

Oxford Energy Comment

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Peering into the future fog of CO₂ – how road maps can help

By David Buchan

It is easy to ridicule the Durban Platform negotiated at the United Nations climate change talks as a classic case of process over substance. Countries have agreed that to replace the Kyoto protocol they should keep talking for four more years so as to try to agree by 2015 on either “a new protocol” or “another legal instrument” or an “agreed outcome with legal force” – that, whatever it turns out to be, would come into effect, whatever that turns out to mean legally, in 2020 [1]. Yet it is a minor miracle that nearly 200 countries consented to this.

The European Union came to Durban without leverage of its own in its campaign to persuade others to join it in signing up to a second commitment period of Kyoto. Everyone knew the EU was going to make a further commitment because the fact that it already has mandatory emission reductions written into its legislation up to 2020 made this a no-cost option; even its fellow travellers in the first Kyoto period – notably Canada, Russia, Japan – are all dropping out. What the EU did have was the leverage provided by a large number of smaller developing countries keen to maintain the UN process, with its double standard imposition of emission cuts on developed countries alone and with its promise of money for developing countries to adapt to climate change. The EU threatened, implausibly, not to sign up to a second Kyoto period unless all the big developing countries, China and India, plus the US, joined a common commitment to a global climate regime at some later date – which eventually they did.

Durban’s big apparent achievement has been to get agreement that whatever replaces Kyoto will apply to all countries with equal legal effect. In other words, even if developed and developing countries were to have different target levels in the future – which is pretty certain – the targets would all be equally binding or non-binding. This would end the legal apartheid in Kyoto’s division between developed and developing countries, based on the logic of industrialised countries’ historic responsibility for carbon pollution and therefore responsibility for removing it. This logic is made increasingly moot by the growth of emissions in China. Not only is China now the world’s biggest emitter on an annual basis, but on present trends, it will in around 20 years time have cumulatively put more carbon in the atmosphere than Europe in the whole of human history. For its part, India this year became the world’s third largest emitter, after China and the US.

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Durban is hard to characterise beyond an agreement to agree, or as its supporters would say, a commitment to commit. So Connie Hedegaard, the European climate commissioner, naturally called it “a road map”. After all, the Durban agreement has a direction of travel, a (2015) milestone and a (2020) destination. But the metaphor is irresistible, because the European Commission currently adores road maps. It has issued four of its own this year – on resource efficiency to 2020, on transport to 2020, on the low carbon economy to 2050 and on energy to 2050 – and in 2012 plans one on renewable energy to 2050 [2]. All relate to climate change and bear heavily on energy, which accounts for about two-thirds of man-made greenhouse gases. Given this resort to carbon cartography, it is worth examining the uses, and abuses, of these policy road maps.

Road map as substitute for action.

This abuse of a road map is very often inevitable. When you cannot get agreement on immediate action –i.e. getting all countries to sign on to another Kyoto commitment - all you can do is to promise to act in the future. Make me chaste, but not yet, on the Augustinian principle. Durban highlighted this abuse. It acknowledged the shortfall between pledges made by countries at previous Copenhagen and Cancun conferences – such as the US administration commitment to reduce emissions by 17 per cent below their 2005 level by 2020 or China’s goal of reducing carbon intensity by 40-45 per cent below its 2005 level by 2020 – and what science says needs to keep the temperature from rising more than 2 degrees Celsius above 19th century levels. Durban’s final declaration “...notes with grave concern the significant gap...” between the pledges and the 2 degree threshold.

Yet the Durban process will only start doing something about this in 2020. And almost everyone present in Durban will have known that the International Energy Agency (IEA) has already told us that 2020 is effectively too late to close that gap.

For several years now the IEA has, in its annual World Energy Outlooks (WEO), been mapping out what it would take to limit Green House Gases (GHGs) to 450 parts per million (ppm) of CO₂ equivalent. This is reckoned to be the level giving us a 50/50 chance of keeping the post-19th century temperature rise to 2 degrees. In its 2011 WEO, the IEA estimates that to achieve the 450 ppm goal, global energy-related emissions would have to peak before 2020, and the carbon intensity (CO₂ emissions per unit of output) of the world economy would have to decline at a rate of 3.5 per cent a year in 2010-2020 and at 5.5 per cent a year in 2020-2050. This, says the IEA, would be more than six and a half times greater than the annual carbon intensity improvements achieved in the past 10 years.

