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Emissions Trading Briefing Note No 3 Carbon Abatement and Innovation



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Introduction

Much of the greenhouse debate has revolved around the economic 'cost' arising from internalising the cost of carbon into the economy. However, a focus on projected costs based on existing technologies and approaches overlooks the fact that markets innovate in response to price signals, and carbon emissions trading with ambitious targets would provide a clear driver for market innovation. System wide innovation on carbon abatement would mean that far from costing more, action around demand side abatement, energy efficiency, materials substitution, smarter engineering, alternative power systems and more sustainable agricultural practices could result in lower economic costs of carbon abatement and a more sophisticated market place which has internalised a broader suite of environmental factors.

The carbon market is more diverse than merely the creation of carbon offsets. In the near future

carbon flows will have to be accounted for in a similar way to cash. If we are to 'trade out' of the climate crisis, then breakthrough innovation is required to decarbonise our systems of production and consumption. Far from being a cost, the carbon market represents one of the greatest market opportunities of the global economy. Companies that innovate in response to a price on carbon will not only achieve reductions in greenhouse gases, but also will be in a stronger competitive position.

This briefing note explores the need for carbon abatement, discusses some of the internal interventions which can be explored by companies for reducing their footprint, and presents some innovative market opportunities which have already or could emerge as a response to this requirement.

The Need for Carbon Abatement

Greenhouse gas emissions from human activities are changing our climate, and although we are already locked into some level of climate change as a result of the concentration of greenhouse gases in the atmosphere, there is wide acceptance that significant global reductions in current emissions of greenhouse gases are required to avoid the most adverse impacts of climate change.

There are three broad decarbonisation pathways that can be identified - trading out of 'carbon-insolvency', stringent regulation, and breakdown. All will have different business and social impacts.

Emissions trading schemes, such as that being proposed in Australia, effectively give business a window of opportunity to address climate change within the context of our current economy. However this window will not remain open indefinitely. Inadequate reductions in emissions by 2030 (or earlier) through market mechanisms could trigger concerted campaigns for severe regulation. This type of regulation will place carbon on a similar footing to the use of asbestos, lead in petrol or CFCs which have been eliminated completely from the economy.

Accompanying this regulation (or even independent of direct regulatory change) will be class action law suits

aimed at companies with high carbon legacy, in addition to action against company directors.

If regulation does not achieve the desired correction, then the third 'pathway' to decarbonisation will be that which occurs naturally, following the consequences of inaction predicted by climate change science. Some countries lack the resources for adaptation to a warmer climate. Others will not recover from continuing climate events of a similar magnitude to Hurricane Katrina. The overall result will be a break down of some economies and societies and severe pressures on others, bringing lower standards of living and social conflict.

Putting aside the philosophical debate on the operation of our economy and requirements for regulation, it is clear that governments around the world are adopting a 'trade out' route to reducing emissions of greenhouse gases. The current structure of the global economy is such that there will be continued pressure to increase energy supplies. Part of the climate challenge is thus providing an absolute decrease in emission levels, which means that the carbon abatement market will have to deliver abatement as measured against a business-as-usual growth curve.

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For the world to meet the Stern Review's trajectory for stabilisation at 450 ppm CO₂e, the following abatement needs to occur relative to business-as-usual [1]:

- 135 billion tonnes of CO₂e abatement products, services and infrastructure are required internationally between 2011 and 2020
- an additional 1,400 billion tonnes of CO₂e abatement is required between 2021 and 2050.

These numbers may seem impossibly large, however while they set out the size of the challenge facing humanity, they also define the size of the opportunity. If we are to meet the challenges of climate change with a 'trade-out' approach, then the market for carbon abatement services must by necessity become one of the largest market opportunities in economic history. The winners in the new carbon market will be those innovators who can supply carbon abatement at below the average cost of abatement.

