

VIII ENVIRONMENT, ENERGY AND CLIMATE CHANGE

2013 saw the further substantiation of scientific findings on climate change and the additional documentation of policy proposals for urgent action. Although international cooperation on reducing emissions did not make significant headway, there are indications that 2015 could be a year of positive developments, when a new universal agreement is due for approval. The European Union is currently examining new policy objectives for climate and energy, adopting a more ambitious stance in certain areas and a more moderate one in others as a result of the toll that relatively high energy costs have had on the European economy's competitiveness. Greece continues to be within the Kyoto targets and now also ranks better on the basis of a new indicator of competitiveness adjusted to environmental sustainability than it used to based on a non-adjusted index. However, a recent study underlined the need to address the side-effects that certain changes to the Emissions Trading System are likely to have on the competitiveness of Greek industries, prompting the government to submit a relevant proposal to the European Commission in January 2014. The main body of legislative and administrative measures over the past twelve months concerned the restructuring and privatisation of the Public Power Corporation, renewable energy sources and the issue of "energy poverty" in conjunction with the smog problem. Finally, the most important energy-related investments involved SOCAR's acquisition of a majority of the share capital of the Hellenic Gas Transmission System Operator (DESFA) and the selection of the Trans Adriatic Pipeline (TAP) for the transportation of natural gas from Azerbaijan to Europe, via Greece. Also worth noting is a recent agreement giving British Petroleum exclusive rights to the oil output of the Prinos field over the next six years.

Fifth Assessment Report (AR5) of Working Group I of the UN Intergovernmental Panel on Climate Change (IPCC), published in September 2013.¹ With contributions from 259 authors from 39 countries, the report concludes that human impact is the main cause of the increase in temperature since the mid-20th century, underlining that this increase is undeniable, as shown by the unprecedented changes recorded in the climate system and by increasing evidence. As Sir Nicholas Stern noted after the release of the IPCC Assessment Report, "governments and businesses should be left in no doubt about the dangers of delaying further cuts in greenhouse gas emissions".²

A few months earlier, a report by the International Energy Agency³ had come to the following very interesting conclusions:

- CO₂ emissions reached a record high in 2012.
- The two largest emitters (the United States and China) have both taken encouraging steps towards "decarbonisation". In 2012 gas emissions in the United States fell to levels of the mid-1990s, while China's emissions grew by one of the smallest amounts in a decade.
- Nevertheless, trends in CO₂ emissions suggest that the long-term average increase in temperature could reach as much as 5.3°C.

These findings are echoed in a UN Environment Programme report,⁴ which concludes that, if necessary action is not taken by 2020 to reduce greenhouse gas emissions and contain the average temperature increase to 2°C, more difficult and costlier means will be needed

I CLIMATE CHANGE RESEARCH AND PUBLIC POLICY: INTERNATIONAL DEVELOPMENTS

I.1 SCIENTIFIC FINDINGS AND REPORTS OVER THE PAST TWELVE MONTHS

The most significant scientific report on climate change in the past few months was the

1 IPCC, 2013: Summary for Policymakers. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

2 Nicholas Stern, "World leaders must act faster on climate change", *Financial Times*, 30 September 2013.

3 IEA, *Redrawing the Energy-Climate Map*, 10 June 2013.

4 UN Environment Programme, *Emissions Gap Report*, 5 November 2013.

thereafter. Meanwhile, in 2013 and early 2014 scientists continued to investigate the correlation between climate change and extreme weather events, which are occurring with increasing frequency.⁵ The fact that man-made climate change is responsible for the increasingly frequent extreme weather events is also corroborated by the scientific reports of the European Academies' Science Advisory Council (EASAC)⁶ and the IPCC⁷.

1.2 INTERNATIONAL POLICY DECISIONS AND CONSIDERATIONS

The 19th United Nations Conference on Climate Change

The 19th yearly session of the UN Conference on Climate Change, also known as the COP19, held in Warsaw on 11-22 November 2013,⁸ was supposed to lay the groundwork for the signing of new binding global climate agreement in Paris in 2015 (committed to containing the global temperature increase to 2°C by 2100). However, the Warsaw climate change talks came to a close without setting a timetable for the submission of legally binding emission targets, with the rapidly developing economies (that also have huge greenhouse gas emission footprints) arguing that they are still developing and, therefore, should be exempted from the measures applying to developed countries, and the developed nations, on their side, rejecting the demand for compensation from the small island states for damage due to sea level rise. To make matters worse, representatives of hundreds of environmental NGOs, who had come to the conference as observers, stormed out of the talks to protest the hosting, just a few kilometres away, of the International Coal Summit.

In the end, the following was achieved:

- first, the participating countries decided to initiate or intensify domestic preparation for their intended national contributions towards the international agreement sought to be concluded in 2015 and to come into force in 2020;

- second, the conference also decided to establish an international mechanism to provide most vulnerable populations with better protection against loss and damage caused by extreme weather events and slow-onset events such as rising sea levels;

- third, developing countries should be helped to reduce greenhouse gas emissions from deforestation and the degradation of forests (the United States, Norway and the UK pledged to finance the Collaborative initiative on Reducing Emissions from Deforestation and forest Degradation in developing countries, also known as the REDD+ initiative, with US\$280 million); and

- fourth, developed countries (including Austria, Belgium, Finland, France, Germany, Norway, Sweden and Switzerland) have paid or pledged over US\$100 million in contributions to the Adaptation Fund, while 48 of the poorest countries of the world finalised a compre-

5 See for instance Peterson, T.C., M.P. Hoerling, P.A. Stott and S. Herring, (eds), "Explaining Extreme Events of 2012 from a Climate Perspective", *Bulletin of the American Meteorological Society*, 2013, vol. 94(9), 1-74, as well as "Assessing the Role of Global Warming in Extreme Weather of 2012" and "Research Cites Role of Warming in Extremes", *New York Times*, 5-6 September 2013. See also a report released by Australia's Climate Council in mid-January 2014 ("Australian heatwave shows man-made climate change, scientists say", *Financial Times*, 16 January 2014), and a summary of the findings of the Rutherford Appleton Laboratory on solar activity ("Is our sun falling silent?", BBC News, 18 January 2014, and "Is the planet headed towards overheating or a mini ice age?", [in Greek], *Imerisia*, 25 January 2014).

