24 The influence of policy

on future material sustainability

Policy makers in many countries recognise the need for action to respond to environmental concerns, but are hampered in their responses by the need to remain popular at the next election. What can they in reality do that would help?

In due course, we anticipate that this book will enter the political mainstream, as material efficiency hits the centre of political debate. "Never was so much owned by so few", "Ask not what your infrastructure can do for you...", "Metal workers of the world unite; you have nothing to lose but your yield losses", and so on. And if the climate scientists are right in their projections on the likelihood and consequences of global warming, or if the other issues we raised in the opening chapter become even more pressing, then without doubt sustainable materials will be a cornerstone of future politics.

But it isn't in the public mind yet and therefore the influence of policy makers is covert rather than overt but certainly real. The absence of border protection combined with the threat of regionally high carbon taxation has driven the European steel industry to invest heavily in research around carbon sequestration. EU regulation on car tailpipe emissions has driven the current rush towards plug-in battery powered electric cars. Failure to regulate or at least failure to apply rules properly, led to the red mud disaster in Hungary. Policy makers determine and enforce the standards and rules which govern materials processing operations, encourage novel developments through taxes, subsidies and investments, enable change by providing infrastructure, information and skills, exemplify good practice through procurement[1] and engage the public and industry through media campaigns and company initiatives.

We saw in the last chapter that several of our options for material efficiency could be stimulated more rapidly through support from governments and the 'policy map' in Figure 24.1 summarises our suggestions for how this might occur. The rest of the chapter is structured around the rows of this table: the four 'E's put forward in the UK sustainable development strategy (encourage, enable, exemplify and engage) to which we've added one further 'E': the rather sterner option to 'enforce' change[2]. In Figure 24.2 we've given general examples of how these five strategies can be applied in future as we become more aware of material efficiency opportunities.

