

The New Industrial Model:

**Greater profits, more
jobs and reduced
environmental impact**

A report completed for Interface by Lavery/Pennell

February 2014

About

Interface

Interface is a global leader in the design and production of carpet tiles. Its products combine style and innovation with functionality and sustainability credentials. Interface was one of the first companies to publicly commit to sustainability, when it made a pledge in the mid-nineties to eliminate its impact on the environment by 2020. Known as Mission Zero[®], this goal influences every aspect of the business and inspires the company to continually push the boundaries in order to achieve its goal.

www.interface.com

Lavery/Pennell

Lavery/Pennell is a strategy advisor assisting clients to increase profits while improving sustainability performance. Using a combination of corporate strategy, commercial, technical and sustainability experience, their rigorous and comprehensive approach creates step-change cost savings, revenue opportunities and competitive advantage.

www.laverypennell.com

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In Support of the New Industrial Model

“This important work by Lavery/Pennell clearly sets out the huge economic and strategic benefits that adopting a new model of improving industrial productivity can bring. The model takes the issue of sustainability out of the conventional CSR area which is usually considered to be a necessary evil, an “add-on” often based purely on compliance and public relations, into mainstream strategy, revenue and profit generation. It is also the first integrated approach that helps companies maximize the benefits of combining greater energy efficiency, improved materials efficiency and energy from renewables. It should be read by all company boards and policy makers interested in becoming more competitive.”

Dr. Steven Fawkes FEI, Director, EnergyPro Ltd

“This report is an important reminder that innovation is at the heart of a successful sustainable business. We believe that businesses have the opportunity and responsibility to transform the key systems we rely on to ensure a sustainable and prosperous future. Our priority is to support more companies in two powerful ways they can make a difference: reshaping the context they operate in and disruptive innovation through new products and services. Interface has been doing this for 20 years. This report sets out a compelling case for others to join in.”

Sally Uren, CEO, Forum for the Future

“It is clear that the business of tomorrow will need to be resilient. The very best companies are now conducting their own trials of innovative solutions to tomorrow’s problems to be better prepared. This report describes how a focus on resource efficiency can deliver long term resilience and profitability while demonstrating a feasible pathway to achieve that. It seems obvious, but it isn’t.”

Professor Steve Evans, Director of Research in Industrial Sustainability,
Institute for Manufacturing, University of Cambridge

“The management of non-labour resource constraints such as water and energy is going to be one of the critical challenges that face many manufacturers in the next decade. As illustrated in this report, given the right leadership significant risks can be reduced, money can be saved and new market opportunities can be found across the manufacturing sector. With the introduction of a practical model that focuses on reducing the use of raw materials/inputs with the highest price, supply risks and environmental footprint, this report has the potential to be a catalyst for sustainable improvements across the sector.”

Mark Goldsmith, Director, Head of Responsible Investment, Actis

“Resource productivity will determine both the future environmental impact of businesses and how exposed companies are to input price shocks. This report explains what a no-brainer resource efficiency is – but it also shows that reinvesting resource efficiency savings in sustainable inputs can dramatically cut their cost. In the case of solar and wind, increased deployment has led to economies of scale that have already dropped prices by 80% and 29% respectively since 2008.”

Dustin Benton, Head of Resource Stewardship, Green Alliance

“This important report provides further evidence that the opportunities offered by sustainable business models are significant and growing. The New Industrial Model shows the business and societal benefits that follow when sustainability outcomes are actively sought, and provides compelling case studies of companies that have capitalised on the opportunities created. Its suggestion that efficiency benefits be reinvested into sustainable inputs is critical in bringing sustainable innovation to scale.

The Aldersgate Group welcomes this contribution towards a sustainable economy, one which can bring economic benefits, jobs and resilience. This is an important step in the transition towards a new economic paradigm that can deliver sustainable value for all.”

Oliver Dudok van Heel, Director, The Aldersgate Group

Executive Summary

Executive Summary

A new, more profitable and sustainable business model has emerged. It involves three stages which respond to today's business challenges:

- 1.** Non-labour resource **efficiency** to reduce costs (and environmental impacts).
- 2.** Reinvesting some of the savings from stage 1 in **sustainable inputs** (e.g. renewable energy, recycled materials) to improve security of supply, reduce price volatility, create jobs and lessen environmental impacts.
- 3.** Developing innovative **new products** and capturing **market share growth**, capitalising on the competitive advantages created in the first two stages.

The logic for the new model is compelling: increased profits, more jobs and reduced environmental impact. Leading companies including Unilever, Body Shop, Patagonia, Ecover and Interface have recognised the power of the new model and are capturing value through its implementation.

Interface, the world's largest manufacturer of carpet tiles, is a case study of the benefits available. In its European manufacturing operations, Interface has reduced energy and yarn usage per unit of production by 40% and 12% respectively since 1996, switched to 100% renewable energy for its Scherpenzeel site, and replaced 43% of its raw materials with bio-based or recycled alternatives. This has reduced Interface's costs by €7.6 million p.a. (current annual saving), as well as reduced lifecycle greenhouse gas emissions by 35,500 tCO₂e p.a. (current annual saving), created local skilled jobs and enabled the company to remain the world's leading manufacturer of carpet tiles in a highly competitive industry.

Executive Summary

The potential of the New Industrial Model for the whole of the European manufacturing sector is estimated to be:

- **€100 billion p.a. increased profit before tax** from materials efficiency, energy efficiency and renewable energy – at a capex cost of €66 billion. This represents an average **9%** increase in profit for the European manufacturing sector. Market share improvements and new product revenues add to this, but have not been included.
- **168,000 new skilled and mostly local jobs** in energy efficiency and renewable energy.
- **1,200 MtCO₂e p.a.** reduction in greenhouse gas emissions (equivalent to **14.6%** of Europe's total annual greenhouse gas emissions) from energy efficiency and use of renewable energy.

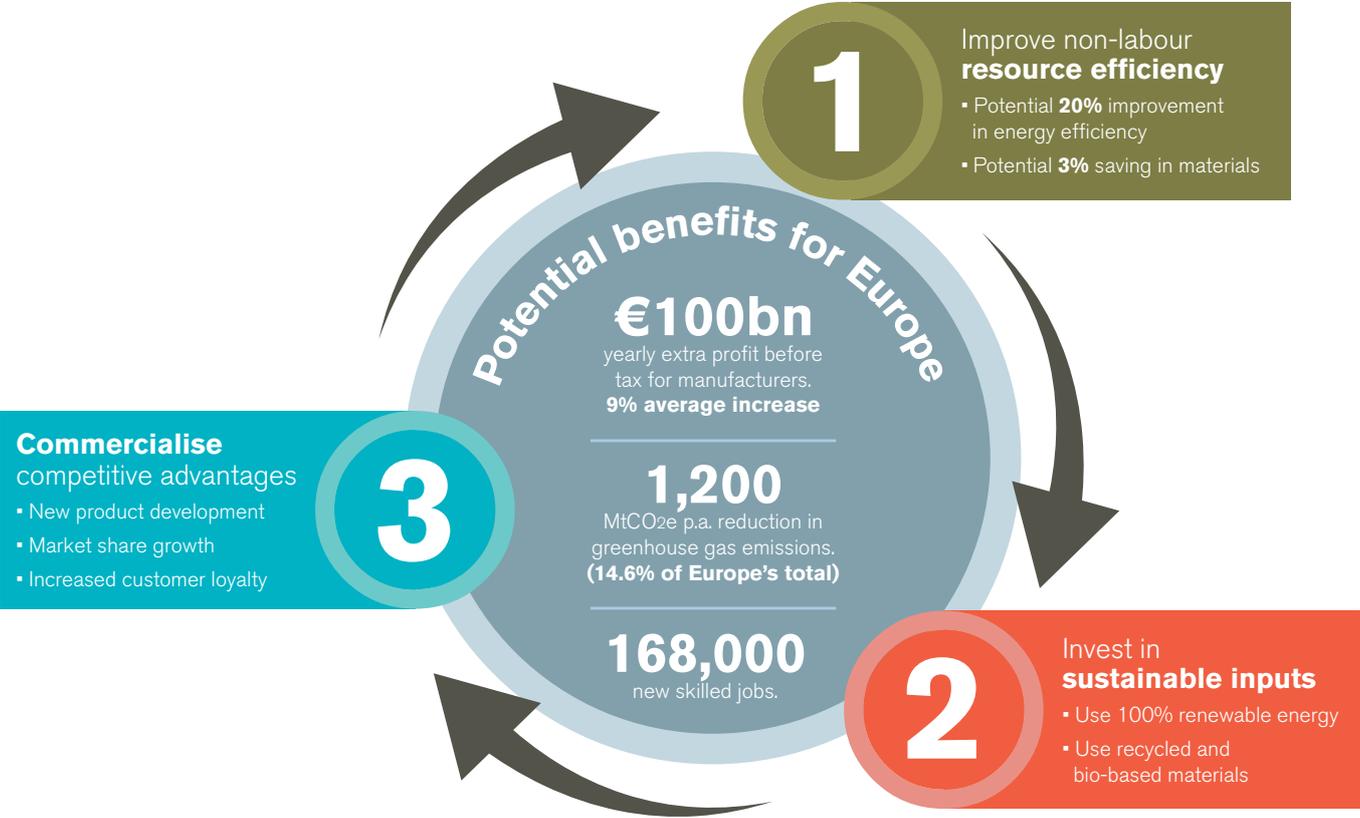
11% of the additional profits and 20% of the additional jobs and greenhouse gas reductions identified above for Europe could be achieved if the top 20 European manufacturers alone applied the New Industrial Model to their global operations.