6 See (1) "Extreme Weather Events in Europe: preparing for climate change adaptation", Norwegian Meteorological Institute in collaboration with the EASAC, 2013, sponsored by the Norwegian Academy of Science and Letters, contributors: Øystein Hov, Ulrich Cubasch, Erich Fischer, Peter Höppe, Trond Iversen, Nils Gunnar Kvamstø, Zbigniew W. Kundzewicz, Daniela Rezacova, David Rios, Filipe Duarte Santos, Bruno Schädler, Ottó Veisz, Christos Zerefos, Rasmus Benestad, John Murlis, M. Donat, Gregor C. Leckebusch, Uwe Ulbrich and (2) "Trends in extreme weather events in Europe: implications for national and European Union adaptation strategies", EASAC Policy Report 22, 2013, by Øystein Hov, Ulrich Cubasch, Erich Fischer, Peter Höppe, Trond Iversen, Nils Gunnar Kvamstø, Zbigniew W. Kundzewicz, Daniela Rezacova, David Rios, Filipe Duarte Santos, Bruno Schädler, Ottó Veisz, Christos Zerefos, Rasmus Benestad, Mike Norton, John Murlis.

7 IPCC Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX), ed. Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley, Cambridge University Press, 2012.

8 UNFCCC, "UN Climate Change Conference in Warsaw keeps governments on a track towards 2015 climate agreement", Press release, 23 November 2013. The conference was attended by the 195 countries that have signed the United Nations Framework Convention on Climate Change, followed by the Kyoto Protocol of 1997, ratified by 192 countries to date.

hensive set of plans to deal with the impacts of climate change.

On 14 January 2014 Christiana Figueres, executive secretary of the UN Framework Convention on Climate Change, estimated that a draft agreement (for approval in 2015) would be ready for discussion by the end of the year and would comprise a goal of zero net greenhouse gas emissions by the second half of the century.⁹

It is also quite telling that, at the time of the conference, UN Secretary General Ban Ki-moon stated: “I have been urging the leaders of the world that they should raise the level of their ambitions and they should prioritise their already limited resources on climate change”, adding that “They should have a broader vision rather than looking at short-term domestic considerations”.¹⁰

Similar views were expressed by leading scientists and commentators on the occasion of the UN Conference. Jeffrey Sachs (Special Advisor to the UN Secretary General and Director of the UN Sustainable Development Solutions Network) marked out four key pillars: more electricity from low-carbon technologies rather than coal; replacing fossil fuels with electricity as the fuel source for sectors such as cars and household heating; greater energy efficiency in industry and the home; and the end of deforestation.¹¹ The well-known columnist Martin Wolf drew attention to the latest findings of economist William Nordhaus,¹² namely that the cost of containing the increase in global temperature to 2°C would be 1.5% of global output, provided the right action were taken, but far costlier if countries responsible for half the emissions did not participate.¹³ Moreover, the World Economic Forum (WEF), on the occasion of the release of its annual report *Global Risks 2014* (16 January 2014) summarising the survey responses of leaders and decision-makers from the global economy, underscored that one of the four key threats that could impact global stability in the next five to ten years is “*slow progress on*

global challenges, where persisting deadlock in global governance institutions leads to failure to adequately address environmental and developmental challenges that are truly global in nature”. The respondents surveyed for the report ranked extreme weather events and climate change amongst the five most likely risks, and climate change the second most potentially impactful risk.¹⁴

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The OECD also released two important reports in October and November 2013,¹⁵ underlining that “credible and consistent carbon pricing must be the cornerstone of government actions to tackle climate change” and that “carbon taxes and emissions trading systems are the most cost-effective means of reducing CO₂ emissions”.

It should also be mentioned that the EU policy was initially summarised in the European Commission’s Communication entitled “An EU Strategy on adaptation to climate change”,¹⁶ adopted by the ECOFIN Council on 21 June 2013. On 18 December 2013, the Permanent Representatives Committee, composed of the ambassadors of the 28 EU member states, approved a compromise agreed with the European Parliament on a draft regulation (submitted by the European Commission on 7 November 2012) on reducing the use and the emissions of fluorinated greenhouse gases (F-gases), i.e. hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆). This regulation (which now only

⁹ “Compelling case for global deal on climate, says UN”, *Financial Times*, 14 January 2014.

¹⁰ “UN presses rich nations to act on climate funds”, *Financial Times*, 22 November 2013.

¹¹ Jeffrey Sachs, “We risk more Haiyans if we ignore climate change”, *Financial Times*, 16 November 2013.

¹² William Nordhaus, *The Climate Casino*, Yale University Press, 2013.

¹³ M. Wolf, “Green growth is a worthwhile goal”, *Financial Times*, 26 November 2013.

¹⁴ World Economic Forum, “Worsening Wealth Gap Seen as Biggest Risk Facing the World in 2014”, news release of 16 January 2014 concerning the report *Global Risks 2014*.

¹⁵ OECD, 1) *Climate and carbon: Aligning prices and policies*, Environment Policy Paper No.1, October 2013, 2) *Effective carbon prices*, 4 November 2013.

