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Cleaning the neighbourhood: How the EU can scrub out bad energy policy

By Stephen Tindale and Suzanna Hinson

CENTRE FOR EUROPEAN REFORM

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★ Four of the EU's neighbouring countries – Serbia, Montenegro, Ukraine and Turkey – are substantially increasing their use of coal, the dirtiest fossil fuel. This increase is driven in part by their desire to sell electricity to the EU market. The EU cannot credibly claim to be committed to climate action if it increases its imports of dirty electricity.

★ The Commission promised in its February 'energy union strategy' to protect the EU market from unfair trade practices. Power stations without the anti-pollution technology which is mandatory in the EU can produce electricity at a lower cost than cleaner power stations can. Pollution from neighbouring countries' coal plants damages the health of EU residents – as well as the health of their own residents. Failure of neighbouring countries to regulate power stations therefore constitutes an unfair trade practice; one that affects public health.

★ The EU should announce that it will not buy electricity from countries which allow highly polluting power stations. This would be consistent with international trade rules: it would be protection, not protectionism.

★ The Energy Community, set up in 2006 to help improve Balkan energy infrastructure and since expanded to Black Sea states, gives the EU leverage to shape the energy policies of Serbia, Montenegro and Ukraine, and to exert some influence over the policy of Turkey, which is an Energy Community observer. This leverage should be used not only to control the expansion of coal, but also to improve energy efficiency and expand clean energy production.

★ The Commission should award grants from its Projects of Common Interest fund to energy efficiency, renewable energy, and carbon capture and storage projects in these four countries.

Introduction

Energy policy can help or hinder economic, foreign, health and climate objectives. Sensible energy policies improve Europe's competitiveness and support higher employment; bad policies do the reverse. A reduction in dependence on energy imports would have benefits for the European economy and for the foreign policy of the EU. Public health would be greatly improved by reducing toxic pollution from power stations. And nearly 80 per cent of Europe's greenhouse gas emissions come from the energy sector.

Several of the EU's neighbours are major users of coal, the most polluting of the fossil fuels. Some have large amounts of hydroelectricity, but none has developed renewables to anything like their potential. And all of them waste a lot of energy. The EU should therefore support – politically and financially – energy efficiency and clean energy generation, and discourage dirty coal.

The energy systems of the EU's neighbours have a direct impact on the EU itself, because toxic emissions from power stations blow across national borders and damage the health of EU citizens. Neighbours' energy systems also have an indirect impact through greenhouse gas emissions; it makes no difference to the climate where carbon dioxide is emitted. The import of electricity from

neighbours' dirty power stations undermines the EU's air quality and climate objectives. With EU assistance, neighbours could instead help meet these objectives. Expanded electricity interconnections would enable the EU to trade intermittent renewables like wind and solar, and to store more electricity in neighbours' hydro-electric schemes. The import of more electricity from countries other than Russia would improve the EU's energy security and reduce Moscow's ability to use its hydrocarbons as hostile diplomatic tools. More efficient energy systems in neighbours would produce more secure and prosperous countries, and so deliver trade and security benefits.

The Commission's 'energy union strategy', published in February, promises to use EU trade policy to "protect the EU market from unfair trade practices".[1] The European Council considered this in March, and promised to use "all external policy instruments to establish strategic energy partnerships with increasingly important producing and transit countries, notably with a view to promoting energy security". The Council also called for "enhanced regional co-operation, including with neighbouring countries".[2]

The EU has participated in four initiatives with neighbouring countries since the end of the Cold War that have relevance to energy policy:

★ The 1994 Energy Charter Treaty, to increase energy co-operation between the EU and former Soviet countries by establishing non-discriminatory energy trade rules and protecting foreign direct investments. This charter has improved the framework for private investors, but offers little scope for the EU to influence energy policies outside its borders.

★ The 2006 Energy Community, to encourage investment in Balkan energy systems, which were extensively damaged in the 1990s wars. In 2010 the geographical scope was extended to Black Sea countries.[3] In return for financial help, non-EU members have to implement the relevant energy, environment and competition measures of the EU's *acquis communautaire*.[4]

★ The 2008 Union for the Mediterranean, with 15 non-EU countries. This included, amongst other ideas, plans to increase co-operation on energy and environment policies and projects – notably by expanding solar power generation in North Africa. This initiative has not delivered much practical benefit, and most of the solar plans have been derailed by post-Arab Spring instability.

★ The 2009 Eastern Partnership, to improve political and economic links with six former Soviet states.[5] Partner countries can sign association agreements with the EU as part of the process of liberalising trade. In return they must implement about three-quarters of the *acquis*, including energy and environmental rules. The Eastern Partnership is now overshadowed by Russian president Vladimir Putin's increasingly hostile attitude to the EU, and by Russia's invasion of Ukraine.

"Imports of electricity from neighbours' dirty power stations undermine the EU's air quality and climate objectives."

The Energy Community is the initiative with the greatest potential to shape the policies of neighbouring countries. It has agreed that the Industrial Emissions Directive (IED), which sets maximum emission levels of toxic gases from new plants, will become binding on its non-EU members at the beginning of 2018. However, Energy Community institutions are not powerful or well-resourced. The Commission's 'energy union strategy' says that the Energy Community should be strengthened, to ensure the implementation of the energy, environment and competition *acquis*, but does not say how.

Four neighbouring countries – Serbia, Montenegro, Ukraine and Turkey – are substantially increasing their current use of coal and have future ambitions to export electricity to the EU; as such they make for an interesting sample of the neighbourhood. The first three of these are Energy Community members, so are committed to following EU anti-pollution rules. They are not doing so. Turkey is not a member of the Energy Community, though it is an observer. The energy chapter of Turkey's long-running accession talks has not opened. So Turkey has not made any commitment to follow the EU's energy and environment *acquis*. To encourage Ankara to clean up its power stations, the EU will have to use trade policy.

This policy brief summarises the existing energy policy and practice of these four countries before considering what the EU has done to contribute to their energy systems in the past. We then recommend what the EU should do now and in the future, including steps to strengthen the Energy Community.

1: European Commission, ´Framework strategy for a resilient energy union with a forward-looking climate change policy´, February 2015.
2: European Council, 'Conclusions on the Energy Union', 19th March 2015.
3: The members in 2006 were the EU plus Albania, Bulgaria, Bosnia and Herzegovina, Croatia, Montenegro, Macedonia, Romania and Serbia. Norway and Turkey attended meetings as observers. Bulgaria, Romania and Croatia ceased their direct membership when they joined the EU: Kosovo joined when it separated from Serbia. Moldova and Ukraine joined in 2010. Georgia is currently negotiating to join, and Armenia is an observer.
4: Competition rules were included because one of the EU's objectives is to extend its internal energy market to non-member states. The Energy Community should remain active on competition and single market issues, but these are beyond the scope of this policy brief.
5: Eastern Partnership countries: Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine.

Energy policy and practice in Serbia, Montenegro, Ukraine and Turkey

Serbia, Montenegro, Ukraine and Turkey all have the potential to provide substantial amounts of electricity to the EU in future. As Table 1 shows, Serbia and Ukraine are already significant net power exporters. In future, increased domestic generation could enable them to increase their exports. In Montenegro, the recent decline of KAP, a highly energy intensive aluminium company, means that the country requires less electricity and could switch from being an electricity importer to being an exporter.[6] Turkey is currently a net electricity importer, although it does export some electricity to EU countries. Ankara sees energy as a significant economic and foreign policy tool, so intends to make Turkey an energy bridge between regions which have energy resources and regions which need them – notably the EU.

Table 1: Energy imports and exports

Source: Energy Community Annual Implementation report 2014 and IEA.

