

A Comparison of the European Climate and Energy 2020 and 2030 Packages

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EPG Working Paper: 1506

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Abstract

In the mid-2000s there was a growing awareness within EU institutions and Member States that meeting internationally agreed climate targets required common action.

This concern was subsequently addressed through two 'packages' of legislation for climate and energy. The first was agreed in 2009 and covered the period up to 2020, the second, is in the process of adoption by the EU institutions and relates to the period 2020-2030.

On the surface they are similar, in that they both contain binding targets for emissions reductions, the use of renewable energy and energy efficiency. However, there are significant differences in the detail of their legal frameworks and governance mechanisms. The 2009 package aimed at reducing GHG emissions by 20% from 1990 levels, 20% of the EU's energy was to come from renewables and a 20% improvement in energy efficiency, all by 2020.

Since then significant progress has been made in meeting the key targets. The 2030 package has introduced a relatively ambitious binding GHG target which should lead to reductions of 40% from 1990s levels. The renewable energy target (27% of energy production by 2030) is the result of a political compromise binding on the EU but not on Member States.

The extent to which countries will be encouraged or required to produce specific quantities of renewable energy remains to be agreed. Included in the 2030 climate and energy package and the related introduction of a 'European Energy Union' are proposals for a new governance framework, the scope and powers of which will be the determining factor on the extent to which the 2030 targets are met.

Keywords: politics, renewable energy policy, institutions, Germany, UK

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1 Introduction

Within the EU institutions and Member States, there was at the turn of the century, a growing awareness that meeting internationally agreed and common European climate targets, along with addressing increasingly globalised energy concerns, required common action. Such action would need to both unify the actions of Member States and the EU institutions and consolidate actions across previously separated legislative areas in particular relating to climate and energy. It was by no means the start of the process, but the Commission presentation of a paper to the informal summit at Hampton Court in 2005¹, under the UK presidency, was a step change to integration and was followed by a Green Paper on Energy Policy in early 2006.²

Since then there have been two key developments: Firstly in 2007 a process was begun which ultimately led to the adoption of the first joint climate and energy package which set key, and in some cases legally binding, targets for 2020. Then in 2014 the process was begun for the introduction of joined targets and objectives for energy and climate for 2030. This paper seeks to review and compare these two legislative packages.

2 Climate and Energy Packages January 2007–9

In January 2007 the Commission proposed a legislative package, that was known as the Climate and Energy Package, which introduced a wide range of issues, under a common framework, including: Greenhouse Gas (GHG) emissions reduction targets; renewable energy targets; energy markets;

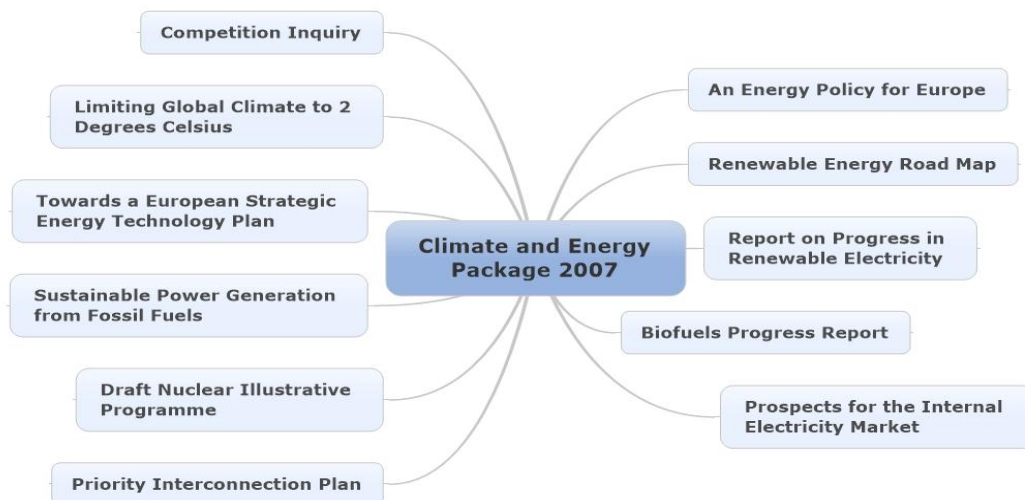
¹ European Council (2005), Press conference at EU informal summit *Hampton Court, 27 October 2005

² European Commission (2006), Energy for a Changing World, Argumentaire – Internal document, 8 January 2006

interconnectors; “sustainable” power generation from fossil fuels; nuclear power; and a proposal for a technology platform – see figure 1. The majority of the papers released at the time, were not legislative proposals, but positioning papers, in the form of Communications.

Despite their legislative status the documents and more importantly the package in its entirety were heralded by the then President of the European Commission **José Manuel Barroso** as *“a step change for the European Union. Energy policy was a core area at the start of the European project. We must now return it to centre stage”*. While the then Commissioner for Energy Policy, Andris Piebalgs stated that these proposals were part of *“a new industrial revolution”*.³

Figure 1: Main Elements of the 2007 Climate and Energy Package



The draft was discussed on the following two years, starting with an informal political agreement in March 2007, at the European Council, followed by further discussions in the Parliament and Council. Then in early 2008, further legislation was published in the form of draft directives to introduce specific legislation. These were finally adopted in April 2009.⁴

³ European Commission, (2007), Commission proposes an integrated energy and climate change package to cut emissions for the 21st Century, IP/07/29, 10 January 2007

⁴ For example of procedure see for renewables directive

(<http://www.europarl.europa.eu/oeil/popups/ficheprocedure.do?lang=en&reference=20>)

Figure 2: Timetable of 2007-9 Climate and Energy Package



The main elements of the 2007 package are set out below.

2.1 Climate Change

The driving force for much of the package was the proposal by the Commission to reduce GHG emissions as part of an international framework, in preparation for the Copenhagen UNFCCC summit in December 2009. This proposed that the EU's efforts must aim to limit the increase of global temperatures to no more than 2 degrees Celsius and that 'the EU must adopt the necessary domestic measures and take the lead internationally' to meet this objective. In order to do so countries must reduce their GHG emissions by 30% by 2020 (compared to 1990 levels).⁵ However, the Communication proposed that until an

[08/0016\(COD\)\)](http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32009D0406) or for GHG decision, (<http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32009D0406>)

⁵ European Commission (2007), Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions – Limiting global climate change to 2 degrees Celsius – The way ahead for 2020 and beyond. Com 2007 0002 final

international agreement was in place, the EU should only propose, as a minimum target, to reduce its emissions by 20% by 2020. The Communication pointed to a number of areas in which the EU was taking action to reduce emissions in addition to those outlined in the package, these included:

- Strengthening the European Emissions Trading Scheme, through:
extending its allocation period – to aid investor security; extend the scheme to other gases and sectors; recognise carbon capture and storage; wider use of auctioning; and links to other schemes at the time to include e.g. California or Australia.
- Limiting Transport Emissions: Include aviation to be included in the ETS; link taxes on cars to CO₂ emissions; Demand orientated measures should be strengthened; and life cycle emissions of CO₂ in transport must be reduced, though the development of sustainable biomass.
- GHG emissions in other sectors must be reduced: Expanding the scope of the building directive; inclusion of methane in ETS or through setting of limits; restricts or prohibition of fluorinated gases; and reducing emissions of nitrous oxide.

