



Sustainability: What Does it Mean for Engineers?

Objectives

By the end of this unit, students should be able to:

1. Define sustainability.
2. List the 3 pillars of sustainability.
3. Give an example of ways that engineers can contribute to a sustainable future.
4. Give an example of a sustainability indicator/metric for engineering designs.

What is Sustainability?



- Meeting society's present needs without compromising the ability of future generations to meet their own needs.
(Brundtland Commission, 1987)
- Humans are integral part of the natural world and nature must be preserved.

Triple Bottom Line Solutions

- Good for the environment
- Good for economics
- Good for society



**Environmental
Protection &
Resource
Conservation**



**Economic
Prosperity &
Continuity**

**Social
Well-Being &
Equity**

The 3 Pillars

- **People**

- Fair practices for all people and does not exploit interest of separate parties based on money, status or growth.

- **Planet**

- Management of renewable and non renewable resources while reducing waste.

- **Profit**

- Financial benefit enjoyed by the majority of society.

Yes, engineers are part of the problem.



We're also an integral part of the solution.



We're also an integral part of the solution.



We're also an integral part of the solution.



We're also an integral part of the solution.



Courtesy Dan Saultier

Examples of Other Ways that Engineers Can Contribute to a Sustainable Future

But not if we keep designing things
in the same old way.

Engineers of the future need to
think differently.

Traditional Engineering Design Criteria:

- Function
- Cost
- Safety

Sustainable Engineering Design Criteria:

The above plus:

- Impact on people (society)
- Impact on the planet (environment)

Questions for future engineers to ask about their designs:

- Will it be made from recycled materials?
- How much energy will it use?
- Will it be powered by a battery or solar cells?
- Will it be able to be recycled at the end of its useful life?
- Will it have parts that contain toxic metals that must be disposed of?



Examples of Sustainability Indicators/Metrics for Engineering Designs

What criteria can we use to compare 2 engineering designs to determine which is more sustainable?

Life Cycle Analysis

- Process of comparing sustainability indicators for various engineering designs.
- - Can be done using Sustainable Design Tables (see “Sustainable Design” Module), or software (e.g. www.eiolca.net)