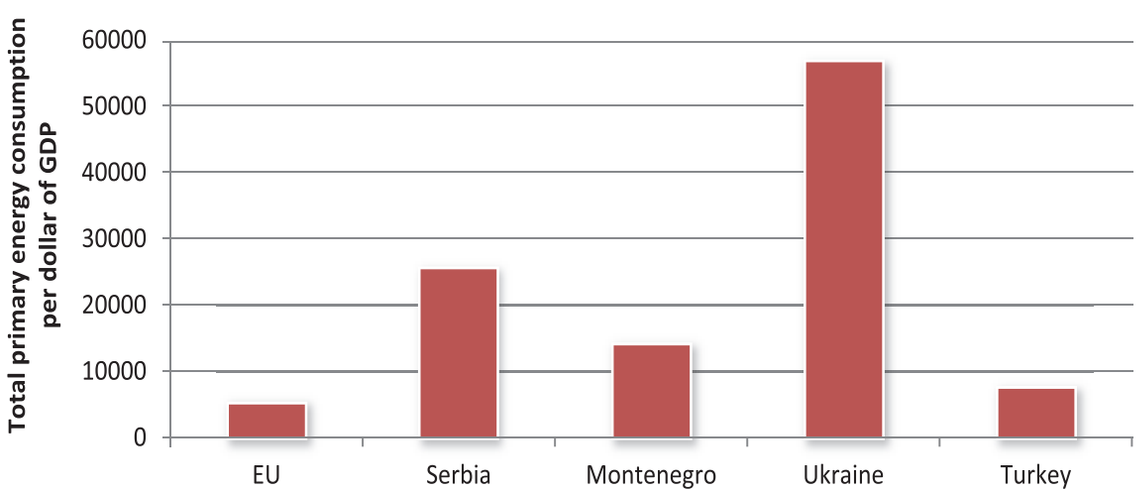
	2012 (kWh)			2013 (kWh)		
	Import	Export	Net	Import	Export	Net
Serbia	2032	2152	+120	1592	4475	+2883
Montenegro	569	353	-216	195	681	+486
Ukraine	91	9751	+9660	65	9874	+9809
Turkey	5827	2954	-2873	—	—	—

N.B. The figures represent total exports but the majority is exported to the EU due to the geography of the countries and lack of interconnections elsewhere.

The four countries have very different energy systems, but share one characteristic: they all use energy inefficiently. Ukraine is the worst: it consumes 11 times as much energy per unit of GDP as the European average. If Ukraine used energy as efficiently as the EU average, it would not need to import any gas, from Russia or anywhere else.[7] Serbia uses five times the European average, Montenegro three times and Turkey one and a half times. This waste of energy damages their economies. The governments spend money on increasing energy production and on imports. Much of this could be saved if, instead, investments were made in more efficient energy systems.

Chart 1: Energy intensity comparison

Source: US Energy Information Agency (data from 2011).



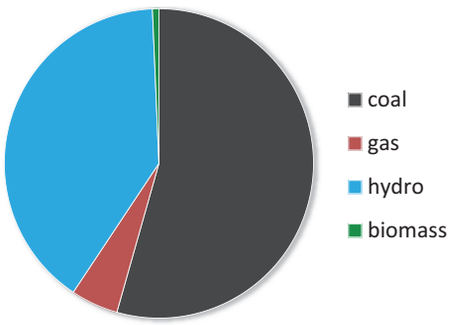
6: Sanjeev Kumar, 'Climate change: Time for the Energy Community to take action', Change Partnership, February 2015.

7: 'Ukraine's economy – Worse to come', *The Economist*, November 15th 2014.

The electricity mixes of the four countries are shown in the pie charts below. Each uses a lot of coal. The amount of gas used varies considerably. All use a large amount of hydro-electricity but not much other renewable energy.

Chart 2: Serbia's electricity mix 2013/4

Source: Energy Community Secretariat



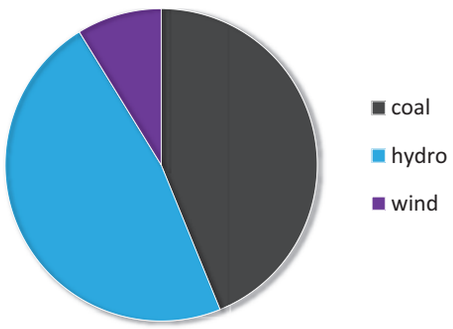
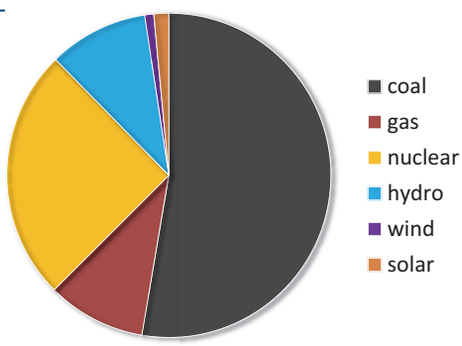


Chart 3: Montenegro's electricity mix 2013/4

Source: Energy Community Secretariat

Chart 4: Ukraine's electricity mix 2013/4

Source: Energy Community Secretariat



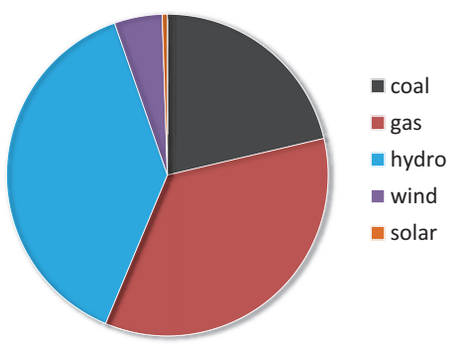


Chart 5: Turkey's electricity mix 2013/4

Source: IEA

All four countries are planning to increase their energy security and become electricity exporters by burning more coal. Unregulated, this will lead to much pollution. Serbia has substantial coal reserves, so Belgrade is supporting new coal power stations, despite the fact that Serbian power stations are already the largest European source of sulphur dioxide emissions. Montenegro is currently building a new second coal power station. Ukraine's electricity mix is more diverse than that of Serbia or Montenegro, but it still relies on its extensive coal reserves for more than half of its electricity generation. Kyiv regards coal as a means of increasing energy security, although many of its reserves are in separatist-controlled areas at the time of writing. Turkey relies on coal for a smaller proportion of its current electricity mix, but its government is putting great emphasis on expanding coal to exploit the country's large reserves. The Erdogan government declared 2012 the 'year of coal', and more than 80 coal power plants are being planned or constructed. The coal industry is essentially unregulated: mines operate with few health and safety measures, so accidents are common, and power plants run without filter systems, resulting in extensive pollution.

Ukraine and Turkey use significant amounts of gas for electricity generation; Turkey's gas use is higher than its coal use. However this gas is mostly from imports, as Ukraine has no domestic resources and Turkey has very few. Both countries aim to become energy exporters and Turkey also wants to become a regional gas hub. These two factors, combined with the frosty relationship with Russia (the main source of imports) at present, mean that both Turkey and Ukraine plan to reduce imports and diversify gas supply options. Nevertheless, with demand growing it is likely the use of gas in all the countries will increase. Montenegro has no gas sector at all. The government plans to construct a gas grid, but this will not happen before 2020. Serbia does have a gas grid, mainly used to distribute gas for heating. It is building new gas power stations, but still uses little gas for electricity generation. And most of the gas is imported from Russia. Electricity from gas is cleaner than electricity from coal, but reliance on imports from Russia does not make it a hugely secure alternative at present. There are even cleaner alternatives that can provide greater security.