This new industrial model decouples economic success from natural resource consumption. It goes beyond conventional thinking, which considers sustainability as a compliance activity and cost, to drive revenues and profits by integrating sustainability within a company's core strategy.

To drive the transition to the New Industrial Model, the **most important catalyst is senior executive leadership. Strategy executives** must also use their strategic, cross-boundary perspective to think through the application of the model for their organisation and build the business case for change. **Staff engagement** is a further enabler of the New Industrial Model.

Executive Summary

New Industrial Model



Executive Summary

Corporate actions that would accelerate the transition include:

- Committing to reducing material use by 5% per unit of production from current levels, reducing energy use by 20% per unit of production from current levels and using 100% green energy by 2020.
- Asking suppliers to provide either Environmental Product Declarations or validated life cycle assessment data for their products/materials so that there is continual focus on reducing the environmental impact of raw materials and products.
- Rethinking products as to whether they could better meet customer needs and create additional value if they were more resource efficient or delivered in a different way (e.g. through servicing, remanufacturing, or shared usage).

Government also plays a vital role in the transition. Regulatory performance standards assist in driving non-labour resource efficiency. Temporary, declining financial support for renewable energy recognises the value for society of a decarbonised and more secure energy supply and the additional jobs that it provides. Governments could further assist the transition through:

- Shifting taxation from income/labour to virgin resource use and environmental damage.
- Mandating transparency of inputs and impacts e.g. creating a rating scheme to allow comparison of the embodied energy in energy-intensive products such as steel and glass between different producers.
- Extending public procurement of products with high recycled content and renewable energy.
- Mandating energy efficiency implementation when an audit shows a payback period of three years or less.

Today's Business Challenges and Opportunities

European manufacturers today face a range of financial, environmental and social challenges:

- Financial concerns include input price rises driven by supply constraints and resource security issues as well as low cost competing products.
- Environmental issues include air quality, climate change and increasing demand for natural resources, which are increasingly being priced into the economy.
- Socially, Europe needs jobs growth to lift the quality of life of citizens and underpin consumer prosperity.

These issues are converging. Companies are increasingly being held accountable for addressing these concerns by investors, customers and society - in an age where transparency and collaboration reward leadership and punish lack of action. If manufacturing continues its traditional approach of seeking profit improvements by cutting headcount and exploiting natural resource reserves, these challenges will become more acute.

However, these challenges also present opportunities for companies willing to take a new approach that moves beyond treating environmental and social issues as an add-on or compliance activity. To date, only a few companies have accessed these opportunities in an integrated way. This paper presents an industrial model to unlock the potential through a simple yet coherent approach (the 'New Industrial Model').

The validity and power of this new model is demonstrated using Interface's European operations as a case study (see Exhibit 2 for an overview of Interface's European operations), providing hard numbers on the costs and benefits of the new model – including increased profits, new jobs created and reductions in greenhouse gas (GHG) emissions.

This paper also quantifies the untapped opportunity represented by extending this new model to specific countries, to Europe as a whole and for the top 20 European manufacturers. Finally, the roles of CEOs, strategy executives, staff and government in driving the adoption of this new industrial model are discussed.

A New Industrial Model

A New Industrial Model

A major hurdle for manufacturers seeking to improve their operations is the cost (or perceived cost) of doing so¹ – especially in tough economic times. The New Industrial Model recognises this and begins by addressing **non-labour resource efficiency**. A focus on reducing the use of big ticket raw materials/inputs with the highest price, greatest supply risks and biggest environmental footprint enables companies to reduce costs significantly. Often this saving can occur with a rapid payback period.

Unfortunately, this is often where many initiatives end: capturing quick cost reductions – but leaving substantial value untapped.

Leading companies **reinvest** part of these savings in **sustainable inputs** to create additional value. Switching to sustainable raw materials and renewable energy improves supply security and reduces products' environmental footprints, while creating jobs in the community.

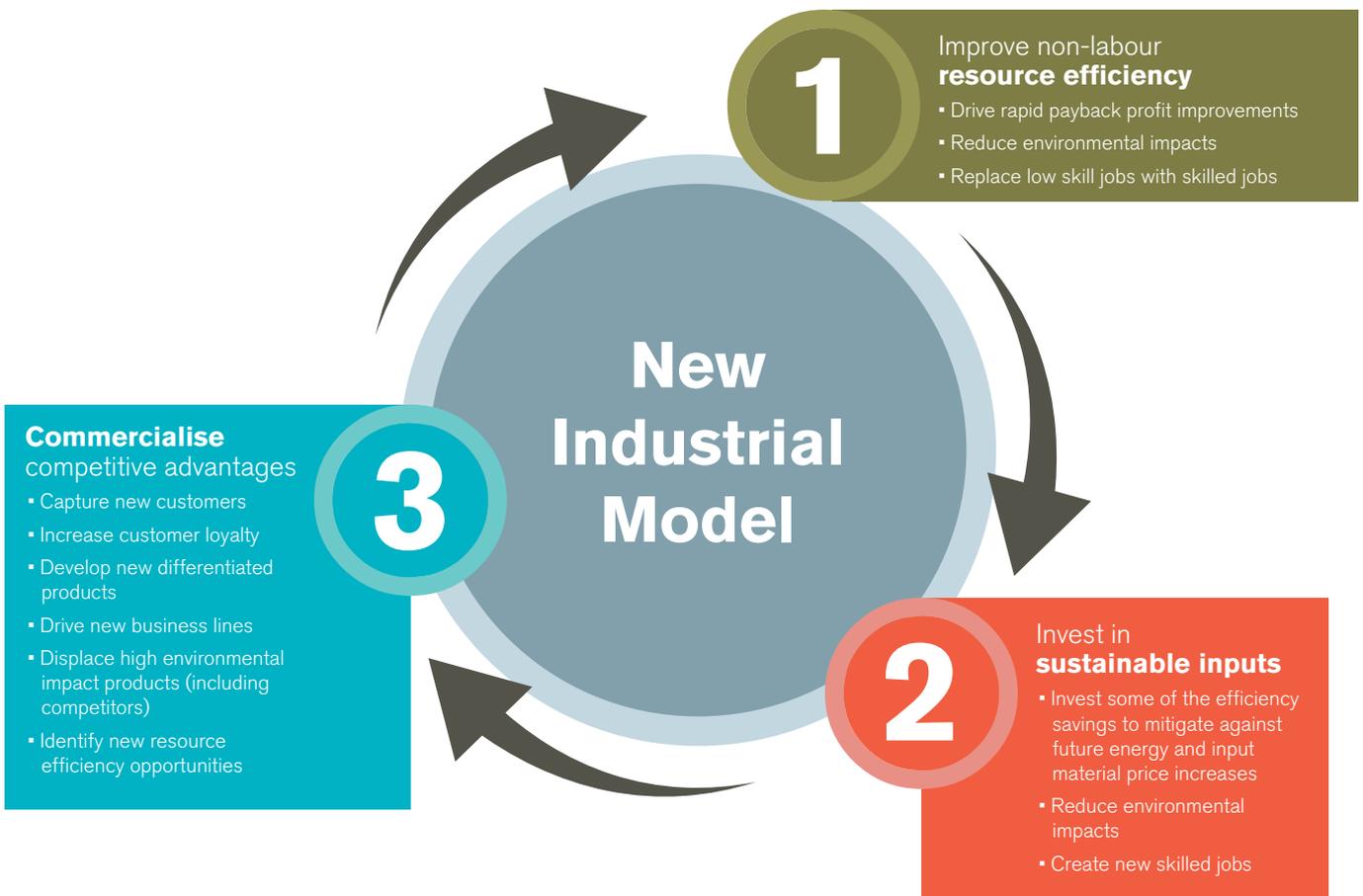
Successful companies do not stop there: they then **commercialise the competitive advantages** established (but not realised) in the earlier two stages by growing market share, creating new products and identifying further resource efficiency opportunities to continue to drive the cycle of improvement.

Together, these three stages of **resource efficiency**, **sustainable inputs** and **commercialisation of competitive advantages** comprise a new industrial model that drives continuous innovation (see Exhibit 1). Moving repeatedly around this cycle increases profits, creates local skilled jobs and reduces environmental impacts, whilst motivating staff and building supporters (brand champions) amongst investors, customers/consumers and the community.

¹Refer to Lavery, G., Pennell, N., Brown, S., Evans, S., 2013. *The Next Manufacturing Revolution: Non-Labour Resource Productivity and its Potential for UK Manufacturing*, p. 38. Available at <http://www.nextmanufacturingrevolution.org/nmr-report-download/>

A New Industrial Model

Exhibit 1: The New Industrial Model



A New Industrial Model

Exhibit 2: Overview of Interface's European Manufacturing Operations

Interface is the world's leading designer and manufacturer of carpet tiles. Established in 1973, the company has a global presence and offers award-winning designs for commercial, government and, increasingly, domestic customers.

Interface has been shifting to the new industrial model for the past two decades. In 1994, Interface identified greenhouse gas emissions, circular resource use and renewable energy as three of seven sustainability fronts which defined its **'Mission Zero'** – a bold aim to have zero environmental impact from its operations by 2020.

2014 marks the achievement of substantial resource efficiency improvements by Interface's European manufacturing operations:

- **Energy usage reduced by 40% per unit of production since 1996.**
- **100% renewable energy (including gas and electricity) at the Scherpenzeel site from January 2014.**
- **Water use reduced by 77% per unit of production since 1996.**
- **Zero waste from Interface to landfill since May 2013.**
- **43% recycled or bio-based raw materials in 2012.**

All of these achievements were made while increasing net margin and maintaining global market leadership in a highly competitive industry.