¹⁶ 16 April 2013, COM(2013) 216 final.

needs to be formally adopted) aims to phase down the total amount of hydrofluorocarbons that can be sold by as much as 80% and to reduce fluorinated greenhouse gas emissions by two thirds by 2030.¹⁷ Previously, the United States and China had signed a similar agreement to phase down the consumption and production of hydrofluorocarbons in June, while the G20 leaders made a relevant commitment in September.¹⁸

On 22 January 2014 the European Commission communicated its proposals on a policy framework for climate and energy in the period from 2020 to 2030. The proposed new framework sets targets for 2030 which – after approval or amendment by the European Council on 20-21 March 2014 – will replace the targets set for 2020 by the European Council in March 2007 (also called the “20-20-20” targets as they included a 20% reduction in EU greenhouse gas emissions by 2020 compared with 1990 levels, a 20% increase in the share of EU energy consumption produced from renewable resources and a 20% improvement in energy efficiency – translating into energy savings – by 2020 compared with the 2007 estimates for 2020). Before the proposals were submitted, the ministers of France, Germany, UK and Italy had addressed a letter to the European Commission (7 January) proposing that a more ambitious binding target be set – *for a 40% reduction in emissions by 2030 from 1990 levels*.¹⁹ A heated debate has been going on since then on questions such as: (i) whether binding goals should be set for the use of renewable energy sources, (ii) which combination of means and targets would be best, in order to *both* reduce emissions *and* avoid hurting the competitiveness of certain economic sectors²⁰ (see also Section 2.2 below). In the end, the Commission’s proposals, considered insufficient by leading environmental organisations,²¹ provide for the following:²²

1st A binding target of reducing greenhouse gas emissions by 40% below the 1990 level by 2030 (binding at the Member State level and,

thus, requiring national measures). Emissions by sectors not subject to the emissions trading system will need to be reduced by 30% below 2005 levels. The Commission called upon the Council and the European Parliament to agree that the EU will commit to reducing emissions by 40% at the upcoming negotiations for the new universal climate agreement, to be concluded in Paris at the end of 2015.

2nd A binding target *at the EU level (but not at the Member State level)* of increasing the share of renewable energy sources to at least 27% of the EU’s total energy consumption by 2030. The purpose of setting this target at the EU level, without requiring translation into national targets, is to drive continued investment in renewable energy, while also leaving the Member States greater flexibility in transforming their energy systems.

¹⁷ See “Climate action: Commission proposes significant reduction in emissions of climate-warming fluorinated gases”, press release of 7 November 2012, and “Memo – European Commissioner Connie Hedegaard welcomes major step forward to reduce some of the most dangerous greenhouse gases”, press release of 18 December 2013.

¹⁸ Hydrofluorocarbons (HFCs) were widely used as a substitute for chlorofluorocarbons (CFCs), after the production and use of the latter was phased down under the Montreal Protocol because of their depleting effect on the ozone layer. While HFCs are not ozone-depleting, their emissions, if left unabated, can be expected to contribute increasingly to the greenhouse effect, as their potential impact on the temperature rise is *up to 23,000 times stronger* than that of carbon dioxide. See European Commission, “The warming effect of F-gases on the atmosphere is up to 23,000 times stronger than carbon dioxide”, press release of 18 December 2013 and “Curbing a Potent Greenhouse Gas”, *New York Times* editorial, 7 January 2014.

¹⁹ Regarding the energy policy problems inside the EU and the different national stances, see also “Europäische Energiewenden”, *Frankfurter Allgemeine Zeitung*, 29 October 2013.

²⁰ See also N. Butler, “Energy Policy – Europe takes power”, *Financial Times*, 5-6 January 2014 and “EU considers scrapping 2030 binding renewables targets”, *Financial Times*, 14 January 2014; “Sluggish Economy Prompts Europe to Reconsider Its Intentions on Climate Change”, *New York Times*, 17 January 2014; “Rewrite energy policy and re-industrialise Europe”, article by Lakshmi Mittal, chairman and CEO of ArcelorMittal, *Financial Times*, 20-21 January 2014; statements by German Minister of Economic Affairs and Energy, Sigmar Gabriel, “German Energy Official Sounds a Warning”, *New York Times*, 21 January 2014; and “Germany cautions on impact of renewables”, *Financial Times*, 21-22 January 2014; “High energy prices hold Europe back”, *Financial Times* editorial, 21-22 January 2014.

²¹ See “European Commission’s proposals on the new climate and energy package 2030 a step backwards for Europe”, WWF press release, 22 January 2014, <http://www.wwf.gr/news/913-2030> [in Greek]; “New EU climate targets ‘weaken renewable energy goals’” and “EU sets out new climate change goals”, *Financial Times*, 22-23 January 2014; and “Europe, Facing Economic Pain, May Ease Climate Rules”, *New York Times*, 23 January 2014.

²² See “2030 climate and energy goals for a competitive, secure and low-carbon EU economy”, European Commission press release, 22 January 2014.

3rd Improved energy efficiency will continue to play an essential role in the transition to a competitive and sustainable energy system, but its role within the time horizon of 2030 “will be analysed in greater detail in a review of the Energy Efficiency Directive to be concluded later in 2014”.

The Commission’s communication is accompanied by a report on energy prices and costs, which amongst other findings states that: (a) energy prices have increased in almost all Member States since 2008, mainly due to taxes and levies, but also due to higher network costs; (b) a look at energy prices in countries that are EU trading partners, especially gas prices in the United States,²³ shows that increasing energy prices could undermine Europe’s competitiveness, especially in energy-consuming industries; (c) energy price increases can be partially offset by the economic yields of efficient energy and climate policies, competitive energy markets and measures to improve energy efficiency, such as the use of more energy efficient products. The report adds that “*European industry’s energy efficiency efforts may need to go even further, bearing in mind physical limits, as competitors do the same and the European industry invests abroad to be closer to expanding markets*”. Meanwhile, the European Commission adopted a Recommendation aiming to ensure that proper environmental and climate safeguards are in place for “fracking” – the high-volume hydraulic fracturing technique used notably in shale gas operations. It is worth noting that, according to Fatih Birol, chief economist at the International Energy Agency, high energy costs in Europe are not due to EU policies for addressing climate change or renewable energy subsidies, but rather to the high cost of imported energy.²⁴ Moreover, a Climate Strategies report, based on the findings of leading European research institutions, came to the conclusion that the cost of energy exerts little effect on the competitiveness of the European economy and that Europe must remain in the lead of global efforts for decarbonisation.²⁵

Against this background of issues, it is interesting that Chancellor Merkel, in a state of the nation address of her coalition government, confirmed an ambitious plan to increase the use of renewable sources of energy, in order to meet 80% of Germany’s energy needs by 2050, compared with the current 25%.²⁶