Nuclear power is one such alternative. Serbia and Montenegro have no nuclear power plants, nor any plans to build them. Ukraine, despite being the location of the world's worst nuclear disaster at Chernobyl in 1986, is very pro-nuclear, and currently gets about a quarter of the country's electricity needs from nuclear power. However, all 15 of its nuclear stations were built in the Soviet era, and are nearing the end of their design life. Kyiv aims to maintain the share of nuclear energy in electricity

production by modernising existing reactors and building new ones. Turkey has no nuclear power plants at present, but the government has set a target that by 2023 (the centenary of the Turkish republic), nuclear will provide 10 per cent of Turkish electricity. Plans for two nuclear stations are well advanced, though construction has yet to start.

Another alternative that all four countries could exploit is renewable energy. As the charts on the previous page show, they already use significant quantities of hydropower, though this could be substantially increased along with wind and solar power. Wind is expanding in Turkey, Serbia and Montenegro, and was in Ukraine before the Russian invasion, but installed capacity remains low. Solar power was also expanding in Ukraine but the governments of Turkey, Serbia and Montenegro seem to have little interest in solar power, despite the fact that their countries receive a copious amount of powerful sunlight. For example, photovoltaic solar arrays across 0.5 per cent of the Turkish landmass could supply the country's current electrical consumption,[8] but Ankara does not encourage the technology by preventing solar development on agricultural land.

"All four countries aim to increase their energy security and become electricity exporters by burning more coal."

More information on the current energy situation in Serbia, Montenegro, Ukraine and Turkey is available in the appendix. From this summary, it is clear that they all waste a lot of energy and do not use much of the clean energy available. Therefore they all burn a lot of coal, and intend to burn even more in future. The EU needs to encourage them to change course.

EU involvement in energy in Serbia, Montenegro, Ukraine and Turkey

There have been several EU energy initiatives in neighboring countries over the last decade, but their impact has been limited and many projects undertaken by the EU or EU companies have undermined the EU's own climate and environmental policies. Over €4.5 billion has been invested in the energy infrastructure of Energy Community members since 2006. The Commission has provided grants, while the European Bank for Reconstruction and Development (EBRD) and the European Investment Bank (EIB) have provided loans. But the investment is not nearly the amount needed, and is almost all made up of EU funds. These funds have not leveraged significant private sector investment, as they were intended to. Investors have been put off by widespread corruption, the inadequate electricity grid and the lack of regulatory stability. Moreover, most of the money has gone on fossil fuels rather than clean energy. Both the EBRD and the EIB are at least now focussing on gas rather than coal. The EIB introduced new lending criteria in July 2013 which have ended most lending to coal. The EBRD adopted similar guidelines in December 2013.[9]

The EU itself has spent around €450 million on energy projects in Serbia since 2000, firstly under a reconstruction programme and since 2007 under pre-accession assistance. But over three-quarters of this has been spent on fossil fuel projects. Around €92 million has gone on improving the grid, which will help energy efficiency and renewables, though also fossil fuels. €25 million has been spent on modernising district heating systems in five cities. Only €2.5 million has been given to specific renewable energy projects.

Serbia has taken various steps to implement the *acquis*, as it is required to as an Energy Community member and a candidate to join the EU. The government has made progress in opening up the electricity sector, though more needs to be done. The gas sector still fails to meet the requirements of the *acquis*, due to a lack of unbundling in the transmission system. Belgrade adopted a National Renewable Energy Action Plan, as it is required to do by the 'renewable energy directive', in June 2013. Serbia was the only non-EU country to meet the deadline for this, and is so far also the only non-EU country to use a co-operation mechanism to transfer excess renewable energy to an EU member-state, in this case Italy. Electricity from ten small hydro-power plants in Serbia will be exported to Italy, and count towards the Italian renewable target. A number of EU energy companies are building wind farms in Serbia, including a Dutch-Belgian consortium and an Italian-Serbian one.

The Energy Community has agreed that the 2010 IED, which sets maximum emission levels of toxic gases from new plants, will become binding on its non-EU members at the beginning of 2018. Serbia has written the IED into its law. However, there are plans for – and investments in – new coal power plants in Serbia which will not comply with the IED rules. Some of these projects, which will not be operational before 2018, involve EU energy companies. For example, Italy's Edison is in a consortium with state-owned Elektroprivreda Srbije, the largest Serbian electricity company (indeed the largest enterprise in the country), to build a 750 MW coal plant. Alta AS, the Czech engineering and energy company, is involved in a €500 million project to develop a new mine and power plant in Serbia.

8: Julia Harte, 'A solar city tries to rise in Turkey despite lack of federal support', Reuters, May 2011.

9: Ingrid Holmes and Stephen Tindale, 'Briefing on the European Investment Bank's new screening and assessment criteria for energy projects', E3G and CER, July 2013.

The EBRD has lent €65 million for the construction of an undersea cable from Montenegro to Italy, which began in January 2015. This cable will be used to transmit Montenegro's excess hydroelectric power to the Italian market, which will then count towards the Italian renewables quota. Montenegro wants to export electricity for economic reasons. But to free up enough hydropower for export, Montenegrins will use electricity from the new coal power plant. This will not meet EU anti-pollution rules, because the Montenegrin government has not yet transposed the IED into its law. The Energy Community Secretariat has concluded that Montenegro is guilty of a complete lack of compliance with the energy *acquis*.[10] The new coal power station is being built by a Montenegrin company which is 40 per cent owned by Italian utility A2A. So in both Serbia and Montenegro, EU companies are investing in projects which will break EU law.

In Ukraine, the EU has worked with local governments to improve energy efficiency and production. The Commission funded a project to help Ukrainian local authorities monitor the energy performance of buildings in 2006-08. The EBRD has lent €238 million to Kyiv to improve the efficiency of the Ukrainian electricity grid, which loses much of the power it is transmitting. The EBRD supported the upgrading of the district heating system in Odessa, Ukraine's third largest city. The Swedish, French and British governments helped finance this, and the Swedish company Alfa Laval carried it out. As a result, Odessa's total energy consumption has fallen by 50 per cent.[11] More controversially, the bank has lent €80 million to upgrade the interconnection from the coal power station at Burshtyn to the EU grid. However the EBRD has also supported renewables by loaning more than €200 million to wind, solar, hydro and bioenergy projects in Ukraine. The Commission has been involved in trying to improve Ukraine's coal sector through Carbon Capture and Storage (CCS). Between 2010 and 2013 the Commission spent about €0.5 million on CCS research, capacity building and dissemination in Ukraine. CCS has to be an essential part of the decarbonisation of the Ukrainian economy, and the country has many saline acquifers that can store the CO_2.[12]

The EU has been less involved in Turkish energy policy. Turkey is an observer rather than a member of the Energy Community; Ankara has regarded membership as a distraction from accession discussions. The EU-Turkey Customs Union does not cover energy, and the energy chapter of Turkey's accession talks has not been opened, due to Greek opposition. The Commission has not given any major grants for energy projects in Turkey. The EBRD has lent €1.2bn to 27 energy efficiency and renewable energy projects. The two biggest Turkish wind farms (142 MW and 135 MW) have had EBRD loans. The EIB announced a loan to Turkey of €100 million for energy efficiency and renewables in December 2014. The banks are also lending to gas projects in Turkey: for example, the EBRD loaned €175 million to a new 950 MW gas plant, and the EIB loaned €300 million to an 870 MW gas plant. Fortunately, there is little EU involvement in Erdogan's dash for coal. Many European energy companies have invested in Turkey, but none has put significant money into coal. RWE, Eon and GDF Suez have invested in gas, EDF in nuclear and wind, and Statkraft in hydro.

"Projects undertaken by the EU or EU companies have undermined the Union's own climate and environmental policies."