A New Industrial Model

Exploring each stage of the New Industrial Model in more detail:

Stage 1. Non-labour Resource Efficiency: Substantial Savings and Jobs, with Good Investment Returns

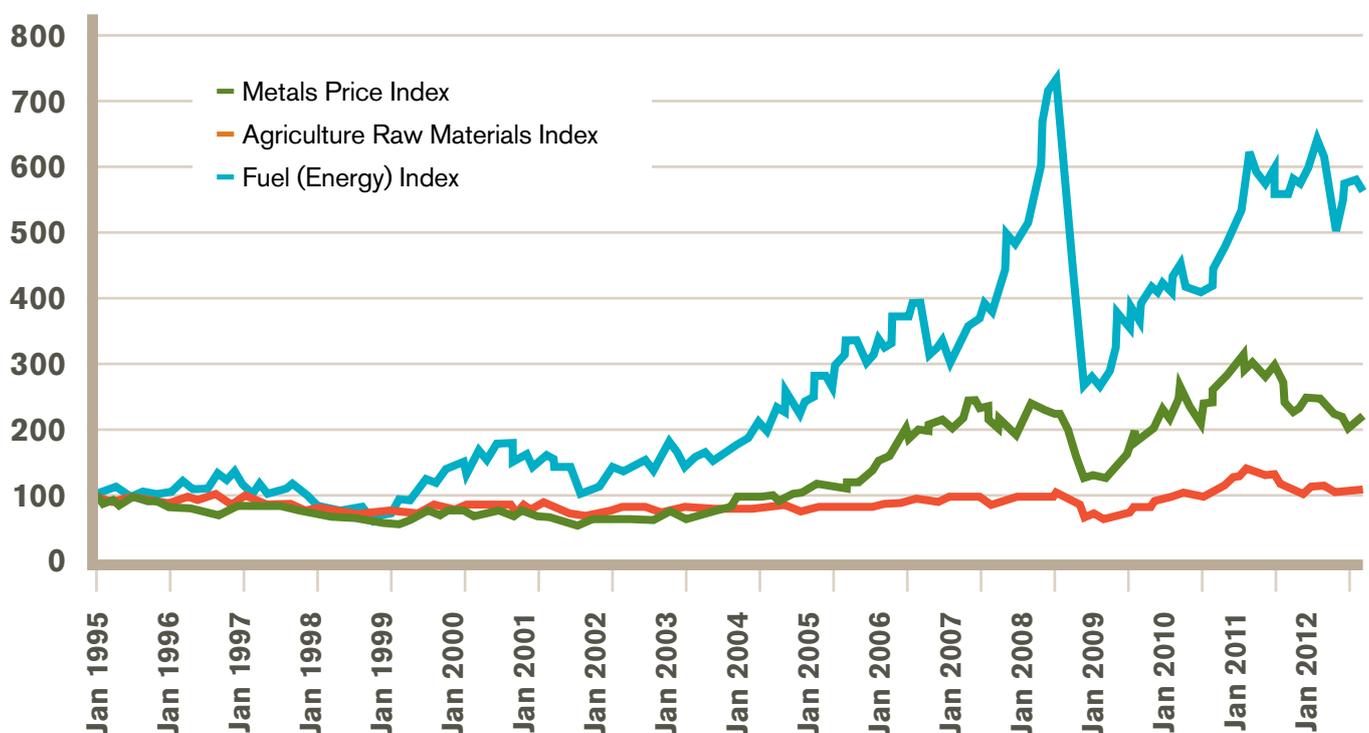
1a) Non-Labour Resource Productivity Opportunities

Energy efficiency, waste reduction, material efficiency, packaging optimisation, transport efficiency and recycling/remanufacturing have been talked about for decades. Some companies have even made substantial progress, but most companies have limited themselves to incremental improvements.

However, rising raw material and energy prices (Exhibit 3) as well as new technologies² are greatly improving the savings and return-on-investment in these areas. Step change improvement opportunities are being identified through reviews of product designs, raw materials, supplier practices and production processes. Senior executive attention is increasing as the combined benefits become substantial, at a time when cost reduction is a major focus for most companies.

Exhibit 3: Commodity Price Increases Since 1995

Commodity Prices (Indexed to 100 in Jan 1995)



Note: Agricultural raw materials index includes Timber, Cotton, Wool, Rubber and Hides. Metals price index includes Copper, Aluminium, Iron Ore, Tin, Nickel, Zinc, Lead and Uranium. Fuel price index includes Crude oil (petroleum), Natural Gas and Coal.
Source: IMF Commodity Price database November 2012, at <http://www.imf.org/external/np/res/commod/index.aspx>

² New technology examples include, for example, LED lights, variable speed drives, and 3D printing.

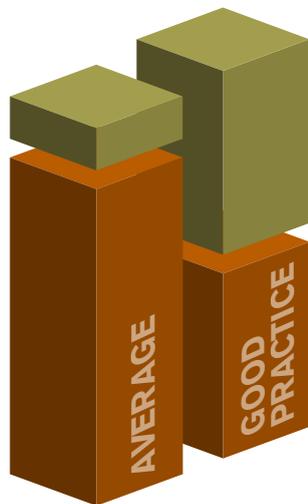
A New Industrial Model

While widespread progress in resource efficiency has occurred in a couple of areas, especially recycling and waste to landfill, significant inefficiencies remain. For example:

- 24% of freight truck journeys in Europe are running empty.³
- While many European manufacturers have achieved 10 to 15% efficiency gains over the last decade, leading companies have achieved over 50% improvements in the same timeframe.⁴
- In the UK,⁵ remanufacturing remains below 2% on average for durable products.⁶

The opportunities are significant in the manufacturing sector for energy efficiency, waste reduction, packaging optimisation, transport efficiency and recycling/remanufacturing. For the UK alone they have previously been estimated to be worth⁷:

- £9.4 billion p.a. in additional profits, representing a 12% increase in average annual profits.
- 314,000 new manufacturing jobs, equivalent to a 12% increase in UK manufacturing employment.
- 25 million tonnes of CO2 equivalent p.a. GHG emissions reduction, which is 4.3% of the UK's GHG emissions in 2010.



While many companies have reduced resource use per unit of output by **10% to 15%** over the last decade,

leading companies have reduced resource use by **over 50%**.

³ World Economic Forum, 2009. *Supply Chain Decarbonisation*, January, p. 19.

⁴ Lavery, G., Pennell, N., Brown, S., Evans, S., 2013. *The Next Manufacturing Revolution: Non-Labour Resource Productivity and its Potential for UK Manufacturing*. Available at <http://www.nextmanufacturingrevolution.org/nmr-report-download/>

⁵ The UK remanufacturing rate is considered typical of most European countries given their similar practices.

⁶ Centre for Remanufacturing and Reuse, 2009. *Remanufacturing in the UK: A Snapshot of the UK Remanufacturing Industry*, p. 6; Office for National Statistics, 2011. *Annual Business Survey*, Release Date 17 November.

⁷ See the *Next Manufacturing Revolution* report, co-authored by the University of Cambridge's Institute for Manufacturing and 2degrees with input from over 40 experts and organisations, endorsed by Ministers, industrialists, NGOs and leading companies including Nestlé and Coca Cola Enterprises. Available at <http://www.nextmanufacturingrevolution.org/nmr-report-download/>

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Leading examples of companies that have exploited the opportunities include Toyota Motor Europe, which has reduced its production energy and water use per vehicle by **70% since 1993** and its production waste per vehicle by **60%⁸**. Unilever has reduced its production waste per tonne of output by **82% in 15 years⁹**. Toyota, Komatsu and United Biscuits have all reduced their transport & logistics GHG emissions (a proxy for transport energy use) by **35% in as little as 5 years¹⁰**.

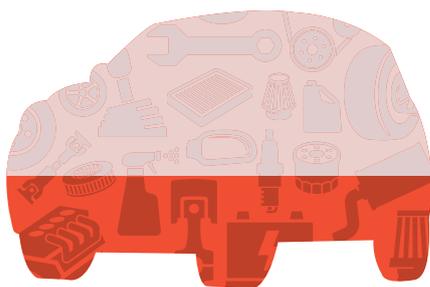
1b) Interface's Non-Labour Resource Efficiency Improvements

By analysing the life cycle greenhouse gas emissions of its products, Interface recognised that its biggest cost and GHG footprint was from nylon yarn, which provides the pile of its carpet tiles.

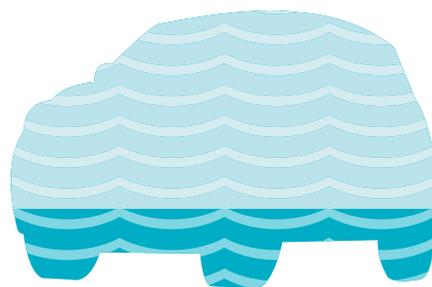
To reduce yarn usage, Interface:

- Developed a new hard-wearing, high quality carpet tile using approximately 50% of the yarn of a conventional tile (called Micro-tuft);
- Shifted the product portfolio to lower yarn use tiles (including Micro-tuft), and;
- Reduced waste.

In 20 years Toyota has reduced...



Production **waste**
by **60%** per vehicle.



Production **energy**
& **water** by **70%**
per vehicle.

⁸ Evans, S., Norell Bergendahl, M., Gregory, M., Ryan, C., 2009. *Towards a Sustainable Industrial Ecosystem*, University of Cambridge Institute for Manufacturing and Cranfield University, p. 14.