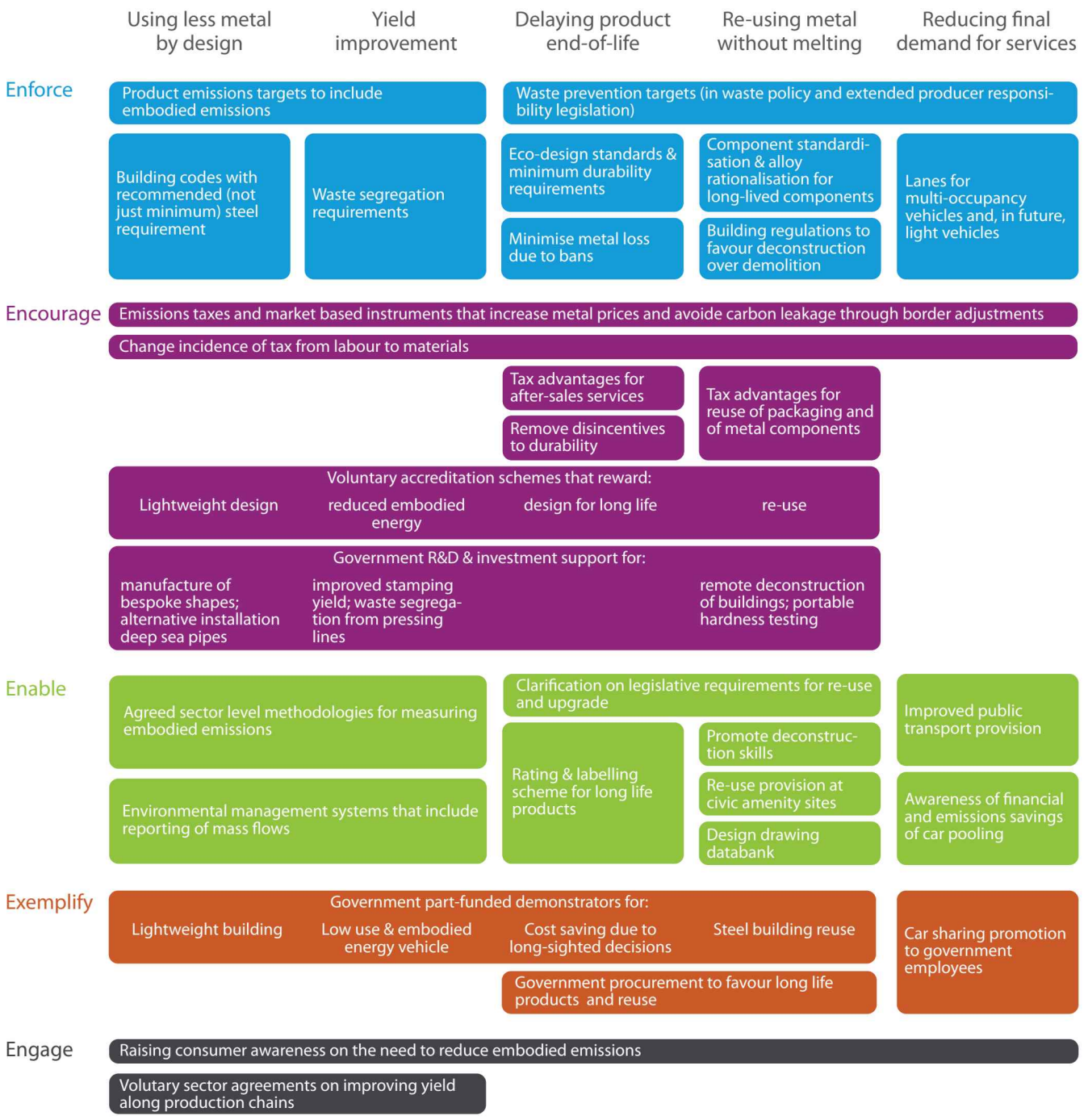

Figure 24.1—**Policy map**

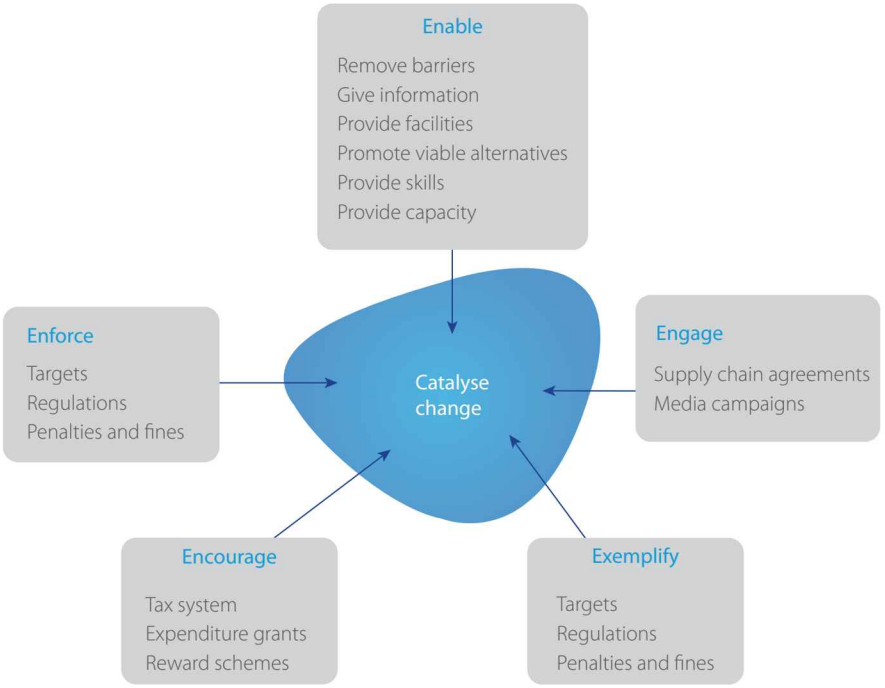

Figure 24.2—**Options for change**

Enforce

Regulations, bans and laws are the least favourite options of policy makers, because they are difficult to specify without creating unintended consequences, and are politically risky. Enforcement is required to ensure the rule of law, for example to ensure that companies do not expose their workers, neighbours, or customers to undue harm. Enforcement has been a powerful strategy to counter some of the specific environmental problems identified in the past century, particularly where a business activity directly threatens human health. So some environmentally harmful products have been banned, and health and safety legislation continues to rule over materials such as asbestos and strong acids that cause immediate harm. However mitigation against climate change is more complex as it acts over long time spans and requires a balance between social, environmental and economic responses. So instead of using enforcement in this area, governments focus more on stimulating change (which is set into law through targets) rather than determining how that change is achieved. The suggestions in Figure 24.1, which arise from our work, aim to remove perverse incentives in emission reduction targets, minimise material inefficiencies due to regulations and enforce greater material efficiency through the rule of law.