Has the Energy Community made a significant contribution to the neighborhood's energy policy? In 2014 a committee of high-level experts, chaired by the former President of the European Parliament and former Polish Prime Minister, Jerzy Buzek MEP, concluded that: "Although the Community has been a success story in many areas, its potential has not been fully exploited."[13] The committee highlighted as shortcomings the lack of investment, weak implementation of the *acquis* and partial effectiveness of the Energy Community's institutions.

Energy Community members are committed to implementing the energy and environment *acquis*. Some of them have adopted the laws, but there has been little enforcement. The governments lack the institutional capacity and, in some cases, the desire to follow the rules. Energy Community institutions lack the clout to enforce the rules. The Ministerial Council meets only once a year. The Regulatory Board, comprising representatives of national energy regulators, exists to advise the Ministerial Council on details of regulatory rules, and to make recommendations in cases of cross-border dispute between regulators. The Regulatory Board is based in Athens, and is supposed to work with the Energy Community secretariat, based in Vienna, and the the Agency for the Co-operation of Energy Regulators, based in Llubljana. The Ministerial Council can instruct the Regulatory Board to take regulatory measures, but has never done so. If it did, the Regulatory Board would not have powers to enforce the measures.

Energy Community institutions do not have a significant budget. For 2015, the budget was €3,517,786 but the majority was for human resources with only 32 per cent covering "other" which includes research and consulting for energy projects. The EU has identified a long list of energy infrastructure projects as 'Projects of

10: 'Annual implementation report', Energy Community Secretariat, September 2013.
11: 'Swedish entrepreneur helps Ukraine become more energy efficient', Green Solutions Vol. 6, 2014.
12: 'CO_2 capture and storage: Ukrainian perspectives on industry and energy security', Bellona Environmental CCS team, October 2013.
13: The High Level Reflection Group of the Energy Community, 'An Energy Community for the future', Energy Community, May 2014.

Common Interest'. Some of these projects, which are about benefiting EU member-states, will be supported by Commission grants and EIB loans. In an attempt to copy this approach, the Energy Community has identified 'Projects of Energy Community Interest'. But these will not receive any money from the Energy Community, because it has no funds. The Energy Community has recommended that some energy projects outside the EU should receive EU financial support. But there is no guarantee that the Commission will take any notice.

The Buzek committee was therefore right to conclude that the Energy Community has underperformed. The next section makes recommendations for how it should be strengthened, as part of a broader reform of EU energy policy and practice towards its neighbours.

What the EU should do

The Commission, EIB, EBRD and member-state governments have operated some sensible programmes on energy in neighbouring countries. But they have not done nearly enough, and have also undertaken activities which undermine EU energy and climate policies. Some EU businesses are investing in projects in Energy Community countries which will even break EU law. So several changes to EU policy and practice are needed. The new approach should be stick and carrot: the EU should be prepared to block electricity imports from countries whose power stations do not meet IED standards, but import more power from countries that clean up their energy system, and help pay for that cleaning up.

A block on imports of dirty electricity from neighbouring countries would be protection, not protectionism. WTO rules allow restrictions on trade as long as they have a clear justification and do not discriminate between countries.[14] The IED provides the justification. Emissions of toxic gases like sulphur dioxide and nitrogen dioxide from Serbian or Turkish power stations damage human health, not only of people in Serbia and Turkey but also of EU citizens. The WTO Disputes Settlement Body has affirmed in several of its decisions that world trade rules do not take precedence over environmental rules.

A block on electricity imports from countries which do not meet IED standards would be consistent with WTO rules. However, a block on imports of coal-derived electricity on the grounds of its carbon footprint would break WTO rules, because the IED does not regulate greenhouse gas emissions. Until the EU regulates carbon emissions from its own power stations, trade blocks on electricity from high-carbon power stations would be seen, correctly, as protectionist and inconsistent with international trade rules.

To be non-discriminatory, an EU ban on electricity imports from countries which do not enforce the IED would have to apply to all countries that could supply electricity to the EU. Energy Community members are supposed to implement the IED from 2018. Norway, Iceland and Liechtenstein have implemented it as members of the European Economic Area. Switzerland does not formally have to implement the IED, but does not have any coal-fired power stations – its power comes from hydro, nuclear and gas. So it would have no difficulty meeting IED rules.

Russia exports electricity to Finland and Lithuania. President Vladimir Putin seems unlikely to be willing to clean up Russia's power stations. So, to remain within WTO rules, the EU would have to block electricity from Russia. In light of Russia's invasion of Ukraine and European leaders' professed desire to reduce energy dependence on Moscow, there is anyway a case for not buying Russian electricity. If Putin's eventual successor is more co-operative, the EU should be prepared to contribute to energy efficiency and clean energy projects in Russia. Until then, the EU should stop buying electricity from Russia. Less than five per cent of the electricity consumed in Finland is imported from Russia, so providing power from alternative sources would not be hard. Lithuania is much more dependent on Russian electricity imports, but interconnectors with Sweden and Poland are under construction.

"A block on imports of dirty electricity from neighbouring countries would be protection, not protectionism."

The EU should announce that from 2018 – the date at which Energy Community members have agree to implement the IED – it will no longer import electricity from a neighbouring country that does not met these standards. The EU would have to insist that any country which imports electricity into the Union meets IED standards at all its power stations. To allow imports of some electricity, say from hydro, and not from coal, would have no real benefit. It is possible to make a nominal distinction, enabling consumers to choose. Austria has done this, to prevent the import of electricity from nuclear power stations. But, as the example of Montenegro demonstrates, electricity is fungible. The grid link from Montenegro to Italy will export power which is nominally generated at hydro plants, but Montenegrins will instead use electricity from dirty coal stations. So to

14: Montenegro, Turkey and Ukraine are WTO members; Serbia is an applicant.

make a block on dirty electricity imports effective, the EU will have to follow an all-or-nothing approach.

As a first step, the Commission should ensure that EU companies do not break EU law. The IED sets limits for toxic emissions from new industrial facilities. This directive will be binding on Energy Community members from the start of 2018. Coal power stations being built in Serbia and Montenegro will not meet the IED limits, and will not be operational before 2018, so will contravene EU law. Yet an Italian company and a Czech company are investing in these power stations. The Rome and Prague governments should take legal action to ensure that these companies withdraw these illegal investments. If the Italian and Czech governments fail to act, the Commission should take them to the European Court of Justice.

As a second step, the Commission and Council should change the EU's operating rules so that no money from the EU budget or EU banks is available for coal power stations unless they have CCS. This should cover member-states and other Energy Community members (and recipients of EU development aid). The EIB and EBRD adopted new guidelines for coal lending in 2013. These were a step forward, but are not strict enough, so should be strengthened. There should be no financial support for coal power plants, anywhere in the world, unless they have CCS covering their full capacity.

A proposal to block imports of dirty electricity, enforcement of IED rules for new power investments in Energy Community members, and an end to all funding of coal without CCS would give the EU three powerful sticks. But to make the approach effective in environmental terms, and to ensure that it does not damage the EU's foreign policy, similarly substantial carrots will be needed. Five are suggested below.

1. Energy efficiency

The EU's top energy priority in Ukraine, Serbia and Montenegro should be to improve energy efficiency. As noted above, Ukraine uses 11 times as much energy per unit of GDP as the European average, Serbia five times and Montenegro three times. Energy is wasted in badly-equipped factories and poorly insulated buildings. Much electricity is lost during transmission on antiquated electricity grids. And much heat is lost because the Soviet or Yugoslav era district heating systems are inadequate. Energy efficiency programmes could deliver major economic and energy security benefits, and also increase the EU's popularity with these countries' residents.