⁹ Unilever Annual Reports; Unilever Sustainability Reports.

¹⁰ Sources: Toyota, Komatsu and United Biscuits annual and sustainability reports.

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These actions netted a 12% reduction in yarn requirements per square metre since 1996, saving €5.8M in 2012 and reducing product life cycle GHG emissions footprint by 11,400 tCO₂e in 2012 – for limited capital investment beyond business-as-usual. These savings will continue into the future and therefore should be considered as annual savings.¹¹ Through these actions the impact of price volatility of yarn, which depends on the price of oil and other chemical inputs, has also been reduced.

Simultaneously, Interface started innovating in energy efficiency. This resulted in an energy reduction of 40% per unit of output compared to 1996, saving €800,000 in 2012 (at today's prices) and avoiding 6,800 tCO₂e of GHG emissions in 2012. This also created jobs for energy efficiency experts, designing and implementing efficiency projects.

In summary, this first non-labour resource efficiency step netted Interface Europe in 2012 **€6.6M** in cost savings, **18,200 tCO₂e** in life cycle GHG reductions and created new jobs designing and implementing the improvements. This GHG emission reduction is part of a 27% decrease in Europe of the average embodied carbon footprint¹² of Interface's products since 2008.



Unilever

In 15 years

Unilever has reduced
own production waste by...



¹¹ Note that the savings figures for both costs and GHG emissions for Interface presented in this document are calculated on a 'run rate' basis – i.e. they are the savings achieved in the latest year compared with 1996. These savings will continue on an annual basis into the future and are therefore presented as per annum savings.

¹² From cradle to gate.

A New Industrial Model

1c) The Europe-wide Potential of Non-Labour Resource Efficiency

Material efficiency, combining waste reduction, packaging optimisation and remanufacturing, was conservatively calculated in the Next Manufacturing Revolution study to have the potential to improve average profits by 1.3% of revenue.¹³ Applied to the European manufacturing sector,¹⁴ this equates to **€94.4B p.a.** in additional profits,¹⁵ requiring negligible additional capital expenditure.

Note that this 1.3% of revenue saving in input material cost is less than half of the saving achieved by Interface through its 12% reduction in yarn.

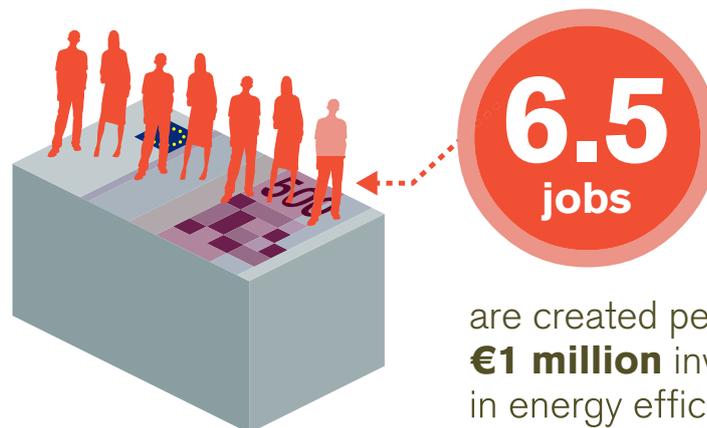
For **energy efficiency**, the Next Manufacturing Revolution research identified an average improvement opportunity across UK manufacturing sub-sectors of 20%.¹⁶ This can reasonably be applied to all European countries, given the similarity of the manufacturing mix and level of maturity regarding efficiency.

Empirical evidence from around Europe shows 6.5 jobs are created per million Euro of investment in energy efficiency.¹⁷ Spreading these jobs over a ten year average equipment life provides 0.65 on-going full-time jobs per million Euro of investment.

For Europe, energy efficiency alone is therefore estimated to be worth:

- **€27.6 billion p.a. in net profit** improvement at a one-off capital cost of **€66.2 billion**¹⁸
- **43,000 new jobs** – which are highly skilled and local, designing and installing equipment
- **278 MtCO₂e p.a.** reduction in GHG emissions (**3.4%** of Europe's total annual GHG emissions)

In summary, the European potential of material and energy efficiency is estimated to be €122 billion p.a. in additional profit, 43,000 new jobs and 278 MtCO₂e p.a. less GHG emissions.



¹³ Materials efficiency includes avoided use of raw materials from reduced waste (conservatively calculated to be worth £450M p.a.), reduced packaging (worth £450M p.a.) and remanufacturing (worth £5,600M p.a.). See Lavery, G., Pennell, N., Brown, S., Evans, S., 2013. *The Next Manufacturing Revolution: Non-Labour Resource Productivity and its Potential for UK Manufacturing*. Available at <http://www.nextmanufacturingrevolution.org/nmr-report-download/>. These savings compare with the 2011 turnover of the UK manufacturing sector of £511,869M (Office for National Statistics, 2012. Annual Business Survey, Section C Manufacturing, release date 15 November).

¹⁴ Europe defined in this document as all 51 countries within the geography of Europe, unless noted otherwise.

¹⁵ No additional investment is considered necessary to achieve these savings beyond business-as-usual improvement initiatives, R&D and product/packaging design and development.

¹⁶ Lavery, G., Pennell, N., Brown, S., Evans, S., *op. cit.*, p. 31.

¹⁷ Lavery, G., Pennell, N., Brown, S., Evans, S., *op. cit.*, p. 35.

¹⁸ Energy efficiency typically has a 2.4 year payback period. See Lavery, G., Pennell, N., Brown, S., Evans, S., *op. cit.*, p. 31.

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Stage 2. Renewable Energy and Sustainable Raw Materials: Becoming Available at Reasonable Prices

2a) Drivers of Sustainable Input Cost Reduction

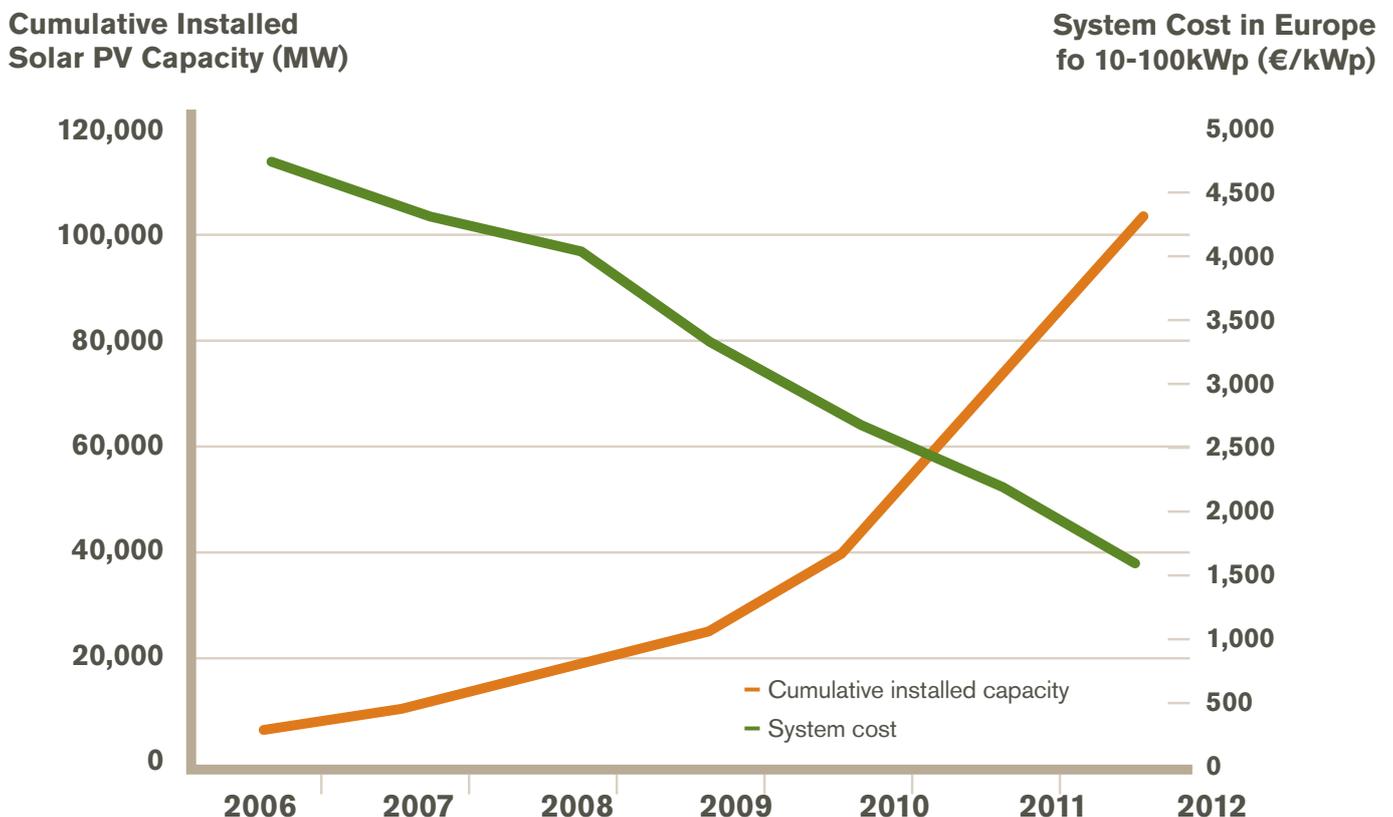
Just as manufacturers feel the pressure to reduce their environmental footprints and social impacts, so do their suppliers. 'Greener' raw material and energy alternatives (including wind, biogas and solar power)¹⁹ are now emerging at prices requiring only a modest premium, if any at all.

