

UCC Engineers Without Borders (EWB) Seminar

Meanings

around sustainability and sustainable development;

Implications

for conceptions of science, technology
and the engineer

Dr Edmond Byrne

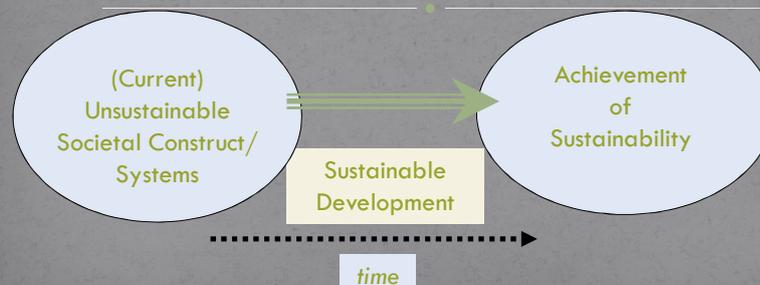
Department of Process & Chemical Engineering
University College Cork, 4th November 2013



'Sustainable Development' and 'Sustainability'; Interchangeable?

The terms 'sustainable development' and 'sustainability' are often conflated and used interchangeably.

Some see sustainable development as an ongoing 'journey' of ever continuing improvement, whereby processes and technologies for example, become 'more and more sustainable', through for example, technological 'progress' and efficiency improvements.



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Sustainable Development

Our Common Future, Brundtland Commission (1987):

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."



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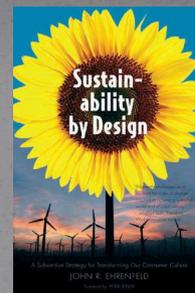
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Sustainability

John Ehrenfeld (2008):

"Sustainability is the possibility that humans and other life will flourish on Earth forever."



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Ehrenfeld (2008):

“Almost everything being done in the name of sustainable development addresses and attempts to reduce unsustainability. But reducing unsustainability, although critical, does not and will not create sustainability.”

'Sustainability is not the obverse of unsustainability'

Instructions: Remove everything that is not a horse

'Sustainability'

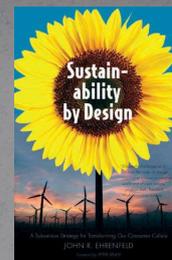
'Unsustainability'

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John Ehrenfeld (2008):

Sustainable Development 'is not actually a vision of the future' but 'merely a modification of the current process of economic development'.

It is 'fundamentally a tool that suggests new means but still old ends – development remains at the core of this concept.'



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Sustainable Development

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present needs



future needs



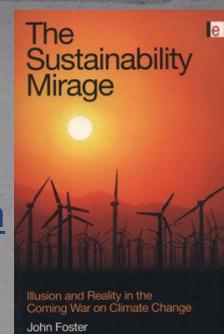
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John Foster (2008):

Sustainable Development thus posited, represents bad faith as it presents **no motivation** for required deep structural change, beyond doing just about enough to let us off the hook (in our own terms), while continuing along the same unsustainable trajectory..



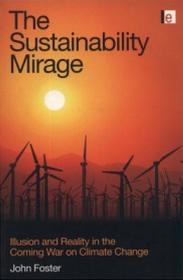
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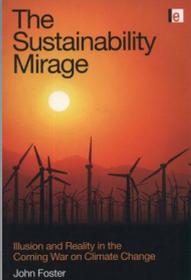
John Foster (2008):
 Insufficient motivation:
 1. Balance present and future generations' needs?
 Problematic as future generations do not exist –thus we can't be held to account by them!

present needs  *future needs*



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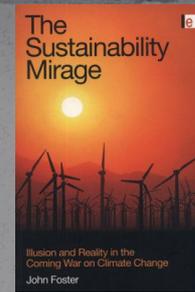
John Foster (2008):
 Current approach to SD:
 -Seeks to 'scientifically' and 'objectively' predict required C emissions cuts through reductionist closed system models. But real world (ecological, environmental, social, techno-economic, political) is complex and indeterminate. In such cases, science can only provide broad brush strokes and trends. Any claims beyond this are hubristic speculation.



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John Foster (2008):

However, we use outputs of such models to set (floating, politically achievable) targets which represent minimum we can get away with (e.g. predict atm C levels to achieve average rise in global temp $<2^{\circ}\text{C}$), ..then aim to achieve these through eco-efficiency and technological progress and control, within a paradigm of continuing economic growth and consumption.



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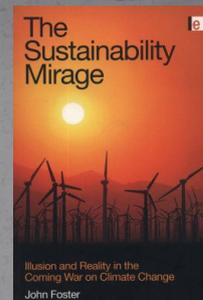
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John Foster (2008):

Insufficient motivation:

2. Present needs: climate justice?

'should mean a global trade system which does not deprive poor countries of essential resources for ecological resilience – in order to provide luxuries for the rich.'