2.2 Energy

The Energy Policy document was the over-arching energy initiative of the January 2007 package. The Communication recalled the founding of the EU, with the European Coal and Steel Community and the Euratom Treaty and called for a new European Energy Policy, without which it stated other

wider EU objectives would not be met.⁶ The Communication summarised many of the other documents put forward in the package and included information on the following.

2.2.1 Market reform

Two Communications were released one on the ‘Prospects for the internal gas and electricity market’⁷ and the second, the final Report on the Competition Sectoral Enquiry.⁸ Together they were said to demonstrate that the present rules and measures have not yet achieved the objective of creating an internal energy market to deliver real choice for all EU consumers, be they citizens or business, new business opportunities and more cross-border trade.

In particular the energy sector inquiry which was launched in June 2005, concluded that action was needed in the following areas:

- Achieving effective unbundling of network and supply activities
- Removing the regulatory gaps
- Address market concentration and barriers to entry
- Increasing transparency in market operation

The Commission’s intentions concerning regulatory proposals were set out in the Communication on. The key elements of this were:

- Ensuring non-discriminatory access to well-developed networks,

⁶ European Commission (2007), Communication from the Commission to the European Council and the European Parliament of 10 January 2007, "An energy policy for Europe" [COM(2007) 1 final – Not published in the Official Journal]

⁷ European Commission (2007), Communication from the Commission to the Council and the European Parliament of 10 January 2007 entitled “Prospects for the internal gas and electricity market” [COM(2006) 841 final – Not published in the Official Journal]

⁸ European Commission (2007), Energy sector competition inquiry – final report – frequently asked questions and graphics, 10th January 2007, Memo/07/15
http://europa.eu/rapid/press-release_MEMO-07-15_en.htm?locale=en

- Improving regulation of network access at national and EU level,
- Reducing the scope for unfair competition,
- Providing a clear framework for investment,
- Resolving issues relating to households and smaller commercial customers.

2.2.2 Energy Efficiency

Despite the Communication recognising energy efficiency's fundamental role in the future of the energy sector, the 2007 package didn't put forward any new initiatives. Instead it referred to the October 2006 Energy Efficiency Action Plan, which proposed to increase by 20% the energy efficiency of the EU by 2020.⁹ This set out the steps how the EU could reduce its overall energy consumption by 13% by 2020, while increasing GDP, saving €100 billion and 780 billion tonnes of CO₂ each year. The Communication further noted that unless the energy efficiency objective is achieved, then many of the EU's targets for the energy sector would not be met or need to be revised e.g. emissions reduction target, renewables targets (as it based on a percentage of the total energy consumed), investment plans, interconnection plans etc. The Communication noted action should be taken primarily by member states, but also on the EU level, in the following areas: transport (public transport and efficient vehicles); tougher standards and better labelling; implementation of buildings directives; taxation to increase energy efficiency.

2.2.3 Renewable Energy

The road map proposed a binding target that 20% of the EU's energy must come from renewable energy sources by 2020. The Communication

⁹ European Commission (2006), Communication from the Commission of 19 October 2006 entitled: Action Plan for Energy Efficiency: Realising the Potential COM(2006) 545, <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=URISERV:l27064>

proposed that the 20% target could be achieved by the following sub-sector targets for 2020¹⁰:

- 34% of electricity, up from 15% in 2006
- 18% of heat and cooling, up from 9% in 2006
- 14% of transport fuels, up from 2% in 2005

The target would not be equally applied across the EU, but rather would be set based on current levels of renewable production. Furthermore, the EU's sectorial targets would not be binding and it would be up to Member States to propose how they would meet their overall target.

Due to the ever apparent problems associated with transport, the use of biofuels was given particular attention. It was proposed that during 2007 a separate initiative would be introduced requiring 10% of the transport using biofuels by 2020 a fivefold increase from 2005 levels, which was eventually overturned. This was driven by greater concern over the impact of dependency on imported fuel, both from a security of supply and price stability perspective.

Under the requirement of the 2001 directive, the Commission was required to report on the progress made in reaching the target of 21% of electricity from RES by 2010¹¹ and was the main objective of the Communication. At the time it was anticipated that by 2010 only 19% of electricity would come from RES sources, due to lack of adequate regulation and/or enforcement. This is because a number of Member States had not set in place, nor had adequately enforcing. The

¹⁰ European Commission (2007), Commission Communication of 10 January 2007: "Renewable Energy Road Map. Renewable energies in the 21st century: building a more sustainable future" [COM(2006) 848 final – Not published in the Official Journal].

¹¹ European Commission (2001), Renewable energy: the promotion of electricity from renewable energy sources, Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity from renewable energy sources in the internal electricity market

Communication noted the progress made by each individual Member State in meeting their target. It turned out that the 2001 target was missed, as by 2010, renewables provided 19.6% of electricity, but the target was exceeded the following year with renewables making up 21.7% of power consumption.¹²

2.2.4 Sustainable Power Generation from Fossil Fuels

The Commission proposed to undertake in 2007 an impact assessment to determine the most suitable way to facilitate the establishment by 2015 of 12 large scale demonstration Sustainable Fossil Fuel technologies in commercial power generation. The Communication noted that once commissioned these plants need to operate for at least five years and be ready for standard investment post 2020.¹³ The Commission believed that by 2020 all new coal fired power stations should be built with CCS and that existing facilities should progressively 'follow the same approach'. In 2007 the Commission also assessed the potential risks from CCS and lay down requirements for the licensing of CCS activities, including whether existing instruments need to be amended or new ones proposed.

2.2.5 Draft Nuclear Illustrative Programme paper

The Commission occasionally publishes a paper on the state of the nuclear sector in the EU. The paper's origin is article 40 of the Euratom Treaty, which states that the Commission shall 'periodically publish illustrative programmes indicating in particular nuclear energy targets

¹² Eurostat (2015), Renewable energy statistics, May 2015, http://ec.europa.eu/eurostat/statistics-explained/index.php/Renewable_energy_statistics#Electricity

¹³ European Commission (2007), Commission Communication of 10 January 2007 "Sustainable power generation from fossil fuels: aiming for near-zero emissions from coal after 2020" [COM(2006) 843 final – Not published in the Official Journal].

and all the types of investment required for their attainment'.¹⁴ The Commission proposed that discussions should take place in three key areas:

- The establishment of a new 'High Level Group on Nuclear Safety and Security' with a mandate of progressively developing common understanding and eventually additional European Rules on nuclear security and safety.
- The paper called for 'greater availability of Euratom loans, provided the ceilings are updated in line with the needs of the market as already proposed by the Commission'.
- Developing a harmonized liability scheme and mechanism to ensure the availability of funds in the event of damage caused by a nuclear accident.

2.2.6 European Strategic Energy Technology Plan

It was proposed that a Strategic Energy Technology Plan be presented to the spring summit in 2008.¹⁵ The SET outlined a portfolio of affordable, competitive, clean, efficient and low carbon technologies that could be deployed over a range of time horizons. The specific areas that were identified included energy efficiency, developing biofuels, competitiveness of large scale offshore wind and solar PV, using fuel cell and hydrogen technologies to exploit their benefits in decentralised

¹⁴ European Commission (2007), Communication from the Commission to the Council and the European Parliament of 4 October 2007 entitled: 'Nuclear Illustrative Programme' [COM(2007) 565 final – Not published in the Official Journal].