In the United States as well, new impetus to policy on climate change was provided when regulations issued by the federal Environmental Protection Agency (that do not require approval by Congress) essentially put a stop to the construction of new coal-fired power plants and may also force existing ones to cease operating. Moreover, as reported in the press,²⁷ the US Secretary of State is seeking close cooperation with China on a new global agreement in 2015, in which the United States and other countries would commit to historic reductions in greenhouse gas emissions. In 2013, China had been in the spotlight on account of the acute smog problem in its cities caused by high levels of greenhouse gas emissions and the extensive use of coal for power generation.²⁸ President Obama, in his State of the Union address on 28 January 2014, stressed that the safe extraction of natural gas had brought the US closer to energy independence, opening the way for an expansion of solar energy use.²⁹

²³ The decrease in energy costs in the United States reflects, amongst other factors, increasing use of shale gas, which however seems to have led to increased carbon exports and thereby to an “outsourcing” of greenhouse gas emissions to other regions of the planet. On this issue and the prospects of Europe proceeding to an economically profitable extraction and use of shale gas, see (a) Daniel Yergin, “The Global Impact of US Shale”, Project Syndicate, 8 January 2014, (b) Florence Gény, *Can Unconventional Gas be a Game Changer in European Gas Markets?*, Oxford Institute for Energy Studies, December 2010, and (c) G. Paleologou, “Europe’s energy treasure is dividing”, *Kathimerini*, 9 February 2014 [in Greek].

²⁴ “Energy price gap with the US to hurt Europe for ‘at least 20 years’”, *Financial Times*, 30 January 2014.

²⁵ See Climate Strategies, *Staying with the Leaders: Europe’s Path to a Successful Low-Carbon Economy*, 6 February 2014, and “Claims of high EU energy prices ‘overblown’”, *Financial Times*, 7 February 2014.

²⁶ “Chancellor Merkel delivers State of the Nation”, *Deutsche Welle*, 29 January 2014.

²⁷ “Kerry Quietly Makes Priority of Climate Pact”, *New York Times*, 2 January 2014.

²⁸ See Thomas Friedman, “Too Big to Breathe?”, *New York Times*, 5 November 2013; “China’s Dirty Air” (editorial), *New York Times*, 7 November 2013; “A year in a word: Airpocalypse – China is getting airy ambitions”, *Financial Times*, 31 December 2013.

²⁹ President Barack Obama, “State of the Union Address”, 28 January 2014.

Table VIII.1 Greenhouse gas emissions¹ and the Kyoto Protocol targets

Country	2011 data							Provisional estimates 2012	
	1990	Kyoto Protocol (base year) ²	2011	Change 2011 over 2010	Change 2011 over 1990	Change 2011 over base year	Kyoto targets 2008-2012	Change 2012 over 2011	Change 2012 over 1990
	(in million tonnes of CO ₂ equivalents)			(percentage changes)				(percentage changes)	
Austria	78.2	79.0	82.8	-2.6	6.0	4.8	-13.0	-3.0	2.8
Belgium	143.1	145.7	120.2	-8.8	-16.0	-17.5	-7.5	-2.3	-18.0
Denmark	68.7	69.3	56.2	-8.1	-18.1	-18.9	-21.0	-7.0	-23.9
Finland	70.4	71.0	67.0	-10.1	-4.9	-5.6	0.0	-7.6	-12.1
France	556.4	563.9	485.5	-5.6	-12.7	-13.9	0.0	0.7	-12.1
Germany	1,250.3	1,232.4	916.5	-2.9	-26.7	-25.6	-21.0	1.4	-25.7
Greece	104.6	107.0	115.0	-1.9	10.0	7.5	25.0	1.2	11.3
Ireland	55.2	55.6	57.5	-6.5	4.1	3.4	13.0	0.4	4.5
Italy	519.0	516.9	488.8	-2.3	-5.8	-5.4	-6.5	-5.0	-10.5
Luxembourg	12.9	13.2	12.1	-1.3	-6.2	-8.1	-28.0	-3.1	-9.1
Netherlands	211.8	213.0	194.4	-7.1	-8.2	-8.8	-6.0	0.4	-7.9
Portugal	61.0	60.1	70.0	-2.0	14.8	16.4	27.0	-0.2	14.5
Spain	282.8	289.8	350.5	0.5	23.9	21.0	15.0	0.9	22.8
Sweden	72.8	72.2	61.4	-6.2	-15.5	-14.8	4.0	3.9	-18.8
United Kingdom	767.3	776.3	552.6	-7.0	-28.0	-28.8	-12.5	3.1	-25.7
EU-15	4,254.5	4,265.5	3,630.7	-4.2	-14.7	-14.9	-8.0	-0.3	-14.9
EU-27³	5,574.4	...	4,550.2	-3.3	-18.4	-0.9	-19.1

Source: For 2011: European Environment Agency Technical Report no. 8/2013, *Annual European Union greenhouse gas inventory 1990-2011 and inventory report 2013*, 29.5.2013. For 2012: European Environment Agency Technical Report no. 14/2013, *Approximated EU GHG inventory: Early Estimates for 2012*, 30.9.2013.

1 Total emissions excluding land use, land-use change and forestry, as well as emissions from international aviation and shipping.

2 For CO₂, CH₄ and N₂O, all Member States chose 1990 as their base year. For HFC, PFC and SF₆, 12 Member States chose 1995 as their base year, while Austria, France and Italy chose 1990. For Cyprus, Malta and the EU-27, there are no Kyoto Protocol targets or base year data.

3 Provisional estimates for 2012 refer to the EU-28, in view of Croatia's entry into the EU as its 28th member, as from 1.7.2013.

Finally, in Greece, WWF-Greece released an extensive report in September 2013,³⁰ with a sustainability roadmap for the Greek economy.

