

The EU climate change regime has increased CO2 emissions, contributed to deindustrialization and undermined European energy security. Do you agree and if so, why? What alternative policies would you recommend to cut CO2 emissions?

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THE FAIRY TALE, FLAWED ASSUMPTIONS AND FAILING ON ALL FRONTS:

Europe's climate change crisis, addiction to coal and a road to recovery

Imagine this fictional scenario depicted in *The Day After Tomorrow* actually happened.

After a series of extreme climatic events, the Northern Hemisphere is catastrophically wiped out under the sudden onset of a new ice age, the US President gives this remaining-survivor speech from Africa: *"For years, we operated under the belief that we could continue consuming our planet's natural resources, without consequence. We were wrong. I was wrong. Not only Americans, but people all around the globe have become guests in the nations we once called 'the third world.'"*

This paper is concerned with the EU's climate change policy regime and attention is given to separate out what politicians say versus reality. Against the backdrop of the multifarious nature of climate change, and to portray a true picture of what Europe faces - climatically, economically and security-wise - considerable reliance (and trust) must be given to what the scientists, climatologists and economists present. After all, they don't need votes to keep their jobs - unless they are Janet Yellen or Christine Lagarde.

Oxford's eminent economist-turned-climatologist, Professor Dieter Helm, provides a rigorous account of how, despite claims of 'world leadership', the EU's climate change regime has failed to cut CO2.¹ Helm's searching and convincing arguments, and his willingness to cut through rhetoric and spin to confront what really matters, lead me to agree with the question above. This paper will cite many of his specialist arguments, including, *"how Europe got itself into such an energy mess"*.

Uniquely, climate change policies require an equal dose of scientific and economic consideration and Helm's relentless focus on the costs of current climate change policies assists this paper's aim to differentiate fact from fiction i.e. what is, against the backdrop of the Eurozone crisis and recession, affordable.

As far as the two pillars of EU energy and climate change policy undermining European energy security of supply ("EESS") are concerned, the Internal Energy Market ("IEM") and the European Climate Change Package ("ECCP"), as emissions know no boundaries and EESS is sourced globally on a daily basis, the impact these specific policies have is contingent upon operating within the exogenous dynamics of the broader geopolitical landscape. The issue of EESS is far from straightforward as each member state is prioritizing according to its own economic and national interests of the day. The inability of the international community to exceed short-term targets to make the necessary sacrifices for long-term solutions is at the heart of CO2 increase. Helm observes, *"despite innumerable conferences, summits, proclamations, agreements and*

¹ Dieter Helm *The Carbon Crunch, How We're Getting Climate Change Wrong - and How to Fix it* 2012 (ed) Yale University Press

policy interventions, so far nothing much has been achieved...from a climate change perspective, it has all been pretty disastrous. By 2020, three decades will have largely been wasted....emissions keep rising...the concentration of carbon in the atmosphere is on the way to doubling from its pre-industrial level, and nothing much stands in the way of it trebling by the end of this century. It is hard to find any mainstream climate change scientist or economist who believes that global warming can be limited to 2C”.

Nietzsche once said, “*he who has the why can deal with almost any how*”. Although it is outside the scope of this paper to explore in detail the science and climatic impacts of global warming, when considering timescales and the urgency required to implement the existing ECCP and IEM, and their reforms, a crucial question is - are we likely to reach or even surpass 2C, and if so, what is the cause?

Prize-winning British scientist, futurologist and former global warming skeptic, James Lovelock, adopted a ‘sick-patient’ analogy to explain the current predicament. *“If in the coming decades, greenhouse gas emissions remain unabated and if climate sensitivity exceeds 6C, the Earth, by about 2050, will resemble - in every respect - a terminally ill patient for whom the only treatment option consists in a highly risky therapy (geo-engineering).”*²

Renowned NASA climatologist (and UNFCCC adviser), James Hansen was one of the first to sound the climate change alarm three decades ago and observed in 2007: *“the crystallizing scientific story reveals an imminent planetary emergency. We are at a tipping point incompatible with the planet on which civilization developed...and to which life is adapted.”*³

In 2013: Hansen offers some examples of the climatic impacts due to increasing (man-made) CO2 emissions caused by fossil fuel extraction: *“The Arctic sea ice is plummeting by more than a third in past few decades, at a faster rate than in most models⁴, and sea ice thickness is declining by a factor of four more than previous simulation models⁵. Greenland and Antarctic ice sheets began to shed ice at a rate, now several hundred cubic kilometres per year, which continue to accelerate⁶. While mountain glaciers recede rapidly all around the world⁷, hot dry subtropical climate belts have expanded as troposphere has warmed and stratosphere cooled leading to wildfires and droughts⁸, Mega-heatwaves have become widespread with the increase demonstrably linked to global warming⁹ in addition to ocean acidification¹⁰. Hansen could not be more clear that, “efforts to slow emissions of the principal atmospheric gas driving climate change, CO2, have been ineffectual so far...in the upcoming Fifth Assessment of the IPCC (2015)¹¹ the emission limit estimates are that the 2C global warming limit (agreed in UNFCCC Summit in*

² *Ethical Aspects of Climate Engineering* Betz, Gregor, Cacean, Sebastian pg 34/cf Lovelock in Goodell 2010:106

³ *State of the Wild: Perspective of a Climatologist*, David Kabraham (Apr 10 2007)

⁴ Strove JC, Kattsov V, Barrett A, Serreze M, Pavlova T, et al (2012). ‘Trends in Arctic sea ice extent from CMIP5, CMIP3 and observations’. *Geophys Res Lett* 39: (L16502)

⁵ IPCC Climate models - Ram Pal P, Weiss J, Dubois C, Campin JM (2011) IPCC

⁶ Shepherd A, Ivins ER, Geruo A, Barleta VR, Bentley MJ, et al (2012)

⁷ IPCC (2007); ‘*Impacts, Adaptation and Vulnerability*’ Parry, ML, Canziani O, Palutikof J, Van der Linden P, Hanson, Cambridge University Press

⁸ Held IM, Soden BJ (2006) (*J Clim* 19; 5686-5699/Dai A (2013) *Nature Clim Change* 3, 52-58

⁹ Rahmstorf S, Coumou D (2011) *Perception of Climate Change Proc Nato Acad sic USA* 108; 17905-17909

¹⁰ Bruno JF, Selig ER 2007 *plod one* 2: e711

¹¹ Intergovernmental Panel on Climate Change

Copenhagen 2009) implies a cumulative carbon emissions limit of the order of 1000 GtC."