¹⁵ European Commission (2007), Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions – A European strategic energy technology plan (SET-plan) – 'Towards a low carbon future' {SEC(2007) 1508} {SEC(2007) 1509} {SEC(2007) 1510} {SEC(2007) 1511}

generation and transport, maintain its technological lead in fourth generation fission nuclear reactors and future fusion technology. Importantly, the plan also stated that “sectoral objectives should be underpinned by specific milestones and an increase in energy research spending”.

2.2.7 Energy Security

Importantly, the Energy Policy Communication also called for greater cohesion when addressing third countries and the need to speak “with one voice”.

The EU and Member States must pursue these goals with a common voice, forging effective partnerships to translate these into a meaningful external policy. Indeed, energy must become a central part of all external EU relations; it is crucial to geopolitical security, economic stability, social development and international efforts to combat climate change¹⁶.

While there weren't any specific legislative proposals on energy security, it was an important theme, although it is fair to say not given as much prominence in the debate or as much of a priority within the legislative priority as is now the case.

¹⁶ European Commission (2007), Communication from the Commission to the European Council and the European Parliament – An energy policy for Europe {SEC(2007) 12} /* COM/2007/0001 final */

3 2008 Climate and Energy Directives

In early 2008 the Commission published an updated set of policy proposals, which had a significantly narrower scope and put forward specific legislative proposals including¹⁷:

3.1 Proposal amending the EU Emissions Trading Directive (EU ETS)¹⁸

The revision applied from 2013, the start of the third trading period of the EU ETS. Major changes include the introduction of a single EU-wide cap on emission allowances in place of the existing system of national caps. It was proposed that the 'cap' would decline by at least 1.74% a year, so that emissions in 2020 it would be at least 21% below their level in 2005. The free allocation of allowances would be progressively replaced by auctioning, starting with the power sector. The scheme would also be extended to the aviation industry from January 2013, covering all flights taking off and landing in the EU, including those originating from or travelling to non-EU countries. However in November 2012 the European Commission decided to defer the extension of the scheme to extra-EU flights until after the International Civil Aviation Organization (ICAO) General Assembly in autumn 2013, on the expectation that a global agreement on greenhouse gas mitigation from aviation will be reached. The ETS continues to apply to intra-EU flights from January 2013. At least 50% of allowances were to be auctioned from 2013 (rather than given to installations). 300 million allowances were set aside in the New Entrants Reserve to fund the deployment of innovative renewable energy technologies as well as carbon capture and storage

¹⁷ http://ec.europa.eu/clima/policies/package/documentation_en.htm

¹⁸ Official Journal of EU (2009) Directive 2009/29/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community (Text with EEA relevance)

3.2 Effort Sharing on GHGs¹⁹

The national emission targets for 2020 were agreed unanimously and were set on the basis of Member States' relative wealth, ranging from a 20% emissions reduction by 2020 (from 2005 levels) for the richest Member States to a 20% increase for the least wealthy one. By 2020, the national targets were to collectively deliver a reduction of around 10% in total EU emissions from the sectors covered compared with 2005 levels. Together with a 21% cut in emissions covered by the EU ETS, this would accomplish the overall emission reduction goal of the climate and energy package, namely a 20% cut below 1990 levels by 2020. The Directive also stated that the EU was to also offering to increase its emissions reduction to 30% by 2020 if other major economies in the developed and developing worlds committed to undertake their fair share of a global emissions reduction effort.

3.3 Directive promoting renewable energy²⁰

The Directive introduced binding national targets for the share of renewable energy in their energy consumption by 2020. These targets, which reflect Member States' different starting points and potential for increasing renewables production, range from 10% in Malta to 49% in Sweden. The national targets in their totality would enable the EU as a whole to reach its 20% renewable energy target for 2020 – more than double the 2010 level of 9.8% – as well as a 10% share of renewable energy in the transport sector. While the Directive proposed binding

¹⁹ Official Journal of EU (2009) Decision No 406/2009/EC of the European Parliament and of the Council of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020

²⁰ Official Journal of EU (2009) Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC

targets on member states, significant discretion remained with national governments on the type of support mechanism that introduced.

3.4 Legal framework for the safe geological storage of carbon dioxide²¹

This established a legal framework for the environmentally safe geological storage of CO₂ and covered all storage in geological formations and their entire lifetime. It also contains provisions on the capture and transport components of CCS.

4 Progress in Meeting the Objectives and Targets of the 2020 Climate and Energy Package

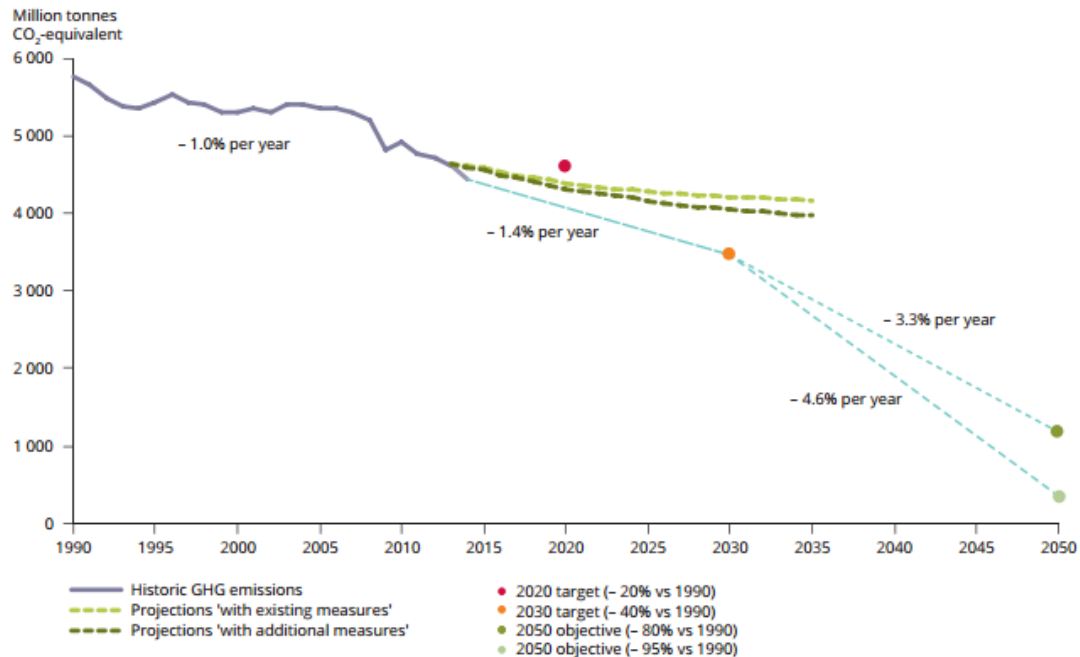
4.1 Greenhouse Gases

In 2014 EU GHG emissions were 23% below 1990 levels. EU Commissioner for Climate Action and Energy Miguel Arias Cañete heralded these reductions as it said that during the same period, “the European economy grew by 46% over the same period. We have shown consistently that climate protection and economic growth go hand in hand.”²² The EEA report that approximated emissions for 2014, show that there was a further reduction of 4% in 2014, the extent of this drop, was in part due to a milder year, leading to reduced energy consumption.

