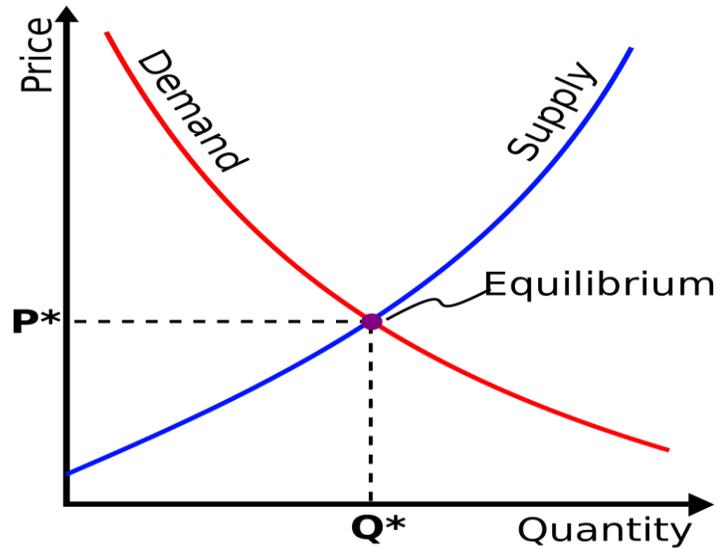
For recycled content in particular, LEED points apply to the Materials & Resources (MR) category and qualify under MR Credit 4.1 / 4.2.

The typical re-melt rate for stainless steel is between 60 and 85%. Our products are at least 60% recycled. All stainless steel products are 100% recyclable.

