

Systems thinking and the 'factor five' payoff

Government efforts to help our economy through the global financial crisis could be eroded by the future economic impacts of global warming. The good news is that a 'factor five' approach to productivity – delivering five times more value with the same input, or using one-fifth the resources to deliver the same value – will not only help cut greenhouse gas emissions but, done effectively, bring economic benefits.

Research by financial services provider HSBC has shown that most investments in a low-carbon economy – for example, building for energy efficiency, renewable energy technologies, low-carbon vehicles, rail transport, and 'smart' grids and meters – lead to strong economic multipliers.¹

This was put to the test in response to the global financial crisis with South Korea investing 81 per cent of its stimulus package – some US\$30 billion (or 2.3 per cent of their annual GDP) – on green investments that led to job creation, with the EU at 58.7 per cent, China at 37.8 per cent, and the US at 9.8 per cent.

However delivering jobs and growth from such investments requires not only rapid technological innovation, but a 'whole of society' approach. Governments will need to revise relevant policies; business and industry will need to carefully re-assess operations; the professions will need to renew their curriculum and practice; research organisations will need to identify new opportunities; and consumers will need to

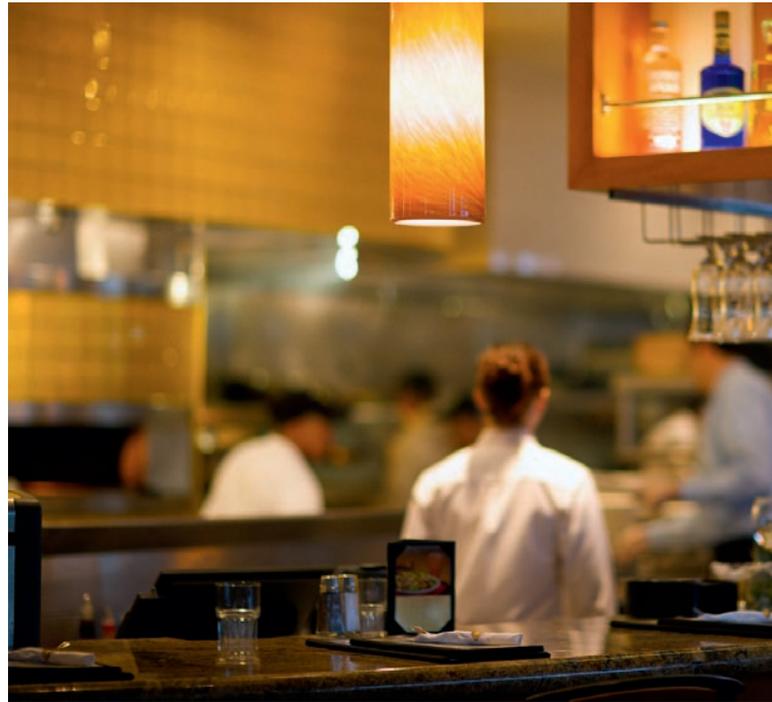
revise their purchase choices.

In 1997, the book *Factor Four*² presented compelling evidence to show that significant reductions in the consumption of energy and water could be profitable. More than a decade later, a new book, *Factor Five*³ revisits and builds on the previous work to present the case for sector-wide advances that can deliver significant resource productivity improvements over the coming decades. The book presents a collaboration between the Australian team from The Natural Edge Project led by Charlie Hargroves, and the original lead author of *Factor Four*, Professor Ernst von Weizsäcker.

The factor five concept is that of delivering five times more value with the same input or, alternatively, using one-fifth the resources to deliver the same value with the aim of achieving 80 per cent resource productivity improvements.

Such a transformational improvement is achievable through a 'whole system approach' – this means that productivity gains in the use of water, energy and materials affect each other. For example, if a household or business reduces their hot water consumption, this would also reduce associated onsite heating, water treatment and distribution costs. The result would be reduced electricity use and lower greenhouse gas emissions in the home or business, and by the water utility.