²¹ Official Journal of EU (2009) Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006

²² EEA (2015), Climate change: EU shows leadership ahead of Paris with 23% emissions cut, European Environment Agency, 20th October 2015

Figure 3: EU GHG Emissions Trends, projects and reduction targets



Source: EEA October 2015²³

The revised, and lower, EU GHG target has effectively been met, 5 years ahead of schedule. The GHG reductions have been achieved as a result of:

- The economic slowdown
- The ongoing restructuring of the industrial sector; less manufacturing and more economic activity from the service sector
- Greater economic and energy efficiency
- The greater deployment of renewable energy

²³ European Environment Agency (2015), Trends and projections in Europe 2015, Tracking progress towards Europe's climate and energy targets. October 2015 <http://www.eea.europa.eu/publications/trends-and-projections-in-europe-2015>

The early achievement of the GHG target adds weight to the argument that the 2020 target was relatively unambitious and that the EU could and should have adopted a 30% reduction target. It is important to note that the contribution of the Europe's flagship tool to meet its carbon mitigation objectives, the ETS. This is the largest example of emissions trading in operation today, encompassing over 11,500 installations across 30 countries and covering approximately 40% of total EU emissions. It is clear that the over-allocation of emissions in phases 1 and 2 and the recession in phase 3 have kept the carbon price low. The different phases of the ETS have enabled some of its problems to be addressed, although some inherent issues still need to be addressed. This includes, the number of sectors that have been classified as 'at risk' and therefore receive free allocations, However, at the heart of the problem that the resistance to creating a price floor has left the EU ETS as the "residual" system absorbing the impact of both recession and complementary policies on energy efficiency and renewables – creating unnecessary tensions between them and leading to the present collapse in prices.²⁴ In spite of this some assessments still attribute emissions reductions from the ETS in the range of 40–80 MtCO₂/year, or about 2–4% of the total capped emissions.²⁵ There are other unmeasurable impacts identified, such as innovation and investment. However, probably the biggest impact has been on increasing the carbon literacy of the public in Europe²⁶.

²⁴ Laing, T. et al (2013), Assessing the effectiveness of the EU Emissions Trading Scheme, Laing, T., Sato, M., Grubb, M., Comberti, C., Centre for Climate Change Economics and Policy Working Paper No 126, Grantham Research Institute on Climate Change and the Environment

²⁵ Laing, T. et al (2013), Assessing the effectiveness of the EU Emissions Trading Scheme, Laing, T., Sato, M., Grubb, M., Comberti, C., Centre for Climate Change Economics and Policy Working Paper No 126, Grantham Research Institute on Climate Change and the Environment

²⁶ ACE (2005), Memorandum by the Association for the Conservation of Energy, Evidence to Select Committee on Trade and Industry, <http://www.publications.parliament.uk/pa/cm200506/cmselect/cmtrdind/1443/1443we05.htm>

4.2 Renewables

The primary production of renewable energy (including large scale hydro) within the EU-28 in 2013 was 192 million tonnes of oil equivalent (toe) — a 24.3 % share of total primary energy production from all sources. The quantity of renewable energy produced within the EU-28 increased overall by 84.4 % between 2003 and 2013, equivalent to an average increase of 6.3% per year. The largest producer of renewable energy within the EU-28 in 2013 was Germany, with a 17.5 % share of the total; Italy (12.2 %) and France (12.0 %). Renewable energy sources accounted for an 11.8 % share of the EU-28's gross inland energy consumption in 2013 or 15 % of gross final energy consumption.²⁷

Preliminary estimates indicate a 2014 share of 16.0% at EU level. 27 Member States (i.e. all except the Netherlands) met or exceeded their indicative targets for 2013 to 2014 set under the renewable energy directive, while 20 Member States (i.e. all except Cyprus, France, Ireland, Malta, the Netherlands, Portugal, Spain and the United Kingdom) exceeded their expected 2014 National Renewable Energy Action Plan targets.²⁸ The deployment of renewable energy continues at pace, despite and in some cases retrospectively, cuts in support schemes, due to falling technology prices. The deployment of solar PV has been particularly strong.

4.3 Energy Efficiency

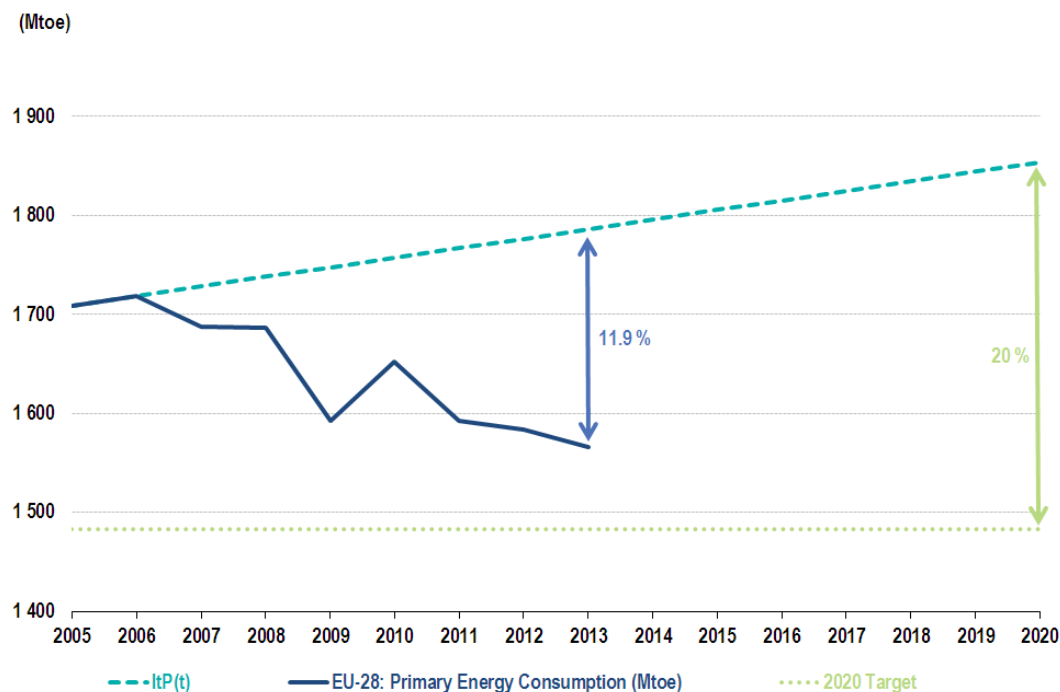
Primary energy consumption decreased between 1990 and 2013 by 0.2 %, despite a more than doubling of GDP over this period (in 1990 GDP was

²⁷ Eurostat (2015), Renewable Energy Statistics, accessed October 2015
http://ec.europa.eu/eurostat/statistics-explained/index.php/Renewable_energy_statistics

²⁸ European Environment Agency (2015), Trends and projections in Europe 2015, Tracking progress towards Europe's climate and energy targets. October 2015
<http://www.eea.europa.eu/publications/trends-and-projections-in-europe-2015>

US\$7259 billion and in 2013 it was US\$17 954 billion)²⁹. In 2013, its primary energy consumption was 8.3% below 2005 levels. Continuing this downward trend at the same pace until 2020 would be sufficient for the EU to achieve its absolute target on primary energy consumption, which is equivalent to a reduction by 13.2%, compared to 2005 levels.³⁰ Figure 4 shows the extent to which energy consumption has fallen since 2005, including the impact of the recession in 2008 and compares this to the expected growth, without additional energy efficiency measures. This shows that primary energy savings against trend growth before 2006 for EU-28 reached 11.9 % in 2013.