Moreover, in its November 2011 WEO, the IEA, scarily, went on to underline the point that the door has almost closed on the 450ppm option. This is because we are already ‘locked in’ to so many carbon-intensive energy systems with a long life that the cumulative emissions over the next 25 years from these existing power plants, buildings, factories and so on would automatically take us to 80 per cent of the total emissions compatible with the 450ppm option up to 2035. By 2017 this share would rise to 100 per cent, swallowing our entire cumulative global carbon budget considered compatible with the 2 degree threshold. Thereafter all *new* energy investment would have to be *zero-carbon* - unless existing, often relatively modern, plant and infrastructure were retired early, re-engineered or idled. Theoretically, this could be done, but only at such expense as to make it impossible politically. Just to rub in the point

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about the cost of delay in the 450ppm scenario, the IEA estimates that for every \$1 of avoided investment or adoption of cheaper fossil-fuel investment options, an extra \$4.30 would have to be spent between 2021 and 2035 to compensate.

But imparting this sense of urgency to a world more preoccupied with short term financial savings than with long term environmental salvation is another matter. Durban showed that the world is still nominally committed to – even “gravely concerned” about – limiting temperature rise to 2 degrees centigrade, but not concerned enough to speed up the journey to a lower carbon world. So here we have a case where road maps that are substitutes for necessary action can lead travellers – in this case the world – off track.

Road maps as precursor to action.

This is what our carbon cartographers claim that their road maps are for. And sometimes this is precisely what happens. Take the UK’s Royal Commission on Environmental Pollution (RECEP), (sadly disbanded due to UK government cuts). In 2000 the RCEP produced a road map report that said, in line with the science, the UK should aim to cut GHGs by 60 per cent by 2050. In 2000 this was as astonishingly high and astonishingly long term ambition. Yet it was accepted by the then UK government, led to the 2008 UK Climate Change Act (under which the UK is now actually legislating its maximum ‘carbon budgets’ for the 2020s), and it became the basis for the subsequent EU target of reducing GHGs by 80-95 per cent below 1990 levels by 2050.

Far more often, road maps are used to extend the time horizon of a given policy far beyond what politicians can set in legislation. Even China’s ruling communists plan no more than five years ahead. Energy investment is a very long term business, because energy systems have such a long life. So reassuring investors about the longevity or continuity of current policy is very important. This is often underestimated by today’s politicians and regulators who vaunt the total sincerity of their commitment to today’s policies without realising investors are more concerned about what the politicians or regulators of tomorrow or the day after tomorrow will do. Reassurance of investors is particularly important in renewable energy which, for the foreseeable future, must live off some element of subsidy as well as what it can earn from the market.

Can roadmaps go beyond reassurance to provide certainty for investors? This is what the European Commission claimed for its communication on ‘a resource-efficient Europe’ at the start of 2011. It stated “a key aim of this flagship initiative is to provide certainty for investment and innovation....it provides a long-term framework for action” [3]. And what are the key ingredients of this roadmap on resource efficiency? More roadmaps. “The key components of this long-term framework will come in the form of a series of coordinated roadmaps” on energy in general, and on low carbon energy and transport in particular.

A complicating factor is that, in the future, energy roadmaps may have to depend more on the outcome of roadmaps in other natural resources. For instance, the interdependence between energy and water is becoming increasingly clear. As Shell points out in the 2011 version of its scenario publication, *Signals and Signposts*, energy now uses huge amounts of water for enhanced oil recovery and for biofuels. In the US, for instance, energy accounts for 40 per cent of all freshwater consumption. The connection works the other way, too, as the McKinsey Global Institute points out in its new publication *Resource Revolution: Meeting*



the world's energy, materials, food and water needs. The energy intensity of water is increasing because of the lowering of the groundwater table, more use of desalination to produce water, and big water transfer projects such as those in China. So energy roadmaps may also require proliferating roadmaps in other sectors such as food (to assess biofuel potential) or rare minerals and metals (for the building of more electric motors).

Roadmaps can also encourage the setting of firm milestones along the way to the ultimate destination. For Christian Kjaer, head of European Wind Energy Association (EWEA), the advantage of roadmaps up to 2050 is not that they contain aspirations for 2050 which are hardly bankable for wind power investors, but that they get policy-makers, in this case the European Commission and eventually governments, to start thinking about making firm, legal commitments on interim goals for, say, 2030 or 2040. [4] The Commission's 2050 energy road map comments that "the EU's 20 per cent renewable energy target has so far proven an efficient driver in development of renewable energy and timely consideration should be given to options for 2030 milestones",[5]. And the Commission clearly intends to propose 2030 milestone targets for renewables in its 2012 road map for this sector.

Common pathway.