He continues, *"the task faced today has become more difficult. Emissions reductions in the biosphere and soils are needed to get CO₂ back to 350 ppm, the approximate requirement for restoring the planet's energy balance and stabilizing climate this century. Such a pathway is exceedingly difficult to achieve, given the current widespread absence of policies to drive rapid movement to carbon-free energies and the lifetime of energy infrastructure in place."* He concludes, *"the stark reality is that global emissions have accelerated and new efforts are underway to massively expand fossil fuel extraction¹² by drilling to increasing ocean depths, into the Arctic and mining coal via mountaintop removal and mechanized long-wall mining. The growth rate of fossil fuel emissions increased from 1.5% year during 1980-2000 to 3% year in 2000-2012, mainly because of increased coal use.¹³ If this path (with 2% year growth) continues for 20 years and is followed by 3% year emission reduction from 2033 to 2150, we find that fossil fuel emissions in 2150 would total 1022 GtC. Extraction of the excess CO₂ from the air in this scenario would be very expensive (300-400 trillion or \$90,000 per individual) and perhaps implausible, and warming of the ocean and resulting impacts would be practically irreversible."*

¹⁴

INCREASING EMISSIONS

At the UN Framework Convention on Climate Change in 1992 ("UNFCCC 1992") the scientific community convinced over 170 world leaders to acknowledge man's role in causing global warming for the first time, or as Hansen calls it, *"changes of Earth's atmospheric composition...defined as an imposed change of planetary energy balance."* Also agreed was the need to limit fossil fuel emissions to avoid dangerous increases of carbon dioxide ("CO₂")¹⁵. To Europe's credit, by 1996 they had proposed to limit global warming to 2C relative to pre-industrial times based on evidence that ecosystems were at risk with larger climate change.¹⁶

High from the "great boom" of the 80's, the 1990's architects of the ECCP regime set out to lead the world towards a comprehensive global climate change agreement and a new international environmental order¹⁷. Proclaiming 'Europe will lead, others will follow', they aimed to set an example of the economic benefits of "decarbonisation"¹⁸ in the form of a low carbon and energy efficient global economy. However, clearly things haven't gone to plan with Jacques Delors 22 years later asking, 'if Europe will be content to follow the lead set by others?'¹⁹

¹² EIA 2011 *International Energy Outlook* <http://www.eia.gov/forecasts/ieo/pdf/0484.Pdf> accessed Dec 2013

¹³ BP *Statistical Review of World Energy* 2012

<http://www.bp.com/sectionbodycopy.do?categoryId=7500&contentId=7068481>

¹⁴ *"Dangerous Climate Change": Required Reduction of Carbon Emissions to Protect Young People, Future Generations and Nature* James Hansen, et al, December 2013 Vol 8 Issue 12 e81648 pg 18

¹⁵ Intergovernmental Panel on Climate Change (2007) *Climate Change 2007; Physical Science basis*, Solomon, S, Dahe, Q, Manning, M, Chen Z, Marquis M, et al editors Cambridge Univ, Press: New York 2007; pg 996

¹⁶ Randalls. S (2010) *History of the 2C Climate Target*. WIREs Clim Change 1, 598-605

¹⁷ Helm 'Energy Policy' 'Oil and Gas Perspectives in the 21st Century' *The European Framework for energy and climate policies* vol 64 Jan 2014

¹⁸ Helm 'Energy Policy' 'Oil and Gas Perspectives in the 21st Century' *The European Framework for energy and climate policies* Vol 64 Jan 2014

¹⁹ Delors J "Policy Proposal by Jacques Delors "Towards a European Energy Community: A Policy Proposal" Study by Sami ANDOURA, Leigh HANCHER and Marc VAN DER WOUDE (2013, Notre Europe)

Why the ECCP has failed to cut its emissions links back to the unrealistic expectations of the framework upon which it was built; The Kyoto Protocol 1997 (“Kyoto”). And In particular, Kyoto’s architect’s encouragement of participants to focus on capping emissions in key developed countries such as the UK and Germany. Those parties have stuck to the Kyoto path in the vain hope that the dirtiest carbon-intensive and rapidly-developing countries (India etc) will eventually follow suit. Crucially, the Europeans who signed up decided to stay the course despite the world’s worst emitters US, China and Canada refusing to join or ratify it at home. As Helm puts it, *“it was as if either all the carbon-intensive, coal-based goods from China didn’t matter, or they could be left for another day. Unilateral action was the order of the day, as if global warming was a national event.”*²⁰ Not to be overlooked, the ECCP was implemented as part of this broader international framework which Helm explains is fundamentally flawed. *“At the heart of the policy failures is Kyoto and the wasted years of political capital to build what was intended to be a credible, binding legal agreement around it. The reality is that the world leaders could never have succeeded and the tragedy is that they did not even realize this. It just is not possible to craft an international agreement that is binding, credible and enforceable on production targets.”*

As there are no glass windows between countries, increased emissions in any country in the world detrimentally impact the rest. Even if Europe capped its member states’ emissions successfully, the fact that carbon-energy intensive countries like China remain addicted to burning coal faster than any Western country, still means total global emissions rise.

From its inception, design flaws have condemned Kyoto’s effectiveness on capped countries to little more than lip-service. Without legally binding its signatories, Kyoto was is not only unenforceable but it lacks credibility. Additionally, its focus on production targets has a flawed rationale (likely due to reasons of free-trade and realpolitik); significantly the net result of not is that that capped countries “carbon footprint” of all the goods and services imported (from the world’s worst emitters) onto their shores is not taken into account. As Helm confirms, *“the Kyoto target approach is seriously misleading, whilst Europe has been deindustrialising its own production, it has not decarbonised its consumption... the reality is that Europe’s carbon consumption has been increasing. Rather than homing in on coal, China, economic growth and underlying population growth, the emphasis has been on the production of carbon emissions to the exclusion of what matters - Europe’s carbon footprint.”*

The irony underlying this paper’s proposition, that the EU’s climate regime has increased CO₂, is deepened by the Europeans having so forcefully claimed over the last two decades to be at *“the vanguard of international action to combat climate change”*²¹. In reality the opposite is true; countries such as the UK would have met their production targets *anyway* due to ongoing deindustrialisation and recession. For Helm this is an example of how hype can obfuscate hypocrisy; *“Rather than boast of their achievements, our political leaders should hang their heads in shame....It is this carbon consumption that matters in terms of global agreements and national burdens...This explains how not just Britain but Europe more generally reduce their emissions and can meet their Kyoto targets, and at the same time have little or no impact on*

²⁰ Helm *The Carbon Crunch, How We’re Getting Climate Change Wrong - and How to Fix it* 2012 (ed) Yale University Press pg 1-10

²¹ Helm *The Carbon Crunch, How We’re Getting Climate Change Wrong - and How to Fix it* 2012 (ed) Yale University Press pg 1-10

global emissions and hence climate change. Kyoto just made Europe look good and created the illusion of action."