2 RECENT DATA ON GREENHOUSE GAS EMISSIONS IN THE EU AND GREECE (2011-2012) AND CHANGES TO THE EMISSIONS TRADING SYSTEM

2.1 LATEST AVAILABLE DATA ON EMISSIONS

In 2011, total greenhouse gas emissions in the EU-27 (excluding land use, land-use change and forestry, as well as emissions from international aviation and shipping) came to 4,550

million tonnes of CO₂-equivalent, 18% less than in 1990. Greenhouse gas emissions in the EU-15 came to 3,631 million tonnes (15% less than in 1990), accounting for 80% of total EU-27 emissions (compared with 76% in 1990). Amongst the older Member States, Germany and the UK were the largest emitters of greenhouse gases in the EU in 2011 (32% of total EU-27 emissions and 40% of EU-15 emissions), followed by France and Italy (13% each). The Member States with the smallest shares were Luxembourg (0.3%), Denmark, Ireland, Sweden and Finland (1% each), with similar shares in total EU-15 emissions (see Table VIII.1).

³⁰ WWF Greece, *A living economy for Greece*.

Table VIII.2 Greenhouse gas emissions by source: EU-27, EU-15 and Greece

(in million tonnes of CO₂ equivalents)

	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011
EU-27										
Energy	4,297	4,029	3,981	4,084	4,080	4,015	3,936	3,659	3,763	3,614
Industrial processes	458	437	390	403	400	412	388	323	335	332
Solvents	17	14	13	12	12	12	11	10	10	10
Agriculture	600	517	505	478	474	475	474	463	460	461
Waste	204	198	177	152	150	146	142	139	137	133
<i>Total*</i>	<i>5,574</i>	<i>5,195</i>	<i>5,066</i>	<i>5,129</i>	<i>5,117</i>	<i>5,059</i>	<i>4,952</i>	<i>4,593</i>	<i>4,705</i>	<i>4,550</i>
EU-15										
Energy	3,282	3,206	3,259	3,348	3,329	3,265	3,200	2,972	3,048	2,898
Industrial processes	353	350	310	311	303	308	292	254	261	253
Solvents	13	12	11	10	10	9	9	8	8	8
Agriculture	434	412	413	385	380	380	379	370	369	370
Waste	172	166	144	119	116	113	109	106	104	102
<i>Total*</i>	<i>4,255</i>	<i>4,146</i>	<i>4,138</i>	<i>4,173</i>	<i>4,138</i>	<i>4,075</i>	<i>3,989</i>	<i>3,710</i>	<i>3,790</i>	<i>3,631</i>
Greece										
Energy	77	81	96	106	105	107	104	100	92	92
Industrial processes	10	12	14	14	12	12	12	10	10	9
Solvents	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3
Agriculture	11	10	10	10	9	10	9	9	9	9
Waste	6	6	6	5	5	5	5	5	5	5
<i>Total*</i>	<i>105</i>	<i>109</i>	<i>126</i>	<i>135</i>	<i>131</i>	<i>134</i>	<i>130</i>	<i>124</i>	<i>117</i>	<i>115</i>

Sources: European Environment Agency, *Annual European Community greenhouse gas inventory 1990-2011 and inventory report 2013*, 29 May 2013; Ministry of Environment, Energy and Climate Change, *Annual inventory submission under the Convention and the Kyoto Protocol for greenhouse and other gases for the years 1990-2011*, April 2013.

* Excluding land use, land-use change and forestry, as well as international aviation and shipping.

However, it is worth noting that countries which, owing to their size, account for high shares of total greenhouse gas emissions in fact *rank better in terms of emissions per capita or emissions per unit of GDP*.³¹ This most likely reflects better performances as a result of the energy efficiency of power and other industrial plants, energy-saving by households and businesses, energy market deregulation, etc.

Breaking down the emissions of the six main greenhouse gases in the EU-27 in 2011, carbon dioxide (CO₂) accounts for the largest share (82%), followed by methane (CH₄) and nitrous oxide (N₂O) with 9% and 7%, respectively. As regards the trends of these emissions, CO₂ emissions in 2011 came to 3,743 million tonnes

(down 15% from 1990), while CH₄ and N₂O came to 389 and 335 tonnes of CO₂-equivalent, 35% and 36%, respectively, less than in 1990. As for the source of the gas emissions (see Table VIII.2), energy-related activities are the major source of greenhouse gases, with 79% in 2011 in the EU-27 (3,614 million tonnes of CO₂-equivalent). Agriculture is the second most important source with a share of 10% (461 million tonnes of CO₂-equivalent), fol-

³¹ For instance, Luxembourg and Finland account for a small share of emissions (just 0.3% and 2% of total EU-15 emissions), but rank amongst the countries with the highest emissions per capita (23 and 13 tonnes of CO₂-equivalent, respectively) and per unit of GDP (0.45 and 0.40 kg of CO₂-equivalent, respectively). Conversely, Germany and the UK, as mentioned previously, with the largest shares of total emissions, produce 11 and 9 tonnes of CO₂-equivalent per capita and 0.37 and 0.30 kg of CO₂-equivalent per unit of GDP.

lowed by industrial processes and waste, with shares of 7% and 3% (332 and 133 million tonnes of CO₂-equivalent, respectively).

*As regards the trends of greenhouse gas emissions vis-à-vis the Kyoto Protocol targets, it is worth noting that most of the EU-15 Member States are on track to meet their national commitments (see Table VIII.1). Amongst the older Member States, eight (including Greece) have already overachieved their Kyoto Protocol targets, while the remaining seven still have some way to go. **The target set for Greece under the Kyoto Protocol was for the increase in greenhouse gas emissions over the period 2008-2012, relative to the base year, to be contained at 25%. Greece's greenhouse gas emissions in 2011 were just 7.5% above 1990 levels (therefore, well on track, a development attributable to some extent to the economic downturn) and in 2012 increased by 1.2%, based on provisional estimates (once again, remaining on track).***

2.2 CHANGES TO THE EMISSIONS TRADING SYSTEM AND THEIR POSSIBLE ECONOMIC IMPACT ON GREEK INDUSTRY

According to EU legislation, the third phase of the Emissions Trading System (ETS), running from 2013 to 2020, provides for a significant increase in the share of allowances to be auctioned. *Auctioning, not free allocation, is now the default method for allocating allowances, while for those allowances still given away for free, harmonised allocation rules shall apply.*

As pointed out in a recent study by Greece's Foundation for Economic and Industrial Research (IOBE),³² as from 1 January 2013 the electricity generation companies in most EU Member States are required to purchase all of their CO₂ emission rights. This expenditure constitutes an additional cost that pushes up electricity prices. Depending on the structure of the market, this expenditure may be passed through, in full or in part, to the prices charged by energy suppliers, thereby burdening final electricity consumers (indirect emission costs). The practice followed by the Public Power Corporation,

Greece's virtually exclusive power supplier, is to pass the cost of purchased emission rights through to the prices charged to its customers.

