

# CLIMATE CHANGE: TIME FOR THE ENERGY COMMUNITY TO TAKE ACTION

A report for CEE Bankwatch Network

# EXECUTIVE SUMMARY

As Albania, Bosnia and Herzegovina, Macedonia, Kosovo, Moldova, Montenegro, Serbia and Ukraine prepare the next generation of their energy investments, they face a simple choice - locking themselves into an antiquated past mired in fossil fuels or aligning themselves with safe, clean and lower cost energy systems which the European Union itself is building at present. This is a 'once in a lifetime' opportunity to shape inclusive, sustainable and effective low-cost development pathways for millions of Europeans. Failure to seize this moment will lead to costly stranded assets, set back development for generations and push these countries further away from EU membership.

In October 2012 the Energy Community's Ministerial Council endorsed a Regional Energy Strategy. On the basis of this, the following year, 34 Projects of Energy Community Interest were identified. Such a regional strategy has the potential to be a critical guiding light at this historic moment but revision is essential for this to be an effective beacon and help prevent costly investments in capacity that will very soon become redundant.

Most Energy Community countries are seeking to increase their coal power generation capacity. Without adequate and clear guidance the real cost of these investments, which accounts for environmental and climate related externalities, will have significant impacts on the long-term development of each country. The estimated CO2 cost of this planned new build adds a further €133-317 million at a €5 carbon price and €790 million - €1.9 billion at €30.

Addressing electricity system inefficiencies will ease the burden on households and energy poverty. We estimate €1.7 billion savings by reducing electricity losses alone would help boost sustainable growth especially if used to contribute to investment in wind and solar capacity.

The Energy Community Treaty is currently being extended and potentially expanded. Once this process is completed, the newly re-energised - and hopefully strengthened - Energy Community needs to revise the Energy Strategy.

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Founder, Change Partnership

18 February, 2015

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# **THE ENERGY COMMUNITY**

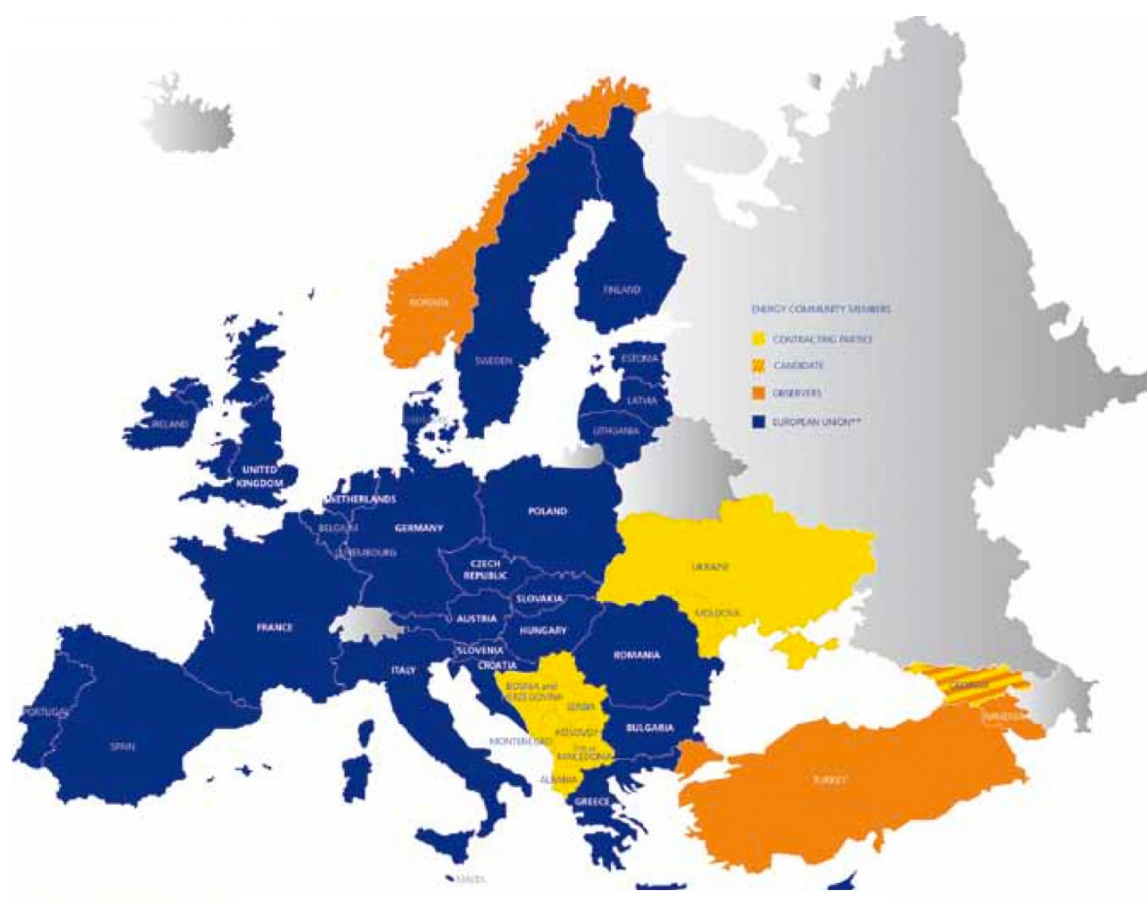


# THE ENERGY COMMUNITY

The Energy Community was established on 25 October 2005 to align countries on the geographical and possible membership periphery of the European Union. It creates a pan-European energy market by uniting the European Union with Albania, Bosnia and Herzegovina, Kosovo, Macedonia, Moldova, Montenegro, Serbia and Ukraine. In February 2014, membership negotiations were launched for Georgia. Since its original inception, Bulgaria, Croatia and Romania have joined the EU and membership negotiations with Serbia and Montenegro are in progress. The aim of the Energy Community is, as defined in Article 2 of the 2005 Treaty, to:

- Create a stable regulatory and market framework capable of attracting investment in gas networks, power generation, and transmission and distribution networks, so that all Parties have access to the stable and continuous energy supply that is essential for economic development and social stability,
- Create a single regulatory space for trade in Network Energy that is necessary to match the geographic extent of the concerned product markets,
- Enhance the security of supply of the single regulatory space by providing a stable

Figure I - Membership of the Energy Community<sup>1</sup>



<sup>1</sup> Energy Community, 'Progress report' (2014).

investment climate in which connections to Caspian, North African and Middle East gas reserves can be developed, and indigenous sources of energy such as natural gas, coal and hydropower can be exploited,

d) Improve the environmental situation in relation to Network Energy and related energy efficiency, foster the use of renewable energy, and set out the conditions for energy trade in the single regulatory space,

e) Develop Network Energy market competition on a broader geographic scale and exploit economies of scale.