2. Renewable energy

EU institutions and member-states should support all types of renewable energy in neighbouring countries, though certain technologies are better suited to some countries than others. Any proposed scheme in an Energy Community country should be subject to a full Environmental Impact Assessment – like schemes in the EU. Proposals for new hydro-electric facilities must consider the impact on local residents plus the damage to wildlife habitats. Proposals for bioenergy must assess direct land-use change (where a piece of land is turned from forest or grassland into farmland for energy crops) and indirect land-use change (where fields used to grow food become fields used to grow energy crops, meaning that more food has to be grown elsewhere – often causing deforestation). However, hydro and bioenergy are both necessary for the decarbonisation of energy, so should not be ruled out in principle.

3. Renewable electricity trading

Just as it makes no difference to the climate where greenhouse gases are emitted, so the location of renewable energy capacity does not matter in climate terms. For obvious reasons, solar cells are much more efficient and effective in southern Europe than in northern Europe. The Commission has been promoting renewable electricity trading for many years: a member-state can buy green electricity which is generated in another member-state, and count that electricity towards its own renewables target. But trading has not taken off; there is no Europe-wide renewable energy market. The Commission should continue to press for intra-EU renewable trading. By the same logic, renewable electricity generated outside the EU is as good for the climate as that generated inside the EU, so trading with non-member countries should also be developed. The Commission and the Energy Community Secretariat aim to do this. Belgrade has signed an agreement with Rome to sell the amount of electricity generated by ten small hydro plants in Serbia to Italy; that power will then count towards the Italian rather than the Serbian renewable energy target. For the reasons outlined above, the country in which the renewable electricity is produced should meet IED standards at all its power stations. Otherwise there should be no renewable electricity trading.

4. Working with mayors

Local and regional government can play an important role in energy and climate policy. For example, Rotterdam and Berlin have improved the energy efficiency of tens of thousands of properties in their cities. Upper Austria has pioneered the 'energy services' approach in which an energy company is paid on the basis of the amount of heat and light it delivers, rather than the amount of fuel it provides.[15] The Covenant of Mayors, in which signatories commit to reduce carbon dioxide emissions and develop sustainable energy, provides a good forum for co-operation with neighbouring countries. 78 Ukrainian mayors have signed the covenant, eight Turkish, six Serbian and three Montenegrin. In May 2014 the leaders

15: Prashant Vaze and Stephen Tindale, 'Repowering communities: Small-scale solutions to large-scale energy problems', Routledge, 2011.

16: Istanbul is also a member of the C40 cities climate leadership group, a global initiative to increase municipal co-operation on climate.

of 35 Ukrainian towns and cities, from both east and west of the country, signed a letter asking for EU help with improving energy efficiency.[16]

5. CCS demonstration projects

In 2007 the EU promised that there would be 10-12 large scale CCS demonstration projects in Europe in 2015. But there are none. Public opinion in parts of the EU, notably Germany, is strongly against CCS. But coal will continue to be burnt for many decades globally, so CCS is a necessary part of climate protection. CCS technology cuts not only carbon emissions but also those of sulphur dioxide and nitrogen dioxide. Several Ukrainian and Serbian towns suffer from poor air quality caused by coal power stations. A CCS demonstration project in one of these places could therefore be popular. Only one CCS project, the Drax/Alstom project in Yorkshire, UK, bid for money under the Commission's current grant round. The Commission should therefore announce that in the next grant round it would welcome applications from neighbouring countries.

Strengthening the Energy Community

In its 'energy union strategy', the Commission promises proposals to strengthen the Energy Community, so that it can ensure the effective implementation of the EU's energy, environment and competition *acquis*.[17] But the paper gives no indication of what these proposals will be.

The Commission might follow the advice of the Buzek committee's 2014 report which highlighted as shortcomings a lack of resources, weak implementation of the *acquis* and the partial effectiveness of the institutions.[18] These are all issues that should be addressed. However the experts also recommended that the Energy Community should have its own court: this is not necessary. Politicians often regard the creation of a new institution, with accompanying press conferences, as a form of policy delivery, but Europe has too many institutions and does not need another court. The Energy Community members are committed to meeting the energy *acquis* and if they fail to do so, the EU should punish them by blocking imports of electricity. Existing courts, both national and the ECJ, should be used to fine companies which invest in illegal energy projects, inside or outside the EU. The Energy Community itself already has three bodies: a Ministerial Council, which meets once a year; a Regulatory Board, comprising representatives of national energy regulators; and a Secretariat. Instead of creating more institutions, Europe's politicians should make these existing ones more effective – for example there should be more than one meeting a year between Energy Community ministers.

The Energy Community secretariat should be given more resources in order to make it more effective. At present it does not have a significant budget. The Energy Community has identified 'Projects of Energy Community Interest', to mirror the Commission' s list of energy infrastructure 'Projects of Common Interest'. So far, the Commission has given PCI grants to studies into the Southern Gas Corridor, which would bring Caspian gas to Europe via Turkey, and into an electricity connection between Norway (another Energy Community observer) and the UK. So two projects which would help two Energy Community observers have been supported, but no projects which would help Energy Community members not in the EU. This must change: the next round of energy infrastructure grants should include some projects in Energy Community members. To free up money for this, EU support for nuclear fusion should be cut.[19] Some of the money saved in this way should be given to the Energy Community Secretariat, so that it can support projects of its own choosing. This would increase its influence.

"The creation of a clean Energy Community would strengthen Europe's economic and foreign policies."

The Energy Community would become higher profile if Turkey became a member. Ankara has in the past dismissed this option as an unwanted distraction from efforts to join the EU. However, the Erdogan government now seems less determined to join the EU because it has other priorities such as becoming an energy hub, and the EU now seems less interested in expansion. The EU should say that it will support Ankara with its energy hub ambitions, and make more aid available to that end, in return for Turkey joining the Energy Community and accepting the relevant parts of the energy *acquis*.

17: European Commission, 'A framework strategy for a resilient Energy Union with a forward-looking climate change policy', February 2015.
18: The High Level Reflection Group of the Energy Community, 'An Energy Community for the future', Energy Community, 2014.
19: John Peet and Stephen Tindale, 'The European Union budget 2014-2020: More boldness needed', CER, 2012.

Conclusion

The energy policies and performance of neighbouring countries might not seem like a priority issue for Europe's leaders in 2015. Prime ministers and presidents are, understandably, focussed on the euro crisis, Russian aggression and the rise of populist parties. Why should they worry about energy policy outside the EU? Why should they focus on the infrastructure of other countries when most of them have major domestic energy infrastructure challenges?

They should do so because this would be a strong example of enlightened self-interest. This approach would strengthen EU foreign policy by demonstrating that the Union is willing and able to support the economic development of neighbouring countries. Cutting toxic emissions in neighbouring countries would improve the health of EU residents, and so cut health spending. Reducing these countries' reliance on Russian gas would weaken Moscow's influence in Europe's neighbourhood. Expanding the capacity of these countries to provide clean energy would reduce the EU's own dependence on Russian gas without undermining its climate goals. Expanding renewable energy in places with the right geography and location, such as hydro and wind power in Ukraine and solar power in the Balkans and Turkey, would reduce the cost of meeting the EU's renewable energy targets.

In short, Europe's leaders should take these steps because a block on dirty electricity imports and the creation of a clean Energy Community would strengthen Europe's economic and foreign policies, improve the health of European residents and help protect the global climate.