There are three primary reasons why greener alternatives are becoming cost-competitive:

- (i) The **maturity** of green products/energy is increasing. Technology and innovation is improving,

enabling suppliers to access new, less expensive sources of raw materials and process them more efficiently. Technologies themselves are moving down the experience curve; increasing scale reduces costs so renewable energy sources such as solar photovoltaics (see Exhibit 4), biogas and wind power are rapidly becoming cost-competitive with fossil fuels. Suppliers are also becoming more sophisticated in their own supply chains; for example German biogas producers are developing fertilisers from the remaining digestate and selling these to offset their production costs.

Exhibit 4: Solar Photovoltaic Volume Growth and Cost Reduction



Sources: European Photovoltaic Industry Association, 2013. Global Market Outlook for Photovoltaics 2013-2017, p. 17; Fraunhofer Institute, 2012. Photovoltaics Report, December, p. 40

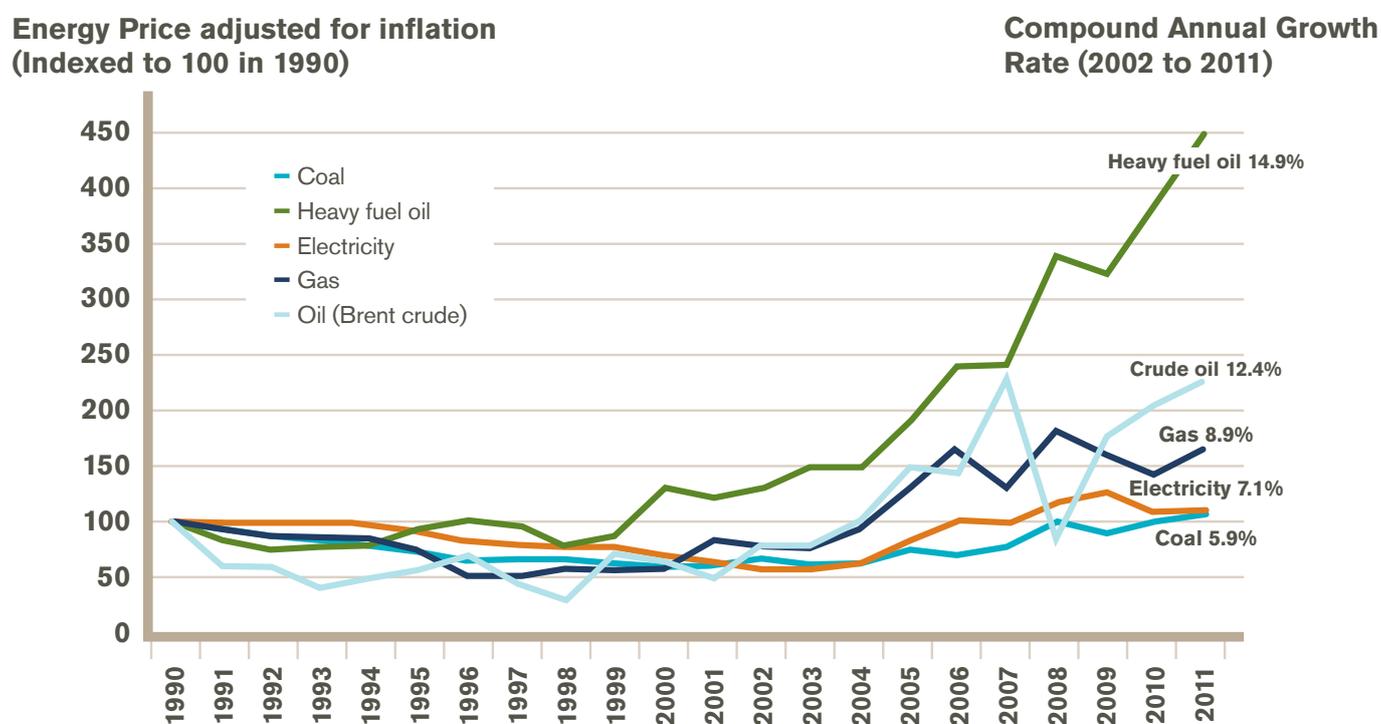
¹⁹ Solar power is becoming cost-competitive in countries with good sunlight such as Spain.

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(ii) **Governments** have set aggressive and binding targets for renewable energy and GHG emissions to improve energy security, reduce long term energy prices and reduce environmental impacts. For renewable energy, 2020 targets in selected geographies are²⁰:

- 30% for Denmark (23.1% achieved in 2011)
- 49% for Sweden (46.8% in 2011)
- 14% for the Netherlands (4.3% in 2011)
- 15% for UK (3.8% in 2011)
- 18% for Germany (12.3% in 2011)
- 23% for France (11.5% in 2011)
- 20% for the European Union (13% in 2011)

Exhibit 5: Energy Price for the last 20 Years, Excluding Carbon Levies



Notes: All data in constant dollars. Does not include Carbon Levies
 Source: DECC for energy prices except crude oil, http://www.decc.gov.uk/en/content/cms/statistics/energy_stats/prices/prices.aspx#industrial; Office of National Statistics for CPI; Wikiposit for crude oil prices

²⁰ European Environment Agency, 2013. Climate and energy country profiles - Key facts and figures for EEA member countries, EEA Technical report No 17, pp. 64, 69, 121, 171.

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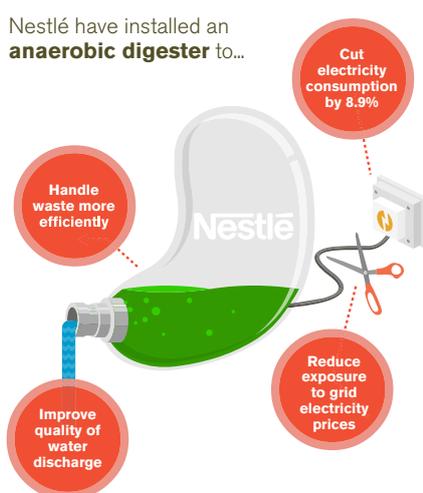
To make greener solutions more affordable so that these targets can be achieved, governments have introduced temporary, degressive subsidies to bridge the declining cost gap (per point (i) above) and taken action to internalise the environmental costs of fossil fuel energy.

(iii) Non-renewable materials and energies are **increasing in price** for reasons including scarcity, rising production costs (see Exhibit 5), the inclusion of externalities in their pricing (such as GHG emissions) and charges to support renewable energy and GHG emission reductions (per point (ii) above).²¹

All of these factors suggest that the cost gap to more sustainable raw materials and energy will continue to decrease. Early movers, who seek out new suppliers and are ready to act quickly when economics permit, can benefit from sustainable inputs for a modest premium.

Pioneering companies in the use of renewable inputs include:

- Google, who currently sources 12% of its electricity from its own renewable power plants, purchases 22% from other renewable generators and offsets the GHG emissions from the remaining 66%. It has committed US\$1 billion to investing in renewable energy projects.²²
- IKEA, who in 2012 produced renewable energy equivalent to 34% of its total energy use and bought 34% of cotton from preferred suppliers who were using or working towards the Better Cotton Initiative standard or other sustainability standards.²³
- Nestlé, who has installed an anaerobic digester at its Fawdon site to make better use of waste, improve the quality of discharged water and to cut electricity consumption by 8.9% - reducing exposure to grid electricity prices.²⁴
- Coca Cola, with its PET bottles made from bio-material as well as recycled PET – decoupling them from oil prices and supply issues.



²¹ An exception to this logic is unconventional gas in the US which is reducing energy prices and which may also be exploited in Europe. Note, however, that savings resulting from unconventional gas may allow governments to increase support for renewable energy sources.

²² Google Green, *The Big Picture*. [online] Available at <http://www.google.co.uk/green/bigpicture/> [Accessed 11 November 2013].

²³ IKEA Group Sustainability Report FY12, 2013. [online] Available at http://www.ikea.com/ms/en_GB/pdf/sustainability_report/sustainability_report_2012.pdf [Accessed 11 November 2013].

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2b) Interface's Sustainable Inputs: 100% Renewable Energy and 43% Recycled or Bio-based Raw Materials

As part of its 43% use of recycled or bio-based raw materials, Interface uses a significant proportion of bio-based and recycled yarn, partially decoupling its supply chain from recently extracted fossil fuels while reducing embodied GHG emissions by a further 10,300 tCO₂e in 2012. This resulted in a cost saving of €1.1M for 2012 compared with the yarn mix used in 1996.²⁵

Interface also invests some of its materials and resource efficiency savings to ensure that electricity and natural gas are supplied from renewable sources. For example, Interface's Scherpenzeel plant in the Netherlands purchases green gas certificates, created by a local anaerobic digestion plant using fish waste mixed with other food waste, for all of its natural gas usage. This increases Interface's energy bill by €108,000 p.a. (a 10% premium). This green natural gas, combined with the use of green electricity, has reduced annual GHG emissions at the Scherpenzeel site by 7,000 tCO₂e compared with 1996.

Because renewable energy provides greater employment in manufacturing, installation and maintenance of plant than large fossil fuelled power stations (per unit of energy produced), switching to renewable energy also creates jobs in the wider economy. Specifically, Interface's switch to renewable power is estimated to have created three new jobs in the community on an on-going basis.

In summary, Interface's use of renewable energy and recycled/bio-based yarn resulted in a net cost saving in 2012 of **€1 million** and GHG emissions reduction of **17,300 tCO₂e**.

2c) What if all European Manufacturing Switched to 100% Renewable Energy?