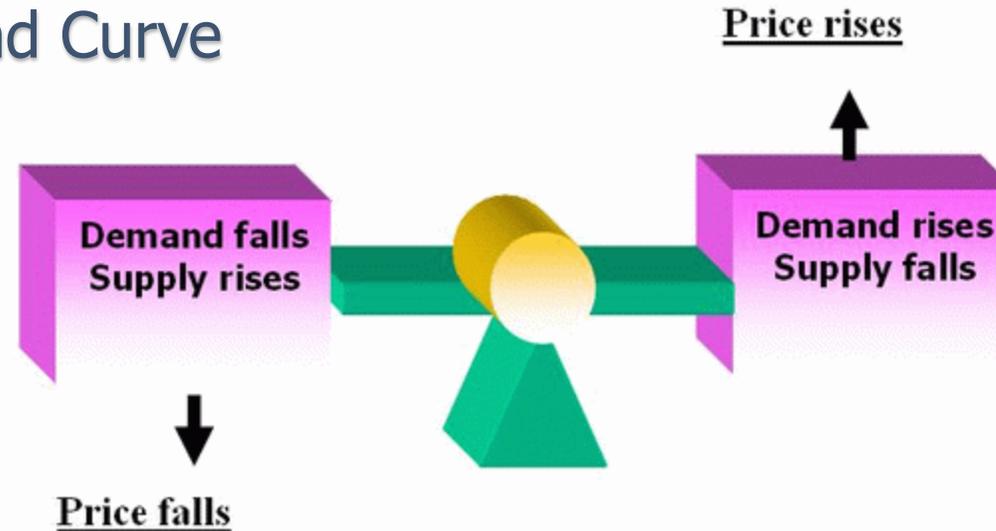


LEED regional priority credit is only 4%

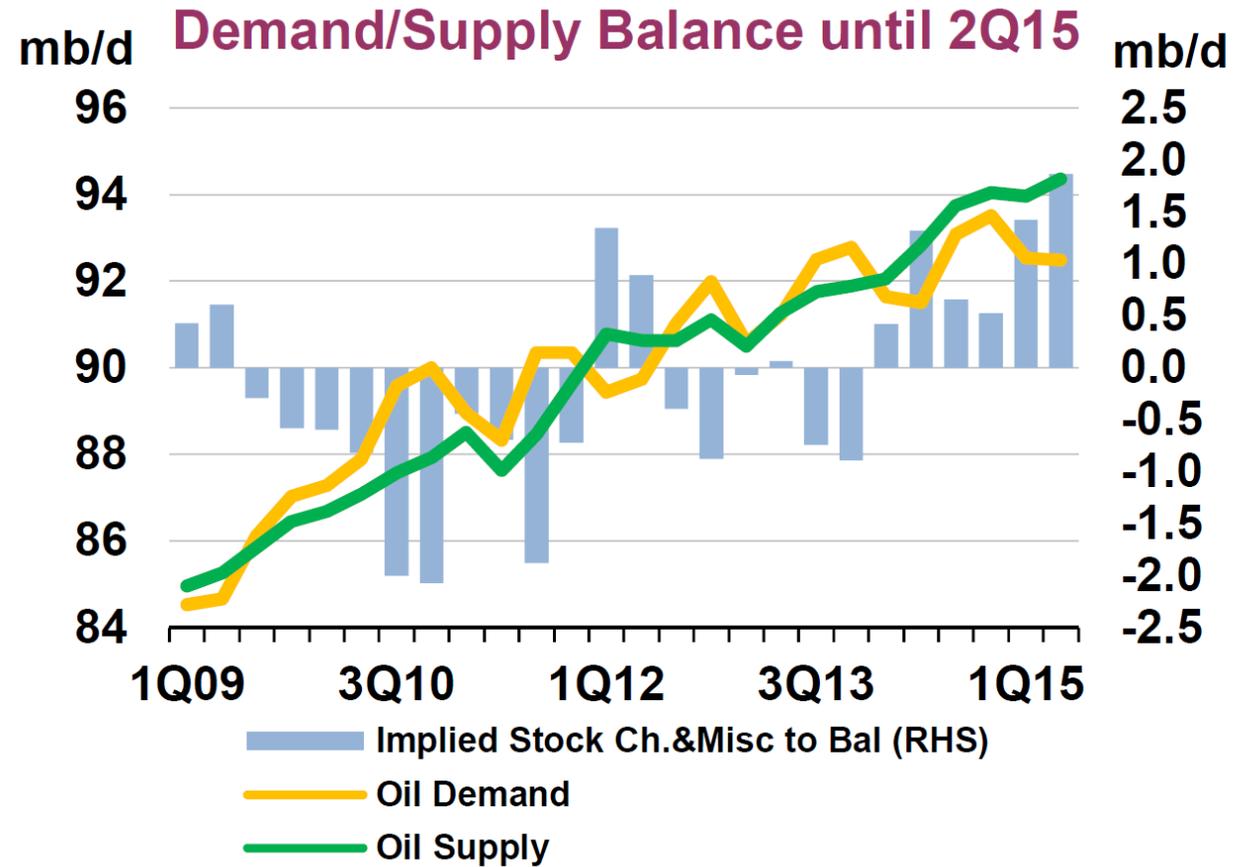
# WHAT IS THE CURRENT OIL CRISIS?