Emission reduction targets should take into account embodied emissions

The UK government estimates that 15% of construction emissions are due to the embodied energy in the materials used. By our estimates this varies between 24% for warehouses and 11% for housing. Similarly for vehicles, we find the current embodied emissions share to be in the region of 15% of total life cycle emissions. As a result of these emissions shares, government policy to date has focused on reducing emissions in use, particularly in buildings and cars[3]. However these policies take no account of embodied energy savings so, for example, fail to promote the reuse of structural steel and by measuring emissions when cars are on rollers[4], fail to reflect the true benefits of vehicle weight saving. Current UK government strategy on new homes[5], includes the aspiration that all new dwellings be 'zero carbon' by 2016, but the interpretation of "zero carbon" does not take into account embodied emissions and rather aims at houses that return as much power as they use over the course of a year to the National Grid. As opportunities to reduce emissions in use are exploited, opportunities to reduce embodied emissions will become relatively more important. Even now we can see from our Sankey diagrams that the steel used in construction and in the manufacture of vehicles accounts for half of the output of the steel sector and so roughly half of the sector's emissions.

Waste policy should be directed towards minimising embodied energy losses

Recent UK waste policy, primarily motivated by land shortages, has been successful in diverting waste from landfill, in increasing recycling and in improving treatment of hazardous waste. However the focus on recycling has in effect taken away attention away from options to extend the life of products and components through delayed disposal or re-use. For example, combined targets for recycling and reuse fail to take into account the embodied energy savings of reuse and the process emissions of recycling. Future developments in waste policy should therefore be directed towards products that have high embodied emissions and value all end-of-life options appropriately[6].

Health and safety legislation should not prevent material efficiency

We have no intention to make life riskier by using our materials more intelligently, and there is no need. As we've seen, safety factors tend to multiply along production chains, as each company assesses the cost of its own risks. A result of

this, compounded by recent changes in health and safety legislation, is growing material use: a quarter of the weight increase in European vehicles is attributed improvements in crash-worthiness. A separate consequence of recent developments in health and safety legislation has been a drive to avoid the use of manual labour where old buildings are taken down. This has discouraged deconstruction of buildings, favouring remote demolition instead.

Product durability standards could be considered

Governments could stipulate minimum durability, eco-design standards and minimum product guarantees as authorized by the EU EcoDesign Directive. In the past these heavy-handed policies have been voted out in parliament. With greater awareness of the benefits of durability, politicians may be more confident in withstanding opposition from business lobbies that favour short product life to stimulate replacement demand. Alternatively, voluntary codes and standards on durability could be developed within industrial sectors.

Encourage

We saw in our evaluation of business activity in the last chapter, that motivated by cost alone businesses are unlikely to pursue material efficiency aggressively unless they find other benefits from doing so, so there is an important role for policy makers to provide encouragement through these other benefits. Governments have many options to encourage change: they can use the tax system to favour certain behaviours, they can subsidise research and development into technologies that facilitate change and they can develop accreditation schemes that allow companies to advertise the benefits of their work with authority.

We cannot rely on existing policies that price emissions

Existing policies that attempt to put a price on emissions, such as the European Emissions Trading Scheme, are unlikely to encourage material efficiency because as we saw in chapter 6, materials costs are only a small fraction of final consumer prices, and because the policies are structured so that the emissions price has little effect on final prices and hence demand[7]. We saw in the meeting of the UNFCCC in Copenhagen in 2009 how unlikely it is that there will ever be a single global agreement on responses to climate change, so there is unlikely to be a unified global carbon price. So instead of relying on carbon pricing, the tax system could be used to encourage material efficiency.