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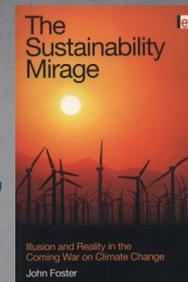
John Foster (2008):

Insufficient motivation:

3. Improving our own quality of life
-move from consumerism, 'affluenza'
and individualistic materialism?

Consequences do not promote widespread
change:

'I am reminded of the man who kept reading in the personal health pages of the colour supplements about how his high-cholesterol diet was bad for him. Eventually, though only after a considerable struggle, he succeeded in giving up colour supplements.'



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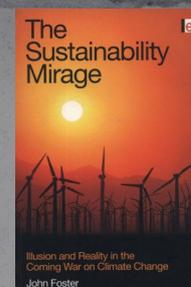
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John Foster (2008):

Requirements to meet our floating
targets include cutting back on our
comforts somewhat, but not so
much that it will really 'hurt' us via
collective very significant lifestyle change.

Instead we focus on being *'green enough to get
away with'* through e.g. increased eco-efficiency
and technological progress.

*But!!! ..represents inauthentic bad faith and will not
lead to necessary change to achieve sustainability*

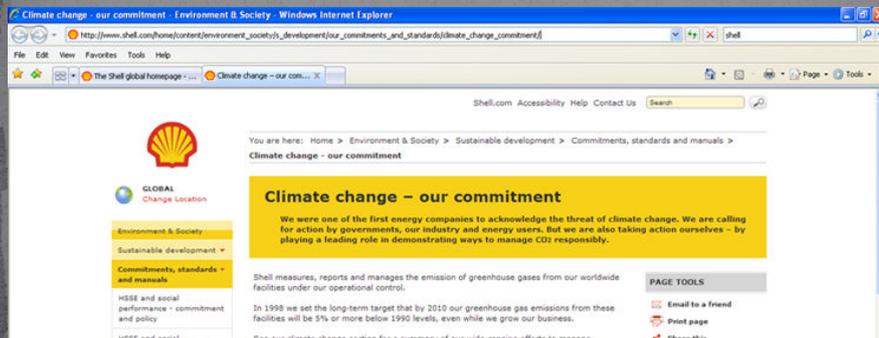


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Sustainable Development in action..



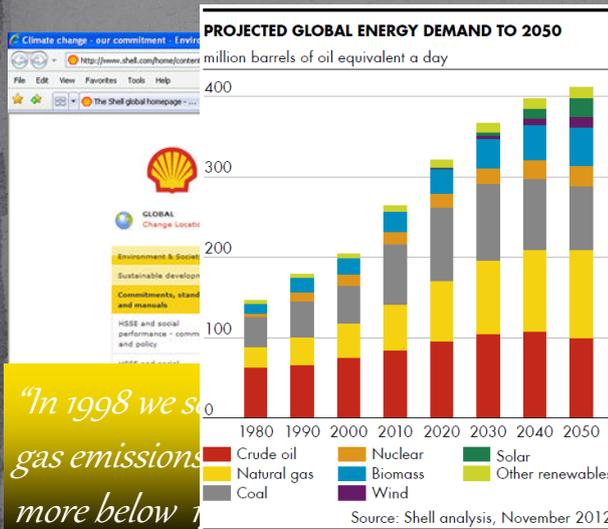
"In 1998 we set the long-term target that by 2010 our greenhouse gas emissions from [Shell worldwide] facilities will be 5% or more below 1990 levels, even while we grow our business."



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Sustainable Development in action..



Source: Shell Sustainability Report 2012

"Our Approach: The world needs to produce enough energy to keep economies growing, while reducing the impact of energy use on a planet threatened by climate change. Shell works to help meet rising energy demand in a responsible way. That means operating safely, minimising our impact on the environment and building trust with the communities who are our neighbours."

"In 1998 we set the long-term target that by 2010 our greenhouse gas emissions from [Shell worldwide] facilities will be 5% or more below 1990 levels, even while we grow our business."

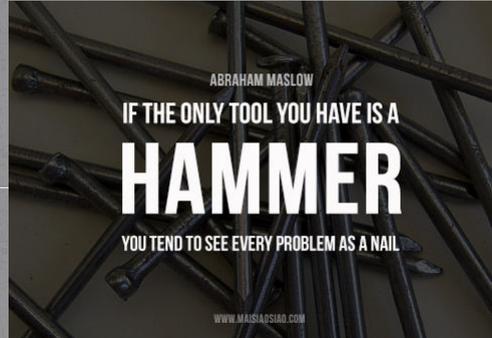


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Implications for Engineering:

If seen as solvers of (closed) technological problems



..then a Sustainable Development approach is logical;
technological eco-efficiency is our only available option



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Sustainable Development

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

Framed in **negative** terms; giving up now for future generations and/or others – hence unfurling progress

Sustainability

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

Framed in **positive** terms; human flourishing; hence progressing to a better life experience

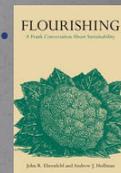
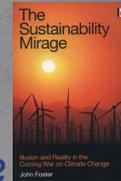


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If there's insufficient motivation for collective change in:

1. Balancing present and future needs?
 2. Climate justice?
 3. Rejection of individualist consumerism?
- and all are seen as **negative**/giving up..