In adopting this approach, the first place for a business to start is asking the right



Same service, less energy: insulation to reduce heat-generation from restaurant ovens can reduce air-conditioning requirements. iStockphoto

questions *before* the design or retrofit phase, as this can lead to significant resource productivity improvements, cost reductions, and superior performance and outcomes. This may take the form of a facilitated scoping or design 'charrette' that involves

the design and project teams. Questions to ask at this stage might include: What is the required service? How else can this same service be provided with less environmental impact? This typically leads to different or new design options



A 'factor five' approach to producing food crops might include the use of drip irrigation to replace spray systems, which use more water. ScienceImage

¹ Robins N, Clover R & Singh C (2009) *A Climate for Recovery – The Colour of Stimulus Goes Green*. HSBC Global Research, London.

² von Weizsäcker E, Lovins A & Lovins L (1997) *Factor 4: Doubling Wealth, Halving Resource Use*. Earthscan, London.

³ von Weizsäcker E, Hargroves K, Smith M, Desha C & Stasinopoulos P (2009) *Factor 5: Transforming the Global Economy through 80% Improvements in Resource Productivity*. Earthscan Press, London. (See www.naturaledgeproject.net/Factor5.aspx for sample chapters).



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that can dramatically change the outcome by reducing environmental impacts but still provide the same service.

Examples are all around us. Many companies now use videoconferencing to reduce air travel; more designers are using natural light and advanced lamps to reduce the use of energy intensive lights in buildings; restaurants are now installing

super-insulated equipment to reduce heat-generation from ovens thus reducing air-conditioning requirements. Innovative companies are now using geopolymers to replace energy-intensive Portland cement in the building sector. Power utilities are investigating how energy-efficiency measures can provide financial rewards to both the utility and the customer.

The reality is that, by and large, consumers will consume what is important to them, and producers will produce what is profitable to them. Hence, as Ernst von Weizsäcker has long advocated, resource productivity should become ever-more profitable for producers, and resource-saving goods and services should become more affordable to consumers than conventional, resource-wasteful options.

● **Charlie Hargroves and Cheryl Desha**

Charlie Hargroves and Cheryl Desha are from The Natural Edge Project (TNEP), an engineering for climate change and sustainability working group based in Australia, hosted by Griffith University, Curtin University, Adelaide University, and the Australian National University.

Sustainable Agriculture Flagship launched

The Australian Government and CSIRO have established a Sustainable Agriculture Flagship to boost productivity and reduce carbon emissions across Australia's agricultural and forestry sectors.

Federal Innovation Minister Senator Kim Carr and Agriculture Minister Tony Burke said the flagship's research will aim to strike a balance between environmental concerns and the need to maintain prosperity in the agriculture and forestry industries.

'This important public sector research initiative will help drive innovation across the economy by addressing the critical productivity and carbon management challenges facing these important industries,' Senator Carr said.

It will bolster Australian scientific expertise and encourage the development

of new technologies to help address global food security.

'The flagship's goals over the next two decades are to support growth in productivity by 50 per cent and to reduce the carbon emissions intensity of agriculture by at least 50 per cent.'

The flagship's specific targets include:

- achieving total factor productivity growth across Australia's key agricultural industries of at least 2 per cent per annum over the next 20 years
- reducing the greenhouse gas emissions per unit of food and fibre production by at least 50 per cent by 2030 through a mix of productivity growth, emissions reduction and carbon storage in soils and vegetation.

Mr Burke emphasised the collaborative approach



Olive trees with drip irrigation, South Australia – the flagship will help Australian farmers identify more sustainable practices. Greg Rinder/Sciencemage

the flagship teams will take, working with government, rural R&D corporations and peak agribusiness bodies and companies to produce practical, science-based policy.

'This research agenda will promote better understanding of soil carbon, biochar and methane emissions from livestock; improved farm management leading to greater productivity; and better management of our natural

resources and ecosystems.'

The flagship research is focused on four main areas:

- greenhouse gas management and carbon storage in land use systems
- advancing agricultural productivity and environmental health
- landscape systems and trends, and
- partnering for international food and fibre security.