This hurts the competitiveness of firms for which electricity is a significant production cost component, as well as of those competing with third-country firms not burdened with indirect emissions costs. The affected firms are thus exposed to the risk of "carbon leakage", meaning that they may be unable to recover from the deterioration in competitiveness and forced either to cease business or to relocate to countries unburdened with carbon emission restrictions.

According to the IOBE study, the economic impact of higher indirect emission costs on the sectors of Greek industry exposed to the risk of carbon leakage is significant. The manufacturing sectors defined as exposed to the risk of carbon leakage³³ account for 5.9% of value added and 4.1% of employment in domestic manufacturing, while also contributing substantially to the trade balance, since their exports in 2012 came close to €1.5 billion (5.4% of total Greek exports and 14.3% of industrial exports, excluding petroleum products).

In order to estimate the economic impact, the study used three scenarios with different prices for carbon emission rights (€5, €15 and €15/tCO₂). In the scenario with the price of €5/tCO₂ (closest to the one in effect today), the total loss of value added to the economy due to indirect emission costs was estimated at €95 million, while in employment terms the losses came to 1,921 jobs. The higher the price of carbon emission rights, the more the losses increased, reaching as much as €474 million and 9,600 jobs (in the scenario using a carbon emis-

³² IOBE, *Economic impact of the pass-through to electricity prices of the cost of purchasing CO₂ emission rights on the sectors most exposed to the risk of "carbon leakage"*, 23 October 2013. This matter was discussed at a conference on "Competitiveness and Climate Change Policies", organised by the Business Council for Sustainable Development of the Hellenic Federation of Enterprises (SEV-BCSD) on 6 February 2014.

³³ These sectors are part of the broader sectors of textiles, paper, chemicals and basic metals, with a 15% share in value added and a 13% share in overall employment in manufacturing.

sion price of €25/tCO₂). These estimates do not explicitly take into account the likelihood of bankruptcy due to higher energy costs. Yet, the risk of bankruptcy is very substantial after a protracted period of recession. Moreover, the study found that, taking into account the multiplier effects stemming from the interconnection between the directly affected sectors and the rest of the economy (indirect impact), together with the impact on demand due to incomes from direct and indirect activity (induced impact), *the total impact on the economy was estimated at over €3.4 billion in terms of value added and at 70,000 jobs in terms of employment.*

This negative impact could largely be avoided with a mechanism that compensates for the indirect emission costs (provided for in Directive 2009/29/EC), while the cost of such a mechanism could be largely offset by tapping foregone tax revenue or in other ways. Similar compensatory mechanisms are already in place in some European countries (e.g. Germany, the UK and Norway). IOBE pointed out in October 2013 that Greece has not yet drafted such a plan. However, on 24 January 2014 it was announced that the Ministry of Environment, Energy and Climate Change, assuming initiatives in the context of European energy and climate policy development, had issued recommendations for **special care to be given to countries facing prolonged economic recession, as well as countries whose geographical position makes them vulnerable to competition** from countries that have not joined the CO₂ emissions trading scheme, “with simultaneous respect, on the part of these countries, to all commitments against climate change and the greenhouse effect”. According to a study submitted by the Ministry of Environment, Energy and Climate Change to the European Commission, based on the current prices of emission rights on energy exchanges, the impact of direct and indirect emission costs on the Greek economy for the period 2013-2020 would, as estimated, amount to €380 million (about 0.2% of GDP) and 5,500 jobs lost annually. The study estimates that *“the recent decision of the European Parliament to backload, i.e.*

*postpone, the auction of some 900 million emission allowances in order to drive up their prices would cost Greece as much as €2.2 billion (1.1% of GDP) and 32,700 jobs (...). If, in addition, certain sectors should be excluded from the “carbon leakage” list, the additional cost to Greece would amount to €90-550 million and another 1,200-7,600 jobs.”*³⁴

3 RECENT GREEK LEGISLATION AND OTHER MEASURES ON THE ENVIRONMENT, ENERGY AND CLIMATE CHANGE – ENVIRONMENTALLY SUSTAINABLE COMPETITIVENESS

3.1 MAIN LEGISLATIVE AND ADMINISTRATIVE MEASURES

— On 24 July 2013, the restructuring and privatisation plan for the Public Power Corporation (PPC) was adopted by the government (Ministerial Act 15)³⁵, which provided for the ownership unbundling of the Independent Power Transmission Operator (IPTO) from the PPC by the end of the second quarter of 2014, for the creation of a new vertically integrated, viable and competitive power company (to receive about 30% of the production capacity of PPC) and for the privatisation of PPC. As regards IPTO, the initial plan was amended by draft law “Regulation of matters related to IPTO SA”, submitted to Parliament and passed on **6 February 2014**. New Law 4237/2014 states that the ownership unbundling will be carried out by the PPC through (a) the sale and transfer to a private investor still to be selected of 66% of the shares issued by IPTO SA by virtue of a Share Sale and Purchase Agreement to be concluded by the end of the second quarter of 2014 and (b) the acquisition by the Greek State of 34% of the company’s shares (statutory minority). As regards the PPC, the law stipulates that the deadline for the completion of the restructuring and privatisation procedures cannot extend beyond the first quarter of 2016.