100% renewable energy use by all European manufacturers would, at an estimated cost of **€22 billion p.a.**²⁶:

- Create **125,000 new jobs**²⁷ – with many of these local, skilled in renewable system installation and maintenance.
- Reduce GHG emissions by **910 MtCO₂e p.a.** (11.2% of Europe's total annual GHG emissions).

There is emerging evidence that substantial savings can be achieved through the use by manufacturers of alternative materials, of the order achieved at Interface (see Exhibit 6). However, data is limited and so no Europe-wide costs or benefits of using alternative materials have been included in this study.

²⁴ IDG Case Studies, Nestlé UK & Ireland - Transforming manufacturing practices through an integrated approach to sustainability. [online] Available at <http://www.igd.com/our-expertise/Sustainability/CSR/12396/Nestlé-UK-Ireland---Transforming-manufacturing-practices-through-an-integrated-approach-to-sustainability/> [Accessed 11 November 2013].

²⁵ To calculate this cost saving, the 1996 yarn mix was applied to 2012 production volumes and 2012 yarn unit prices were used.

²⁶ Based on a 20% premium, which is more conservative than the 10% premium paid by Interface. This premium includes recouping capital investment costs by the supplier, which in some cases may be the manufacturer. Note that European renewable energy targets in most cases exceed the energy used by the manufacturing sector, so there should be no difficulty in accessing the quantities of renewable energy that would be required.

²⁷ Calculated as the difference between 0.11 person years of employment per GWh for coal and gas fired generation and 0.205 person years of employment per GWh for wind and biomass generation. Source: Kammen, D.M., Kapadia, K., Fripp, M., 2006. Putting Renewables to Work: How Many Jobs Can the Clean Energy Industry Generate? RAEI Report, University of California Berkeley. [online] Available at <http://rael.berkeley.edu/sites/default/files/very-old-site/renewables.jobs.2006.pdf> [Accessed 11 November 2013]

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Reducing Greenhouse Gas Emissions through Sustainable Inputs: Automotive Industry Case Study

Automotive manufacturers, who comprise one third of the top 15 manufacturing companies in Europe, can reduce the embodied greenhouse gas emissions of their vehicles through the use of alternative and more sustainable inputs.

The Carbon Trust's 2011 analysis of the European automotive sector entitled 'International Carbon Flows Automotive' calculated that using recycled and lower carbon raw materials can save 25% of the embodied (excluding in-use) GHG emissions in a vehicle. This is similar to the GHG reduction figure of 24.7% achieved by Interface replacing 43% of its raw materials with bio-based or recycled raw materials.

While many manufacturing sub-sectors are yet to assess their sustainable input opportunities, the Carbon Trust's findings for automotive industry indicate that Interface's GHG reduction achievements from using bio-based and recycled materials can be replicated across multiple manufacturing sub-sectors.

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Stage 3. Capturing Further Value

The new industrial model creates much greater value for manufacturers than just cost savings.

3a) Sustainable Products are increasingly being Rewarded in the Market

The additional value on offer to manufacturers having completed stages 1 and 2 of the new industrial model includes:

Price premia/product differentiation, especially in B2B markets

Greener products can achieve higher prices or be preferentially chosen by customers over conventional alternatives, often because they save customers money through the life of the products (such as more fuel-efficient engines). Many customers choose equally-priced products with less environmental impact, especially in the B2B and the public sectors where green procurement policies are common. For example, in the building products sector, architects, accustomed to choosing products for their properties and energy consumption, are now considering embodied carbon in their decision criteria.

Customer loyalty and trust

Customers whose values align with brands are more likely to switch to and remain loyal to those brands. Consider the success that a few companies have had with a values-based approach to business in sectors with historically low levels of trust, such as utilities and banking. Origin Energy, Australia's leading supplier of

green energy, has lower churn rates and lower rates of payment default from its green power customers than customers buying electricity sourced 100% from fossil fuel power stations. Triodos Bank only lends to people and organisations who are working to make a positive impact - culturally, socially and environmentally. It does this in a transparent way that enables its customers to see that their savings are being used in ways that are consistent with their values. This has built a loyal following.

Competitive Advantage in standards

Voluntary standards, especially related to sustainable inputs, are driving customer choice in a number of markets. Often these standards are less stringent at the beginning, but over time become industry norms because they address customer needs. For example, in the construction industry a series of voluntary standards have emerged which are driving product redesign around issues including recycled content (e.g. the LEED assessment system), lifecycle performance, environmental footprint (e.g. DGNB) and toxic substances.

Legislation banning superseded products. As more sustainable products emerge, in some sectors superseded products are no longer allowed. This has occurred, for example, in the lighting industry where incandescent bulbs are being phased out,²⁸ in the chemical industry which has banned ozone depleting substances, and in the oil and gas sector where leaded petrol is no longer permitted.

²⁸ Brazil and Venezuela started to phase-out incandescent bulbs in 2005, followed by the European Union, Switzerland, and Australia in 2009. Other nations are implementing new energy standards or have scheduled phase-outs: Argentina, and Russia in 2012, and the United States, Canada, Malaysia and South Korea in 2014. Source: Wikipedia, Phase-out of Incandescent Bulbs. [online] Available at http://en.wikipedia.org/wiki/Phase-out_of_incandescent_light_bulbs [Accessed 11 November 2013].

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For forward-thinking companies adopting the new industrial model, voluntary standards and legislative bans can create competitive advantage including patents on better solutions and barriers to entry to new market entrants.

Increased profit margins from remanufacturing

Remanufactured products not only reduce environmental impacts and create jobs, but they also have greater profit margins. Remanufacturing can reduce raw material and processing costs (typically 66% of revenue) by 70% while doubling labour (typically 18% of revenue) resulting in a net margin increase of 28%²⁹ - some of which will be passed on to customers if the product is sold competing against new products, but all of which is kept if products are leased. An example is the leasing of remanufactured photocopiers by Fuji Xerox and Ricoh.

Interface's Biosfera product, its greenest collection introduced in 2011,³⁰ delivered higher margin than average for Interface products while delivering additional value for clients. It quickly became the highest growth product in Interface's portfolio.

Employee attraction and engagement through a shared purpose

Traditionally companies have struggled to motivate staff around profit-related aims. However, companies with a higher sense of purpose towards improving the environment and contributing to the community are successfully attracting, motivating and retaining staff. Interface, for example, has a voluntary staff turnover rate in its European manufacturing operations of 2%, which compares favourably with the voluntary turnover rates of manufacturers considered to be amongst the top 25 best workplaces,³¹ including Kimberley Clark (9%), Mars (7%), National Instruments (6%) and WL Gore (2%).

Anecdotal staff turnover figures for other companies adopting the new industrial model including Whole Foods Market, Patagonia and The Body Shop (Australia) of 15%, 25% and 21% respectively are significantly lower than the average turnover rate for their retail sector of 40 to 60%.³²

²⁹ For the data behind this calculation see Lavery, G., Pennell, N., Brown, S., Evans, S., 2013. *The Next Manufacturing Revolution: Non-Labour Resource Productivity and its Potential for UK Manufacturing*, pp.83-88. Available at <http://www.nextmanufacturingrevolution.org/nmr-report-download/>

³⁰ One of the green features of Biosfera is its inclusion of 100% recycled yarn, which is used more efficiently resulting in a lower yarn content than standard carpet tiles.

³¹ Great Place to Work, 2013. *The World's Best Multinational Workplaces*. [online] Available at <http://www.greatplacetowork.net/best-companies/worlds-best-multinationals/the-list> [Accessed 26 November 2013]

³² Sources: Martin, M. "Data on Employee Turnover in the Grocery Industry", *Chron*. [online] Available at <http://smallbusiness.chron.com/data-employee-turnover-grocery-industry-18817.html> [Accessed 11 November 2013]; Henneman, T., 2011. "Patagonia Fills Payroll With People Who Are Passionate", *Workforce*, 5 November 2011. [online] Available at <http://www.workforce.com/articles/patagonia-fills-payroll-with-people-who-are-passionate> [Accessed 11 November 2013]; Fairfax Digital, 2003. "Relax ... it's the boss's order", *The Age*, 18 August 2003. [online] Available at <http://www.theage.com.au/articles/2003/08/17/1061059711755.html> [Accessed 11 November 2013].

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These figures are supported by a growing body of evidence around the role of corporate responsibility in the attraction and loyalty of staff:

- 75% of workforce entrants in the US regard social responsibility and environmental commitment as important criteria in selecting employers.³³
- MBA graduates would sacrifice an average of \$13,700 in salary to work for a socially responsible company, according to a Stanford University study.³⁴
- 83% of employees in G7 countries say a company's positive CSR reputation increases their loyalty.³⁵

For companies relying on professions where talent is in limited supply, staff attraction and retention are vital to company success.

Innovation

Resource efficiency, sustainable sourcing and the development of new more sustainable products can be a values-based approach to innovation, tapping into the passions of staff keen to create a better world. For some companies this can kick-start innovation where it may have stalled. This innovative spirit continues as further non-labour resource efficiency ideas, sustainable sourcing opportunities and new product concepts drive the New Industrial Model cycle.

Examples of companies for whom innovation and environmental impact reduction are integrated include:

- Henkel, the company behind brands including Persil, Purex and Loctite, who ensures that all new products must perform better on one or more of their environmental priorities.
- GE's Ecomagination initiative has committed substantial R&D funding to lower environmental impact products, which today comprise 15% of GE turnover. Ecomagination product revenues are growing 2% p.a. faster than the revenues from their other products.³⁶
- 45% of Philips' products perform better environmentally than conventional alternatives and revenues from these products are growing 7% p.a. faster than revenues from the rest of their products.³⁷

In summary, translating the company's demonstrated commitment to environmental and social sustainability from the first two stages of the New Industrial Model into products and brand creates competitive advantages, greater profits and happier investors and staff.