Supply and Demand Curve

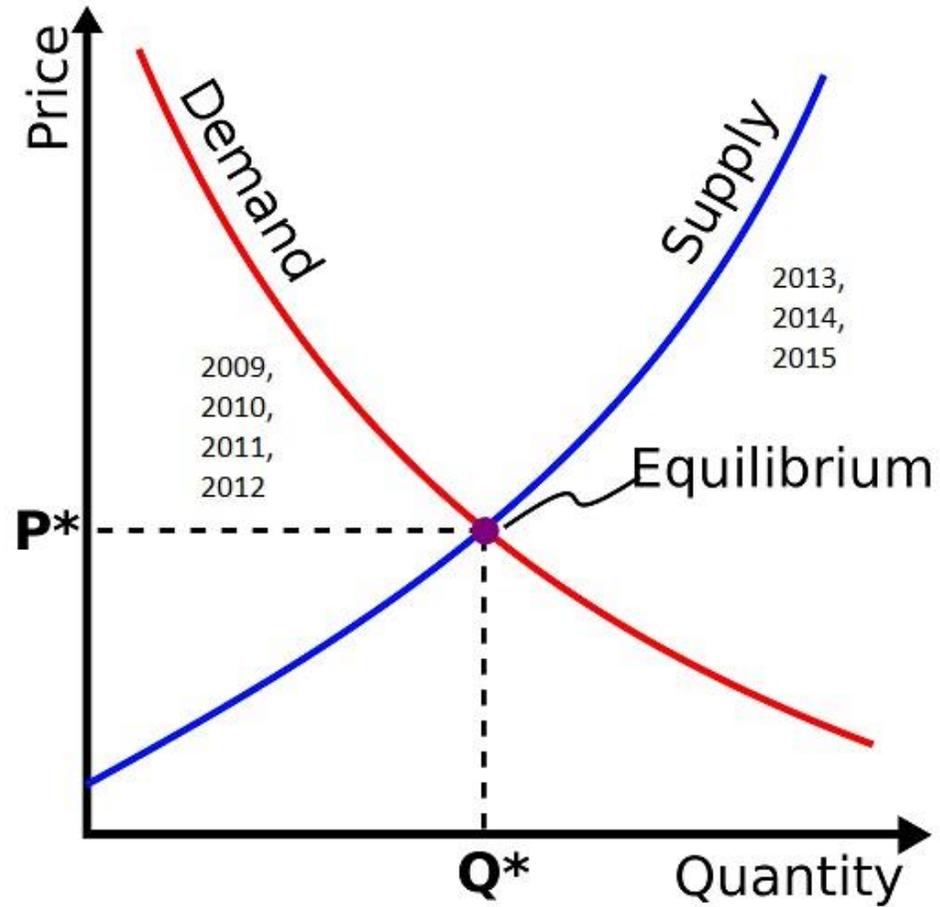


# WHAT IS THE CURRENT OIL CRISIS?

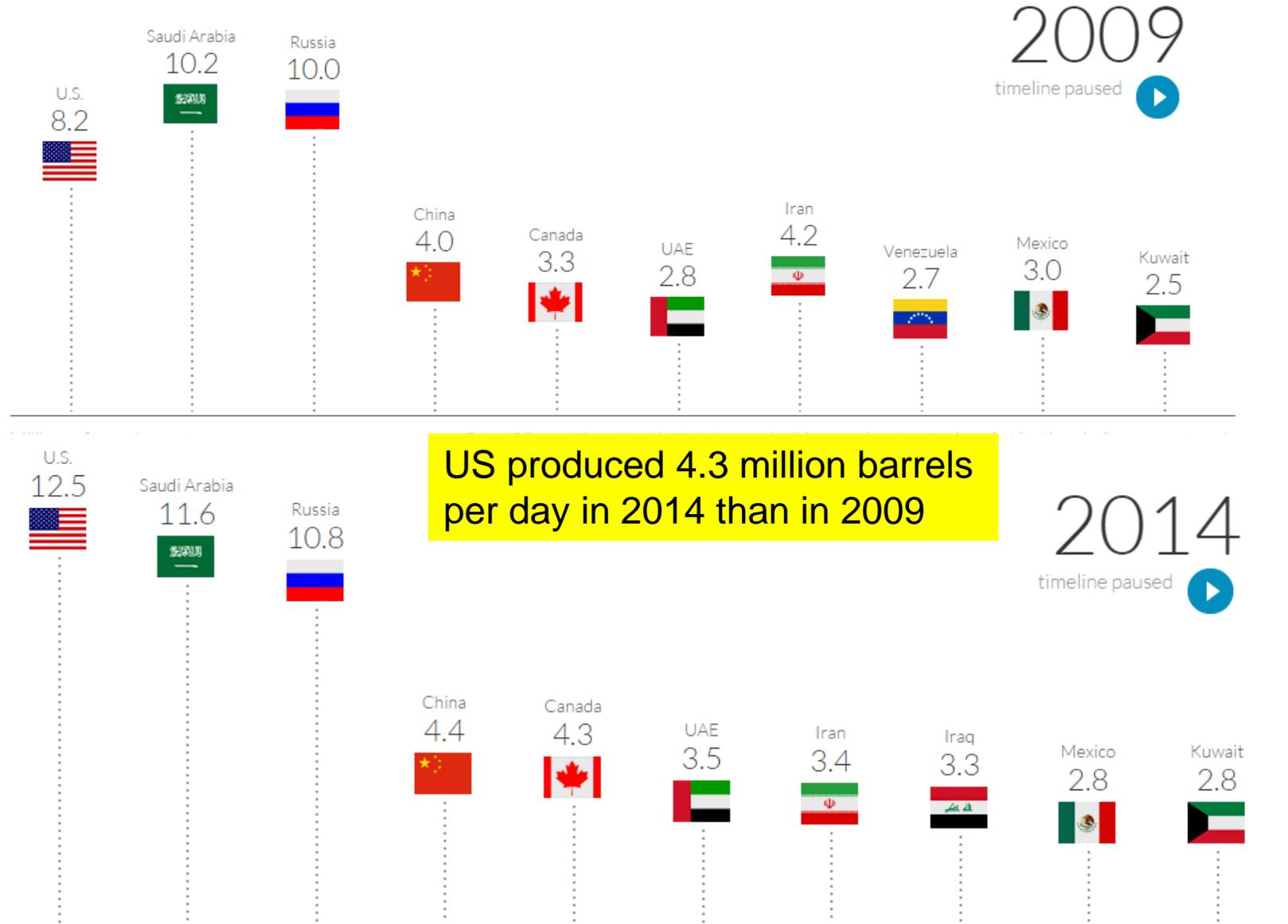


Source: <http://www.vox.com/2014/12/16/7401705/oil-prices-falling>

# SURPLUS OF OIL



# WHY THERE IS A SURPLUS?



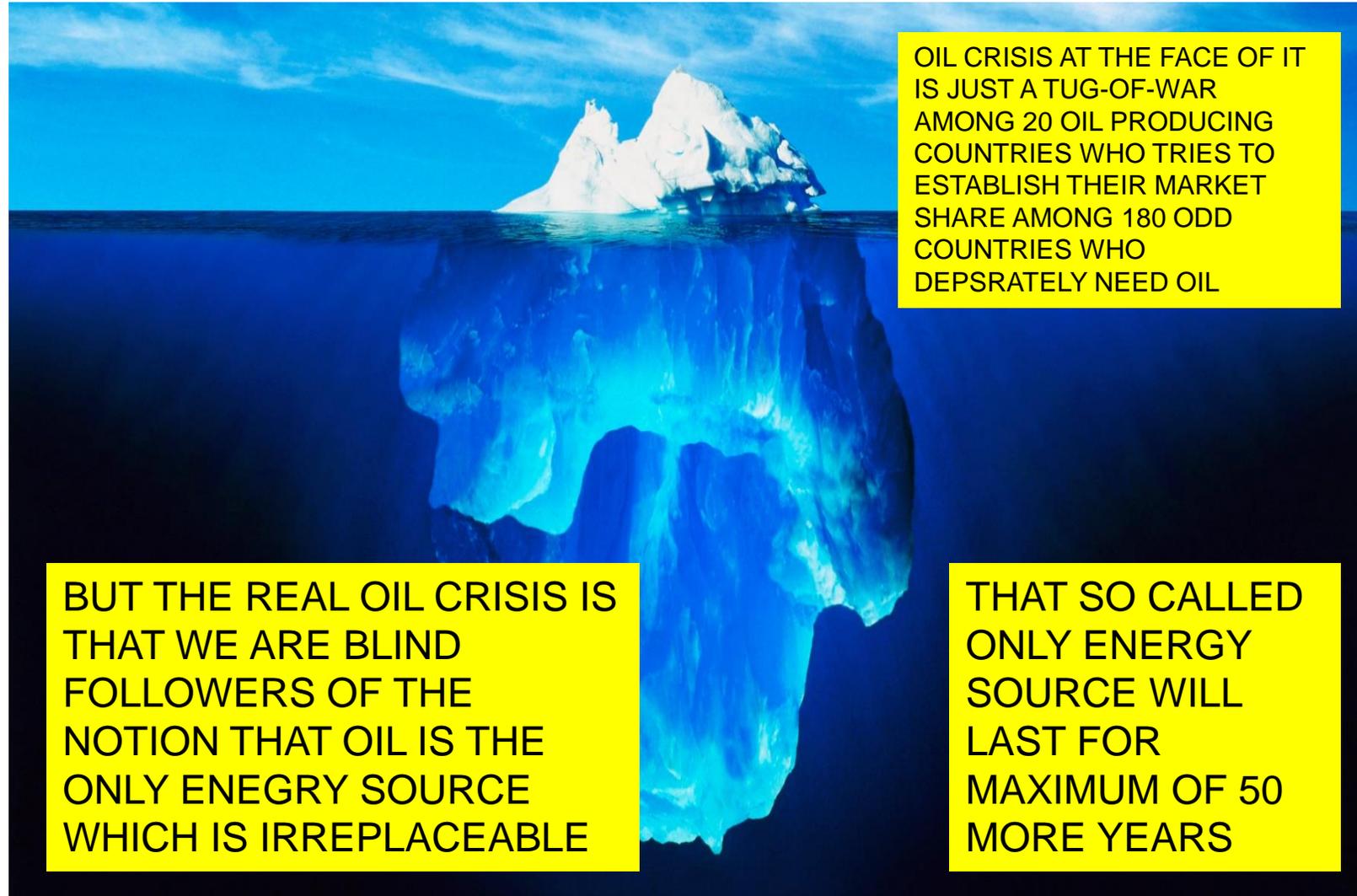
Millions of barrels per day

Data: US Energy Information Administration - crude oil, lease condensate, natural gas plant liquids, and refinery processing gain

# OIL CRISIS

- OIL PRODUCING COUNTRIES ARE BADLY HIT BY THE LOWER SELLING RATES
- NON-OIL PRODUCING COUNTRIES ARE GETTING BENEFITTED BY THE CHEAPER BUYING RATES
- WHO WINS? WHO LOSES?