Setting the Scene for Abatement: Reporting and Emissions Trading

In a decarbonising economy businesses will have to measure their carbon flows as accurately as cash flows in order to determine their net carbon impact. The Greenhouse Gas (GHG) Protocol sets the standard for reporting and accounting of greenhouse gas emissions based on relevance, completeness, consistency, transparency and accuracy. The GHG Protocol also defines operational boundaries for reporting as three levels of 'scope', with businesses who claim to be reporting in accordance with the Protocol being required to report on Scope 1 and 2 emissions as a minimum.¹ [2]

In Australia reporting on greenhouse emissions will become mandatory for approximately 700 medium to large companies with the enactment of the National Greenhouse and Energy Reporting Act, set to come into effect on 1 July 2008. The company threshold for reporting starts at 125,000 tonnes of CO₂e, but

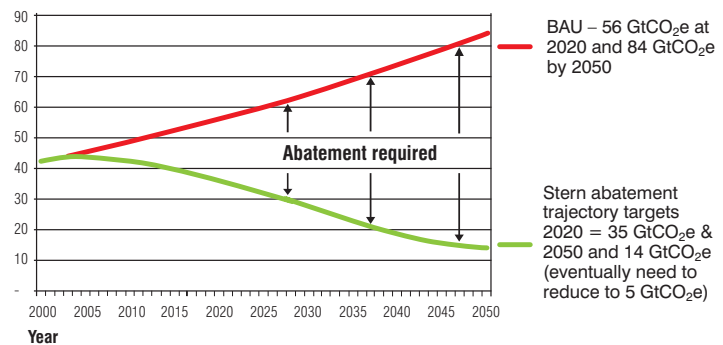


Figure 1 –Indicative global carbon abatement requirements relative to business-as-usual (Source: derived from The Stern Review [1].)

decreases down to 50,000 tonnes of CO₂e by 2010-11, meaning that even more companies will be required to report. [3] The Act also establishes a Greenhouse and Energy Data Officer, and although the regulations are not yet finalised, it is likely that reporting on Scope 1 and 2 emissions will be mandatory, with non-compliance becoming a civil offence for chief executive officers. [4]

The main intent of mandatory reporting is to support emissions trading in Australia. While the final shape of a national emissions trading scheme is yet to be decided, emissions trading will begin in 2010-11. [8,9]. Mandatory reporting and emissions trading will provide a direct price signal on carbon for the economy. Each company will then be influenced to take action according to their own individual cost curve for greenhouse gas abatement,² their internal setting of targets and their appetite for risk and innovation.

¹ Scope 1: Direct Greenhouse Gas Emissions – reporting on emissions of the six Kyoto gases arising from direct combustion of fossil fuels (including car fleets), chemical production and other industrial process emissions. Scope 2: Electricity Indirect Emissions – emissions that are created from electricity generation according to the amount of electricity usage by the company. Scope 3: Other Indirect Emissions – an optional reporting category for all other indirect greenhouse emissions that occur as a consequence of company activities; including extraction and production of purchased materials, emissions from product use, outsourced activities, contractor vehicles, employee travel and waste disposal.

² This relates to the cost and amount of greenhouse gas reduction for a given abatement option.

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Intra-organisational Innovation in Carbon Abatement

The discipline of reporting on greenhouse gas emissions will provide an individual organisation with a map of their carbon footprint. The process of intra-organisational abatement thus begins with measurement and analysis. The footprint and its impact then needs to be contrasted against the value created by the company, in other words the carbon: value intensity ratio needs to be calculated. The immediate focus is then on reducing this carbon intensity ratio.

Different sectors will face different challenges by virtue of their intrinsic carbon intensity, however there are some commonalities which need to be explored across industry sectors. These include exploration of efficiency improvement opportunities, and whether more output can be gained without increasing the current level of greenhouse emissions through for example upgrading equipment, improved maintenance, and switching production technologies. Energy switching options are also important, with moving to a lower carbon fuel mix through use of renewables, and 'cleaner' fossil fuels such as gas. Materials switching will help carbon

abatement by using lower carbon footprint materials in production with a greater emphasis on renewable materials from sustainable sources, and materials with effective cradle-to-cradle producer responsibility that ensure maximum recycling.

Other options include product design changes, thereby improving operational efficiency of products sold through use of recycled materials during manufacture, developing products with lower in-use energy consumption, 'zero' standby power drain, and enhanced end-of-life recyclability. Additional gains can be made through human resource management interventions, such as bundling incentives in line with decarbonising strategies, for example incentives to use public transport, and offering bicycle friendly workplaces. And finally there is the option of purchasing offsets for those emissions which cannot be reduced, through purchasing greenhouse gas emissions reduction units (ERUs).