Bringing it back to the ECCP, Helm points out, *"the 2020-20-20 Climate Change Package sought to demonstrate that a fast track programme of investing in current renewables and energy efficiency complemented by the world's first large scale emissions trading scheme - (the "EU ETS") - would provide a template for others to follow."* Discrediting policy-thinking such as Nicolas Stern's *Economics of Climate Change 2006 Report*²² he also emphasizes that, *"EU policies achieved at best little and probably made things worse and at great cost. Reinforced by their concentration on a short-term target of moving towards 20% renewable energy by 2020 to meet their 20% emissions target for a long-term problem. Why everything should add up to the magic number '20' when set against the great-burning expansion, remains a mystery. The economic illiteracy is astonishing."*

In the wake of the Eurozone crises, the EU's increasing loss of credibility on climate change turned to humiliation in 2009 at Copenhagen²³ when Europe's leadership reached, what Helm calls "a farcical climax." Having offered a 30% reduction in its emissions if anyone followed, the EU's proposal was ignored as the US and China cut their own secret deal. Known as 'The Copenhagen Accord' its aim is to *try* to limit warming to 2C.²⁴ Despite claims of "breakthrough" at the time, Helm gives his take on the following 2011 summit. *"If Copenhagen went badly, Durban was a disaster with the net result that all that was "agreed" (amidst the media circus and hungry politicians) was that by 2015 the parties would try to agree what they might do after 2020."*

To recap why ECCP has in reality caused emissions to rise, can be summarized in three ways: Firstly, that "current" renewable technologies (wind, solar, biomass and nuclear) are either far too expensive, small scale or unreliable to fill the huge hole left by making the transition away from fossil fuels' sources of energy. Secondly, by focusing caps only on selected industrial polluters production, it not only excludes the world's worst (non-participating) emitters CO2 but also excludes taking into account individual countries carbon-intensive imports. Thirdly, Kyoto's production-only based targets work conveniently in favour of countries already in full swing of deindustrialization (plus a recessional economy), allowing them to gain credit for very little effort.

THE "DASH-FOR-COAL-ADDICTION"

Since 1990, the growth of emissions has resulted from an unprecedented economic and population expansion, based on coal and China. Of the most intense users of coal, China, has the worst addiction. It is projected, says Helm, that *"by 2020, China will have doubled its economic size yet again which will mean the build of 400-600 GW of new coal-fired power stations with emissions estimated to surpass 400 ppm"*²⁵.

²² Nicholas Stern *The Stern Review on the Economics of Climate Change 2006 (HM Treasury)*

²³ 2009 United Nations Framework Convention on Climate Change/5th Meeting of the parties to the Kyoto Protocol

²⁴ Copenhagen accord (2009) UNFCCC, Draft decision -/CP.15 FCCC/CP/2009/L.7 18 December 2009

²⁵ International Energy Agency, *Coal; Medium-term Market Report; market trends and projections to 2016*, Dec 2011 pg 9, p31

Following the Fukushima nuclear disaster in 2011, Germany reversed its commitment to low-carbon generation and revoked its decision to close eight nuclear reactors. In its place conveniently “using” low-cost replacements; 7-8 GW lignite-based nuclear power stations, which according to Helm are, “*as about as dirty as you can get*”.²⁶ Germany’s carbon production is rising and the final nail in the ECCP’s coffin is that as a result of the US “shale revolution” the former “enemy of global warming” has amongst the fastest falling CO2 emissions in the world, whilst Germany’s are increasing.²⁷

CARBON CONSUMPTION AND COSTLY RENEWABLES

The UK is a good example of a country claiming credit for meeting Kyoto targets while suffering from a bad case of carbon-consumption. “Focusing on this reveals the true scale of the deception; whilst carbon production fell by 15% from 1990-2005, carbon consumption went up by 19%.”²⁸ Self-congratulation over meeting its 2020 targets is misplaced; alongside Japan and the Netherlands, in 2011 the UK became one of the world’s worst consumers of US coal exports²⁹. As part of the ECCP implementation, the ‘Stern Report’ 2006 mistakenly promoted “current” (wind, solar, biomass) renewables by claiming that costs of mitigation would be low or even zero. Helm elaborates, “just because the UK isn’t burning as much coal as Germany, the obsession with offshore wind in the North sea will make no difference to climate or Britain’s carbon footprint. It’s a question of basic arithmetic - even with the largest wind turbines, hundreds are needed to match a single gas, coal or nuclear power station...worse not only are they expensive and ineffective due to intermittency issues, wind energy may even drive up energy prices and thereby further deindustrialisation at home, relying on even more imports of carbon-intensive goods from abroad - why did these Europeans choose the most expensive first?”³⁰

Not only are CO2 emissions on an upwards trajectory, but the EU ETS and its carbon price have also hit an all time low. This is against the backdrop of the ‘great-burn’, to which Helm refers, meaning the post-Kyoto explosion in fossil fuels extraction, the implications of which Europe is only just beginning to grapple with.

The small take-away for the ECCP players is that, as Delors admitted³¹ while at the expense of their “international credibility”, for two decades the Kyoto regime gave the Europeans ‘much credit for very little effort’. The truth is they have been deindustrialising *anyway* as a result of a prolonged economic crisis from 2007. At the same time the ECCP began to be implemented. Helm helpfully points out, “*while it (ECCP regime under Kyoto) did nothing to address global warming, indeed it may have made things worse (shipping costs etc)...the Eurozone crisis in particular meant that the expected European GDP growth when the package was agreed failed to materialize. Europe had at least discovered one way to reduce emissions - reduce GDP.*”³²

²⁶ Helm, *The Carbon Crunch* (ed) 2012 Yale University Press pg 6

²⁷ Helm *The Carbon Crunch* Yale University Press pg 1-10

²⁸ Helm, *The Carbon Crunch* (ed) 2012 Yale University Press pg 7

²⁹ ‘*European energy policy in the new geopolitical context* Helm *The International Club*, Vienna Oct 23 2013 Aurora Energy Research EIA

³⁰ Helm, *The Carbon Crunch* (ed) 2012 Yale University Press pg 6

³¹ Delors J et al ‘Towards a European Energy Community: A Policy Proposal’ 2013 Jacques Delors et al

³² Helm ‘*Energy Policy*’ ‘oil and gas perspectives in the 21st century’ *The European Framework for energy and climate*