# BUT YOU ARE SEEING ONLY THE TIP OF THE ICEBERG

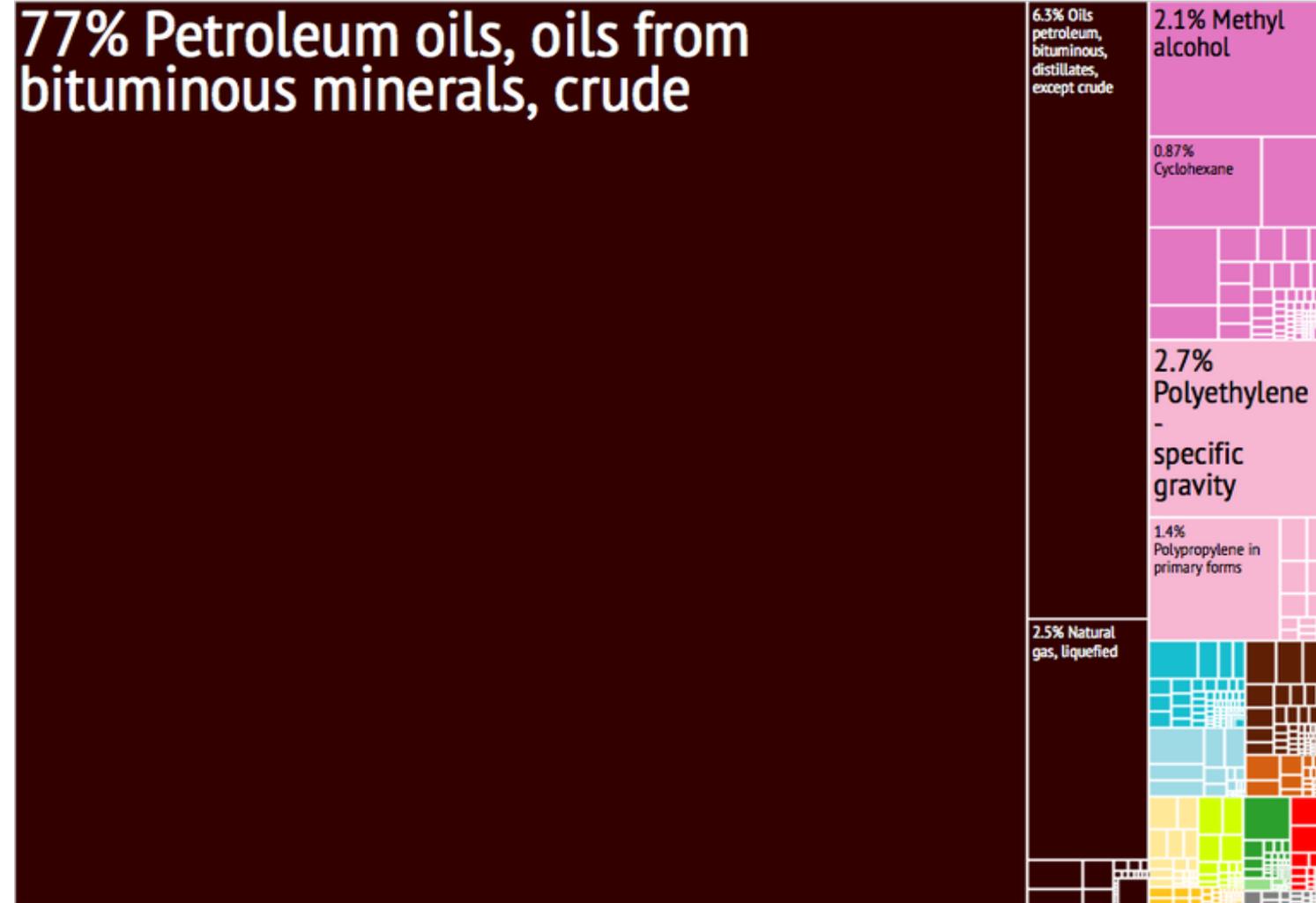


OIL CRISIS AT THE FACE OF IT IS JUST A TUG-OF-WAR AMONG 20 OIL PRODUCING COUNTRIES WHO TRIES TO ESTABLISH THEIR MARKET SHARE