The Energy Community should provide clear guidance on sound, clean and cost effective investments in signatory countries so that they are aligned with the direction of the EU. This is vital if these countries will have stronger economic links with the EU as well as membership. Without this guidance, Energy Community countries would be deprived a fair chance of successful, cost effective and safe alignment to the EU which would constitute a grave diplomatic failure on many levels.

The region would be put at an economic disadvantage if it locks in carbon-intensive energy infrastructure whilst the EU continues to decrease its use of fossil fuels in its energy and electricity mix. As emission reduction activity intensifies, the EU will face considerable internal political pressure to introduce carbon content-related border measures to support its decarbonisation effort.

This will create considerable political and economic instability for Energy Community countries especially if they continue to invest heavily in coal. It is already the case in California, which has the most aggressive climate change policy in the US. The California Global Warming Solutions Act (2006) or AB32 requires electricity importers to pay a carbon cost on their greenhouse gas emissions. California also introduced an Emissions Performance Standard<sup>2</sup>, applied to all baseload generation capacity owned by public utilities, of 499 kg CO<sub>2</sub> per megawatt-hour (MWh). Importantly, electricity imported into California must also comply with this standard. Should the EU introduce a similar regulation, it would have significant implications for Energy Community countries, especially those that seek to export electricity to the EU.

<sup>2</sup> California Global Warming Solution Act (2006).

<sup>3</sup> Senate Bill SB 1368 Emissions Performance Standards (2006).



# **EU 2030 CLIMATE AND ENERGY FRAMEWORK**

# EU 2030 CLIMATE AND ENERGY FRAMEWORK

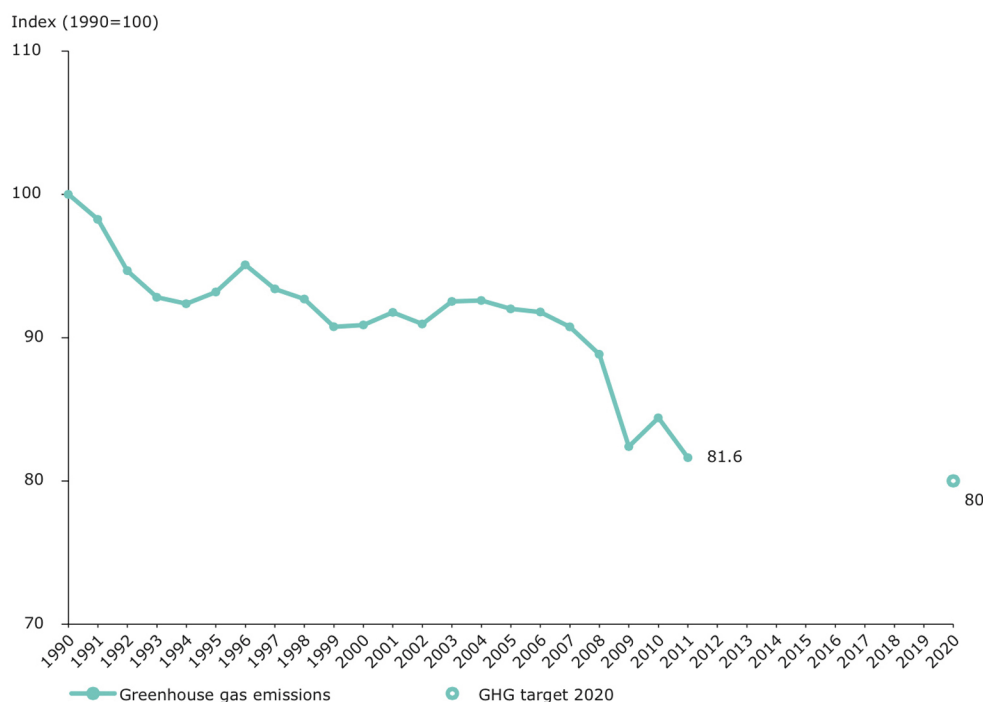
There are two reasons why energy system investments in the Energy Community cannot diverge too much from those in the EU. Firstly, it leads to incompatibility with the EU energy system which, increasingly, will be governed by greenhouse gas emission reductions activities, greater integration of renewable energy capacity, energy savings and greater decentralisation in key markets.

Tackling chronic unemployment, directing regional re-industrialisation, improving security of supply and responding to changing consumer patterns are the main drivers for this transformation. To this effect, the EU has extended its 20:20:20 targets with an unilateral framework of climate and energy targets to 2030 which include a 40% reduction

in greenhouse gas emissions, a 27% increase in final energy consumption from renewable sources and an increase in energy savings between 27-30%.<sup>4</sup> This continues the long-term trend of emission reductions since 1990 as outlined by the European Environment Agency in Figure 2.

The second reason concerns growing international momentum towards a global treaty to address climate change. The main outcome from the Lima round of international negotiations on the new climate change treaty was acceptance of all countries to take on binding emission reduction targets called Intended Nationally Determined Contributions (INDCs).<sup>5</sup>

Figure 2 - EU greenhouse and gas emissions since 1990<sup>6</sup>



<sup>4</sup> European Council conclusions, (24 October 2014).

<sup>5</sup> UNFCCC 'Lima Call for Climate Action Puts World on Track to Paris 2015', (December 2014).

<sup>6</sup> European Environment Agency, 'Annual European Union greenhouse gas inventory 1990–2011 and inventory report No 8/2013: Submission to the UNFCCC Secretariat', (2013)

The historic agreement between China and the USA,<sup>7</sup> on unilateral reductions in greenhouse gas emissions to 2030 is also significant because China has committed to peaking its climate emissions to 10 billion metric tonnes by 2030. It will also increase the share of renewables to 20% of final energy consumption. This could also have a bearing on stricter enforcement of the 'Green Credit Directive' (GCD), the government's banking regulation, which encourages loans to be vetted against social and environmental impacts throughout their financial lifespan. The China Banking Regulatory Commission, which enforces the GCD, has yet to align its goals with the new national targets. China is increasingly financing overseas investments in fossil-fuel powered capacity,<sup>8</sup> including in Energy Community countries. The USA has committed to reduce its greenhouse gas emissions by 26-28% to 2030 and boost the share of renewables in its final energy consumption.<sup>9</sup> Over time, all INDCs are expected to get tighter and tighter to stay below the two degrees threshold. Energy Community countries will be expected to act on greenhouse gas emission reduction and on energy transformation at a much quicker pace than they have at present. Their proximity and interaction with the EU means they cannot avoid this.