FROM HUBRIS TO HUMILIATION

Before considering how the EU climate change regime contributed to deindustrialisation, a definition is required. Helm calls it, *"relying on imports of carbon-intensive goods from abroad"*, while Andrzej Ancygier writes that, *"deindustrialisation, is understood as a decrease in the role of industry in creating GDP."* He adds, *"it is taking place in the EU, decreasing competitiveness of European enterprises and forcing industry to leave the EU and set up abroad. In fact, The EC Commissioner for Energy, Gunther Oettinger, has confirmed the process of deindustrialisation in Europe has already begun."*³³

In 2014, Europe remains in the unenviable position of being on the back foot regarding competitiveness with US and China as it is saddled with debt, low economic growth, fragmented energy supply and high fuel prices. But as Helm argues, miscalculations have been largely due to reliance on antiquated 'assumptions'. The main flawed assumption they have clung onto is Hubbert's 'peak oil theory'. Helm elaborates, *"peak oil turned out to be nonsense; global reserves keep coming, especially from unconventional. Technical progress has transformed the fossil fuel outlook, with the US moving towards energy independence and bringing with it cheaper energy supplies, especially gas. Europe faces an enormous competitiveness challenge, exacerbated by the costs it has self-imposed by putting so much priority on short term renewables targets."* Hardly the best environment for a reassessing the climate change regime.

FLAWED ASSUMPTIONS

Just as Europe's leaders are not candid over CO2 increases, they also mask the economic realities and true costs attached to their 'Roadmaps' and low-carbon energy "winners". In New York 2009 the EC President, Jose Manuel Barroso, declared that for climate change, *"the economic case is as strong as the scientific. It presents an immense economic opportunity - it's about surfing the next wave of economic development – Europe's 20-20-2020; cutting emissions by at least 20% below 1990 levels by 2020 and doubling the share of renewable energy to 20%. We think this will generate some 90 billion (130 bbs) of additional investment in renewables, and some 700,000 new jobs in this sector, as well as reducing our oil and gas import bill around 45 billion a year by 2020."*

As Helm debunks; *"such claims stretch economic and political credibility, especially when it jars with customer's bills. The mantra about the sunny uplands of 'green growth' and decarbonization by 2020 just keeps on getting trotted out. It's hard to take seriously - that the world's carbon-based economy can be decarbonised in a few decades without economic pain."*

Similarly, EU Commissioner for Climate Action, Connie Hedegaard, likes to emphasize that; *"added investment would stimulate new sources of growth, preserve existing jobs and create new ones."*³⁴ But Helm disagrees. *"They think they have an ace up their sleeves; all this*

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³³ Ancygier A. LSE/EUROPP blog <http://blogs.lse.ac.uk/europpblog/category/authors/andrzej-ancygier/> accessed January 17th 2014)

³⁴ "The EU's Role in Fighting Climate Change", in Barysch, K. (ed) "Green, Safe, Cheap; Where next for EU energy policy?"

infrastructure investment will, they claim, create jobs and economic growth but the costs have to be paid, and these raise prices above those of our competitors blessed with cheap energy,

especially gas. Lots of traditional 'brown' jobs in industries sensitive to energy costs are being lost, and in the meantime alternative investments, such as gas infrastructure and liquefied natural gas ("LNG") plants, fail to materialize. Although it would be nice to pretend the costs don't matter, sadly resources are limited. Hedegaard's claims should be treated as political advocacy, not hard economics. Intermittency (of wind and solar) is expensive, full stop."

Even in 2013 EEC regime architect, Jacques Delors, is still spinning the yarn that global warming is a "crisis which offers an opportunity."³⁵

As to why the ECCP has contributed to Europe's deindustrialisation, a summary of the flawed assumptions can be found in 'Annex 1', but in essence it is all about believing fuel prices are rising because of a blind belief in 'Hubbert's curve' on fossil fuel reserves.³⁶ As demonstrated above, faced with climate change, Europe's leaders (with EECP architects) promoted the idea at home and abroad of renewably-generated "green growth" and wishing to 'kill two birds with one stone'; CO2 and a recessional economy. By 'decarbonising', they claimed, Europe could miraculously achieve the required competitive advantage over more fossil-fuel-dependent countries such as the US. By implementing Kyoto's carbon caps and setting up the EU ETS the market would seize this opportunity of a lifetime. How wrong they have turned out to be. Rather than attracting investment and energy-intensive industries into Europe, at the start of 2014, industry is exiting for the US to take advantage of cheap US energy. Against the 'great-burn' and excess supplies of new cheap gas and coal, rather than renewable energy turning out to be 'cheap' the reality is that it's excessively expensive.³⁷

ECCP's central pillar is the idea that current renewables - wind turbines and rooftop solar - are the future clean-tech "winners" and will kick start a "Green Revolution". The main policy instrument, as Helm observes, "was given the title 2020-20-20. (20% carbon reductions, 20% energy efficiency) achieved by 2020"³⁸. *The idea that the right answers all added up to the magic number 20 is laughable and economically absurd. Climate change is a long-term problem; it has multiple facets, and the 20% renewables target skewed the market towards a small number of what are in most cases very expensive technologies."*

Not dissimilar from the UK's own "obsession", as Helm puts it, with offshore wind, Germany has taken an equally costly path influenced by the "green NGOs and green parties" determined to phase out nuclear and replace it with "a diet of wind farms and solar panels, complemented by energy efficiency measures". In addition to the flaws inherent in Kyoto's production-targets, similarly "these core design faults (that) were either glossed over or ignored" are having the accumulated effect that the ECCP's is adding fuel to Europe's deindustrialisation fire.

From a climate change perspective, the main mistake was the "cap and trade" system of the EU

³⁵ Delors J. *Towards a European Energy Community: A Policy Proposal* Study by Sami Andoura, Leigh Hancher and Marc Van Der Woude (2013, Notre Europe)

³⁶ J.R. Wood. "Peak Oil: The Looming Energy Crisis". Michigan Technological University. Retrieved Jan 2014

³⁷ Helm, *The Carbon Crunch* (ed) 2012 Yale University Press Part 2 pg 75-156

³⁸ Commission of the European Communities (2008)

ETS. As “supply-side” theorist, Hans-Werner Sinn explains, “By setting an overall cap, if renewables reduced emissions, then there was more room to burn coal and other fossil fuels inside the cap with coal offsetting the renewables rather neatly, undermining all the benefits.”³⁹ Given what the policy-makers are told about the damage coal-CO₂ does to the atmosphere, it is scandalous that coal offset should be allowed and alone institutionalized in the “market-approach”.

SUBSIDIES

In his preface, this is what Helm had to say about his time as Special Adviser to EC Energy Commissioner Oettinger: “I saw firsthand how Brussels works. It was not always a pretty sight... the conduct of the lobbyists - particularly the green politicians and green NGOs - was very disillusioning to someone who is both deeply concerned about green issues and who has been deeply pro-European.”