Stephen Tindale
Research fellow, Centre for European Reform

Suzanna Hinson
Research assistant

Appendix

Energy in Serbia, Montenegro, Ukraine and Turkey

1. Serbia

Serbia, like many of its neighbours, wants to increase generation of energy, to allow it to decrease imports, whilst meeting domestic demand and having a growing role as an energy exporter. To meet this aim it has the potential to develop a wide range of renewable resources. However it is also pursuing fossil fuels including domestic coal and imported gas. Serbia's power stations are already hugely polluting, and affect residents of both Serbia and the EU. Despite this, Serbia is making good progress in meeting the relevant areas of the *acquis* in terms of its EU accession ambitions. According to the Energy Community is was the only one of the countries assessed to produce a National Renewable Energy Action Plan, as it is required to do by the 'renewable energy directive', by the deadline in June 2013, and it has also made significant progress in unbundling its market and incorporated the IED into law.

1.1. Coal

Over half of the electricity generated in Serbia is from coal. Serbian power stations have historically been the largest European source of sulphur dioxide emissions.[20] Most of the power plants are based in the Kolubara basin, including the 2,600 MW Nikola Tesla Power which generates nearly half of the country's electricity.

Serbia's domestic coal resources are extensive. Belgrade aims to exploit this: expanding its coal sector to increase energy security and decrease reliance on imports. The Serbian government also wants new coal power stations so that Serbia can export more electricity to the EU.

The Chinese government is funding new coal facilities in Serbia. In 2009 presidents Hu Jintao and Boris Tadic signed a 15-year agreement for China to invest over €1 billion in Serbia's energy infrastructure.[21] As a promise of things to come, in December 2014 Beijing funded the expansion of a coal power station and a mine.

1.2. Gas

Serbia uses little gas for electricity generation (though more gas power stations are being built[22]) but large amounts for industrial and domestic heating. The gas grid does not currently cover the entire country, so the government is supporting extensions to new regions. Only a quarter of the gas used in the country at present is from Serbian gas fields. Currently, all imported gas comes from Russia. Belgrade has signed an agreement for an interconnector with Bulgaria, and plans gas pipelines with Romania, Macedonia, Kosovo, Montenegro, Bosnia-Herzegovina and Croatia.

1.3. Nuclear

Serbia has no nuclear power stations nor any plans to build them. The current government is strongly anti-nuclear.

1.4. Renewables

Serbia's potential to pursue renewables is significant but, other than hydro, this potential is hardly exploited. As a member of the Energy Community, Serbia adopted the 2009 'renewable energy directive' in 2013. This included a legally-binding target of 27 per cent from renewables by 2020 (up from 21 per cent in 2009). Table 2 below shows this target in the context of its achievability compared with overall renewable potential of the country, installed renewable capacity, and renewable feed-in tariffs (the subsidy level for renewable technologies).

Table 2: Summary of renewable energy in Serbia

Source: Energy Strategy for Serbia and Energy Community Annual Implementation Report 2014.

Renewable technology	Potential	Installed capacity	Feed-in tariff rate c€kW/h	2020 target
Hydro	4,600 MW	2,810 MW	7.4-12.4	3,270 MW
Wind	1,300 MW	0 MW (350 MW in planning for construction)	9.2	500 MW
Solar	6,978 MW	3.8 MW	5.9-20.9	10 MW
Biomass	9,200 MW	48 MW	1.3-8.2	143 MW
Geothermal	50 MW	<1 MW	6.9-9.6	1 MW

20: Alexsander Kovacevic, 'The potential contribution of natural gas to sustainable development in south eastern Europe', Oxford Institute for Energy Studies, March 2007.

21: Gordana Filipovic, 'Serbian mine sees Chinese, Vattenfall agreements for upgrades', Bloomberg, November 2011.

22: 'Serbia: NIS starts building power plant "Pančevo" in 2015', Energy World, January 2015.

1.4.1. Hydro

In 2013, hydropower produced approximately 40 per cent of the electricity used in the country. Although Serbia has 614 MW of pumped-storage hydro capacity, the overall hydro-power output remains seasonal and variable. New large hydro facilities on the rivers Morava, Drina, Lim and Danube are being considered, as are about 900 potential locations on Serbia's smaller rivers.[23]

1.4.2. Wind

Serbia has significant potential for wind energy: about 1,300 MW, which could generate 10 per cent of the country's total electric energy consumption.[24] Yet Belgrade has set a target of just 500 MW. The government and Serbia's publicly-owned energy companies are not much involved in wind power. Some private investors are involved, including Dutch, Belgian and Italian companies. Many wind farms are due to be completed this year, but the total capacity in planning and construction is still only 350 MW.[25] For comparison, a single wind farm which opened in Romania in 2012 is 600 MW.

1.4.3. Solar

The target for solar capacity is also low: just 10 MW by 2020. Serbia has significant potential for solar, with 40 per cent more solar radiation than the EU average.[26] But solar has fallen out of favour in Belgrade since the failure of ambitious plans for 1,000 MW solar farms. The government signed a contract which contained so many caveats that the putative developers were able to take the grant without building the facility. In light of this experience, Belgrade is now promoting smaller projects. A 1MW solar farm opened in September 2014, followed by a 2 MW one in November. The feed-in tariff rate for solar photovoltaic is high enough to attract investment so the 2020 target of only 10 MW is extremely unambitious. For comparison, next-door neighbour Bulgaria installed 843 MW in a single year (2012).

1.4.4. Geothermal

The government is also overlooking Serbia's geothermal potential. The country uses geothermal energy for heating and for recreational spas, but geothermal electricity generation is very small and the 2020 target is for only 1 MW.

2. Montenegro

Until recently, Montenegro generated only two-thirds of the electricity it consumed and imported the rest. However the country's biggest electricity consumer, aluminium company KAP, went bankrupt in 2013 and its consumptive plant is now operating at much reduced capacity. As a result, Montenegro now generates roughly the same amount of electricity as it consumes (though hydropower depends on rainfall so is variable). The government aims to increase electricity generation so that the country can become an electricity exporter, with the associated financial and relational benefits. This aim is already being realised with a connection to Italy underway. However in terms of Montenegro's accession plans, the Energy Community reports that much more progress is needed to unbundle their market to align it with the *acquis*.

2.1. Coal

Montenegro has extensive coal reserves, so the government intends to expand coal use in future. There is currently only one coal power station with a capacity of 210 MW. Another of 300 MW is currently being planned. Coal is also used for heat in homes and district heating systems.

2.2. Gas

Montenegro does not currently have a gas grid. The government does have plans to construct one, with EU support, but this will not be achieved before 2020. As part of this gas grid ambition, the government is also promoting pipelines to deliver gas to Montenegro, and exploration of offshore gas resources in the South Adriatic.

2.3. Nuclear

The country has no nuclear power plant, nor any plans to build one.

2.4. Renewables

Like Serbia, Montenegro has adopted the EU's 2009 'renewable energy directive', and was given a 33 per cent renewable energy target for 2020, compared with 26 per cent in 2009. In 2010 the government introduced feed-in tariffs to help reach this target. The feed-in tariffs and targets, as well as potential and actual capacity, are shown in Table 3 on page 13.

23: 'National Sustainable Development Strategy', Serbia, September 2007.
24: 'Wind power potential in Romania, Bulgaria, Serbia and Turkey', South-East European Industrial Market, February 2010.
25: Djordje Daskalovic, 'Serbia's MK Fintel Wind starts construction of 9.9 MW Kula WPP', SeeNews, February 2015.
26: Ljubisav Stamenić, 'Solar photovoltaic power in Serbia', Jefferson Institute, December 2009.

Table 3: Summary of renewable energy in Montenegro

Source: Energy Strategy for Montenegro and Energy Community Annual Implementation Report 2014.