President Jean-Claude Juncker, head of the European Commission, has gone a step further than the European Council's October 2014 agreement. Two of his five Vice-Presidents - Maroš Šefčovič ~ Vice-President for Energy Union and Jyrki Katainen, Vice-President for Jobs, Growth, Investment and Competitiveness - have been mandated to make the EU 'number one in renewable energy'. President Juncker stated that renewable energy is not just about "responsible climate policy" but also "an industrial imperative if we still want to have affordable energy at our disposal in the medium term". He adds "A binding 30% objective for energy efficiency by 2030 is to me the minimum if we want to be credible. Transport policy will also have to make a contribution to these objectives."<sup>10</sup> The Energy Community Treaty does not focus on transport issues at present. However, this should not preclude Member Countries from maximising the mutual benefits

of modernising their transport sector as well as cleaning their energy systems.

The EU 2030 framework is based on:

- A significant carbon price which is delivered through the EU Emissions Trading System (EU ETS). Reform of the carbon market will take two steps. Firstly, a Market Stability Reserve (MSR) was proposed by the European Commission in January 2014. The MSR will remove surplus allowances which have dampened the carbon price investment signal currently oscillating around €6. The European Parliament and leading governments have come out in favour of starting the MSR in 2017 and moving 900 million surplus allowances directly into the reserve. Modelling by Point Carbon estimates that these two changes alone will deliver an ETS price of €15 in 2020, €30 by 2025 and €50 by 2030.<sup>11</sup> Secondly, from 2021, the rate at which the ETS cap declines will be increased to a 48 million tonne annual reduction as opposed to the current 38 million tonne reduction.<sup>12</sup> *No Energy Community country has an ETS in place though this is a requirement upon entry to EU membership.* A carbon price signal, either through an ETS, tax or regulation, should be applied to Energy Community countries which have fossil fuel capacity and or are seeking to add CO2 intensive capacity.

- Binding renewable energy targets to 2030 give investors confidence in meeting 2020 targets as well as 2030 targets. EU governments have had more time to prepare to meet their 2020 targets in comparison to Energy Community countries, some of which introduced RES legislation as recently as January 2014.<sup>13</sup>

- Energy Efficiency targets are likely to have specific focus on investments in the building sector. Details are yet to be agreed but there will either be an extension of the obligation on power generators to invest in energy savings measures or something similar. This is an area of action that had been underexploited by Energy Community countries. However, the 35th meeting of the Permanent High Level Group, held on 17 December 2014, agreed that an adjusted Energy Efficiency Directory would be adopted.<sup>14</sup>

7 U.S.-China Joint Announcement on Climate Change, Beijing, (November, 2014).

8 The Guardian, 'What good are China's green policies if its banks don't listen?', (16 May, 2014).

9 The White House Office of the Press Secretary, 'U.S.-China Joint Announcement on Climate Change and Clean Energy Cooperation', (November 2014). <https://www.whitehouse.gov/the-press-office/2014/11/11/fact-sheet-us-china-joint-announcement-climate-change-and-clean-energy-c>

10 European Commission - Mission Letter to Maroš Šefčovič, (November, 2014).

11 Point Carbon, 'ENVI's draft MSR report - an analyst's assessment', (2014).

12 Change Partnership calculations.

13 Energy Community - Article 2.1 of the Decision of the Ministerial Council of the Energy Community (2012). <http://www.energy-community.org/pls/portal/docs/1766219.PDF>

14 Energy Community, '35th Permanent High Level Group - Preliminary Conclusions', (December 2014). [https://www.energy-community.org/portal/page/portal/ENC\\_HOME/DOCS/3546150/35th\\_PHLG\\_17-12-2014\\_preliminary\\_conclusions\\_signed.pdf](https://www.energy-community.org/portal/page/portal/ENC_HOME/DOCS/3546150/35th_PHLG_17-12-2014_preliminary_conclusions_signed.pdf)

- Innovative financing mechanisms from the strategic use of EU ETS revenue. Since 2012, EU governments have been auctioning ETS allowances to polluters mainly in the power generation sector. In July 2014, €154,934,560 was raised from the auction of 26,222,000 allowances at a carbon price of below €6. A total of €3,933,436,035 has been raised between 13 November 2012 and 31 July 2014.<sup>15</sup> Some countries, such as Germany, use 75% of these revenues to support domestic low-carbon investments and the remaining 25% to support international low-carbon investments. It has provided urgently needed additional financing to countries such as Bulgaria (€101,228,215), Romania (€225,598,515) and Poland (€322,031,455) that require additional finance for investments to stimulate growth. By 2020 50% of EU ETS allowances will be auctioned and more in the period after 2020.

- Additionally, somewhat controversial, financing has been granted to some 10 EU governments in a series of binding investment agreements between the governments and the Commission. These countries are allowed to continue giving free EU ETS allowances to power generators in exchange for modernising and diversifying their energy systems with measurable investments in low-carbon technologies and energy efficiency.

- A further fund, estimated to be in the region of €10 billion, will be established for new Member States to “improve energy efficiency and to modernise the energy systems of these Member States, so as to provide their citizens with cleaner, secure and affordable energy.”<sup>16</sup>

## Impact of EU climate and energy policies

Radical changes have started to take root within a short period of time. In coal-rich countries such as Germany and Poland, the commercial benefits of coal-fired power generation have been dramatically eroded. In Germany, E.ON, one of the largest European electricity producers, split operations into two companies. E.ON remains as a clean-energy service provider whilst fossil-fuel assets are wrapped in a new company with considerable liabilities. This was partly driven by increasing volumes of renewable energy power which removed a customer base for the company coupled with the cost of natural gas which made it too expensive to use.<sup>17</sup> In the case of Poland, coal too is uneconomic. The government currently operates a support system for uneconomic coal plants which has made electricity 20% more expensive than German year-ahead prices since July 2013.<sup>18</sup>

Many EU countries have introduced additional domestic measures to reduce emissions and increase investment in low-emission energy capacity. Ireland introduced a carbon tax in 2009 which has raised over €1 billion and helped to reduce emissions as the economy started to grow again in 2012.<sup>19</sup> Germany encourages and invests massively in renewables and energy efficiency, as part of its *Energiewende*, with an aim to reach its own targets of 40-45% renewables share and 55-60% energy savings by 2025.<sup>20</sup> Through its Climate Change Act, the UK took on an ambitious road to decarbonise its economy, setting its own annual carbon caps and planning to reduce greenhouse gas emissions by 50% from 1990 levels until 2025.<sup>21</sup>

<sup>15</sup> European Energy Exchange, ‘Auctions by the transitional common auction platform’. (July 2014).