The ECCP architects justify the huge (tens of billions of euros and pounds) subsidizing wind, solar and biofuels (as opposed to R&D, smart grids or infrastructure interconnections) based on the economic argument that capital costs will eventually be lowered and returned. While in reality wind costs continue to climb at an ever alarming rate and as companies like the German manufacturer of photovoltaic (PV) Q-Cells came to discover, the costs of solar may have crashed but only to the competitive advantage of the Chinese who ripped off the technology and undercut the European market.

THE EU ETS

The clearest evidence that few believe that the ECCP regime will either cut emissions or boost the European economy, came on July 25th 2012, with the collapse of the EU ETS’ carbon price. This resulted in, Helm explained, “the Commission trying to fix both the price and the quantity; the renewables emissions gains were offset in the EU ETS and the coal burn went up”⁴⁰. From a climate change perspective, it was conclusive; ECCP had failed on all fronts.

While it is outside the remit of this paper to discuss the EU ETS and carbon pricing in detail, one clear mistake on the Commission’s part was to give out free allowances as part of the EU Allowances (EUAs), thereby bringing the carbon price to the floor. In phase 3 (2013-2020) a single, EU-wide cap on emissions replaced national caps. Auctioning is the new mechanism for allocating allowances. In 2013 more than 40% of allowances were auctioned with a larger number (on an annually progressive basis) intended to be released at the end of the 2020 trading period. For those free allowances, “harmonized” allocation rules apply based on new EU-wide benchmarks of emissions’ performance.⁴¹ Whether these tweaks will win back any credibility from the ECCP remains to be seen. But the ‘temporary’ crisis has brought to the fore not only the “internal contradictions and confusions at the heart of European policy which has undermined the climate change framework”⁴² but also the detrimental effect the highly paid

³⁹ Hans-Werner Sinn “*The Green paradox a supply-side approach to global warming*”, Cambridge, Massachusetts MIT press 2012

⁴⁰ Helm ‘*Energy Policy*’ ‘oil and gas perspectives in the 21st century’ *The European Framework for energy and climate policies* Vol 64 Jan 2014

⁴¹ Nunes Joao dos Santos Presentation at City Law School on EU ETS Nov 2012

⁴² Helm ‘*Energy Policy*’ ‘oil and gas perspectives in the 21st century’ *The European Framework for energy and climate policies* Vol 64 Jan 2014

lobbyists for “current” renewables companies are having on the need for effective and urgent action to address cutting CO₂, as identified by Hansen (above).

To explain the oxymoronic manner which the ECCP has been operating at a national level and how the “sceptre”⁴³ of deindustrialisation has caused Europe to regress in CO₂ terms (so that it can *progress* in industrial (and export) terms) - there is one place to look; Germany.

Following the humiliation ECCP’ protagonists suffered at Copenhagen⁴⁴ and Durban⁴⁵, the ‘green NGOs and green parties’ in Germany were quick to wield the Fukushima nuclear disaster on 11th March 2011, as a political weapon against Angela Merkel. Within two months Germany had announced it was shutting down all its nuclear plants (most immediately with the rest phased out over a decade). The motivation, as Helm explains, behind this bold new energy policy, “*was driven more by short-term political calculation than any rational plan*”.

The net outcome from an ECCP perspective, with the carbon price at rock bottom and acting as no deterrent, Germany chose to fill the hole left by exiting nuclear and decided to switch to the cheapest way to generate electricity for energy-intensive industries – coal-burn. Having built itself up since WWII and the fall of the Berlin wall, Germany is refusing to slip further into the doldrums of deindustrialization, so it made the stark choice of growing industry (particularly exports to China) over carbon compliance. Proof of how the economics of the day determines energy policy. While the ‘Energiewende;’,⁴⁶ renewables, energy efficiency and sustainable development might be long-term objective on paper (Roadmap 2050), in reality, Germany has in gone from wanting to lead the Green Revolution to becoming Europe’s Number One carbon emitter, while dragging Italy, Switzerland and Belgium along with them (also quitting nuclear).

As Helm summarizes, “*Germany now combines the building of new lignite based coal power stations with some of the most expensive electricity in the developed world.*”⁴⁷ And here’s the rub; because the cost is so high, Germany has been excused from the cost of renewables and associated subsidies. Due to the fragmented nature of the market there is no single electricity price, and disadvantaged energy companies are filing complaints to the Commission for unfair competition. As such Germany’s carbon production is rising and the final nail in the ECCP’s coffin is that as a result of the US “shale revolution” the former “enemy of global warming” has itself managed to squeeze out coal and now has amongst the fastest falling CO₂ emissions in the world, whilst Germany’s are going up.”⁴⁸

At the international level, the total disinterest US and China shown in Europe’s 30% target offer at Copenhagen (2009), highlighted that none of the serious players have any real regard for “cap and trade” regime. Quite the contrary the superpowers saw through it as a mark of poor economic success, low GDP and lack of innovation. In this sense not only was “*Europe’s leadership in tatters,*” as Helm observed, was barely worth discussing and was viewed as ‘on a hiding to nowhere’; evidenced most brutally by Canada, Japan and Russia all abandoning it after

⁴³ LSE/EUROPP blog <http://blogs.lse.ac.uk/europpblog/category/authors/andrzej-ancygier/> accessed January 17th 2014)

⁴⁴ UNFCCC Dec 2009

⁴⁵ UNFCCC Nov 2011

⁴⁶ Meaning energy transition to a sustainable economy

⁴⁷ Helm The Carbon Crunch Yale University Press pg 32-56

⁴⁸ Helm The Carbon Crunch Yale University Press pg 75-120

Durban (UNFCCC) in 2011.

The fiasco and wasted political capital of Durban (UNFCCC 2011) is evidential in its conclusion; an agreement to agree (the form of such an agreement to be decided) by 2015 (The Copenhagen Accord) what the (primarily US and China) might do after 2020. As Helm decodes in climatologists speak, *“this means if China and India continue to grow at around 7% p.a. the economies would double in size before anything happens, this would mean around 400-600 GWs of new coal-fired generation added to these two countries.”*

Europe is still in economic decline and its ECCP has failed to keep up with the times or any of its promises; its adoption of the flawed rationale of Kyoto with its easy-to-reach-targets and easy-to-manipulate mechanisms - the EU ETS - is a contradiction of coal offsets and carbon allowances and is now viewed by serious climatologists and commentators as ineffectual, flawed-by-design and too susceptible to the influence of “vested interests”. As this paper concludes, a globally adopted carbon tax (or “fee”) is the best chance of averting catastrophe as we climb dangerously towards “2C”. Given Europe’s track record to date and what’s at stake for its industrial economies, when it comes to a new global climate change regime, it will be the “US-Chinese axis” that who will be deciding the direction of travel from 2015.