The tax system should encourage material efficiency

It's a dark secret, but part of the work of the Treasury is to find ways to raise taxes without people noticing. Environmental taxes are intended to have the opposite effect: they are levied precisely so that the drivers of environmental harm cause financial pain. However, with the complexities of the tax system, several disincentives to greater material efficiency linger and should be removed, particularly where tax reductions are offered to encourage more purchasing. For example, in the UK value added tax (known as sales tax in the US) is currently charged at 20% on building refurbishment but is not charged at all for new buildings. 'Capital allowances' which allow some purchases to be depreciated rapidly rather than in line with the incomes they generate, are designed to promote faster replacement purchases. The tax system could also be adapted to encourage material efficiency, for example by charging higher tax rates on disposable products and lower rates for more durable ones.

Material efficiency should be rewarded in voluntary eco-standards

Material efficiency could be rewarded more effectively through certification in voluntary eco-standards that account properly for embodied energy and emissions. We saw in the box story in chapter 15 that the voluntary UK eco-standard BREEAM could follow the lead of the Australian Green Star system and promote best practice in steel production and fabrication and to encourage more efficient use of steel in structural applications.

Enable

We've been dogged throughout the preparation of this book by a shortage of data. Companies are required to release very little data about energy purchases or material flows and this inhibits the adoption of both energy and material efficiency because the real drivers of energy are rather well hidden. Governments could therefore play an important role in enabling future material efficiency, by requiring a greater release of audited data. We have also found areas where the absence of appropriate standards prevents adoption of good practices. For example, the absence of a government standard for re-certifying steel prevents re-use because the risks associated with using old steel (which we believe to be very small) cannot be valued and traded.

Governments should promote meaningful data collection on material efficiency

Much European policy regarding to materials has been developed related to Life Cycle Assessments (LCAs) of the total energy involved in making and using products. However, as we discussed in Chapter 2, this allocation of energy to products is impossible, and also tends to disguise the more important information we'd like to have in the public domain: we could make much more precise suggestions about options for change if we had in the public domain data on energy use at production sites, particularly when related to key processes, provided by the European Environmental Management System (EMAS), as discussed on page 23. A move towards environmental reporting that reveals opportunities to save energy and emissions at national level, rather than promoting blame-shifting at product level, should be encouraged and applied consistently across different sectors. Governments should promote participation in schemes such as EMAS and encourage assessment of metal flows along production chains.

Governments should provide greater clarity on the requirements for reuse

Governments have a role to play in reducing the (small) risks associated with reuse by giving greater clarity on regulations for reuse and by working with insurers to reduce the cost of certifying reused steel. The European Commission is developing "End-of-Waste" criteria under the Waste Framework Directive, with a particular focus on ferrous metals, aluminium, copper, recovered paper and glass. Once completed, these criteria must be interpreted for national application[8].

Exemplify

Government procurement can be used to promote material efficiency. In Europe, public authorities spend 16% of GDP on the purchase of goods and services[9]. Governments could therefore promote material efficiency through their purchasing choices, could fund demonstrator projects to develop experience with reuse including understanding of true costs, inconvenience, project timing and concerns over health and safety, and could report carefully on the experience.

Engage

Initiatives to raise consumer awareness of embodied energy as the next environmental challenge would give businesses a new and positive opportunity for competition. For example, if consumers were more aware of embodied energy, suppliers of more durable goods could more easily advertise their environmental benefits. As well as raising awareness amongst consumers, governments have a role to play in engaging companies in all aspects of materials transformation to encourage collaborative exploration of opportunities to improve material efficiency[10].

Outlook

Many of the recommendations made in this chapter concern removing barriers to material efficiency, but procurement and the development of certification and standards are both positive options that would support its expansion. Government funded pilot studies and the subsequent use of Government purchasing to develop appropriate markets are important opportunities to stimulate constructive change.