<sup>16</sup> European Council, ‘European Council conclusions’. (October 2014).

<sup>17</sup> The Guardian, ‘E.ON to quit gas and coal and focus on renewable energy.’ (December, 2014.)

<sup>18</sup> Bloomberg, ‘Power Politics Dominate Polish Electricity Market, CEZ Says.’ (December, 2014).

<sup>19</sup> The New York Times, ‘Carbon Taxes Make Ireland Even Greener.’ (December, 2012).

<sup>20</sup> Agora Energiewende, ‘The German Energiewende and its Climate Paradox - An Analysis of Power Sector Trends for Renewables, Coal, Gas, Nuclear Power and CO2 Emissions, 2010 – 2030.’ (April 2014).

<sup>21</sup> Committee on Climate Change website, ‘Reducing carbon emissions: carbon budgets and targets’, <http://www.theccc.org.uk/tackling-climate-change/reducing-carbon-emissions/carbon-budgets-and-targets/>

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# **REGIONAL ENERGY STRATEGY TO 2030**



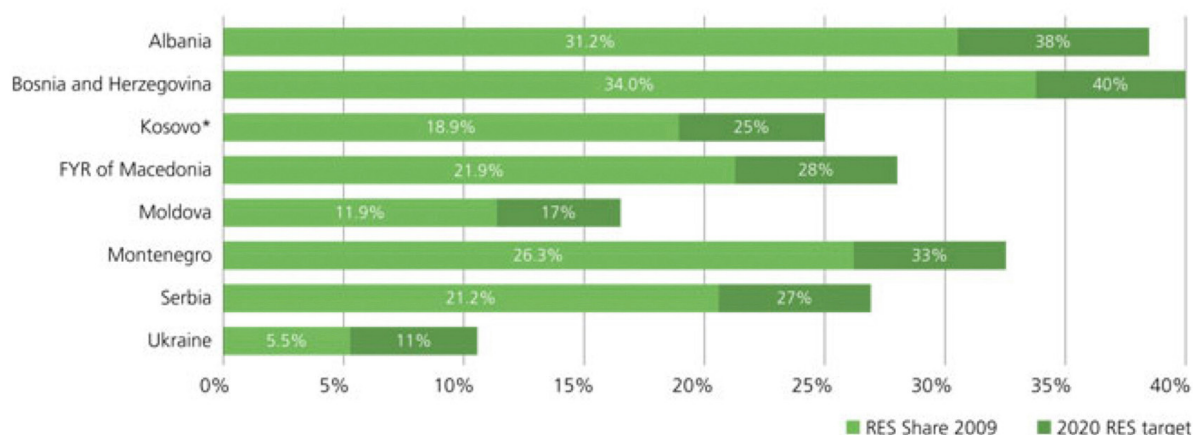
# REGIONAL ENERGY STRATEGY TO 2030

The Energy Community's Ministerial Council, which is the main decision-making institution, called in 2011 for a Regional Energy Strategy defining “energy priorities for the next years and setting the actions to be taken in order to tackle the challenges of achieving a market with competitive prices and secure supplies, saving energy, using less polluting energy sources and reducing the carbon footprint from the energy sector.”<sup>22</sup> An Energy Strategy was agreed in 2012. It outlines a series of priority actions and is based on three scenarios - ‘Current trends’, ‘Minimal investment’ and ‘Low Emissions/ Sustainable Growth’ . The latter requires at least €59 billion investments without Ukraine and €130 billion when it is included by 2030.<sup>23</sup>

The Strategy claims that “complex and costly transition will have to take place in time of an economic crisis when the available public and private capital is limited and difficult to obtain”

and that intense competition for finance does not favour energy system investments.<sup>24</sup> This is only true in instances where there is no regulatory framework attracting and directing investment into low-emission energy systems. However there is considerable private sector, long-term financing available. The Institutional Investors Group on Climate Change (IIGCC), which represents over €9 trillion in investor funds, is just one of the voices calling for governments to provide clear, long-term regulatory frameworks to allow them to invest. Recently, the IIGCC stated: “Reducing emissions to stay below 2 degrees is going to require investment in clean energy far beyond the levels seen to date. Institutional investors are willing and able to play a big role in financing a low carbon economy, but need strong policy which creates the conditions for this investment.”<sup>25</sup>

Figure 3 - Energy Community 2030 renewable energy targets<sup>26</sup>



<sup>22</sup> Energy Community, 'Energy Strategy, Ref: 10thMC/18/10/2012 - Annex 19/27.07.2012'. (2013).

<sup>23</sup> Energy Community, idem.

<sup>24</sup> Idem

<sup>25</sup> IIGCC, 'Investors worth €9 trillion respond to Lima climate agreement'. (14 December, 2014).

<sup>26</sup> Idem

Timescale is also vitally important. As highlighted above, the EU has extended its targets to 2030 to give investors greater certainty. An Energy Strategy needs to do the same to allow the hard work some Energy Community countries have made in establishing legislative frameworks and to reap benefits. Figure 3 outlines existing commitments from countries. It doesn't highlight the time taken to train specialists, identify potential capacity, develop project proposals and obtain the required planning permission. For energy investments that have a lifespan considerably longer than the six years to 2020, targets until 2030 are essential.

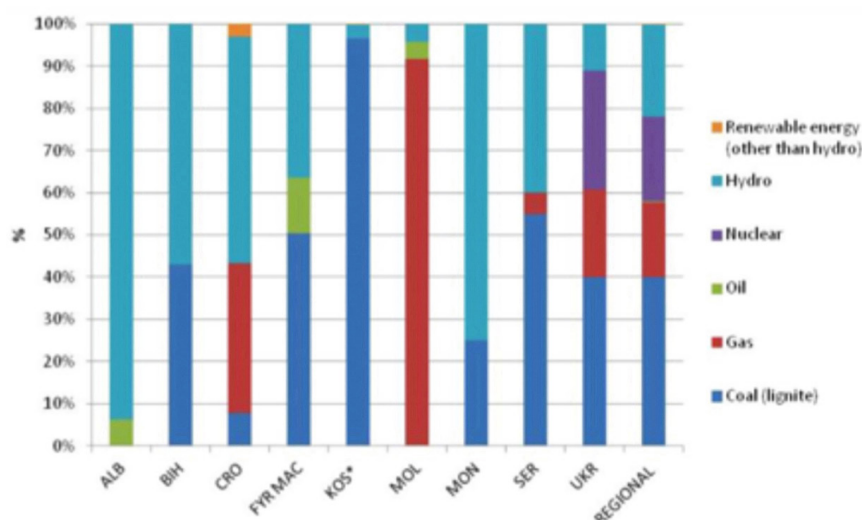
The lack of transposition of EU environmental criteria such as the Birds and Habitats Directive and the Water Framework Directive as well as social criteria into the Energy Community Treaty significantly distorts its direction of future investments. Social criteria, as outlined in the 2007 'Memorandum of Understanding on social issues in the context of the energy community'<sup>27</sup> are vital as they ask for social safeguards to be in place to allow for an inclusive restructuring of energy sector workforces on Member countries. These social safeguards are important to help transition high-carbon sectors workers in the Energy Community countries.