ENERGY SECURITY OF SUPPLY

As an economist, Helm devotes much discussion to how the ECCP made its “central error” over fossil fuel prices and overestimating “current” renewables as the key to European competitiveness.

As anyone running an energy-intensive company or energy customer in any member state (save Norway (not a member) and Europe’s main gas supplier before Russia) is only too aware, Europe is in an ‘affordability crisis’. The ECCP’s belief that energy efficiency measures would cut demand and bills has turned out to be flawed. Comparatively high living standards compared to the Chinese, for example, and pressures put on energy supply systems with increased population growth, have spelt high energy demand. The ECCP implementers have been misguided in their assumption that demand would decrease, as a result of energy efficiency measures, when in reality they have soared. Households who save on energy costs actually increase energy consumption and similarly, the first thing energy-intensive companies do with any savings is to reinvest and expand their capacity - increasing energy consumption.⁴⁹ Put simply, the greatest damage caused by Europe’s sustained deindustrialisation period and the ECCP’ unrealistic policy regime is that instead of remaining in the EU (to aid the recession and high unemployment), energy-intensive companies are exiting to the US to take advantage of less demanding and lower energy prices (see Annex 1). Cheap energy supply attracts foreign investment.

Ironically, from a price and costs perspective, the ECCP push for “current” renewables and energy efficiency is increasing, turning consumers to revolt against their ‘low-carbon energies’ policies and subsidies because they drive prices ever-upwards while other nations (US in particular) enjoy cheap prices and competitiveness. Both Europe’s leaders and the ECCP architects are making the mistake of sticking to the past and reacting too slowly to developments in the rest of the world.

⁴⁹ Helm, *The Carbon Crunch ‘Can demand be cut?’* 2012 Yale University Press pg 100-120

To the major disadvantage of the ECCP, in 2007 with the application of 2020-20-20, a development was already well underway in the US propelling the world into a new era which not only proved 'peak oil' wrong but ushered in an energy supply surplus bringing brought the "US competitive effect"; the fossil fuel renaissance.

Since the onset of the shale gas or "unconventionals" revolution over the last 15 years, Helm explains, "*a transformation of US energy markets took effect which the Europeans seem not to have noticed; that the energy world around them was being turned on its head.*" The biggest impact of this renaissance in fossil fuels has been on fossil fuel prices; contrary to assumptions of the ECCP, since the 1990s prices are now sustaining a *lower* not higher trajectory. Helm explains, "*gas is four times more expensive in Europe and the US petrochemicals industry is exploding, exacerbating European industrial decline and exits. Europe's industries now have somewhere else to go...the US...while Europe has invested in some of the most expensive energy technologies (wind, solar, biomass etc), America now has some of the cheapest.*"⁵⁰

From a consumer perspective, this breakthrough is thanks to advances in new technologies that aid the extraction of shale gas, shale oil, and other 'unconventionals' (including coal-bed methane, tar sands and tight gas) while at the same time enabling increases in conventional oil and gas production by maximizing existing reserves. From a climate change perspective, Helm reminds us, this development provides a double edged sword, "*The assumptions based on fossil fuel scarcity has turned out to be wrong...now there is enough to fry the planet several times over.*"⁵¹ Most significantly from a CO2 perspective, Russia plans to exploit the Arctic. Despite conventional finds in the North Sea, it is Europe's regional neighbours who are most likely to provide it with much needed supplies, notably North Africa and Turkey. Algeria is Europe's 3rd largest gas supplier but security risks are high after the attack on BP/Statoil' gas plant in In Amenas.⁵²

EESS

Before answering how the ECCP and its sister instrument, the Internal Energy Market ("IEM") may have impacted upon EESS, the next question to ask is how has this "US competitive effect" undermined it. There simply is not room to cover the broader geopolitical landscape of EESS within which the ECCP is attempting, and failing, to steer⁵³ Europe and the rest of world towards a low carbon future, however, in addition to referring the reader to 'Annex 1' (based on Helm's own breakdown) here is a brief outline of the main influencing factors.

Heading deeper into decentralisation and up against a recessionary economy and increasing demand, the implications for EESS are "alarming".⁵⁴ Having only clocked onto the rich opportunities offered by the shale revolution in the last couple of years, Europe is woefully behind its main regional-block competitors the US and "BRICS"⁵⁵ nations. Hydraulic fracturing and horizontal drilling has hardly begun in Europe while the US has been perfecting its use and

⁵⁰ Helm, 'The European Framework for Energy and Climate Policy' Energy Policy 64 (2014) 29-35

⁵¹ (Helm, 'The European Framework for Energy and Climate Policy' Energy Policy 64 (2014) 29-35

⁵² (Congressional Research Service 'Europe's Energy Security: Options and Challenges to Natural Gas Supply Diversification' Michael Ratner, Belkin, Nichol Woehrel 20 Aug 2013

⁵³ Stewardship according to former Chancellor, Nigel Lawson

⁵⁴ Helm European energy policy in the new geopolitical context The International Club, Vienna Oct 23rd 2013

⁵⁵ Brazil, Russia, India and China and South Africa

regulatory regime for the last three decades. The ECCP has been focusing on its “silver bullets” (as Helm calls them); “current” renewables, energy efficiency and nuclear at great cost exacerbated by considerable network grid disturbance inherent in the “intermittency” drawbacks of wind and (to a lesser extent) solar supply. This inadequate supply policy has contributed to Europe’s increased dependency on both MENA and Russia for its oil and gas supply. Meanwhile, the US edges towards energy independency, less dependent on the Middle East to the degree that is fast becoming a major exporter to the rest of the world and even looking to exploit the European market for itself, according to Michael Ratner’s CRS report for Congress⁵⁶.

THREATS

Collectively, Europe’s demand is now so high it’s become one of the world’s largest energy importers; importing 55% of their energy supply - 84% oil and 64% of their natural gas⁵⁷. Relevant to the climate change agenda, the report confirms that coal use rose between 2011-2012 supplied partly by US, while (forecast by the EC) the EU will import over 80% of its natural gas needs by 2030, mainly due to Germany and others exiting on nuclear, France’s ban on shale and a fragmented non-liberalised market with high costs and inadequate physical infrastructure.