But proliferation of road maps can confuse as much as clarify future policy; there are only so many long-term scenarios the human brain can absorb. So it is important that road maps provide not only the direction of travel, but also some common pathways. In the general energy 2050 roadmap, approved in December 2011, the European Commission has shed some useful light on these pathways which may provide reassurance, if not certainty, to investors.

The Commission energy roadmap goes through the different possible pathways to Europe's decarbonisation by 2050. But it does not try to choose one pathway over others; locking in one option or scenario and locking others out over the next 40 years would be crazy. It examines five scenarios – one of 'high energy efficiency' chiefly affecting demand, and four mainly on the supply side: 'diversified supply technologies' with no preference for any one technology or support apart from carbon pricing; a variant of this with 'delayed Carbon Capture and Storage (CCS)'; another variant with 'low nuclear'; and a scenario of 'high renewable energy' produced by strong specific support measures. Some of the trade-offs between these scenarios are no less important for being obvious. In particular, the lesson that Europe can delay CCS or reduce its reliance on nuclear power, but cannot to do both at the same time is a lesson for Germany which has renounced nuclear power and is also dragging its feet on CCS.

No Regrets for Policy-Makers = No Losses for Investors?

But the usefulness of the Commission's energy roadmap lies in its focus, not on how the pathways differ rather on what they all have in common. In all five scenarios, there is a larger role for electricity, for energy efficiency, for renewables and (because of renewables and energy efficiency) for more infrastructure including electricity storage, and for gas. Therefore, as far as politicians and policy-makers are concerned, money spent in these areas should be "no regrets" investments, because they will serve as the foundation for whatever final shape Europe's energy supra-structure takes by 2050. But investors will want to know that "no regrets" also means "no losses" for them. And of this they cannot be confident, until

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or unless the politicians persuade their publics to shoulder the cost of low carbon energy, or find ways of helping poorer people to pay for this cost.

As pointed out by the energy 2050 road map, low carbon energy is capital intensive, not just because of the money needed to build new power plants and grids, but to cover the cost of equipping end-users with new heating/cooling systems, smart meters and distributed generation like solar PV panels. Fuel costs may fall, but capital costs of energy equipment will rise. Much of this capital cost will fall on householders (for new appliances and insulation, for example) rather than on big energy producers as in the past. The share of income that an average European householder spends on energy and energy-related products could double to around 15 per cent by 2030, according to the roadmap. If so, this would put a large proportion of the population into the category of the 'fuel poor'; the current definition of householders judged to be in 'fuel poverty' is those who have to spend more than 10% of their income to keep their houses adequately lit and heated. One way to deal with this is to redefine fuel poverty as straight poverty and deal with it through the tax and state benefit system.

Travelling alone.

Durban will not remove the European Union's anxiety that, having put written emission reduction targets into its legislation up to 2020, it will now be travelling alone through the second commitment period of Kyoto. (Left undecided in Durban was whether the second commitment period would last five years until 2017 or eight years until 2020 – but this does not seem to matter much to the EU because its legislation goes in any case to 2020). In framing their energy 2050 scenarios, the European Commission modellers assumed that the whole world was acting to curb climate change, because this assumption required the biggest cuts in emissions. By contrast, 'fragmented action' on climate change – which is what we are likely to get now for a period of years – was assumed by the EU modellers to require lower reductions in emissions because energy-intensive companies would be excused from making deeper emission cuts or given free carbon permits in order to keep them competitive with their rivals in countries with no carbon constraint. And this is what is likely to happen.

Nonetheless, the EU should have no difficulty meeting its 2020 emission target of a 20 per cent cut on 1990 levels. Thanks to recession, switching to gas, de-industrialisation in some of western Europe and most of central and eastern Europe, emissions for the 27 EU states are today already around 17 per cent below 1990. Not that this is of much consequence to the atmosphere. The EU accounts for only some 14 per cent of global emissions, and the case for the EU upping its ambition to make a 30 per cent emission reduction is not made easier by the EU having to travel solo through the second commitment period.

Global action - inevitable one day?

Durban restores some small sense of the inevitability of global climate action one day. It will give heart to those who think a main problem of Europe's troubled Emissions Trading Scheme is that it has had to bear the weight of being the world's sole dumping ground for carbon credits earned outside Europe. It will give some heart to those in Australia and California introducing cap and trade schemes, and those in China talking of doing so.



Most important, Durban may confirm parts of world business – significantly in the fossil fuels industry – in their growing sense that one day they will face carbon constraints. For there has been a shift in recent years. Take the case of ExxonMobil, once a staunch climate sceptic and opponent of climate action. In its *Outlook for energy – A View to 2030*, the company clearly accepts the phenomenon of man-made climate change, and for this reason promotes the use of gas in the power sector “which is the single largest contributor to global energy-related CO₂ emissions”.