Notes

1. The ONS construction statistics annual (ONS, 2010b) includes data on the split of new spending in construction between infrastructure, public, commercial and industrial building works. In 2008 the public sector share (including infrastructure) was 38%.
2. Defra (2005) sets out the UK sustainable development strategy and put forward the four "E"s (encourage, enable, exemplify and engage) as a means of instigating change.
3. For example minimum requirements for operational carbon emissions are imposed through Part L of the building regulations and for cars by specifying fleet average emissions reductions in line with the EU standards for tailpipe emissions (160 gCO2/km in 2008 to 130 gCO_2/km by 2015 and 95 gCO_2/km by 2020)
4. Tailpipe CO_2 emissions are currently determined by running drive cycles (themselves not considered realistic) using static tests on rollers that do not fully take into account the benefits of weight reduction. Certified CO_2 figures are calculated using categories that cover a 100 kg range of weights. This means that up to 100-kg in weight can be taken off cars at the top of a weight class before any change in certified CO_2 is seen.
5. Defined in the policy statement (DCLG, 2007).
6. The publication of the UK Waste Policy Review (DEFRA, 2011) moves in the right direction – it explicitly makes the link between greenhouse gas emissions and waste and states the aim "to promote resource efficient product design and manufacture and target those streams with high carbon impacts both in terms of embedded carbon (food, metals, plastics, textiles) and direct emissions from landfill (food, paper and card, textiles, wood)".
7. In order to make effective decisions about material choice and product design, manufacturers must face consistent carbon prices so that they can factor in the costs to society they cause both up and downstream. In reality there is no single price of emissions: the average Phase II EUA price has been €20 /tCO_2 , approximately £15/tCO_2; the CCL is levied at 0.47 p/kWh equating to an implied carbon price of £0.09/tCO_2 ; the fuel duty is levied at £0.5819/L equating to an implied carbon price of £220/tCO_2 for the use of diesel in cars and £252/tCO_2 for the use of petrol. Furthermore there are many reasons why policies that price emissions from energy intensive industries (e.g. the steel and aluminium industry) do not lead to their output prices increasing in line with the emissions associated with production: tax revenues from the Climate Change Levy (CCL) are returned to businesses through cuts in National Insurance contributions; the majority of the CCL can be avoided by industries that negotiate Climate Change Agreements; fears over 'carbon leakage' (this phrase refers to the fact that high taxes on carbon in one country will cause production to shift elsewhere, so lead to national but not global reduction in carbon emitted) result in free allocation of EU ETS emissions permits. As a result of these measures, product manufacturers do not face input prices that properly reflect the embodied emissions in their inputs. Emissions pricing policies are particularly hard to implement regionally; for example, EU policy on carbon pricing currently threatens the survival of energy intensive industries in Europe. In 2011, Tata cut 1,500 jobs in Scunthorpe and Teesside citing EU carbon legislation as one of the reasons for the cut back (BBC News, 2011b). Also, carbon prices cannot effectively encourage material efficiency unless carbon leakage is addressed through border adjustments (that levy a tax on imports) rather than by negotiating agreements that reduce the tax burden within the scheme. The legalities of such border adjustments within WTO trade legislation should be explored.
8. Our discussion with UK steel fabricators about the legalities of reusing steel sections has revealed confusion about current rules on CE marking. For example, do unmarked beams installed prior to the 1991 Construction Products Regulations need CE marking in order to be traded for reuse? Which harmonized standards should be used? How much testing is required in order to validate the properties of the reused steel?
9. In fact some government regulations already favour material efficiency but aren't implemented. In the UK, existing government procurement priorities claim to favour reuse as set out in the recommendations of the OGC (2007).
10. Following the success of the Courtauld Commitment (a UK initiative that reduced food waste by 670,000 tonnes and packaging waste by 52,000 tonnes 2005-2009 by collective action in the food production and retail sector) the UK Waste Policy Review (DEFRA, 2011) recommends further voluntary responsibility deals within the packaging, textiles, paper and hospitality sectors. The analysis in this book suggests that similar initiatives should be instigated in the industries that are the main users of steel and aluminium – construction, vehicles, metal products and machinery and equipment. It is also likely that there will be overlap across these sectors in the lessons learned about particular processes. For example, innovations that reduce the yield losses of stamping and pressing lines will be of interest to both the car and the can industry.