Figure 4: EU Energy Efficiency 2005-2020



Source: Eurostat 2015³¹

²⁹ Knoema (2015), European Union GDP, accessed October 2015
<http://knoema.com/rtbjfi/european-union-gdp>

³⁰ European Environment Agency (2015), Trends and projections in Europe 2015, Tracking progress towards Europe's climate and energy targets. October 2015
<http://www.eea.europa.eu/publications/trends-and-projections-in-europe-2015>

³¹ Eurostat (2015), Energy Saving Statistics Accessed October 2015
http://ec.europa.eu/eurostat/statistics-explained/index.php/Energy_saving_statistics

4.4 Carbon Capture and Storage

Little progress has been made in introducing commercial scale CCS and the EU is not on track with its objective of deploying 12 projects by 2015, in fact it has yet to complete one. However, the EU is not alone and globally there are only 17 projects, almost all are related to industry, with two-thirds associated with enhanced oil recovery and only one, in Canada, associated with power generation. The two most advanced projects are in the UK at the White Rose oxy combustion coal and biomass plant and at the Peterhead gas-fired station, investments decisions could be taken in 2016. EU policies, namely the New Entrant Reserve (NER) 300 and the European Energy Programme for Recovery (EEPR), have so far provided €1.3 billion for CCS development. Furthermore it is said that the new incentives that are to be introduced, mostly via a reform of the ETS and the NER 400 (or Innovation Fund), are likely to be insufficient to accelerate investment.³²

4.5 Nuclear

Prior to the Fukushima accident in Japan in March 2011 nuclear power's contribution to electricity supply was largely static, with some new build, such as in Finland, France and Slovakia, taking place, although with rising costs and delayed construction. Other Member States, such as Czech Republic, Hungary, Lithuania, Romania and UK continued to develop new projects and proposals. However, Fukushima significantly changed the debate in some countries, most notably Belgium, Germany and Italy, which either abandoned plans for new build, or in the case of Germany shut down 8 reactors and put in place a programme for the total abandonment of the technology.

³² Bassi S., et al (2015), Bridging the gap: improving the economic and policy framework for carbon capture and storage in the European Union, June 2015, Bassi, S., Boyd, R., Buckle, S., Fennell, P., Dowell, N., Makuch, Z., Staffell, I., Grantham Research Institute on Climate Change and the Environment, Centre for Climate Change Economics and Policy

Of the three specific objectives of the Illustrative Programme, only that relating to the 'High Level Group on Nuclear Safety and Security' has occurred. While the EURATOM loan facility has not been extended and a harmonised liability scheme not introduced. In late 2015 the Commission is scheduled to release the next version of the Nuclear Illustrative Programme.

4.6 Research and Development

It is difficult to gauge the extent to which energy European research and development budgets have changed, given the broad scope of the energy agenda and the modifications in the overall European framework. The current research framework, called Horizon 2020, runs from 2014–2020 and is the largest research budget to date, €79 billion. Of which 5.9 billion is for non–nuclear research and €1.6 billion for nuclear research.³³

4.7 Overarching Assessment

There a number of criticisms of the existing policies, both on the individual level and on their collective impacts. One of the most comprehensive analyses undertaken of European climate policies, which looked at 262 evaluations concluded that there was insufficient evidence as to the impacts of the current policies:

“If the EU wants to continue its global political leadership in the climate arena it needs to demonstrate that it can bring down its greenhouse gas emissions while securing economic welfare for European industries and citizens. Knowing whether and how climate policies work is essential to achieving these goals. At present we know too little about how European and Member State policies influence greenhouse emissions, to a large

³³ European Commission (2015), Research and Innovation – Energy – Web site: Accessed 30 July 2015, http://ec.europa.eu/research/energy/index_en.cfm

*extent because the evidence base for conducting good policy evaluation is lacking”.*³⁴

Others have highlighted the extent to which energy security is not directly addressed by the targets although acknowledging that energy importation will be reduced through greater energy efficiency and the use of renewable energy, despite this being a major concern to EU policy makers.³⁵ Some point to the inherent problems in setting climate and renewables target, which are firstly a slogan rather than careful analysis, with particular critique of the “balanced” nature of the 20:20:20 target.³⁶ Others point to the fact that the 20% target was not arrived at solely for ‘deeply scientific’ reasons, and that it may have been influenced by the Parliament calling for a 25% target.³⁷ Helm further critiques the setting of specific targets and says that “Europe’ energy and climate policy are going nowhere” and calls for the Internal Energy Market to be central, with a credible carbon prices, border adjustments, capacity markets, a target for subsidising future rather than current renewables.

However, probably the policy that has been the focus of the most criticism, in part because it has had the most impact, is the renewable policy. There are three main criticisms of the policy.

Firstly, that it is in conflict with the Emissions Trading Scheme. The argument is that put forward is that without the mandatory renewables target, the ETS could achieve at lower cost the necessary emissions

³⁴ Haug, C et al (2010), Navigating the dilemmas of climate policy in Europe: evidence from policy evaluation studies, Haug, c., Rayner, T., Jordan, A., Hildingsson, R., Strippel., J., Monni, S., Huitema., D., Masey, E., van Asselt., H, Berkhout, F., Climate Change, 2010, 101–427–445

³⁵ Bohringer C., Keller A., (2011), Energy Security: An Impact Assessment of the EU Climate and Energy Package, Carl von Ossietzky, Universitat Oldenburg

³⁶ Helm, D, (2009), EU–Climate Change Policy – A Critique, Smith School of Enterprise and the Environment, October 2009

³⁷ House of Lords (2008), The EU’s Target for Renewable Energy: 20% by 2020: European Union Committee, 27th Report of Session 2007–8, 24th October 2008

reductions and that it would foster greater incentives for climate friendly technology change.³⁸

Secondly, that renewable energy policies are relatively expensive and they are damaging to the traditional utilities, as the Economist puts it, “The 20 largest European energy utilities have lost a jaw-dropping €500 billion in market value since 2008.”³⁹

Thirdly, that it is too much, too soon and that it would mean becoming too reliance on wind power (at least in the UK context).⁴⁰

However, others counter this, by: That the costs of renewable technologies have, in part due to the current policies leading to greater economies of scale, fallen, making them now competitive, in a growing number of markets, with conventional generation.

- The problems of the structure of the ETS, with the lack of a floor price and its inability to adjust the total volume of allocations, is not the fault of the renewables policy.
- Finally, it is interesting to note that the fear that the renewables sector would be dominated by wind, has now disappeared, with now concern of over-deployment of solar PV. This highlights the speed at which some new technologies are coming market, a

³⁸ Stavins R., (2014), Will Europe Scrap its Renewables Target? That would be Good News for the Economy and the Environment, Rober Stavins, Professor of Business and Governance at Hard Environmental Economics Program, <http://www.robertstavinsblog.org/2014/01/18/will-europe-scrap-its-renewables-target-that-would-be-good-news-for-the-economy-and-for-the-environment/>

³⁹ The Economist (2014), European Climate Policy, Worse than useless, January 25th 2014.

⁴⁰ House of Lords (2008), The EU's Target for Renewable Energy: 20% by 2020: European Union Committee, 27th Report of Session 2007–8, 24th October 2008

processes which is likely to continue – possibly with energy storage.