Renewable technology	Potential	Installed capacity	Feed-in tariff rate c€kW/h	2020 target
Hydro	3,900 MW	635 MW	5.04-10.4	826 MW
Wind	400 MW	118 MW	9.6	151.2 MW
Solar	33 MW	0 MW	15	10 MW
Biomass	4,200 MW	0 MW	12.3-13.7	29.3 MW

2.4.1. Hydro

Montenegro has the potential to expand hydro-power production five-fold.[27] But expansion schemes are being met with resistance. Plans to build a hydro plant on the Tara River were dropped in 2005 due to objections; the reservoir would have been in a UNESCO world heritage site. Conservation groups oppose any new reservoirs, but the government proposed four new dams in its 2014 Energy Development Strategy to 2030.[28] The dams have government backing, but so far no investors.

2.4.2. Wind

Montenegro has potential for wind power along the Adriatic coast and in some of its more mountains regions and significant progress has been made in exploiting this potential. However, the electricity grid is small and inefficient which is limiting the growth of wind development. Despite this, in view of the recent increase in capacity, the 2020 target is overly conservative.

2.4.3. Solar

The feed-in tariff rate for solar electricity is lower than that of other southern European countries, which discourages investment. Solar thermal, for heating, is more widely used and is expected to increase, mostly in tourism facilities but also in households.

2.4.4. Biomass

Firewood is widely used for heating, but the government has low ambitions for biomass plants to generate electricity.

3. Ukraine

Ukraine has a more diverse mix of electricity generation than Serbia or Montenegro, but this does not make it more secure. It relies on Russia for both gas imports and for nuclear fuel. This insecurity is a significant driver in Ukraine's energy policy, especially considering its current relationship with Russia. To achieve increased security, Ukraine is relying on developing coal from its extensive reserves. However it also has extensive potential for renewables, especially wind and biofuels, which should be encouraged. Ukraine is similar to much of the EU's neighbourhood in its ambitions to turn from being a gas and energy importer to an energy exporter and a gas hub in the coming years. There is much that can be done to achieve this with clean exports, rather than coal.

3.1. Coal

Ukraine has extensive coal reserves. Kyiv regards coal as a means of increasing its independence from Moscow – though in December 2014, 70 per cent of the country's coal production was in separatist-controlled areas.[29] The government's 2014 energy strategy aims to increase Ukrainian coal production and consumption by more than half by 2030.[30] As well as using coal for electricity and steel production, Kyiv has promoted its use for heating by switching district heating systems from gas to coal. Several district heating systems have been changed from gas to coal since 2011.

Before the start of the war, Ukraine exported electricity produced from Burshtyn, a large coal-fired power station in the west of the country, to Hungary, Poland, Slovakia and Romania. The power plant is connected to the EU grid rather than the Ukrainian grid. The city of Burshtyn suffers from serious air pollution due to the coal burning.

3.2. Gas

Historically, less than half the gas that Ukraine consumed came from Ukrainian gas fields. The rest was imported, mainly from Russia. To address this dependence, Ukraine has boosted its own domestic production: in the year before the Russian invasion Ukraine produced more gas than it imported. Kyiv also tried to diversify its suppliers: it now imports from Hungary, Poland and Slovakia, as well as Russia. But these countries are also quite dependent on Russian gas.

The Ukrainian gas sector is dominated by government-owned Naftogas, which is responsible for about 90 per cent of gas production in the country.

27: 'Energy development strategy of the Republic of Montenegro by 2025', Ministry for Economic Development, June 2007.
28: 'Energy policy of Montenegro until 2030', Ministry of Energy, February 2011.
29: Wojciech Kononczuk, 'Ukraine facing harsh winter due to coal shortages', OilPrice, October 2014.
30: 'Energy strategy of Ukraine until 2030', Ministry of Energy and Coal Industry, February 2014.

In October 2012 Kyiv abolished the monopoly that Naftogas had over gas imports. But the company retains a monopoly on gas supply to major industrial consumers. Corruption is widespread in the company, as it is in Ukraine generally.

3.3. Nuclear

The world's worst nuclear power incident was in Ukraine: the meltdown at Chernobyl in 1986. Despite this, most Ukrainians support nuclear power, which provides about a quarter of the country's electricity. However, all 15 nuclear stations were built in the Soviet era, so are nearing the end of their design life. Kyiv aims to maintain nuclear's share in electricity production via new construction and currently two stations are being planned.

Nuclear power would do more to reduce Ukraine's dependence on Russia if the Ukrainians avoided using Russian nuclear technology. Before the war, Russia's Rosatom was being lined up to build the two new stations. Additionally the fuel fabrication facility under construction – to enable Ukraine to use its own uranium – was being financed by a Russian loan. Kyiv is now turning to American technology instead, having signed an agreement with Westinghouse for nuclear fuel in December 2014.

3.4. Renewables

With its adoption of the EU's 2009 'renewable energy directive' Ukraine accepted a target of 11 per cent by 2020, compared to 5.5 per cent in 2009. This target, as well as current capacity, potential and feed-in tariffs, are shown in Table 4 below.

Table 4: Summary of renewable energy in Ukraine

Source: Energy Strategy for Ukraine and Energy Community Annual Implementation Report.

Renewable technology	Potential	Installed capacity	Feed-in tariff rate c€kW/h	Target 2020
Hydro	12,500 MW	4,550 MW	7.75	5,350 MW
Wind	19,000-24,000 MW	497 MW	8.43	2,300 MW
Solar	4,000 MW	819 MW	44.6	2,300 MW
Biomass	15,000 MW	26 MW	12.4	950 MW

3.4.1. Hydro

Kyiv intends to get half of its renewable energy from hydropower, by building new facilities and improving the inefficient existing ones, which were installed during the Soviet era.

3.4.2. Wind

Ukraine has many flat, sparsely-populated areas, so wind power has great potential. But at the end of 2013 the total installed capacity of wind was less than 500 MW. For comparison, Poland had 3,400 MW. Before the Russian invasion, the main barrier to wind power expansion in Ukraine was connection to the inadequate grid.

3.4.3. Solar

Ukraine also has good solar power potential, particularly in the south. Before the war Ukraine was making significant progress with solar power. It had 819 MW of solar power at the end of 2013, due the very generous feed-in tariff rate (more than double that of Germany).

3.4.4. Biomass

Biomass has great potential in Ukraine, because of the country's extensive agricultural output. Biomass is widely used for heating in private households and public buildings. Ukraine also produces and exports wood pellets, wood chips, charcoal and firewood. But biomass is hardly used for electricity generation. The government aims to get nearly 950 MW of electricity from biomass by 2020, but the potential is 15 times this amount.

4. Turkey

Turkey has a growing population, an increasing standard of living and expanding industrial activity. So it is one of the fastest growing energy markets in the world. In January 2015, President Erdogan stated "we have now doubled our electricity consumption, and this will quadruple in 2023, compared with 12 years ago".[31] This demand is currently being met by a heavy reliance on imports: 75 per cent of the energy which Turkey consumes is imported.[32] The cost of imported energy results in a trade imbalance which threatens Turkey's economic growth. A secure supply of energy, from internal and diverse external sources, is therefore central to Ankara's aims.

Over the last two decades the government has carried out several energy market reforms, increasing competition and private sector involvement in order to attract investors. There are now several foreign-owned facilities.

31: Speech to Energy Markets Summit in Ankara, January 2015.

32: 'Turkey's changing Power Markets', Bloomberg New Energy Finance, November 2014.

Turkey ratified the Kyoto Protocol in 2009, but as an emerging economy did not take on a carbon reduction target and has no greenhouse gas emissions target for the future. Air pollution and other environmental issues play little role in Turkish energy policy.