AMONG 180 ODD COUNTRIES WHO DEPRATELY NEED OIL

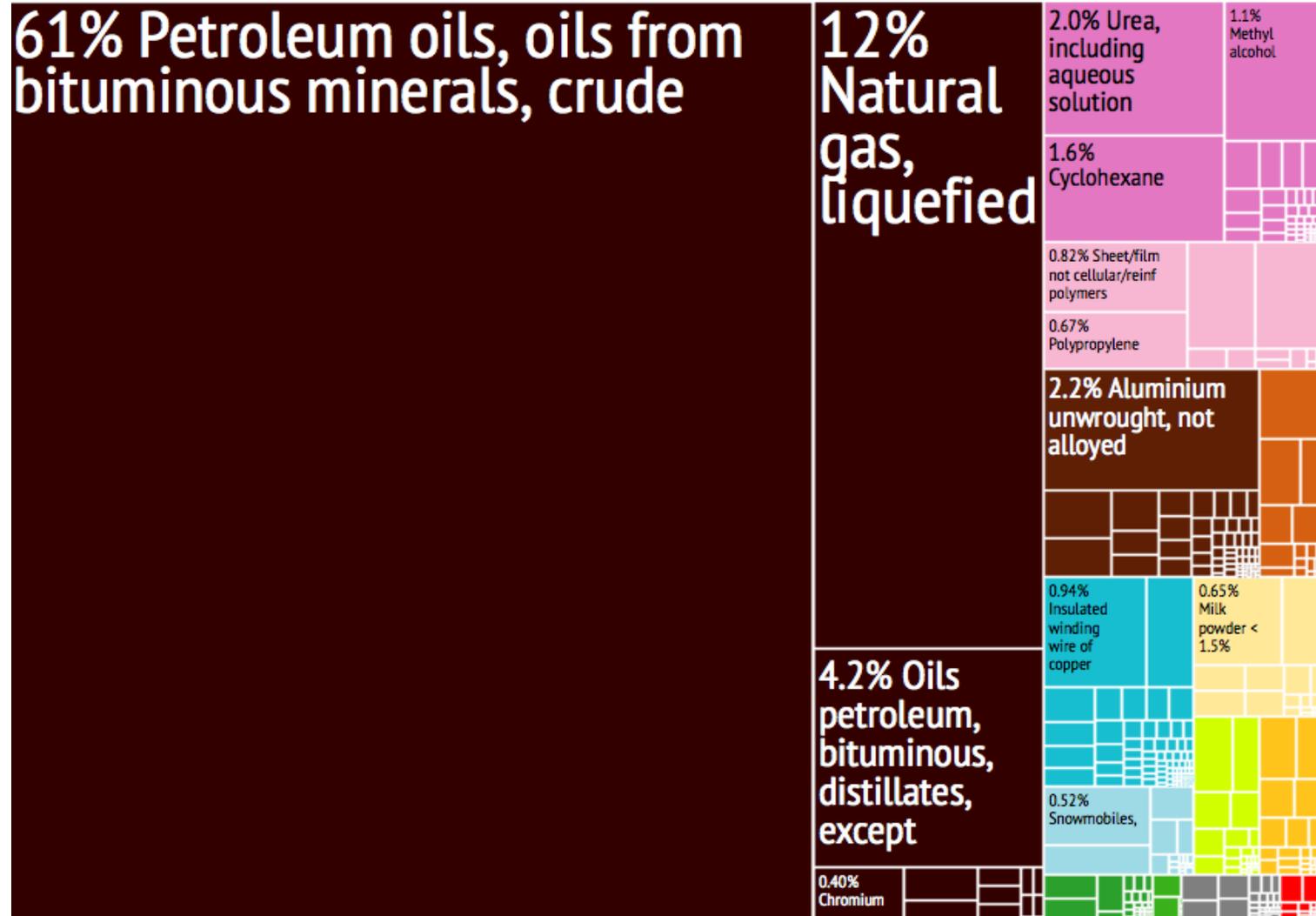
BUT THE REAL OIL CRISIS IS THAT WE ARE BLIND FOLLOWERS OF THE NOTION THAT OIL IS THE ONLY ENEGRY SOURCE WHICH IS IRREPLACEABLE