From a CO2 perspective, while the CRS report gives the good news that “*EU member states increasingly rely on natural gas, particularly to reach ambitious targets to reduce CO2*”, crucially, from an EESS perspective, the bad news is that 34% of that supply market share to Europe is forecast to come from Russia. CRS reports, “*it is important to keep in mind that Russia not only holds the largest supplies of natural gas globally but already has significant infrastructure connecting its resources to Europe.*” Post-communism, historically a mistrusted nation by most American and European countries’ standards, this threat of over-dependency on Russia as a single supplier of gas (excluding the UK), and in particular, to Germany (heavily reliant on the majority-Russian-owned Nord Stream pipeline)⁵⁸ is further evidence of how readily Gazprom has manipulated its gas prices and sources of supply (causing “cut-offs”) as they did with Ukraine in the “gas wars” of 2005-2006. This fear has not been allayed by their withdrawal from the European Energy Charter Treaty, intended to provide protection against this kind of behaviour. Similarly, fears of market abuse and price leveraging are not helped when, as Ratner observes, Gazprom has been allowed majority ownership of many of Europe’s most crucial distribution and storage infrastructure hubs. Similarly unhealthy is the show of power Gazprom has been demonstrating. “*The Nabucco pipeline project was the centrepiece of European energy diversification and has been replaced by TAP with significantly less capacity...Moscow continues to push forward with its South Stream pipeline which observers believe is at least partly intended to thwart European backed diversification efforts.*”

With dual pressures to address rising demand and CO2 emissions, it is only fair to acknowledge the challenge ECCP policy-makers face; a dilemma of making the ‘right’ choice of encouraging a switch from coal to gas, but in doing so exposing those countries to a higher-risk energy security

⁵⁶ Congressional Research Service ‘Europe’s Energy Security: Options and Challenges to Natural Gas Supply Diversification’ Belkin, Nichol Woehrel Aug 2013

⁵⁷ Aurora’s long term outlook for gas demand and supply 2007-2030 June 5 2010 p5

⁵⁸ Germany - Second biggest natural gas consumer and Russia’ largest market, relied on Russia for almost 35% of its imports in 2012. Germany’s planned closure of its nuclear power plants highlights its greater reliance on Russia and its Nord Stream pipeline. Nord Stream pipeline (2011 opened) is operating at approx 80 of its 2 tcf capacity

of supply. Ratner suggests that one alternative, especially in the vulnerable “Southern Corridor” could be to redirect US and European efforts from Central Asia to MENA - especially Libya and Egypt - as an alternative to Russian natural gas supplies - thereby improving the chances of more natural gas reaching Europe in the shorter term. Ratner concludes, *“in the face of rising concern about Europe’s reliance on Russian energy and growing pressure to address global climate change, EU member states have begun increasingly to cooperate towards an ‘Energy Policy for Europe’.”*

Having arrived late to the shale gas party, this paper now deals with the ECCP’s most pressing EESS issues and outlines a brief ‘road to recovery’ to effect *real* cuts in CO₂ emissions.

Since 1951’s ECSC⁵⁹ the architects of energy policy and ECCP have wanted a single energy market to neutralise competition between member states over resources while at the same time aiming to punch their collective competitive weight as a region on the world stage.

Given the high level of imports Europe is forecast to rely on, Hedegaard’s claims that wind “will” boost EESS and that, *“the investment will be largely offset, or even overcompensated, by major reductions in the EU’s oil and gas imports”* is untrue. Hedegaard’s claim that energiewende will insulate it from future “price shock” because of its independence from fossil fuels is equally misguided. The intermittency issues of wind and solar cause havoc with energy systems; as they take priority over the cheaper energy sources by pushing gas “off grid” when wind is “on grid” at great cost (for storage and back-up supply) all passes onto the consumer.

Today’s “current” renewables are inadequate to meet Europe’s level of demand and the ECCP policy should dump its 2030 targets and rapidly re-direct its efforts on a robust and realistic new policy agenda; for the short term: (i) bring back gas stations and create capacity markets ii) drastically cut wind (especially offshore), solar farms and biomass subsidies; medium term re-direct into Carbon Capture Storage iii) collective energy security measures, focus on Turkey iv) implement an EU-wide carbon tax and border adjustment regime on all imports of goods produced using coal v) full EU-wide implementation of ICAO international aviation emissions scheme choosing the ‘multiple ‘bands’ method-based Per Plane Tax (PPT) designed for ‘environmental purposes’ and to ‘induce behavioural change’⁶⁰ as proposed by the UK vi) introduce a global carbon fee (tax) at 2015 summit with its own Global Carbon Agency (setting a predictable carbon price) and Carbon Court (see below for rationale) vii) new nuclear with focus on eradicating the waste threat and upgrading reactors; long term viii) new R&D investment in “future” and commercially viable clean energies ix) ‘fracking’ in non-sensitive EIA approved zones x) complete IEM integration and liberalisation reforms with an ‘Energy Community Court’⁶¹ x) a ‘collective’ European Energy Community (‘EEC’) with “Associated Status” for tiers of Treaty “integration” and no protectionist measures over member states not wishing to relinquish their national energy security sovereignty. All decisions to be made by The European Council with the EC performing an administrative role drafting the “harmonisation” strategy and regulation proposals for approval by national governments. Fast implementation of the three priorities; i) strengthening cooperation for energy networks ii) common energy fund

⁵⁹ European Coal and Steel Community

⁶⁰ Steven Truxal ‘Evaluating Three Levels of Environmental Taxation in Aviation: Global limitation, EU determination and UK self-interest?’ (co-author, Dunbar) in *Market Instruments* (2012: 275-289)

⁶¹ CEPS Policy Brief ‘Deploying the Energy Incentive: Reinforcing EU Integration in South-East Europe’ Alan Riley No 296, 8 July 2013)

iii) establish gas purchasing groups⁶² as identified by Helm in his analysis of the two pillars of the European energy and climate change regime; IEM and CCP. The priority for the IEM in the short term should be to proceed with the “liberalised” single competitive market and, in particular, to implement rapid ‘harmonisation’ of i) network charges ii) common accounting rules and asset valuations while also helping ECC’s member states to make a collective effort (through investment and regulatory approvals) to make physical infrastructure interconnections, networks and grids a reality.

Currently, under Article 194(2) of the Treaty on the Functioning of the European Union (TFEU), competence for energy security policy and its ‘energy mix’ is reserved via treaties to individual member states.