³⁴ Ministry of Environment, Energy and Climate Change, press release, 24 January 2014 [in Greek].

³⁵ Government Gazette, issue A, 168/24 July 2013.

– On **14 October 2013** the government announced a broadening of eligibility criteria so that more households would be entitled to the heating oil subsidy.

– On **24 October 2013**, Law 4203/2013 “Regulation of Renewable Energy Matters and other provisions”³⁶ was passed by Parliament. This law, inter alia, (a) lays down specific criteria for licence extension for the installation of RES projects, (b) clarifies matters relating to the licencing of major hydroelectric projects and the possibility of installing such projects in forest areas, (c) provides for the conditional change in RES project site, (d) clarifies matters relating to the payment to household consumers of amounts corresponding to the 1% contribution of the pre-VAT sale prices of RES-generated electricity, (e) limits the annual price adjustment of RES-generated electricity, except for photovoltaics, to 25% of the previous year’s CPI, and (f) defines criteria for the setting of electricity prices for new photovoltaic projects. Moreover, this is the first time that “interruption contracts” have been provided for and made available by IPTO to high voltage industrial users (e.g. steel, cement and glass plants), in accordance with which energy-consuming industries, in exchange for a discount in electricity rates, agree to limit or even interrupt their consumption, thereby enabling a stabilisation of the power system through a reduction of the power loads, whenever the sufficiency and safety of the power system is at stake. As in other European countries, the financial cost of this arrangement will be borne not by consumers, but by all power generators through a “transitional supply security fee”. This law, for the first time, also provides for the installation of photovoltaic stations and small wind generators (up to a total capacity of 50 KW), as well as for a special programme for the rational development of small wind generators.

– On **23 December 2013**, in an effort to address the pressing smog problem (suspended particulate matter in the atmosphere), two Ministerial Decisions were issued (one amending the application of “Social Household Rates” for

electricity and another one on the eligibility criteria for a special “Solidarity Services Rate”). A Joint Ministerial Decision was also issued regarding “short-term action plans to address atmospheric pollution due to suspended particulate matter”. A second Joint Ministerial Decision was issued on **3 January 2014** on the “special subsidy to household electricity consumers as a means to address atmospheric pollution caused by suspended particulate matter”.

– On **2 January 2014** the Regulatory Authority for Energy (RAE) announced its decision regarding an increase, as from 1 March 2014, of the special fee for reducing emissions of atmospheric pollutants, if by that date the arrangements for the definitive settlement of the deficit of the Special Account for RES and High Efficiency Cogeneration (of the Greek Electricity Market Operator LAGIE SA) have been enacted and regulated or have not yielded sufficient results.

– On **24 January 2014** the Ministry of Environment, Energy and Climate Change announced that it had submitted a study to the European Commission recommending that special care be taken to ensure that vulnerable countries and sectors can meet the increase in energy costs from the changes in the emissions trading system.

– On **6 February 2014**, Law 4237/2014 on IPTO was passed by Parliament (the draft law had been submitted on 20 December 2013).

3.2 THE TAXATION OF HEATING OIL, THE SMOG PROBLEM AND THE ENERGY EFFICIENCY OF BUILDINGS

Last year’s *Annual Report*³⁷, in its reference to the equalisation of the special levy on heating and motor fuels and to the granting of heating subsidies,³⁸ had mentioned the factors and con-

³⁶ Law 4203/2013 “Arrangement of matters relating to Renewable Energy Sources and other provisions”, Government Gazette, issue A, 235/1 November 2013.

³⁷ *Annual Report 2012*, February 2013, pp. 185-186.

³⁸ Article 5 of Law 4092/2012, October 2012.

straints at the heart of this complex matter, as consideration must be given simultaneously to:

- public revenue, under conditions of fiscal adjustment but also of a need to combat fuel adulteration;
- “energy poverty”;³⁹
- the protection of public health, at immediate and long-term risk from the concentration (above tolerable levels) of suspended particulate matter in the atmosphere (as a result of wood-burning);⁴⁰
- the need to reduce greenhouse gas emissions (by cutting back on the use of oil and firewood, but also of lignite in power generation).

As mentioned previously, the government has already taken useful measures, both to increase the number of heating oil subsidy recipients and to discourage recourse to wood-burning by making electricity not only more affordable for poor households, but also preferable for many more households (not just poor ones) during smog peaks. However, the matter still needs to be reviewed comprehensively and in depth along two axes: changing the energy model as regards the heating of houses and other buildings (in favour of using environment-friendly energy sources) and intensifying efforts to improve the “energy efficiency” of buildings (e.g. by upgrading heat insulation, options encouraged by projects such as “Saving at home”).⁴¹ According to a report of the Ministry of Environment, Energy and Climate Change on the first three years of energy inspections of buildings (9 January 2011-9 January 2014),⁴² two thirds of the 509,000 energy efficiency certificates issued over this period concerned buildings (mostly apartments) to be rented out. It is worth noting that: (a) both the number and the percentage of certificates issued after a first energy inspection doubled in 2013 relative to 2012 (14.7% of the total, from 7.5%) in order to meet the requirements for participation in the project “Saving at home” and (b) inspection data “*point to the huge potential for*

energy-saving from the country’s building stock” (as established by the Ministry of Environment, Energy and Climate Change).⁴³

3.3 NEW INDICATOR OF ENVIRONMENTALLY SUSTAINABLE COMPETITIVENESS

For the first time, in its latest competitiveness report (*Global Competitiveness Report 2013-2014*, 6 September 2013), the World Economic Forum incorporated a competitiveness indicator adjusted to environmental sustainability, which takes into account “the set of institutions, policies and factors that make a nation remain productive over the longer term while ensuring social and environmental sustainability”. It is worth noting that Greece ranked 56th amongst 126 countries on the basis of this adjusted index, while ranking 91st amongst 148 countries on the basis of the Global (non-adjusted) Competitiveness Index.

4 ENERGY SECTOR INVESTMENT

Two were the major developments in the field of energy investment in 2013:

- On 28 June 2013 Azerbaijan chose the Trans Adriatic Pipeline (TAP) for the transportation of natural gas from the Caspian Sea to Europe.