5 2014 Climate and Energy Package

In March 2013, the Commission published a Green Paper which made recommendations on the framework for 2030 legislation.⁴¹ Then in January 2014 the European Commission outlined a new climate and energy package, in the main to prepare for the Paris UNFCCC summit in Paris in December 2015. This contained a number of legislative and non-legislative proposals and included:

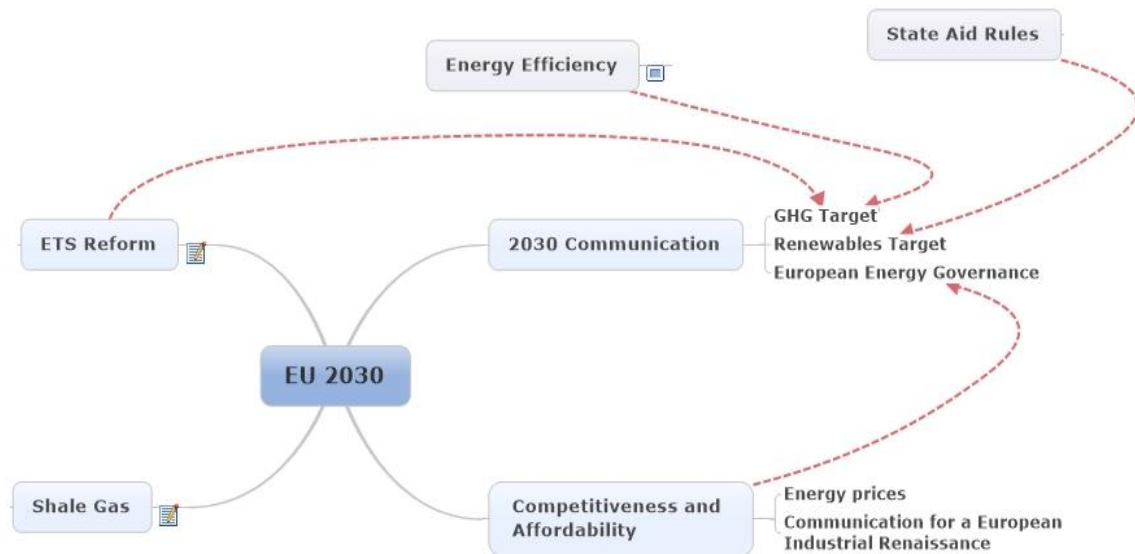
- The 2030 Communication, which included the headline proposals for targets for reductions in GHG emissions and renewable energy, along with proposals for a new energy governance regime⁴²
- A Regulation for a new stability mechanism for the Emissions Trading Scheme
- A Recommendation for the creation of a framework for the exploitation of shale gas
- Two Communications relating to competitiveness, one on an Industrial Renaissance and the other on energy prices.

⁴¹ European Commission (29013), Green Paper, A 2030 Framework for Climate and Energy Policies, COM (2013) 169 final.

⁴² Communication from the Commission to the European Parliament, Tet Council, the European Economic and Social Committee and the Committee of the Regions A policy framework for climate and energy in the period from 2020 to 2030 / COM/2014/015 final /

Not published at the same time as the package, but important for achieving the overall objectives of the 2030 Communications are the Energy Efficiency Directive and the ongoing State Aid review of the energy sector.

Figure 5 Schematic Diagram of the Main Elements of the 2014 Package and their Connections



5.1 GHG

The key element for the package was the GHG target, that EU emissions must be 40 percent below 1990 levels by 2030. The Commission proposed that the target was achieved with domestic action and not to include international credits. This was introduced for the 2015 Paris UNFCCC summit and the draft also stated that it sees, “no merit in proposing a higher conditional target ahead of international negotiations.” However, in the event of higher targets, “additional effort could be balanced by allowing access to international credits.”

Those engaged with the preparation of the summit welcomed the EU’s announcement, Christiana Figueres head of the UNFCCC, said that the “EU is on track by recommending Europe-wide 40 percent emissions cut target by 2030,”... “Positive signal for meaningful 2015 agreement.”

Others were less positive, noting that the 40 percent reduction target is said, by the Commission's own analysis, to be on a pathway that only has a 50/50 chance of not exceeding the 2°C threshold.

The Commission noted that the continuation of current policies would lead to a reduction in emissions of approximately 32 percent by 2030 and that additional policy action will be needed if the proposed target were to be met. Just prior to the publication of the Commission's draft, Ministers from four Member States, France, Germany, Italy and the UK, wrote to the Connie Hedegaard, the Commissioner in charge of Climate Change, urging that a 40 percent GHG target was proposed. The letter was subsequently backed by the Netherlands and Spain.

5.2 Renewables

The Communication also proposed an EU wide target of at least 27 percent for renewable energy by 2030. This is despite previous publications by the Commission, both the 2030 Green Paper and the Roadmap for 2050⁴³ both suggesting a 30% target. Analysis in the 2020 Communication suggested that current policies would lead to a level of use of 24 percent by 2030 and so additional action would be required. Importantly for electricity utilities, the power sector is expected to continue to lead the deployment of renewables, and therefore provide about 45 percent of the Union's electricity by 2030. However, where the proposal differs significantly from previous targets for renewable energy is that it would be binding on the EU as a whole and not on individual Member States.

This rather unusual system was a compromise between those Member States that strongly support the continuation of the existing system, with a binding target and those fundamentally opposed, either because they believe that countries should have flexibility to choose the most effective

⁴³ European Commission (2011), Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Energy Roadmap 2050, COM(2011) 885 Final.

and economical way of meeting their GHG target or as they are opposed to further binding targets in general. This has led to an unclear situation regarding the implications on each Member State of this new target and it has been described as ‘unenforceable’, by Client Earth. The proposal itself recognises the potential problem and it states “These new commitments for 2030 will be reviewed as part of the governance process...and if necessary, they would be complemented by further EU action and instruments to ensure delivery of the EU target.”

5.3 Energy Efficiency

The Communication notes that there is broad consensus about the importance of energy efficiency and that it is an essential part of the climate and energy policies. It further refers to the fact that the current target is non-binding and that process is being made through specific policies on the EU and national level across a variety of sectors. While the Commission’s analysis suggests that a GHG reduction of 40 percent will require energy saving to reach 25 percent by 2030. A more in-depth analysis was published by the Commission in June 2014. Separating energy efficiency from the 2030 Communication risks making the same mistakes as in 2008, when energy efficiency was not made a binding target, which was a contributing factor to the relative de-prioritisation of energy efficiency.⁴⁴

5.4 Governance structure

The Commission proposed a new governance structure for energy and climate that goes beyond renewable energy and covers a wide range of existing EU energy objectives including: Energy price differentials between EU and major trading partners; diversification of energy imports and share of indigenous energy sources; deployment of smart grids and interconnections; intra-EU coupling of energy markets and the

⁴⁴ ECEEE (2014), A binding target for sustainable energy demand: Why and how?, A discussion paper prepared by Jean-Sebastien Broc, European Council for an Energy Efficient Economy, 16 May 2014

liberalisation agenda; competition and market concentration; and technological innovation. This is said to be a streamlining of the current reporting systems, so that there will be a single unified and iterative process, in which the proposals of Member States are reviewed by the Commission to ensure that in total they meet the EU's objectives. The current proposals however, are vague in important areas of monitoring, enforcement and sanctions for non-compliance. By being, almost certainly, intentionally unspecific, the proposal can be viewed, either as an attempt by the Commission to move towards a more harmonised and common EU energy policy or the reverse whereby Member States remain firmly in control. This contradiction is not new in the field of energy, as the Lisbon Treaty was also a potentially important step for development of a more harmonised European energy policy as for the first time it became an area of joint EU-Member State competence. However, the Treaty also states that EU measures adopted under this new legal basis "shall not affect a Member State's right to determine the conditions for exploiting its energy resources, its choice between different energy sources and the general structure of its energy supply" (Article 194(2)).