The Erdogan government has set targets for how much each fuel should contribute to total electricity generation in 2023 – the 100th anniversary of the founding of the Turkish Republic. In 2023, demand is expected to be almost double that of 2013. But generation is similarly expected to almost double: from 64,000 MW to 125,000 MW.[33]

4.1. Coal

The government is exploiting Turkey's large coal reserves. It called 2012 'the year of coal', and the dash for coal continues. At the end of 2013 a quarter of electricity was generated from coal; the government intends to increase this to a third by 2023, with more than 80 proposed coal power plants awaiting licences and planning permission. The licencing of coal is a box-ticking exercise in Turkey and the industry is essentially unregulated. Mines operate on minimal health and safety standards, making them prone to accidents and government-owned power plants operate without filter systems, making them hazardous to health.

4.2. Gas

Turkey has few domestic gas resources but a large gas demand. Imports of gas nearly tripled between 2001 and 2011, and are expected to almost double again by 2030.[34] Most of the gas currently comes from Russia, which turned off the supply in 2007, causing prices to soar. Erdogan's main policy to reduce the import bill and to strengthen energy security is to reduce the proportion of electricity generated from gas, from 44 per cent at present to 30 per cent by 2023.[35] However, the increase in electricity use will mean that 30 per cent of the total in 2023 is in fact more electricity from gas than is generated in Turkey today. Many new gas plants are planned for the future.

4.3. Nuclear

Turkey has no nuclear power stations, but does have ambitious plans to develop them. The 2023 target for nuclear is 10 per cent of Turkish electricity. In 2009 Ankara signed a contract for Russia's Rosatom to build a nuclear station at Akkuyu, on the Mediterranean coast. Rosatom promised that Akkuyu would start generating electricity in 2016. Despite strong support from the Putin and Erdogan governments, construction only began in April 2015. Moscow is providing the money: Rosatom will begin with 100 per cent equity in the project company, and retain at least 51 per cent when it is operational.

The second Turkish nuclear plant is planned for Sinop, on the Black Sea coast. Ankara signed an agreement in 2013 with a consortium led by Japan's Mitsubishi and Itochu and France's Areva. The start of construction at Sinop is promised for 2017 and the first operation is foreseen for 2023.

For the third reactor, the government has signed an initial agreement with the State Nuclear Power Technology Corporation of China plus Westinghouse. Ankara hopes that construction will begin by 2023.

4.4. Renewables

Turkey has great potential for renewable energy. Ankara has taken various steps to promote renewables, including the introduction of feed-in tariffs in 2010. These feed-in tariffs, the potential, current capacity and future targets of Turkey's renewables are shown in Table 5 below.

Table 5: Summary of renewable energy in Turkey

Source: IEA.

Renewable technology	Potential	Installed capacity	Feed-in tariff rate c€kW/h	Target 2020
Hydro	125,500 MW	22,749 MW	6.4	36,000 MW
Wind	90,000-100,000 MW	3,762 MW	6.4	20,000 MW
Solar	54,300 MW	2 MW	11.7	3,000 MW
Geothermal	2,000 MW	400 MW	9.3	600 MW

33: 'National renewable action plan for Turkey', Turkish Government, December 2014.

34: David Koranyi and Nicolò Sartori, 'EU-Turkish energy relations in the context of EU accession negotiations: Focus on natural gas' GTE Working Paper 5, December 2013.

35: 'Turkey's changing Power Markets', Bloomberg New Energy Finance, November 2014.

4.5. Hydro

On hydro expansion: Erdogan said in 2011 that he would ensure that Turkey's rivers would no longer "run in vain".[36] Almost 40 per cent of electricity generation in Turkey is hydro, but this represents only around a third of the technology's total potential, estimated at 125,000 MW.[37] Erdogan's target for 2023 is to double hydropower capacity.

Many reservoirs require significant deforestation, damaging wildlife and causing soil erosion and landslides. Turkish legislation does not yet require an Environmental Impact Assessment before a dam is built, though new rules (drawn up with the help of the World Bank in 2013) are in the process of being implemented.[38] Despite the environmental improvements, the Turkish Water Assembly – a group of anti-hydro activists – argues that there are also social costs. They claim 2 million people could be displaced by the schemes and that the government is riding roughshod over human rights.[39] But social and environmental opposition has done little to stem development.

4.5.1. Wind

Wind power in Turkey is also growing fast, with installed capacity increasing by 500 MW per year since 2010. But this was starting from a low base, and only reached 3,762 MW at the end of 2014, out of a predicted potential of 90-100,000 MW.[40] The 2023 wind target is 20,000 MW. Several Turkish companies are now manufacturing wind turbines, and they provide an industrial voice for wind energy. But construction is hampered by drawn-out permitting processes and by the lack of sufficient grid capacity. These barriers may lead to Turkey missing its wind power target.

4.5.2. Solar

Turkey receives plenty of strong sunlight yet the Erdogan government prohibits solar farms on agricultural land. An additional problem for solar electricity is that many Turkish buildings have solar thermal panels on them: producing heat but limiting space for rooftop solar power. At the end of 2013, there was only 2 MW of solar PV in the whole of Turkey. Nevertheless, there is clear appetite for solar electricity. In 2014 the government invited bids from developers to receive subsidies to expand solar capacity up to 600 MW. It received applications totalling 8,900 MW. Several applications were from Chinese solar companies, attracted by the fact that Ankara does not levy duties on their products, unlike the EU. Small solar facilities (less than 1 MW) can be built without planning permission in Turkey. IHS, the business information and analysis company, predicted in 2013 that the country could have 1,000 of these by 2017.[41]

4.5.3. Geothermal

Much of Turkey's geological structure is of volcanic origin, so it enjoys great geothermal potential. Geothermal sources could provide 14 per cent of its energy needs. 65,000 Turkish homes use geothermal heat, through district heating systems. This number is increasing by a quarter each year. Geothermal could also produce around 2,000 MW of electricity in Turkey.[42] However the high initial costs, which include exploration, have limited geothermal development. The 2023 target for geothermal is a conservative 600 MW, 400 MW of which is already in operation, and a further 165 MW is under construction.[43]

4.6. Energy efficiency

In addition to the electricity generation targets, the Turkish government has set itself a target to cut energy intensity – the amount of energy used to produce each unit of GDP – by 20 per cent (compared to 2011) by 2023. However, Bloomberg New Energy Finance, analysers of energy internationally, regards this as a very ambitious target and expects it to be missed. Indeed, it says that unless the government takes new measures, Turkey' s energy intensity will worsen.[44]

List of abbreviations

CCS – Carbon Capture and Storage
EBRD – European Bank of Reconstruction and Development
EIB – European Investment bank
ETS – Emissions Trading Scheme
EU – European Union
IED – Industrial Emissions Directive
PCI – Projects of Common Interest
PV – Photovoltaics
WTO – World Trade Organisation

36: Fiachra Gibbons and Lucas Moore, 'Turkey's great leap forward risks cultural and environmental bankruptcy', *The Guardian*, May 2011.
37: Kamil Kaygusuz, 'Hydropower potential in Turkey', Energy Sources, October 2010.
38: 'Sample guidelines: Cumulative environmental impact assessment for hydropower projects in Turkey', World Bank, December 2012.
39: Fiachra Gibbons and Lucas Moore, 'Turkey's great leap forward risks cultural and environmental bankruptcy', *The Guardian*, May 2011.
40: Jane Burgermeister, 'Turkey looks to exploit wind energy potential', Renewable Energy World Network, September 2007.
41: 'IHS reports on emerging growth regions for solar', Solar International, September 2013.
42: Ari and Taplamacioglu, 'In the light of global developments, Turkey's electricity market, role and capacity of electricity generation companies', International Journal on Technical and Physical Problems of Engineering, September 2012.
43: Orhan Mertoglu, Sakir Simsek and Nilgun Basarir, 'Geothermal country update report of Turkey (2010-2015)', Proceedings World Geothermal Congress, 2015.
44: 'Turkey's changing power markets', Bloomberg New Energy Finance, November 2014.