The latest attempt to steer Europe’s energy sector towards prioritising climate change, was the EC’s Energy Roadmap 2050. Not surprisingly it doesn’t seem to be going very well. As Fischer and Geden⁶³ observe, *“the European consensus that climate policy should determine energy policy is likely to erode.”* Rather than the ECCP undermining EESS, the regional picture reveals that in addition to the geopolitical landscape, the main obstacle to progress are the national governments themselves. Rather than *“consider the costs of change borne by the public, especially the young people and future generations”*⁶⁴ countries want to retain power to make the necessary decisions required for the economic and security issues of the day. As such Member States are a long way off accepting any curtailment of their sovereignty regarding energy supply. At a national level, electricity generation portfolios tend to be influenced more by the profit calculations of lobbyists and private sector companies than climatologists or bureaucrats. As Fischer and Geden explain, *“the EU has absolutely no responsibility for the energy or electricity mix in the member states... so any attempt by the EU to intervene directly with a member’s national sovereignty would be regarded as an affront.”* And lament that, *“The Energy Roadmap 2050 will disappear in the files of the administration for the moment...the EC outline paths that could be pursued but fail to create real political motion”*.⁶⁵

The primary challenge for the EU is its fragmented internal European electricity market. The IEM’ has been trying to provide a greater level playing field across the EEC to create greater competitiveness and lower electricity prices to pass onto the consumers. There has been sketchy implementation to date. Fischer and Geden continue, *“if the largely uncoordinated coexistence of twenty-seven national energy strategies continues, the EU will not be in a position to achieve the desired emissions reductions by 2050 without having to accept problems in the areas of security of supply or cost efficiency. Moreover, the contribution of renewables in a decarbonisation scenario already has to be so large that national sovereignty over the energy mix would be successively undermined anyway.”*

⁶² Jacques Delors ‘Towards a European Energy Community: A Policy Proposal’ Andoura, Hancher and Van Der Woude 2013 Notre Europe

⁶³ Severin Fischer and Oliver Geden ‘The EU’s Energy Roadmap 2050’: Targets without Governance’ SWP Comments 8 March 2012

⁶⁴ ‘Assessing Dangerous Climate Change’ James Hansen PLOS Dec 2013 Vol 8 Iss 12 e81648

⁶⁵ Severin Fischer and Oliver Geden ‘The EU’s Energy Roadmap 2050’: Targets without Governance’ SWP Comments 8 March 2012

Getting the gas flowing across Europe with all the CO₂, competitiveness and security benefits it would bring block as a whole, if presented correctly on a sound economic footing it should be saleable enough for the European Council to bite. The IEM, ECT EEC regime's all need coordinating to identify the best route to raise the trillions of euros required to fund Europe's first proper make-over. Therefore the Commission's actions to i) oblige network operators to submit network development plans to "harmonise" all of the electricity generating structures under the IEM regime need to be encouraged.

In the medium-longer term, for the 'road to recovery' to get under way, the world needs to come clean about its addiction to carbon-consumption, receive the right medication and start on its new environmentally enlightened path into the "post-fossil fuel" era. As this paper began with the foresight and credibility attributed to James Hansen and Dieter Helm; two of the most widely recognised climatologists in the world, this paper will also end with their thoughts and specialist knowledge.

HANSEN ON 'A CARBON FEE'

"A basic requirement for phasing down fossil fuels emissions is abundant carbon-free electricity - the most rapidly growing form of energy which has the potential to provide energy for transportation and housing of buildings. The transition to post-fossil fuel world of clean energies will not occur unless they appear to both the investor and the consumer as the cheapest energy.

Fossil fuels are cheap only because they do not pay their costs to society (the climatic impacts above) and receive large direct and indirect subsidies. The essential underlying policy, albeit not sufficient, is for emissions of CO₂ to come with a price that allows these climate and environmental impact costs to be internalised within the economics of energy use. The price should rise in a predictable way to enable people and businesses to efficiently adjust lifestyles and investments to minimise costs. Reasons for preference of a carbon fee or tax over cap-and-trade include the former's simplicity and relative ease of becoming global⁶⁶. A near global carbon tax might be achieved, for instance, via a bi-lateral agreement between China and the US, the greatest emitters, with a border duty imposed on products from nations without a carbon tax. This would provide a strong incentive for other nations to impose an equivalent carbon tax.

*A tax beginning at \$15/tCO₂ and rising \$10/tCO₂ each year would reduce emissions in the US by 30% within 10 years a rising carbon fee is the sine qua non for fossil fuel phase out.*⁶⁷

HELM ON THE ELECTRIFICATION OF TRANSPORT

Under 'Investing in New Technologies'⁶⁸ Helm highlighted this as a rapidly expanding market and, in my opinion, this is where the Next Generation revolution is going to take place. This Autumn 2014 the Formula Electric Championship (FIA) will launch its first electric racing car season in Beijing. 'The Electric Era' presents opportunities for companies, the consumer and cutting emissions, importantly it also offers transition out of oil.

⁶⁶ Hsu S L (2011) *The Case For A Carbon Tax.* Washington DC Island Press

⁶⁷ Hansen J 'Assessing "Dangerous Climate Change": Required Reduction of Carbon Emissions to Protect Young People, Future Generations and Nature.' *PLOS ONE* Dec 2013 Vol 8 Issue 12

⁶⁸ Helm *The Carbon Crunch* pgs 224-226 'Investing in new technologies' Yale University Press

Bloomberg predicts that the electric car industry will within a decade replace the traditional combustion engine vehicle market, with most sales aimed at first-car buyers. The battery technology and the infrastructure will be “in a continuous process of improvement”. However, the most exciting dimension of Electrification is how the normal ‘drain’ of consumer demand could be turned on its head so individuals-become—power-generators (IPGs).

People could not only produce enough energy to sustain themselves but also to power their homes, their streets and even their smart grids. They will “help balance the system” by releasing electricity back onto the system (through car charging and street-vehicle-fleets storage supply). Imagine that every time you drive your car you would be doing the world a favour. With its low costs and ability to be rolled out rapidly and commercially to a mass market in a favourable tax regime. The reality of zero-carbon cities (with carbon taxes for non-electric entry) will signal the first real visible sign humanity is setting itself on the right course to its road to recovery. The energetic way urban populations have taken to bicycle schemes across the world’s cities shows the green-will is there. As for world leaders and ‘the coalition of the willing’ at the COP 21 summit in Paris in 2015 their own prophetic judgments remain to be seen.

To cut CO₂, the main challenge for Europe is to get back into the ‘carbon war’ race by replicating the same large-scale transformational transition of fossil fuels (from coal-to-gas) the US is coming so close to “winning”. For the first time in the history of man the competition is not exclusively with ourselves but with Mother Nature itself - at the expense of our own extinction. Which calls to mind heeding the powerful biblical warning in Revelation 11:18 *“the nations raged, but your wrath came, and the time for the dead to be judged, for rewarding your servants and the prophets, and those who fear your name, both small and great, and for destroying the destroyers of the earth.”*