When discussing the proposals the European Parliament expressed, in part due to its fears of being excluded from the process, "it's deep concern about the proposals for a new governance structure for the 2030 framework, and recalls that the 2020 framework is based on full co-decision between Parliament and the Council; insists that the Commission should base any legal proposal under full co-decision between Parliament and the Council."

5.5 Emissions Trading Scheme (ETS)

On 8th January 2014 the European Council agreed to postpone the release of 900 million carbon allowances between 2014–16, choosing instead to reintroduce them in 2019–20 in order to reduce the oversupply accumulated during the recession. However, more fundamental reform is necessary to enable the scheme to adjust to ever changing economic and other circumstances. The Commission's proposal increases the linear

reduction factor that determines the 'cap' on ETS emissions from 1.74 percent to 2.2 percent per year and creating a market stability reserve. The mechanism will work so that when any cumulative surplus exceeds 833 million tonnes in any given year the mechanism will withdraw 12 percent of this surplus from the auctions scheduled to take place two years later. The withdrawn allowances will be placed in a reserve, to be gradually released to the market at a later date.

5.6 Shale Gas

The proposed legislation is a Recommendation, not a Directive, and defines minimum principles of the exploitation of shale gas. It calls for a Strategic Environmental Impact Assessment to be undertaken prior to high volume exploration – a high volume is more than 1000m³ of water per fracturing stage or 10 000m³ in total. For other, smaller, fracking operations, Member States should take the necessary steps to ensure an Environmental Impact Assessment is carried out. Furthermore, Member States should ensure a site is suitable and that characterisation and risk assessment have been undertaken, all the while ensuring that environmental liability and financial guarantees apply to all installations.

5.7 Competitiveness

The Commission noted that wholesale electricity prices have fell between 2008–2012 by 35–45 percent, while retail prices rose increasing the number of vulnerable customers and affecting competitiveness. They further noted that electricity network costs have risen by 18.5 percent for households and 30 percent for industries and that taxes and levies are a small but rising part of household and industry bills having risen by 36 percent for households and 127 percent for industry since 2008. Consequently, the Commission said it was preparing an in depth study on the full costs and subsidies of various technologies in power sector and a

Communication on retail market, which was released before the summer of 2015.⁴⁵

5.8 State Aid

President Barroso noted in January 2014 that the Commission was reviewing State Aid rules to “make sure there are no distortions. Because we have seen in the past that in some countries there were distortions precisely because of these national targets on renewables, including heavy subsidisation with sometimes important costs for competitiveness and also creating distortion in terms of the internal market”. The Commission asked for comments, by mid-February 2014, on a new set of Environmental and Energy Aid Guidelines (EEAG). The scope of the review included looking at state support for: renewables, energy infrastructure, energy efficiency, ‘generation adequacy’ (and the role of capacity markets), Carbon Capture and Storage (CCS) – nuclear was explicitly included in early draft but now excluded, primarily at the request of some Member States. The review split renewable technologies into ‘deployed’ (whose share is 1–3percent of electricity production at the EU level) and ‘less deployed’ technologies for the purposes of introduction of competition and other specifics. The new guidelines came into effect in July 2014. Once adopted, it is up to the Commission to interpret the rules.

5.9 2014 Council of the European Union

In March 2014 the European Council discussed the Commission’s proposal. At the time they asked the Commission and Council to further continue to work on the 2030 GHG and renewables target, to review progress made on energy efficiency and on competitiveness and carbon

⁴⁵ European Commission (2015), Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Delivering a New Deal for Energy Consumers, COM (2015) 339 final

leakage. The Council asked that a decision be taken by October 2014 at the latest.

At the October meeting, the European Council endorsed a binding EU target of an at least 40% domestic reduction in greenhouse gas emissions by 2030 compared to 1990. They further stated that “the target will be delivered collectively by the EU in the most cost-effective manner possible, with the reductions in the ETS and non-ETS sectors amounting to 43% and 30% by 2030 compared to 2005, respectively.” On renewables the Council proposed a 27% target by 2030 that would be binding on the EU – but not on Member States as well as an indicative target for a 27% improvement in energy efficiency by 2030 compared to current projections. On the ETS reform the council called for a speeding up of the reductions of the cap from 1.74% to 2.2% from 2021 onwards.⁴⁶

6 European Energy Union

In April 2014 the then Polish Prime Minister, Donald Tusk and Now President of the European Council of the European Commission, revised calls, in wake of events in Ukraine, for the creation of an Energy Union. This in turn led to the Commission developing plans to become less reliant on Russian gas and by February the following year the Commission published proposals for a European Energy Union. This initially focused on gas security of supply, but it also highlighted the need for reform in other sectors, including the greater use of renewables and energy efficiency and close co-operation between Member States when addressing external energy suppliers.

It has been said that the European Energy Union (EEU) is the most ambitious European energy project since the European Coal and Steel Community, and “a project that will integrate Europe’s 28 Energy markets into the Energy Union, make Europe less dependent and provide the

⁴⁶ European Council (2014), European Council Conclusion, 23 and 24th October EUCO 169/14

predictability that investors need to create jobs and growth”. It is intended that it will build on the existing objectives to achieve 5 key ambitions:

- Energy security, solidarity and trust;
- A fully integrated European energy market;
- Energy efficiency contributing to moderation of demand;
- Decarbonising the economy, and
- Research, Innovation and Competitiveness

To achieve these five ambitions, the structure of the EEU thus comprises a variety of preamble visions, 15 separate Actions and 43 Initiatives.

It is said by European Commission that achieving a fully integrated Energy Union will require significantly more than a re-bundling of the existing acquis, but a fundamental rethink of both the prioritization of the existing policies and in some cases a rethink of the foundations of current thinking.

However, others are more caution about the ambitions of the EEU, claiming that its proposals are little more than building on existing legislation and site previous statements on calling for the EU to act with one voice on external energy policy and the ongoing harmonization process for energy markets. To date much within the EEU remains vague, which is in part because it is yet to be defined as the politics have not been agreed and in part because it is likely to an iterative process, with clarity only occurring with time. However, what is clear is that the future on the EEU and the 2030 package are now interlinked and effectively united.

Over the coming year or years legislative proposals will be introduced to further meet the objectives of both the EEU and 2030 targets, for

example a new renewables directive is expected to be introduced by the end of 2017.

7 Comparing 2020 and 2030 Climate and Energy package

While there are many similarities there are also a number of difference between the climate and energy packages. These are a reflection of the changes in the political momentum within the EU and support for the institutions, wider changes in the support for action on climate change and the relative priorities of policies for the energy sector.