An even bigger carbon contributor, BHP Billiton, is more explicit in acknowledging the impact of man-made climate change. In its 2011 Sustainability report, the huge coal and mining group states that it “believes mainstream climate science is correct and human activities are having a negative impact on our climate, and this poses risks to our social and economic well-being”. The company goes on to echo a widespread sentiment in business at present, in saying that “we believe that a global solution to climate change which also includes a carbon price of some form is likely, but also some time away”. A global carbon price is clearly some way off, though in Australia, one of BHP Billiton’s home markets, a price on carbon is on its way very soon with the phase-in of that country’s new cap and trade system. Rio Tinto, another mining group, is also on record as accepting the need for a price on carbon.

Some oil companies already use carbon costs as one of their criteria in judging which projects to back. Shell for instance has for several years made internal use of a shadow carbon price of \$40 a ton to help determine which oil or gas projects to support, though this has not prevented the company from developing oil sands projects in Canada. ExxonMobil does not yet appear to use a carbon criterion in this way yet. But in its January 2011 report on energy to 2030, it says it anticipates that policies by OECD governments will add the equivalent of \$30 a ton to the cost of carbon by 2020 and \$60 a ton by 2030.

Another indication of the slowly emerging awareness in the US of the need for eventual carbon pricing came from the National Petroleum Council report to Energy secretary Steven Chu in September 2011. Among its recommendations was the recognition that in order to “better reflect environmental impacts in markets and fuel/technology choices...the US will find it difficult to reduced GHG emissions further without a mechanism for putting a price on GHG emissions that is economy-wide, market-based, predictable, transparent and part of a global framework”.

Yet, despite its more accepting rhetoric about climate change, if not climate action, the petroleum industry is still passive about investing in renewable energy. Shell and BP have cut back their investments in wind and solar energy, while ExxonMobil never entered these sectors, though the three companies, plus other oil majors, are active in bio-fuels, which they see as a natural extension of their traditional business. Like everyone else, the oil majors foresee rapid growth in renewables. In its Energy Outlook to 2030, BP likens the rate at which renewables is penetrating the global market to the surge in nuclear power in the 1970s and early 1980s. But until governments and societies decide to increase either the compulsion for, or financial attractiveness of, renewables, the oil majors seem to find the profits that can be made in focussing on upstream oil and gas irresistible. Moreover, they can, with justice, argue that in developing gas they are making a significant contribution to relative de-carbonisation of energy systems.



By contrast, one business sector that is as active as ever in championing climate action is the insurance industry. Munich Re, the global re-insurer, has the world's most comprehensive database on weather-related catastrophes, totalling more than 30,000 events. In a statement before the Durban meeting, the company said "the number of major weather-related natural catastrophes has almost tripled since 1980...it would seem that this can only be explained by climate change". It put aggregate losses from weather events since 1980 at \$1,600bn. Other major insurers around the world are also exercised about climate change. Why?

The obvious answer would seem to be that the insurance industry has to bear the (insured) losses of storms or floods possibly or probably caused by climate change. But actually this is not so obvious, because the insurance sector can meet this problem with short term adjustments. Insurance policies are usually renewed every year, and insurers can cover themselves by raising premiums from one year to the next, or by withdrawing policy cover. Perhaps the insurance industry is using 'climate alarmism' to prepare its clients for steadily higher premiums. But to justify steadily higher premiums, the insurance industry would have to assert a more direct link between the severity and regularity of weather events than its own research, or that of climate scientists, can yet establish. To some extent, the insurance sector's attitude to climate action is just an extension of their traditional pro-active behaviour in risk reduction, pushing for product safety standards, promoting building codes and so on.

At all events, there is a paradox in the way insurers and oil companies behave. The former take a long view of advancing climate change, but only have to place short-term annual bets on the safety of insured assets, while the oil industry is willing to make huge long-term bets on new investments in fossil fuels but still takes the short view on how the climate and climate policy might affect those bets. Perhaps the oil industry could use a road map to look further down the track.

[1] <http://unfccc.int>

[2] Energy 2050 road map due in December 2011, 'A resource-efficient Europe – Flagship initiative under the Europe 2020 Strategy' COM (2011) 21, 'a Roadmap for moving to a competitive low carbon economy in 2050' COM (2011) 112, 'Roadmap to a Single European Area' COM (2011) 144.

[3] COM (2011) 21 page 5.

[4] Author interview

[5] Energy roadmap 2050, COM (2011) 885/2 page 19.