What motivation might represent a **positive** move towards human **flourishing**?



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What would it take to collectively choose Sustainability?

Sustainability

..over an unsustainable global society with **appallingly horrific consequences** of runaway climate change, food, energy, water, crises, etc.



Modern luxuries of contemporary wealthy consumerist society; 'the M25, 'reality' TV and Christmas breaks in Thailand'

Foster: The need for intrinsic **Meaningfulness**

- **Life-hope**, the hope that 'Life goes on' (i.e. is sustained), such as when one is grieving - it is spoken in the present 'as an appeal to the inexhaustible spontaneity of life sensed within life'.



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Modern luxuries of contemporary wealthy consumerist society; 'the M25, 'reality' TV and Christmas breaks in Thailand'

Ehrenfeld (2013): '**Flourishing** is nothing more than a state recognized when one says: "All my **cares** are being **satisfied**, at least for the moment."



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How can we envisage Sustainability as a positive goal rather than as cutting back?

Foster:

Difference between Britain (1939): Entering war where 'doing what we can't avoid, honouring obligations ..is a war on the way to being lost.'

..& Britain (1940): *'Without victory, there is no survival'*
W. Churchill

'Victory at all costs ..no matter how long and hard the road may be' is 'quite another thing'.



Britain was collectively mobilised: losing the war and losing liberty to the existential threat of Nazism was **not an option**;
People **positively** took on whatever sacrifices required, including **rationing**, in order to maintain **meaningfulness**.



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Winning the War on Unsustainability

Foster:

Sustainability as an Open loop learning process: Leaving scientism and hubris aside by recognising inherent uncertainty in complex open systems. Accept that we don't know what will really happen, but build in possible future options (hence resilience), thus maximizing 'our room to respond creatively to the emergent.'

Implications for Science, Technology and Engineering..

This is in the realm of '**Post Normal Science**', whereby contemporary 'value free' borders of reductionist science are extended to recognise that *'the role of science, still essential, is now appreciated in its full context of the uncertainties of natural systems and the relevance of human values.'*

(Ravetz, 1999)



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Winning the War on Unsustainability

Foster:

Carbon Rationing – Individual Carbon credits (spent at point of purchase) which reduce and converge over time under a global Contraction & Convergence (C&C) framework.

Global total limits monitored and re-evaluated continually;

- would fuel **both** massive technological eco-efficient innovation/entrepreneurship **as well as** real reductions.

All the while ..people happy to **positively** engage in rationing if it means continued life-hope and chance of winning the war!



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Implications for Engineering:

If seen as agents of social good and as participants in helping realize human flourishing..

..then Ehrenfeld's and Foster's models of Sustainability are rational as engineers can bring their technological, innovative and other skills to bear in a complex and contingent world (alongside others), to positively play a part in ensuring that 'life goes on'.

(i.e. being 'green enough to make sense of life' as opposed to 'green enough to get away with').



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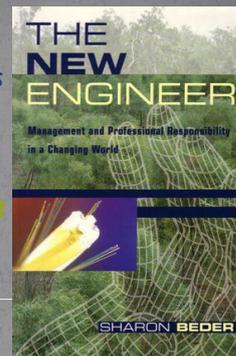
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Implications for Engineering:

The '**New Engineer**' (Sharon Beder, 1999);

- recognises the 'deep sociotechnical complexities that are often at the heart of [engineering] "Grand Challenges."' while making 'explicit the social and ethical responsibilities of engineers' (Herkert & Banks, 2012).
- leaves hubristic illusions of control aside and embraces context, complexity, inherent uncertainty and risk (Bucciarelli, 2008).
- While valuing science and technology, acknowledges that technocentric approaches alone are incapable of achieving progress towards sustainable outcomes among inter-related complex social, techno-economic and ecological systems (Conlon, 2008).



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Implications for Engineering Education:

Education for Sustainable Development;

Seen as the development of largely uncontested competencies, jargon, metrics and technological innovations.

Education for Sustainability;

Seen as the development of an appreciation of contingency and complexity, the contested nature of the concepts and the development of critical thinking skills.



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No One Can Save Us

Mojoko + Eric Foenander, Singapore Art Museum (Feb 2012)



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