Figure 4 highlights the dominance of hydro, coal and gas in the current electricity mix of each Energy Community country.

The EU is phasing out operational and investment subsidies for unprofitable domestic coal production. Regulation 1407/2002 was extended to 2018 in December 2010, to allow a gradual reduction in state subsidy in exchange for modernisation. Hard coal mines that are not profitable by 2018 will have to be closed down and alternative employment found for workers that are to be displaced.<sup>28</sup>

Introducing social and environmental screening in the Energy Strategy will provide effective investment guidance to new electricity generation to reduce security of supply, climate and environment considerations. This criteria would have looked unfavourably towards recent unsustainable investments. For example, between 2006 and 2012 only €18.5 million of the European Bank for Reconstruction and Development (EBRD) funds were spent on non-hydropower renewables compared to €254 million on hydro power and €509 million on fossil fuels. The World Bank, during the same period, has only contributed €50 worth of financing for renewables, all of which was for hydropower investments.<sup>29</sup> The 2012 public consultation which led to the Energy Community Regional Energy Strategy highlighted the main barriers to diversified renewable energy investments as including lack of a thorough "examination of the sustainability of renewables plans."<sup>30</sup> This must be addressed in the revised Energy Strategy.

Figure 4 - Energy Community electricity mix<sup>31</sup>



27 Energy Community, 'Memorandum of Understanding on social issues in the context of the Energy Community' (18 October 2007). <https://www.energy-community.org/pls/portal/docs/296209.PDF>

28 European Council, 'Council Decision 10 December 2010 to Regulation 1407/2002' (2010).

29 CEE Bankwatch, 'A tale of neglect: Energy finance figures from the Western Balkans.' (June 2013).

30 Energy Community, "Summary of the submitted answers to the consultations questions." (2012).

31 Energy Community

The current Energy Strategy does not prevent investments which are likely to become stranded assets. Kalman Kalotay, an economist for the United Nations Conference on Trade and Development (UNCTAD), stated correctly that the Balkans region is an interesting investment prospect for international finance from countries like China because “It is a gateway to the European Union but not yet in the EU and the EU rules don’t apply.”<sup>32</sup> Local civil society groups echo similar concerns: “We believe that countries of the region should be supported with development of their energy strategies in line with long- term EU goals”. They consider essential to “...include the whole range of Directives covering industrial emissions and air

quality, but also energy-related water, waste and habitats legislation if the Energy Community is to be part of a European energy market with a level playing field for all participants.”<sup>33</sup>

Extending the Energy Strategy to deliver a 2030 vision also means integration of core EU social and environmental legislation into the region. Otherwise this will significantly undermine “economic development and social stability” outlined in Objective A and improvement of the “environment situation” through energy efficiency and renewable energy, as highlighted in Objective D of the Energy Community Treaty.

<sup>32</sup> Euractiv, ‘China seeks gateway to EU via cash-strapped Balkans.’ (December, 2014).

<sup>33</sup> WWF EPO, “Failure to keep up with EU climate and energy policies will move South East Europe away from the EU, say NGOs.” (March 2014).

# 4

## **ASSESSING ENERGY COMMUNITY COUNTRY PERFORMANCE**

# ASSESSING ENERGY COMMUNITY COUNTRY PERFORMANCE

We examine each Energy Community country to determine their investment directions and proposal solutions to realign with those of the EU.

The following elements are applied:

- **Carbon pricing:** we apply a carbon price of €5 in 2014, €15 in 2020 and €30 by 2025 as projected by Point Carbon. There are many ways in which a carbon price can be implemented, either through taxation, as is the case in the UK, Ireland and Sweden, or through an Emissions Trading System (ETS) like the EU ETS, which was launched in 2005. Each contractual party should be allowed to determine which carbon pricing scheme it prefers. This should not detract from the need for a carbon price to be applied in each country.

- **Assessing CO<sub>2</sub> emissions from planned new fossil fuel capacity:** Unless stated otherwise, new capacity is lignite coal. We calculate how much electricity is produced from one GW capacity per country by dividing the volume of fossil fuel generated electricity in one year (2012) by the existing installed capacity to ascertain projected electricity volume. We calculate the potential carbon costs by multiplying current emissions of electricity production by €5 and €30 carbon prices. To find out the costs of newly installed fossil fuel capacity we calculate the carbon costs for a period of ten years.

- **Industrial Emissions Directive (IED)<sup>34</sup> and Large Combustion Plant Directive (LCPD):<sup>35</sup>** These are key drivers for investment and change

in the European power and industrial sectors. LCPD applies to combustion plants with a thermal capacity of 50 MW and above built after 1987. It includes power generation, steel combustion and petroleum refineries. Emission limits for Sulphur Dioxide, Nitrogen Oxides and dust are applied. The Joint Research Council concluded in its report that the application of these directives together with carbon pricing would reduce EU thermal capacity to 65 GW by 2030.<sup>36</sup> Energy Community decision D/2013/05/MC-EnC grants Contracting Parties the possibility to use, until 31 December 2027, the option of National Emission Reduction Plans (NERPs). These are an alternative to all plants complying with the LCPD emission limit values by the end of 2017. Furthermore, an “opt-out” (limited lifetime derogation) possibility can also be applied between 1 January 2018 and 31 December 2023 for a total number of 20,000 operational hours. This equals to approximately 2.3 years. That means that if a plant is run at full load, it would already reach the end of its opt-out period by early 2020. Few Energy Community countries have implemented these directives leading to social and health costs which contravene Article 2 of social and environmental aspects of the Treaty.

- **Renewable energy targets to 2030:** We identify 2030 renewable energy targets in Figure 6 based on a formula used by the European Commission.<sup>37</sup> The national EU 2020 renewables targets were set on the basis of the 2005 share (2009 for Energy Community parties) plus a flat-rate increase of 5.5% per Energy Community Party as well as a GDP-weighted additional increase.<sup>38</sup>

<sup>34</sup> OJEC, 'Directive 2010/75/EU on industrial emissions (integrated pollution prevention and control)', (2010).

<sup>35</sup> OJEC, 'Directive 2001/80/EC on the limitation of emissions of certain pollutants into the air from large combustion plants', (2001).