³⁹ See a survey by the Built Environment Physics Laboratory of the University of Athens, summarised in a press article in *To Vima*, 24 November 2013, and <http://env.mg.uoa.gr>.

⁴⁰ See Prof. D. Kremastinos, “How dangerous smog from burning firewood really is”, *Ta Nea*, 9 January 2014 [in Greek]. Also “Smog from burning wood has turned us into Beijing”, *Ta Nea*, 10 January 2014 [in Greek], citing comments from Mr. Gerasopoulos, Research Director at the Institute for Environmental Research and Sustainable Development of the National Observatory of Athens, on an ongoing study for measuring suspended particulate matter in the Athens area, as well as from Prof. K. Katsouyianni at the Medical School of the University of Athens and Prof. P. Behrakis at the Harvard School of Public Health.

⁴¹ See also Law 4122/2013, in transposition of Directive 2010/31/EU of the European Parliament and of the Council.

⁴² Ministry of Environment, Energy and Climate Change press release, 16 January 2014 [in Greek].

⁴³ For the revised terms of the programme that apply to households with an annual family income of €80,000 or less, see <http://www.ypeka.gr/Default.aspx?tabid=526&language=el-GR> [in Greek]. Low-income households are entitled to a subsidy for 70% of the expenditure and to an interest-free loan for the remaining 30%, while higher-income households are entitled to a subsidy for 15% of the expenditure and to an interest-free loan for the remaining 85%.

The TAP will cross Northern Greece, Albania and the Adriatic Sea, ending in Italy. Greece is expected to reap significant benefits from this decision, in terms of both foreign direct investment and job creation.

— On 21 December 2013, the Hellenic Republic Asset Development Fund (HRADF) and HELLENIC PETROLEUM SA signed an agreement to sell 66% of the shares of the Hellenic Gas Transmission System Operator (DESFA) SA to the State Oil Company of the Azerbaijan Republic (SOCAR). At the same time, a Shareholder Agreement was signed between the Greek State, HRADF and SOCAR on the management of DESFA after the shares are transferred to SOCAR.

The privatisation of the Public Gas Corporation of Greece (DEPA) remains on the agenda of HRADF for 2014.

Meanwhile, as part of the programme for the development of RES, the Ministry of Environment, Energy and Climate Change continued to approve the environmental conditions for the construction and operation of large wind farms. In December 2013 and January 2014 alone, such approvals were issued for 23 wind parks on islands not connected to the national power grid and on the mainland, with a total capacity of 888 MW. As estimated by the Ministry of Environment, Energy and Climate Change, the real economy stands to gain some €1.1 billion from their construction.

Also worth mentioning is the agreement signed on 13 January 2014, by which British Petroleum (BP) acquires the exclusive rights to the output of the Prinos oil field over the next six years.

5 THE WORK OF THE CLIMATE CHANGE IMPACTS STUDY COMMITTEE (CCISC) IN 2013

5.1 PHASE 2 OF THE IMPACTS STUDY

The Climate Change Impacts Study Committee (CCISC) of the Bank of Greece continues its

research activities, given that research — on which knowledge and forecasting can later be based — can prove essential in addressing factors that either presently affect or are expected to affect the natural environment in the future.

As shown by studies by the scientific community in Greece and worldwide (see Section 1.1 of this chapter), adaptation to climate change has become crucial to preserving the planet's resources and to ensuring human survival, both now and in the future. This is why the CCISC, after conducting a first study to estimate the environmental, economic and social impacts of climate change in Greece, has currently moved on to Phase 2 of the study which consists in formulating a *national strategy for adaptation to climate change* (NSACC), to be based on in-depth sectoral studies. The study on tourism is nearly complete, while a second sectoral study, focusing on the health impacts of climate change, is currently being planned and mapped out.

5.2 GREEK TOURISM AND CLIMATE CHANGE: ADAPTATION POLICIES AND A NEW GROWTH STRATEGY

Sea level rise, increasing temperature levels and other related phenomena, such as changes in humidity and wind conditions, as well as the possible further loss of water resources, are some of the impacts that climate change is expected to have on tourism, the tourism product and tourism climate indices. In the context of its sectoral study of tourism, the CCISC, together with representatives from tourism business associations and experts in the field, organised a conference on “Greek tourism and climate change: adaptation policies and a new growth strategy”, held on 9 July 2013. In attendance were well-renowned scientists, the heads of tourism bodies and organisations, the Secretary General of the Ministry of Tourism and the Secretary General for the Aegean and Island Policy. The actions proposed for the adaptation of tourism to climate change would contribute in a first stage to the recovery of the Greek economy and at a later stage to its sustainable growth, with a substantial positive impact on GDP and employment.

As regards entrepreneurship in the tourism sector, it was underlined that investment initiatives must have a long-term horizon and a global approach. The proposals stressed the need for:

- a development and expansion of the tourism product to include all regions of Greece, as well as all seasons;
- investment initiatives that respect Greece's cultural and environmental heritage; and
- a reduction of the environmental footprint of existing infrastructures.

Highlighting the distinct but complementary roles of the State and private businesses, the proposals regarding the role of the State stressed the need for:

- a channelling of available resources, however limited at present, towards improving infrastructure, so as to contribute to an upgrading of tourism and environmental services;
- an improvement in the sector's business environment;
- coordination of central and local authorities, together with a reinforcement of decentralisation; and

- support of tourism/environmental education at the university level.

Other proposals worthy of note touched upon the need for:

- the co-financing of infrastructure works through public and private sector partnerships;
- the collective participation of businesses in the financing of activities serving to prolong the tourism season;
- a review of the special land use plan for tourism;
- the implementation of an environmental standard system;
- an upgrading in services provided by marinas; and
- the design of new tourism products, with an emphasis on small units and traditional accommodation.

Relevant information has been posted on the website of the Bank of Greece, while the results and recommendations of the conference and the CCISC study will be published in a special volume.