Political and public conditions prior to the drafting of package were significantly different between 2007 and 2014 and as a consequence the former package was dominated by legislative proposals, including binding actions and targets on Member States. This was a reflection of the priority that the public and politicians placed on climate change, but also the level of support for the EU institutions. In 2007 European Commission President José Manuel Barroso, stated “*Climate change is the greatest challenge of our generation.*”⁴⁷ While in the spring of 2007 a Eurobarometer poll suggested that 57 percent of the public supported the institutions of the EU, compared to 41 percent for national governments.⁴⁸

In 2014, at the launch of the Commissions’ new proposals, some of these conditions have changed, which is reflected in the, scope, ambition and legislative nature of the package. In part as a result of the Euro crisis, trust in the EU institutions has fallen, down to 31 percent in the autumn of 2013. While climate change clearly remains an important issue it is no longer seen as the absolute priority, In January President Barroso stated that “*climate change is a defining challenge of our time, while a truly*

⁴⁷ Barroso (2007), EU Commission launches 2nd European Development Days with focus on climate change. EVDAYS 2007, 7 November 2007

⁴⁸ European Commission (2013), Standard Eurobarometer 80, Autumn 2013, Public Opinion in the European Union,

European energy policy is key for our competitiveness. What we are presenting today is both ambitious and affordable.”⁴⁹

There is also a significantly different level of support from Member States for binding targets. In particular the UK, the Government of 2010–15, stated that “We will ensure that there is no further transfer of sovereignty or powers over the course of the next Parliament”⁵⁰ The UK Government was clear, along with at least 13 countries in opposing the introduction of binding renewables targets. At the beginning of March, the so-called Green Growth Group Ministers⁵¹ called for “a binding EU renewables energy target which should not be translated into binding national targets by the EU, leaving greater flexibility for Member States to develop their own renewable energy strategies. The EU target should be at least 27 percent.”⁵²

Also interesting to note is that the 2020 renewable energy target included a sub-target on biofuels, which has not been taken up in the 2030 target. This is in primarily due to the reduction of support for binding target, but its lack of prioritisation is also an indication of the reduced support, due to greater awareness of its environmental impacts.

One of the criticisms levelled against the 2020 package was its short timetables as when it was finally adopted in 2009, it had only had 11

⁴⁹ European Commission (2014), Statement by President Barroso on the 2030 Energy and Climate Framework, 22nd January 2014 http://europa.eu/rapid/press-release_SPEECH-14-50_en.htm

⁵⁰ HM Government (2010), The Coalition: our programme for Government May 2010, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/78977/coalition_programme_for_government.pdf

⁵¹ Belgium, Denmark, Estonia, Finland, France, Germany, Italy, Netherlands, Portugal, Slovenia, Spain, Sweden and UK

⁵² UK Government, (2014) Green Growth Group Ministers issued the following joint statement on 3 March 2014 <https://www.gov.uk/government/news/green-growth-group-ministers-statement-on-climate-and-energy-framework-for-2030>

years to meet the final target.⁵³ A short-term timetable makes it difficult to develop and disseminate, at scale, new technologies. This was seen as particularly acute in meeting specific targets for the deployment of renewable energy. However, it is difficult to level a similar criticism at the 2030 package for two reasons. Firstly, the final adoption of the package is likely to be four years before (2016) the start of the emissions reduction/technology deployment period (2020–30). Secondly, that this is a continuation of both the current decarbonisation process and it is set in a longer term framework, 2050, interim targets. It is also worth noting that the GHG target timetables are co-ordinated with those of the UNFCCC timetables and so not determined by the EU institutions.

By Commission's own admittance the 2020 target is inadequate to meet internationally agreed climate objectives and that a 30% reduction, rather than the 20% adopted would be necessary. A similar criticism can be levelled at the 2030 target, which by the Commission's own analysis, the 40% target is said to be on a pathway that only has a 50/50 change of not exceeding the 2°C threshold.

Both packages are following a similar legislative process, with the initial introduction, primarily with Communications, of ideas from the Commission. These are then discussed the Council, to gain a political mandate, priority to the drafting of binding legislation in the form of Directives. The initial Communications have both been more numerous and broad-reaching than the scope of the Directives.

In 2014, following the release of the Climate and Energy Package, and as a result of events in Ukraine, the Commission published proposals for a European Energy Union. This initially focused on gas security of supply, but it also highlighted the need for reform in other sector, including the greater use of renewables and energy efficiency and close co-operation between Member States when addressing external energy suppliers. There are many similarities in the content of the first of the scope of the

⁵³Helm, D, (2009), EU-Climate Change Policy – A Critique, Smith School of Enterprise and the Environment, October 2009

European Energy Union and the 2007 Energy Policy for Europe Communication.

The 2009 GHG target had a unilateral (20% from 1990 levels) cut and further cuts contingent on similar international commitments (moving to 30%). The GHG legislation also enable the use of the international market to meet the domestic target, so that up to approximately one third of reduction effort could be met by schemes outside the EU. In the event of a 30% reduction in GHGs up to 50% of the additional reduction effort could be met by international emissions permits.

This differs from the 2014 draft, which saw “no merit” in making any conditional target ahead of any international offer. Rather it saw that in the event on international deal requiring further commitments, this would be facilitated by allowed the use of international credits, which within the 40% target were prohibited

The biggest potential impact of the 2014 package is the introduction of the European Energy Governance regime. While initially this was seen as a means to compromise between powerful Member States, particularly Germany and the UK, on the introduction of a post 2020 binding target for renewable energy, it has been seized upon, particularly by the Commission, as a means of harmonising reporting across the whole of the energy sector. There are approximately 200 separate reporting requirements on European energy. Therefore, it is unclear, how many are intended or could be bought into a unified governance framework, with potentially a huge amount of legislative changing to existing directives and regulations, just to harmonise the reporting dates. Further legislative requirements are likely to be required, to change their status, in a new ‘iterative’ process is to be introduced between member states and between member states and the Commission.

The new governance framework, is also linked in to the implementation of the European Energy Union and will probably determine the extent to which new a more co-ordinated energy sector is developed.

8 Conclusions

Since the introduction of the concept of a climate and energy package in 2007 there have been remarkable changes in the energy, but particularly the electricity, sector in Europe. Some of this has been driven by the legislation of the packages, most notably the renewable policy, but also by other European legislation, such as the Large Combustion Plant Directive and the Industrial Emissions Directive, both of which have or will significantly impact upon the operational regime of coal plants. However, the sector has also been shaped by events outside the EU, most notably the meltdowns at the Fukushima nuclear power plants in Japan in March 2011 and the ongoing conflict between Russia and Ukraine. While the role of the GHG policy in establishing support for the renewables target should not be underestimated, the relatively weak initial target, coupled with the recession, has meant that the climate target has been met with relative ease and without significant structural changes.

Within the 2030 framework, it may well be that it is the renewable energy policy that continues to be the driver of change, as achieving 27% of the EU's energy from renewable and the implications for the power sector that it contributes 45% is transformative, from a systems perspective. A similar level of change is not required from the 40% reductions in GHGs, although further reduction will require more structural changes and the greater engagement of new sectors, such as agriculture. However, the hybrid status of the renewable target, being binding on the EU and not on Member States, puts in doubt the extent to which a serious attempt is made to meet the target, an issue that maybe resolved in discussions around the New Energy Governance regime.

However, what has been seen in Europe over the last decade is that policy can be the catalyst for change, although it is far from guaranteed. While the renewables policy has delivered new power capacity reading to a changing sector, very little progress has been made on carbon capture

and storage. Whereas the EU's GHG emissions continue to fall and the EU will meet its 2020 with years to spare, very little of this can be attributed to the ETS, the policy that was expected to be at the heart of delivery.

The lesson for Europe surely must be that a wide range of policies and measures are needed to meet very specific objectives, and that it must be assumed that some policies will fail. Furthermore, that not all policies can be complementary and that they need to be flexible enough to react to unintended consequences and external events. However, it must be recognised that Europe, is one of the few place that has sufficient political and public support to introduce relatively strong, although scientifically inadequate to avoid dangerous climate change, although maintaining the support should not be taken for granted.