<sup>36</sup> Joint Research Council, 'Future fossil fuel electricity generation in Europe: options and consequences', (2009).

<sup>37</sup> Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC. <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32009L0028>

<sup>38</sup> Energy Community Secretariat, 'Updated Calculation of the 2020 RES Targets for the Contracting Parties of the Energy Community' (March 2012)

[https://www.energy-community.org/portal/page/portal/ENC\\_HOME/DOCS/1422183/Updated\\_Calculation\\_of\\_2020\\_RES\\_targets\\_ECS\\_6\\_March2012.pdf](https://www.energy-community.org/portal/page/portal/ENC_HOME/DOCS/1422183/Updated_Calculation_of_2020_RES_targets_ECS_6_March2012.pdf)

Figure 6 - RES targets

Country	Share of RES in 2009	Share of RES in 2020	2030 target
Albania	31.2%	38.0%	46.5%
Bosnia and Herzegovina	34.0%	40.0%	48%
Macedonia	21.9%	28.0%	36.2%
Kosovo	18.9%	25.0%	31%
Moldova	12.2%	17.0%	25.4%
Montenegro	26.3%	33.0%	41%
Serbia	21.2%	27.0%	35%
Ukraine	5.5%	11%	18%

- **Energy efficiency targets to 2030:** Where official data is not yet available, we apply a 5.5% increase to 2020 targets, which is consistent with the formula used to identify 2030 RES targets.

Figure 7 - Energy efficiency targets

Country	2018	2021	2024	2030
Albania	9%			14.5%
Bosnia and Herzegovina	9.20%	12.10%	15%	17.60%
Macedonia	9%			14.50%
Kosovo	9%			14.50%
Moldova		20%		25.50%
Montenegro	9%			14.50%
Serbia	9%			14.50%
Ukraine	11%			30%

- **CO<sub>2</sub> cost of thermal electricity production:** To determine this cost we rely on data from the IEA Data Service which lists total electricity output per country in 2012. This is multiplied by the average quantity of CO<sub>2</sub>/kWh produced from lignite and from gas as provided by the US Energy Information Agency.

<sup>39</sup> US Energy Information Agency, 'How much carbon dioxide is produced per kilowatt-hour when generating electricity with fossil fuels?', <http://www.eia.gov/tools/faqs/faq.cfm?id=74&t=11>

# 5

## **CURRENT TRENDS IN THE ENERGY COMMUNITY**



# CURRENT TRENDS IN THE ENERGY COMMUNITY

- **Climate change cost of existing electricity capacity:** For all countries that have CO<sub>2</sub> intensive electricity production, a carbon price signal would make the sectors considerably uneconomic. This cost comes in addition to the cost of meeting requirements to manage local pollutants covered by the IED and LCPD in Figure 8. Albania is not included because, although it plans thermal capacity, it has yet to make this operational.

Figure 8 - Investment costs of TPPs/CHPs for compliance with IED<sup>40</sup>

Country	Pollutant			Total (€)
	Dust (PM) (€)	NO <sub>x</sub> (€)	SO <sub>2</sub> (€)	
Bosnia and Herzegovina	33,500,000	53,000,000	288,300,000	374,700,000
Macedonia	47,000,000	57,600,000	167,000,000	371,600,000
Kosovo	23,000,000	26,000,000	35,200,000	84,200,000
Montenegro	0	4,900,000	46,000,000	50,900,000
Serbia	64,700,000	109,500,000	536,500,000	710,700,000
Ukraine	811,700,000	2,300,900,000	2,920,600,000	6,033,200,000

Figure 9a below applies a carbon price of €5, current EU ETS prices, and €30, which is expected to be the EU ETS price in 2025, according to Point Carbon. We use IEA data on installed capacity in 2012 which is more accurate than projected 2012 installed capacity which was used in Energy Strategy scenarios. Projections submitted to the Energy Community Strategy are presented in Figure 9b.

Figure 9a - application of a carbon price on existing electricity generation capacity (IEA data)

Country (IEA Data)	2012 (GWh)	CO <sub>2</sub> emissions (t)*	€ 5	€ 30
Bosnia and Herzegovina	9,841	9,523,930	47,619,650	285,717,900
Macedonia	5,130	4,850,940	24,254,700	145,528,200
Kosovo	5,833	5,658,010	28,290,050	169,740,300
Moldova	5,517	3,034,350	15,171,750	91,030,500
Montenegro	1,367	1,325,990	6,629,950	39,779,700
Serbia	26,811	25,806,330	129,031,650	774,189,900
Ukraine	96,457	86,826,910	434,134,550	2,604,807,300

\*Calculations based on average lignite-powered plants emissions of 0.97 kg/KWh and gas-fired plants emissions of 0.55kg/ KWh. Source: EIA <http://www.eia.gov/tools/faqs/faq.cfm?id=74&t=11>

There is a considerable difference between IEA data and Energy Community Strategy projections for 2012, with the former indicating that these countries would be paying a higher carbon price. For instance, the difference between emissions costs at a €30 carbon price would be of nearly €60 million for Moldova and €90 million for Bosnia and Herzegovina.

<sup>40</sup> South East European Consultants Ltd, 'Study on the Need for Modernization of Large Combustion Plants in the Energy Community' (November 2013). Hereafter South East Consultants.

Figure 9b - Application of a carbon price on existing electricity generation capacity (Energy Community data)

Country (EnCom Data)	2012 (GWh)	CO2 emissions (t)*	€ 5	€ 30
<b>Albania</b>	254	165,100	825,500	4,953,000
<b>Bosnia and Herzegovina</b>	6,663	6,463,110	32,315,550	193,893,300
<b>Macedonia</b>	6,716	5,704,340	28,521,700	171,130,200
<b>Kosovo</b>	5,386	5,224,420	26,122,100	156,732,600
<b>Moldova</b>	1,405	772,750	3,863,750	23,182,500
<b>Montenegro</b>	1,150	1,115,500	5,577,500	33,465,000
<b>Serbia</b>	26,992	26,092,780	130,463,900	782,783,400
<b>Ukraine</b>	78,364	69,642,940	348,214,700	2,089,288,200

Serbia and Montenegro face the most immediate concerns as they are closest to becoming members of the EU. As EU Member States, they will be required to meet all EU climate and energy legislation and join the EU ETS. Ukraine's electricity generation is the most polluting in terms of greenhouse gas emissions. Due to its geographical proximity to the EU and industrial trade flows, it faces the highest risk of potential carbon-related border measures, should the EU decide to pursue this route.

