

SUSTAINABILITY PRINCIPLES

One of a number of discussion papers produced by the IPENZ Presidential Task Committee on Sustainability during 2003 and 2004.

March 2004

INTRODUCTION

Sustainability is the focus on the long-term survival of humanity. It must recognise that decisions made today must enable both those in the present, and in the foreseeable future to make effective choices about their quality of life.

Three key principles are the basis of sustainability. The overarching problem is the need to manage change in the environment, many of which are increasingly human induced, and need to be addressed to avoid long term degradation of the environment.

Each of the key principles has a set of guidelines as to how best to achieve the desired result. Any human sourced problem, can be considered against these guidelines, to see whether sustainability is being enhanced by the proposed solution.

Principle 1: Maintaining the viability of the planet.

1. Humans need to **maintain the integrity of global and local biophysical systems** to ensure that the irreplaceable life support functions upon which human well-being depends are retained.
2. Non-renewable resource **depletion rates shall equal the rate at which renewable substitutes are developed** by human invention and investment.
3. Renewable resources must be managed to **ensure that they can be produced over the long term within sustainable harvest rates** (i.e. that do not exceed the regenerative capacity of the natural system that produces them), and without long term damage to the environment.
4. Technological options selected for engineered products, processes or systems, shall be **weighted in favour of choices that, for a given expenditure, minimise the use of resources**, particularly non-renewable resources such as fossil fuel-based energy and metals. They should also be based on the precautionary principle and reduce risks as much as practicable or foreseeable.
5. The **material and energy intensity of engineered products, processes or systems needs to be reduced** significantly (10 to 50 times), and the efficiency of those that use energy must be improved to achieve sustainability. To achieve this requires the use of recycling and other resource reuse and minimisation techniques.
6. All **waste streams from the life cycle of engineered products, processes or systems shall be minimised**, preferably at the source. Waste discharges should be kept within the assimilative capacity of the local and global environments.
7. The **use and production of environmentally hazardous materials shall be minimised** and, wherever possible, eliminated. In particular, the use of materials and chemicals that accumulate in the environment needs to be reduced to a level that does not exceed acceptable or natural levels.

Principle 2: Providing for equity within and between generations.

8. Humans, now and in the future shall have **equal rights to achieve an acceptable quality of life**. They shall have choices in life that reduce significant gaps in health, security, social recognition, political influence, etc. between people.
9. **Consumption of resources needs to be balanced** between the affluent and those yet to fulfil their basic needs, while ensuring total resource use is within the environment's sustainable capacity.
10. Resource use and development must be **considered over a sufficiently long time scale that future generations are not disadvantaged** economically, socially or environmentally by present actions.
11. Those directly affected by engineering projects, products, processes or systems **need to be consulted and given the opportunity to voice concerns without repercussions**. Their views shall be incorporated into the planning and decision making process.

Principle 3: Solving problems holistically.

12. Problem solutions shall be **appropriate and based primarily on human needs and ecosystem viability** rather than the availability of a particular technology.
13. Solutions to issues of **growth in demand shall involve its realistic assessment and management**, rather than merely predicting and providing the means for meeting growth targets.
14. A holistic, **systems-based approach shall be used to solve problems** rather than focussing on technology alone.
15. Methods shall be implemented that provide solutions with **optimum outcomes for all stakeholders**, rather than expedient or narrowly focussed solutions.
16. The use of unsustainable practices, or **practices that present a risk to sustainability shall be minimised** and reduced to zero over time. Where it is practicable or desirable, past degradation shall be reversed.
17. Problem **solutions shall be based on prudent risk management approaches**, and not by solving one problem at the expense of, or by creating another problem.