The Market for Carbon Abatement Services

One of the main targets for innovation in terms of carbon abatement services is where a company delivers abatements through stand alone projects which can be purchased by another company to offset its own carbon emissions. However, the market for carbon abatement services, although only in its infancy, is more than 'just' the market for carbon offsets. A number of other products and services which are already emerging in this market follow:

Greenhouse Gas Reporting and Inventory Services

In the same way that many organisations outsource their accounting requirements, so too will there be a demand for greenhouse gas reporting and inventory services that can comply with a variety of standards and emissions trading requirements. This will involve an ever increasing reliance on life cycle assessment practitioners and associated software packages. Closely associated with reporting requirements are other regulatory and legislative requirements that require specialist legal and business planning advice.

Demand Side Management Opportunities

The McKinsey global cost curve for greenhouse gas abatement beyond BAU identifies that reducing growth

in energy demand can achieve carbon abatement at a zero or negative cost. For example, the energy savings associated with the installation of building insulation, improvements in fuel efficiency, lighting system overhaul, and improvements in the operation of air conditioners and hot water heaters can pay for the cost of these interventions while at the same time achieving carbon abatement [5]. However, the bulk of these improvements are spread across a wide number of organisations and geographic locations, many of which would have no mandatory requirements to decarbonise. This creates the opportunity for specialist demand side abatement companies to bulk up the abatement potential from a large number of facilities and package it as a saleable offset.

Renewable Electricity Generation

A wide range of companies who would require access to renewable energy are unable to generate this electricity onsite. Hence the need is created to purchase this product from a dedicated generator. Distributed renewable power generation can also avoid distribution losses, if close to demand. In a decarbonising economy there will be increased demand for solar, wind, wave, tidal, geothermal and biomass generated electricity.

Fuel Switching Opportunities

The traditional fossil fuels of coal, oil and gas may be replaced by renewable alternatives for those processes where heat and/or carbon are required. Alternative liquid fuels may include biodiesel, ethanol, and pyrolytic oil from biomass processing. Alternatives to coal could be sourced from the charring of biomass supplies and alternatives for gas from anaerobic digestion of waste products, as well as from the gasification of biomass.

Carbon Capture and Storage Innovations and Technologies

Where fossil fuels continue to be used, it has been suggested that opportunities exist for preventing the release of the carbon dioxide generated into the atmosphere. Geosequestration refers to the capture of carbon dioxide at the point of generation such as at a power station, and then compression, liquefaction and storage in deep geological formations. (Although it is noted that a serious concern with this option is the potential for leakage from the point of storage; and that polluters will avoid ultimate responsibility by transferring

it to government). Biosequestration, in contrast, refers to using 'natural' carbon sinks such as forests, and soil structure to store carbon, in addition to achieving other conservation goals. Another option for storage of the carbon is to react it to form solid mineral carbonates. However, TEC regards these as receiving far too much current attention, subsequently diminishing the level of investment in options that reduce carbon intensity absolutely and quickly.

Other Changes to Business Services and Operations

A range of other activities are likely to emerge as part of a decarbonising economy, including more sophisticated software and hardware for teleconferencing and telecommuting to reduce business travel; moving from product based to service based business offerings, selling ecosystem services such as remediation of land and increasing biodiversity, and marketing on the basis of improved greenhouse performance.

Market for Breakthrough Innovation

Many opportunities associated with carbon innovation and abatement can be applied immediately at negative cost, such as demand side abatement. There is, however, also a need for breakthrough innovation in order to achieve the cuts in emissions required to limit the impacts of climate change. One example is the commercial growth of algae as a biomass source which can be an opportunity to incorporate the treatment of nutrient-rich wastewater in a system that reduces carbon dioxide and recycles organic nutrients without competing with agricultural land. [6]

Suitable market place mechanisms are required to accelerate this type of innovation, including a high price of carbon. Other support to fast track breakthrough innovation is incentives for investors to fund research and development and early stage commercialisation, such as matching grants, low interest loans, carbon abatement incubators and tax concessions.

Useful References

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Contact Total Environment Centre

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