Albania experiences a cost advantage as its power generation capacity is 99% non-fossil fuel. However, it too will indirectly pay a

carbon price if it continues to import CO<sub>2</sub>-intensive electricity from neighbours and if it uses its fossil fuel capacity. There is a risk that Albania may lock-in domestic hydro capacities for export to EU countries, such as Italy and Greece, through long term power purchase agreements, leaving the domestic consumption to imports.

Moldova has a lower CO<sub>2</sub> emission profile because it uses natural gas for about 90% of its electricity generation.

- **Cost of new fossil fuel capacity:** A carbon price is essential to inform investors of the likely economic performance of projects. Figure 10a and 10b applies a carbon price of €5, which is similar to today's EU ETS price, as well as a €30 price expected by 2025 on projected electricity production of the new capacity.

Figure 10a - Estimated carbon cost for new coal capacity (national plans)

Country	Coal capacity to be added GW*	Electricity production GWh**	CO2 emissions (t)	€ 5	€ 30
<b>Bosnia and Herzegovina</b>	1.95	9,694	9,403,180	47,015,900	282,095,400
<b>Macedonia</b>	0.3	1,854	1,798,380	8,991,900	53,951,400
<b>Kosovo</b>	0.6 ***	2,300	2,231,000	11,155,000	66,930,000
<b>Montenegro</b>	0.22	1,367	1,325,990	6,629,950	39,779,700
<b>Serbia</b>	2.85	14,408	13,975,760	69,878,800	419,272,80
<b>Ukraine</b>	8.9	25,800	25,026,000	125,130,000	750,780,000

\*According to on the ground plans - see individual states' analysis for more details and sources.

\*\*Calculation based on 2012 installed capacity/electricity production ratio (IEA data)

\*\*\*A draft of Kosovo's Energy Strategy, dated 2013, indicates 0.6 GW of new capacity will be built. [http://mzhe.rks-gov.net/repository/docs/SE\\_-\\_Ang\\_26.12.pdf](http://mzhe.rks-gov.net/repository/docs/SE_-_Ang_26.12.pdf)

Figure 10b - Estimated carbon cost for new coal and gas capacity (Energy Community Strategy)

Country (EnCom data)	Capacity to be added*		Electricity production** GWh	CO2 emissions (t)	€ 5	€ 30
	Coal (GW)	Gas (GW)				
<b>Albania</b>	0	0.1	426	234,300	1,171,500	7,029,000
<b>Bosnia and Herzegovina</b>	1	0.7	6,723	4,425,810	22,129,050	132,774,300
<b>Macedonia</b>	0.3	0.3	3,073	2,444,050	12,220,250	73,321,500
<b>Kosovo</b>	1	0	3,591	2,717,940	13,589,700	81,538,200
<b>Moldova</b>	0.2	0	1,196	1,160,120	5,800,600	34,803,600
<b>Montenegro</b>	0.35	0	2,012	1,951,640	9,758,200	58,549,200
<b>Serbia</b>	2.5	0.5	15,079	13,732,030	68,660,150	411,960,900
<b>Ukraine</b>	0	0	0	0	0	0

\* Energy Community Strategy projections, p.46.

\*\* Calculation based on 2012 installed capacity/electricity production ration (Energy Community Strategy data)

In Figures 11a and 11b we combine carbon build and operational costs to project estimated total costs of planned new capacity. The build cost is based on the 600 MW plant at Sostanj, Slovenia, which has come online in 2014 at a cost of €1.4 billion.<sup>41</sup> We selected this because it is one of the most recent plants to be built in the EU and provides a good indicator of likely costs to be borne in the Energy Community countries. For gas-fired power plants, IEA estimates costs at €350-650 million/GW<sup>42</sup> and we used an average of €500 million/GW. Carbon costs are based on the 2025 carbon price (€30), as an indication for the years 2020-2030 and a projected amount of CO2 emissions for a 10-years period.

Figure 11a - Estimated total cost of new fossil fuel capacity (national plans)

Country	New coal capacity (GW)	Build cost for new fossil fuel capacity (€)	Carbon cost for new capacity 2020-2030 (€30/tonne)	Build cost + Carbon cost 2020-2030 (€)
<b>Bosnia and Herzegovina</b>	1.95	4,550,000,000	2,820,954,000	7,370,954,000
<b>Macedonia</b>	0.3	700,000,000	539,514,000	1,239,514,000
<b>Kosovo</b>	0.6	1,400,000,000	669,300,000	2,069,300,000
<b>Montenegro</b>	0.22	467,000,000	397,797,000	864,797,000
<b>Serbia</b>	2.85	6,650,000,000	4,192,728,000	10,842,728,000
<b>Ukraine</b>	8.9	20,767,000,000	7,507,800,000	28,274,800,000

There is a difference between the Energy Community Strategy new build projections and those from more recent national energy strategies or on the ground plans. For example, Serbia forecasts 2.5 GW coal and 0.5 GW gas in the Energy Community Strategy, which would cost €10 billion, while in reality Serbia is planning coal projects totalling 2.85 GW and a gas CHP project of 450 MWe.

41 CEE Bankwatch, 'Šoštanj unit 6 lignite plant: a mistake not to be repeated.' (2014).

42 IEA, 'Projected costs of Generating Electricity', <http://www.iea.org/textbase/npsu/eleccostsum.pdf>

Figure 11b - Estimated total cost of new fossil fuel capacity

Country (EnCom)	Capacity to be added*		Build cost for new coal capacity (€)	Build cost for new gas capacity (€)	Carbon cost for new capacity 2020-2030 (€30/tonne)	Build cost + Carbon cost 2020-2030 (€)
	Coal (GW)	Gas (GW)				
Albania	0	0.1	0	55,000,000	70,290,000	125,290,000
Bosnia and Herzegovina	1	0.7	2,300,000,000	385,000,000	1,327,743,000	4,012,743,000
Macedonia	0.3	0.3	690,000,000	165,000,000	733,215,000	1,588,215,000
Kosovo	1	0	2,300,000,000	0	815,382,000	3,115,382,000
Moldova	0.2	0	460,000,000	0	348,036,000	808,036,000
Montenegro	0.35	0	816,000,000	0	585,492,000	1,401,492,000
Serbia	2.5	0.5	5,750,000,000	275,000,000	4,119,609,000	10,144,609,000
Ukraine	0	0	0	0	0	0

Albania again could increase its regional competitiveness as it plans to build wind and solar rather than fossil fuel capacity. It has an added incentive to meet new renewable energy targets which will allow it to avoid paying for electricity imports, provided it uses this capacity for domestic consumption, especially as higher carbon prices are likely to be factored into future supply.