THAT SO CALLED ONLY ENERGY SOURCE WILL LAST FOR MAXIMUM OF 50 MORE YEARS

# ECONOMY OF SAUDI ARABIA

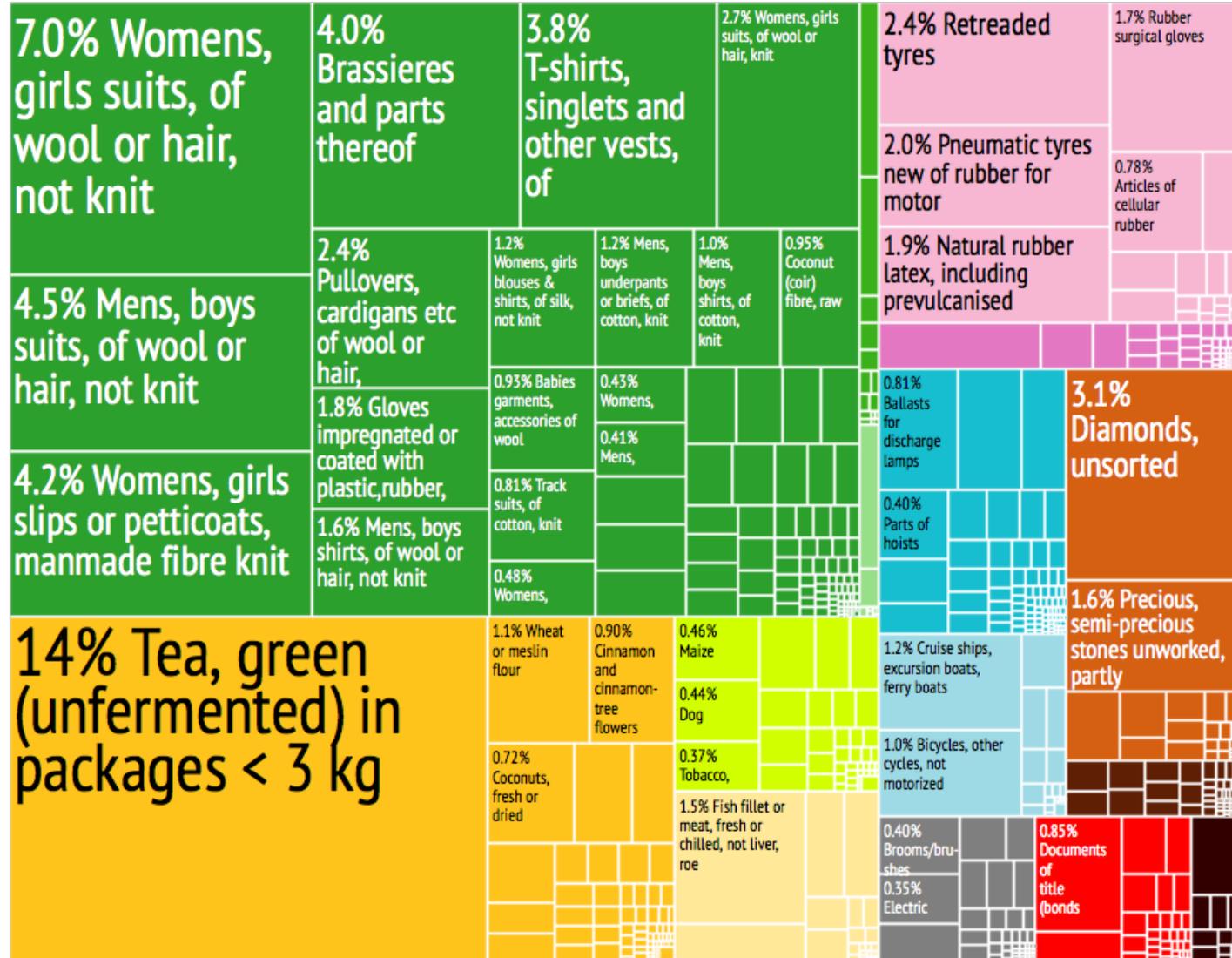


# ECONOMY OF OMAN





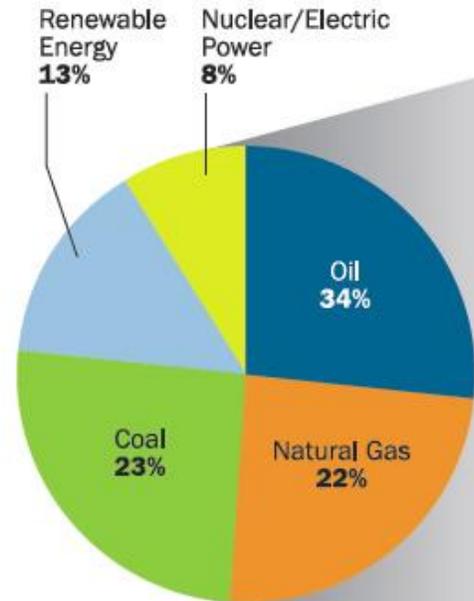
# ECONOMY OF SRI LANKA



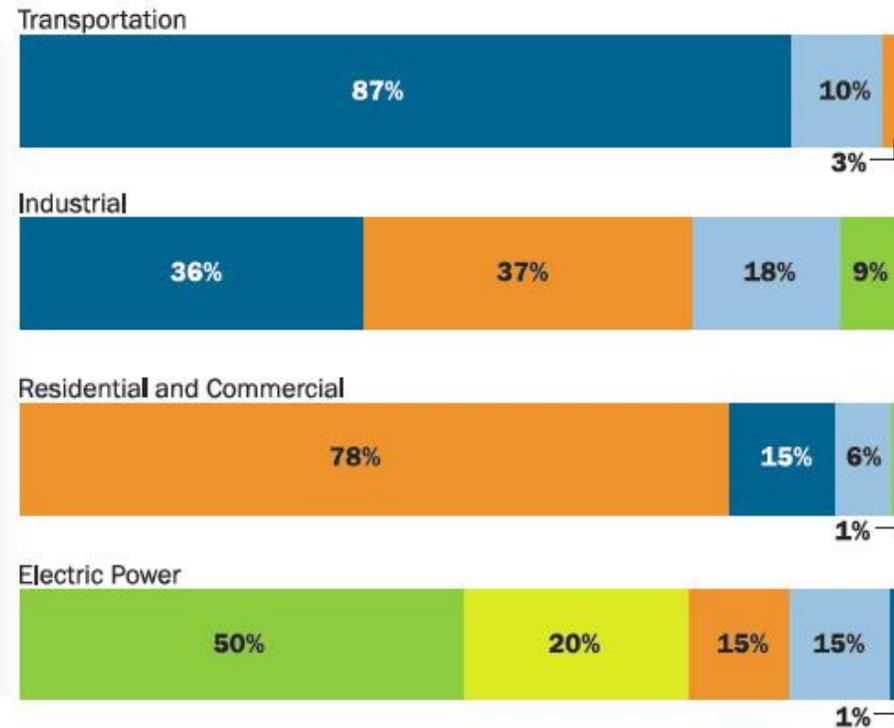
# WHERE DOES THE PROBLEM LIE?