³³ Nidumolu, R., Prahalad, C.K., Rangaswami, M.R., 2009. "Why Sustainability is Now the Key Driver in Innovation", *Harvard Business Review*, September, p. 10.

³⁴ Montgomery, D.B., Ramus, C.A., 2003. *Corporate Social Responsibility Reputation Effects on MBA Job Choice*, Stanford University.

³⁵ *GlobeScan 2006*, cited in Strandberg, 2009. *The Business Case for Sustainability*, December, p. 5.

³⁶ Sources: GE annual and sustainability reports

³⁷ Sources: Philips annual and sustainability reports

³⁸ Interface has also set itself targets and is achieving substantial improvements in waste reduction, recycling, transport efficiency and water use.

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3b) The Further Advantages Achieved by Interface

Interface's non-labour resource efficiency, sustainable inputs and other³⁸ sustainable approaches have enabled it to differentiate itself from competitors such that it has retained global market leadership in modular carpet.

Interface has done this by engaging with its customers on social and environmental issues as well as delivering value for the community and environment, whilst maintaining competitive prices on its products.

Interface has also developed new innovative products with additional social and environmental benefits/credentials (such as Biosfera which uses 100% recycled nylon and significantly less yarn). Where these innovative products are more expensive to produce,

some customers who value these benefits have proven willing to pay the necessary premium. This shared responsibility with customers has provided the support needed for Interface to work with its supply chain to reduce costs to that of conventional alternatives – so that these innovations can ultimately be incorporated into all products at no additional charge.

This spirit of innovation has enabled Interface to continue driving further cycles around the new industrial model virtuous loop (per Exhibit 1).

Specifiers of flooring, including architects, designers and building owners are willing supporters of this cycle of improvement. They choose Interface products, remain loyal to the brand and, when values align, pay a price premium for the greenest offerings in Interface's product portfolio.

³⁸ Interface has also set itself targets and is achieving substantial improvements in waste reduction, recycling, transport efficiency and water use.

The Combined Impact Of The New Industrial Model

The Combined Impact of the New Industrial Model

The combined outcome for Interface is net current (and ongoing) annual savings of **€7.6 million** in costs, **13,800 tCO₂e** in GHG emissions from manufacturing energy use, **21,700 tCO₂e** in GHG embodied in materials and the creation of new jobs. Sharing these achievements with customers has enabled Interface to retain a leading market share and to continue to develop profitable new products and initiatives which drive further iterations around the new industrial model cycle. This has also reduced business risk for Interface, including reduced exposure to fossil fuel scarcity/price rises, carbon price escalation, more rigorous building standards³⁹ and competitor price discounting.⁴⁰

Extending the New Industrial Model approach across the European manufacturing sector suggests potential net benefits of:

- **€100 billion p.a. profit before tax increase** from implementing materials efficiency, energy efficiency and renewable energy – at a capex cost of €66 billion. This represents an average **9%** increase in profits for the European manufacturing sector.⁴¹ Market share increases and new product revenues add to this, but have not been included to be conservative.

- **168,000 new skilled and mostly local jobs** in energy efficiency and renewable energy.
- **1,200 MtCO₂e p.a.** reduction in GHG emissions (**14.6%** of Europe's total annual GHG emissions) from energy efficiency and renewable energy.

11% of this total profit improvement opportunity and **20%** of the jobs and GHG reductions can be achieved by **Europe's 20 largest manufacturers** alone addressing their global operations.⁴²

Figures for selected countries, Europe and the top 20 manufacturers are shown in Exhibits 7, 8 and 9.⁴³

³⁹ Such as the US Green Building Council's LEED version 4 which will require increased disclosure of a product's footprint.

⁴⁰ Through having a lower cost base.

⁴¹ Assumes profit before tax of 15% of revenue, as per the UK manufacturing sector.

⁴² The top 20 European manufacturers based on 2012 revenue are: Volkswagen, Daimler, Siemens, BASF, BMW, ArcelorMittal, Nestlé, Peugeot, Bosch, ThyssenKrupp, EADS, Unilever, Novartis, Renault, Saint-Gobain, Nokia, LyondellBasell, Bayer, Hoffmann-La Roche and Sanofi.

⁴³ Note that of the European countries examined, only the Netherlands uses more energy in manufacturing than their national 2020 renewable energy targets and so availability of renewable energy is not considered an issue, even for the Netherlands because they have historically imported some of their electricity. For France, 91.5% of their electricity is currently zero greenhouse gas emissions and so no switching to renewable energy has been assumed. The price premium for renewable energy has been assumed to be 20%, which is higher than the 17% that Interface is paying.

The Combined Impact of the New Industrial Model

Exhibit 6: Additional Annual Profit Potential from the New Industrial Model from Material Efficiency, Energy Efficiency and Renewable Energy

Net profit Increase from Material Efficiency, Energy Efficiency and Renewable Energy

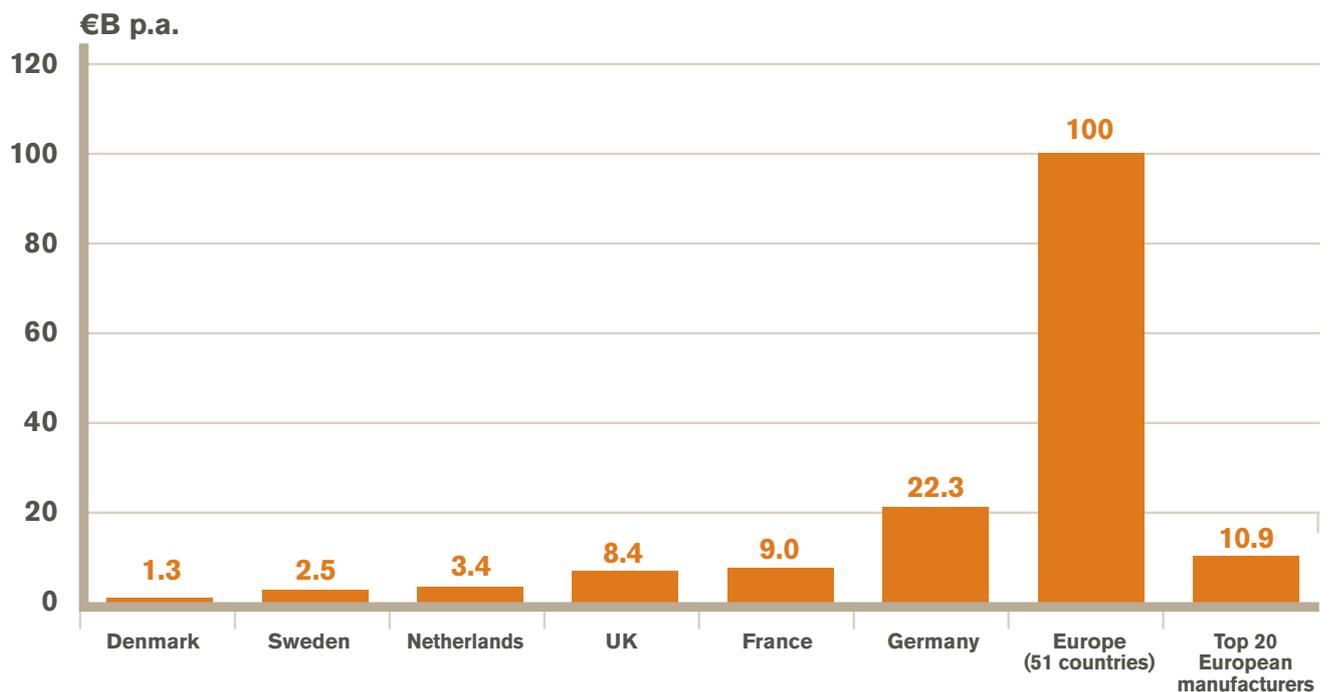
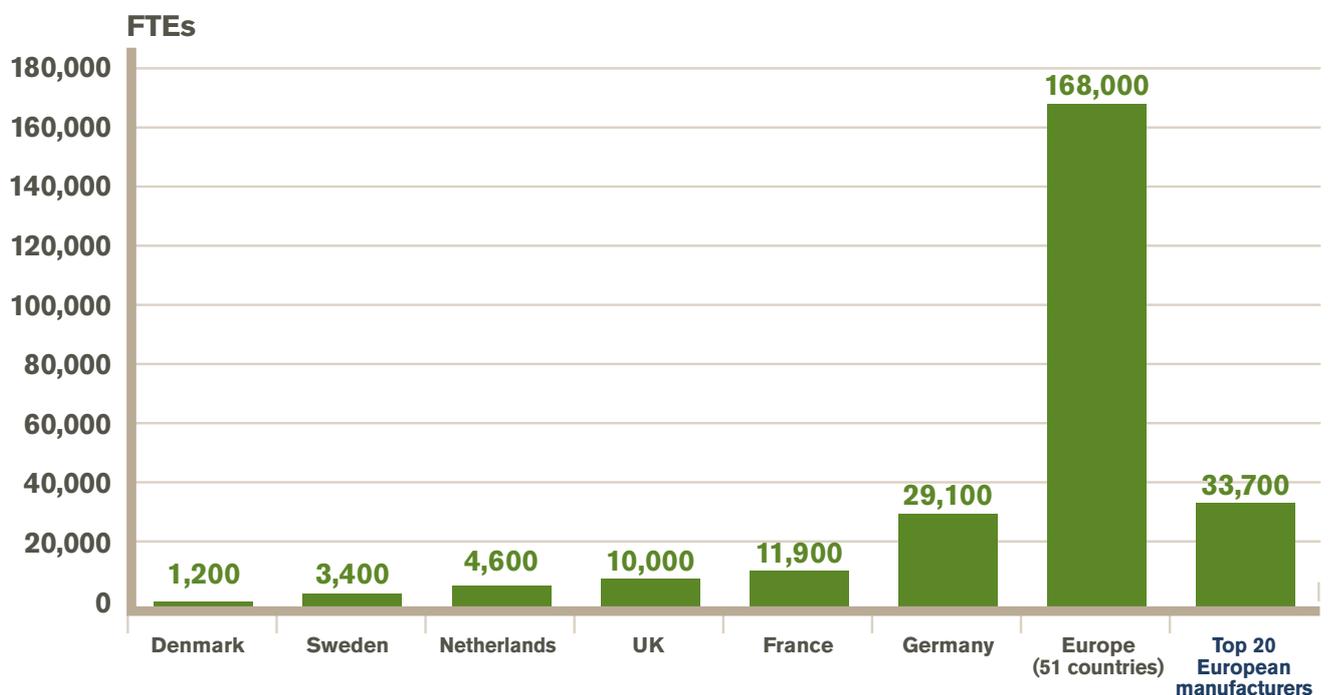