## Energy Consumption by Sector, 2030

Total Energy Consumption by Fuel



Sector Energy Consumption by Fuel Type

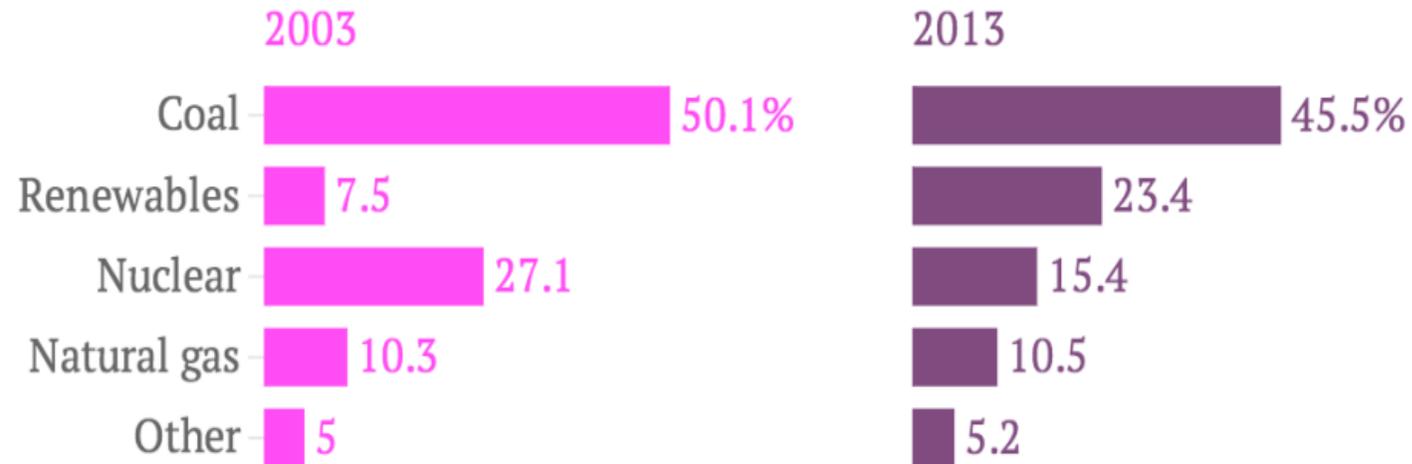


Oil Natural Gas Coal Renewable Energy Nuclear/Electrical Power

Source: Updated AEO 2009 Tables A1, A2 and A17

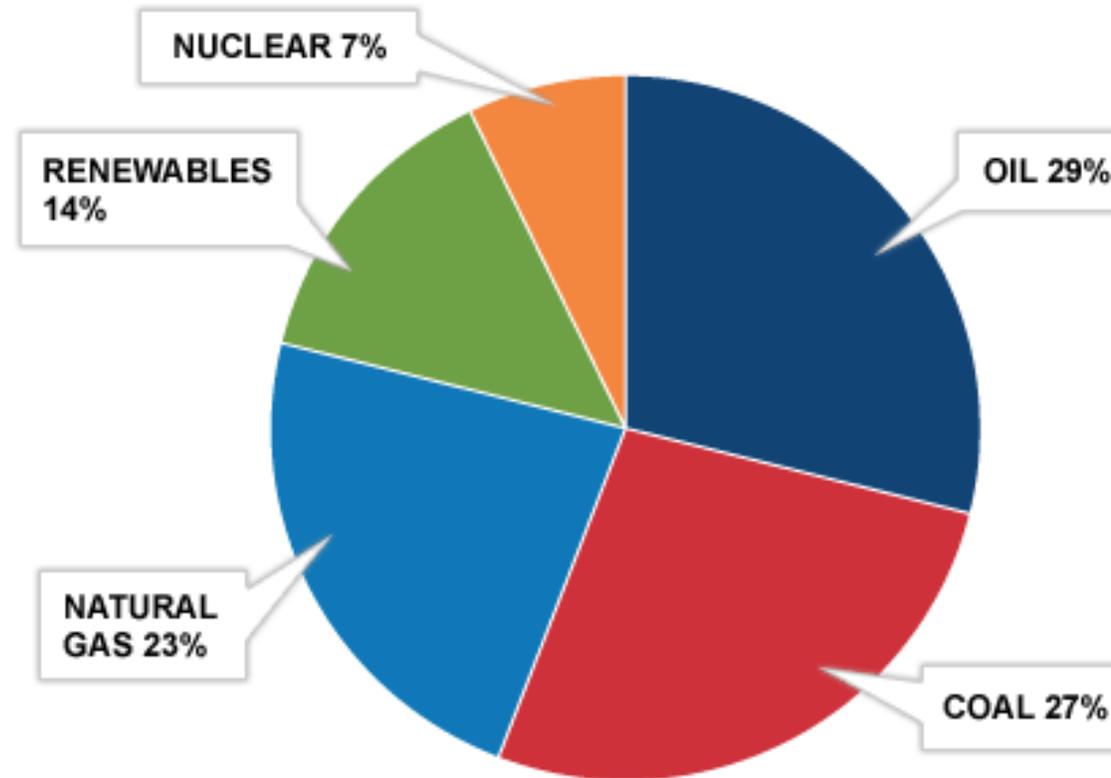
# CAN THE WORLD CHANGE ?

Electricity generation in Germany, by energy source (share of total)



# HOW THE CURRENT OIL CRISIS AFFECTS A SUSTAINABLE ECONOMY?

PROJECTED WORLD ENERGY MIX, 2035



SOURCE: EIA

# WHAT CAN YOU DO AS A HUMAN BEING?



## TOWARDS SUSTAINABLE ECONOMY

- RENEWABLE ENERGY
  - RECYCLING
- WASTE MANAGEMENT

# TIPS TO MINIMISE YOUR FUEL BILL



## Maintain your car (3 per cent savings)

Inflate the tyres to the optimum pressure. Take your car on time for regular service to keep the engine efficient.



## While driving

(15 to 20 per cent savings)

Don't press hard the accelerator and keep the fuel flow to the minimum.



## Air conditioning

(10 per cent savings)

Drive with the windows down and only use the air conditioning when it is really necessary.



## Filling up

(1 to 2 per cent savings)

Filling your fuel tank between half and three-quarters will help your car run more efficiently.

# Global gasoline prices

As of January 4, 2016 (Prices in Omani baisas per litre)



# MESSAGE TO YOU



# MESSAGE TO YOU

## Contact

Environment Society of Oman

P.O. Box: 3955

P.C: 112 Ruwi

**Tel:** 24482121

**Fax:** 24486876

**Email:** [admin@eso.org.om](mailto:admin@eso.org.om)



**MUSCAT DAILY  
RECYCLING  
AWARENESS  
CAMPAIGN**

Contact us on  
**80076000**

or email us and our team  
will collect paper that  
you want to recycle

[recycle@apexmedia.co.om](mailto:recycle@apexmedia.co.om)





# QUESTIONS AND ANSWERS



**THANK YOU**

**ADD A LAYER OF SUSTAINABILITY IN  
EVERYTHING YOU DO**