Exhibit 7: Additional Jobs from the New Industrial Model from Energy Efficiency and Renewable Energy

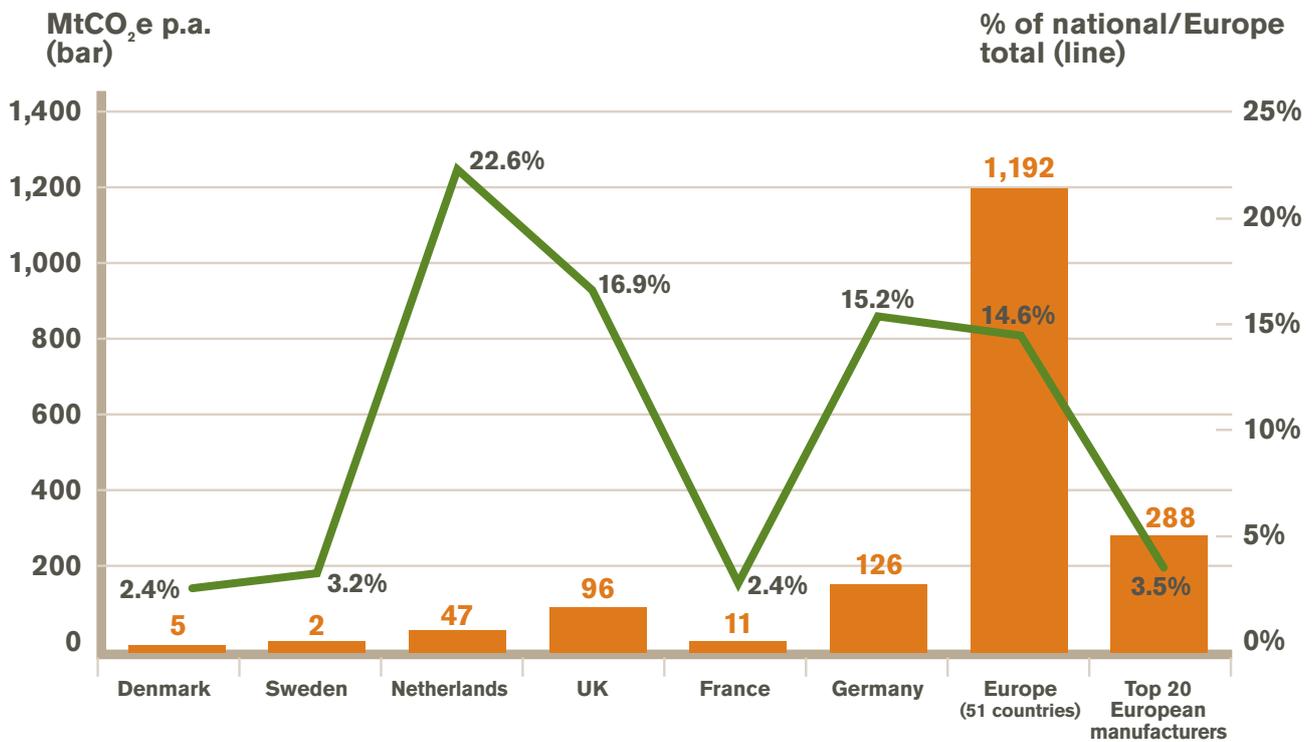
New jobs from Energy Efficiency and Renewable Energy



The Combined Impact of the New Industrial Model

Exhibit 8: Greenhouse Gas Emissions Savings Potential from the New Industrial Model from Energy Efficiency and Renewable Energy

Greenhouse Gas Emission Savings from Energy and Renewable Energy



Making The Transition

Making the Transition

Key Stakeholders

To drive the transition to the New Industrial Model, the **most important catalyst is senior executive leadership.** The New Industrial Model is an on-going activity; a company must stay the course, which is difficult unless senior executives are driving the transition. Also, given that many parts of a company will need to change (including procurement, operations, marketing and sales), the CEO is often the only executive with the authority to encompass all areas. Behind many of the pioneering companies adopting the New Industrial Model (often under the guise of 'sustainability') were/are founders or CEOs with deep and public commitment including Paul Polman (Unilever), Ian Cheshire (Kingfisher), Anita Roddick (Body Shop), Ray Anderson (Interface), Yvon Chouinard (Patagonia) and Gunter Pauli (Ecover).

Of course, CEOs must be aware of the opportunity and recognise the benefits. To date, CEOs adopting the new industrial model have often trusted their business instincts.⁴⁴ However, with the model now clearly articulated, it is the responsibility of a company's **strategy executives** to think through the application of the model for their organisation, to build the business case for change and to present this to the CEO and Board. A strategic perspective is vital to understand all of the value on offer and how it links together – from operational efficiency to brand equity to customer engagement.

Delivering such a transition is a step change from where we are today. From experience, the executives of many companies think they are doing well to have

reduced their energy, waste, packaging, transport use or increased recycling by 10% to 15% in the last decade. Good practice companies in all sectors, however, have achieved over 50% improvements in the same timeframe. And the evidence of the Next Manufacturing Revolution looking at leading companies globally indicates that **even good practice companies have missed many opportunities.**⁴⁵

Staff engagement is a vital enabler of the New Industrial Model, to tap their detailed understanding of the business, improvement ideas and enthusiasm. Significant non-labour resource efficiency improvements can be made through staff behaviour change and alterations to processes and systems⁴⁶ - which are low cost. Along the way this improves morale and participation while driving bottom-up innovation.

Government plays a vital role. Regulatory performance standards assist to drive non-labour resource efficiency. Temporary, declining financial support for renewable energy recognises the value for society of a decarbonised and more secure energy supply and the additional jobs that it provides. The importance of this support is seen in renewable energy jobs, where the German government's extensive renewable energy programme has supported around one third of the 1.1 million renewable energy jobs created in the 27 EU member states.⁴⁷

In summary, the New Industrial Model requires a committed CEO, the skills and awareness of the strategy team, openness to improvement and staff engagement – supported by government policy.

⁴⁴ Refer, for example to Anderson, R., 1998. *Mid-Course Correction*, Peregrinzilla Press, Atlanta; Anderson, R., 2009. *Confessions of a Radical Industrialist*, St. Martin's Press, New York.

⁴⁵ Lavery, G., Pennell, N., Brown, S., Evans, S., *op. cit.*

⁴⁶ Lavery, G., Pennell, N., Brown, S., Evans, S., *op. cit.*, pp. 29-30.

⁴⁷ Sources: Renewable Energy Policy Network for the 21st Century, 2012. *Renewables 2012: Global Status Report*, p. 27; Observ'ER, 2011. *The State of Renewable Energies in Europe: 11th EurObserv'ER Report*, p. 173.

Making the Transition

Big Ideas to Accelerate the Transition

For companies:

1. Commit to reducing material use by 5% per unit of production from current levels, reducing energy use by 20% per unit of production from current levels and using 100% green energy by 2020. Meaningful targets drive step change improvements, encouraging innovation and a fresh look at how activities are currently done. Scale also brings cost advantages through bulk purchasing and moving a technology down its experience curve.
2. Ask suppliers to provide either Environmental Product Declarations (EPDs) or validated life cycle assessment data for their products/materials. This will have them thinking about their impacts and enable your company to better understand its supply chain impacts.
3. Rethink your products and how they could better meet customer needs and create value if they were more resource efficient or delivered in a different way (e.g. through servicing, remanufacturing, or shared usage).

For governments:

In addition to the current and planned initiatives such as carbon pricing, energy performance standards and temporary support for renewable energy:

- Shift taxation from income/labour to virgin resource use and environmental damage.
- Mandate transparency of inputs and impacts. For example, the Aldersgate Group and BT are developing an electricity label to help consumers identify the impacts of their energy purchasing decisions. This could include creating a rating scheme to allow comparison of the embodied energy in energy-intensive products, such as steel and glass, between different producers.
- Extend public procurement of products with high recycled content and renewable energy - at local, regional and national level.
- Mandate energy efficiency implementation when an audit shows a payback period of three years or less. This has been successfully done in Australia and has reduced costs, GHG emissions and energy demand at no cost to the government by simply addressing low risk commercial opportunities now being missed.