Bosnia and Herzegovina and Serbia's new build plans are extremely costly when factoring in the estimated total carbon and build prices.

According to on ground plans, Bosnia and Herzegovina's cost just over a 10-year period will be over €7 billion, whereas Serbia's cost will be almost €11 billion (see Figure 11a). Due to regulated energy prices in Bosnia and Herzegovina, power producers are likely to face significant economic disadvantages as they are unable to pass on CO<sub>2</sub> and local pollution costs to consumers. The same negative impacts will apply to other countries that have regulated electricity prices.

• **Identifying the opportunity cost of renewable energy:** Figure 12 below shows that replacing planned new fossil fuel capacity with wind and solar will lead to an over achievement of our projected 2030 targets for all countries planning to invest in new fossil fuel capacity. Other renewable energy sources such as biogas, local sustainable biomass cogeneration and pumped electricity storage based on hydropower should also be considered by Energy Community countries. Column A is the final electricity consumption in 2009 based on data from the Energy

Community Strategy. Column B identifies electricity generated from installed RES in 2009. In column C we assume that the planned fossil capacity is met through RES (GWh). Column D is the assumed final consumption of electricity in 2030 (Column A + Column C). Column E indicates the potential volume of electricity generated from RES in 2030 (Column B + Column C). In Column F we show that, by replacing planned new build coal capacity with wind and solar capacity, each country will overshoot our projected targets.

Figure 12 - Displacing new build with renewables

Country	A Final consumption 2009 (GWh)*	B RES 2009 (GWh)	C New Build by 2030** (GWh)	D Expected consumption 2030 (GWh)	E RES 2030 (GWh)	F RES % of final consumption in 2030
Albania	5,377	1,678	426	5,803	2,104	36.25%
Bosnia and Herzegovina	9,463	3,217	6,723	16,186	9,940	61.41%
Macedonia	6,392	1,400	3,073	9,465	4,473	47.26%
Kosovo	3,921	741	3,591	7,512	4,332	57.67%
Moldova	5,621	686	1,196	6,817	1,882	27.60%
Montenegro	3,017	793	2,012	5,029	2,805	55.79%
Serbia	26,810	5,684	15,079	41,889	20,763	49.57%
Ukraine	119,309	6,920	0	119,309	6,920	5.80%

\* IEA data, as the Energy Community does not provide final electricity consumption data

\*\* According to the Energy Community Strategy, p.46

We identify how much wind and solar capacity is required to deliver the projected electricity from planned new fossil fuel projects in Figure 13. Hydro was not included as we deem it to be sufficiently exploited in the region and additional capacity does not increase security of supply. We have calculated the capacity of wind and solar needed to generate as much electricity as the planned new fossil fuel-fired plants. In our calculations, we have taken into account the number of sun daylight hours/year in each country and a load factor of 75% for solar (for example, in Bosnia Herzegovina there are 1,886 sun daylight hours/year and we assume that a solar plant would only generate electricity in 75% of this time) and we used a 28% load factor for onshore wind farms.<sup>43</sup>

Figure 13 - Necessary wind and solar capacity to produce the same amount of electricity as the planned fossil fuel capacity

Country (EnCom)	Electricity production GWh	Sun-Daylight hours/year	Needed Solar capacity GW	Needed wind capacity GW
Albania	426	2,544	0.22	0.17
Bosnia and Herzegovina	6,723	1,880	4.77	2.74
Macedonia	3,073	2,339	1.75	1.25
Kosovo	3,591	2,066	2.32	1.46
Moldova	1,196	2,126	0.75	0.49
Montenegro	2,012	1,920	1.40	0.82
Serbia	15,079	2,112	9.52	6.15
Ukraine	0	1,840	0.00	0.00

43 Scottish Renewables, 'Onshore wind: what you need to know'. [http://www.scottishrenewables.com/media/uploads/publications/sr\\_on-shore\\_wind\\_briefing\\_040613.pdf](http://www.scottishrenewables.com/media/uploads/publications/sr_on-shore_wind_briefing_040613.pdf)



- **Cost of renewables:** To enable comparison of the different investment opportunities, we compared the cost of installing new fossil fuel capacity against the cost of installing wind or solar capacity, in Figure 14. At today's prices, one GW of wind costs €1.23 billion<sup>44</sup> and one GW of solar costs €1.35 billion<sup>45</sup>. These costs related to capacity installation, not operational costs and maintenance. Furthermore, we do not take into account observed trends for falling production and installation costs that have been experienced over the last decades.

Figure 14 - Cost of RES new build capacity

Country (EnCom)	Needed wind capacity GW	Cost at current prices (€)	Needed Solar capacity GW	Cost at current prices (€)
Albania	0.17	213,625,245	0.22	301,415,094
Bosnia and Herzegovina	2.74	3,371,367,417	4.77	6,436,914,894
Macedonia	1.25	1,541,010,274	1.75	2,364,856,776
Kosovo	1.46	1,800,770,548	2.32	3,128,654,405
Moldova	0.49	599,755,382	0.75	1,012,605,833
Montenegro	0.82	1,008,600,000	1.40	1,890,000,000
Serbia	6.15	7,561,631,605	9.52	12,851,420,455
Ukraine	0.00	0	0.00	0

The cost of new build coal capacity is artificially cheaper than wind or solar because the external costs of coal are not included in the Energy Community Strategy calculations. In Figure 15 we compare, over a 10-year period, total costs of new fossil fuel capacity against total costs of meeting that same capacity through wind or solar. Wind is the cheapest way to cover electricity from new installations. There are geographical and cost limitations to achieving the RES potentials which were not included in this analysis. We recommend more detailed analysis of RES potential in each country.

Figure 15 - Cost comparison between fossil fuels and RES of new capacity for the first 10 years of operation

Country (EnCom)	Total cost of new fossil fuel capacity in 2030 (€)*	Wind cost at current prices (€)**	Difference (%)	Solar cost at current prices (€)**
Albania	125,290,000	213,625,245	171%	310,415,094
Bosnia and Herzegovina	4,012,743,000	3,371,367,417	84%	6,436,914,894
Macedonia	1,588,215,000	1,541,010,274	97%	2,364,856,776
Kosovo	3,115,382,000	1,800,770,548	58%	3,128,654,405
Moldova	808,036,000	599,755,382	74%	1,012,605,833
Montenegro	1,401,492,000	1,008,600,000	72%	1,890,000,000
Serbia	10,144,609,000	7,561,631,605	75%	12,851,420,455
Ukraine	0	0	0%	0

\* Built cost + carbon cost 2020-2030 (see Figure 11b).

\*\* Operational costs not included.

44 EWEA, 'The Economics of Wind Energy' (March, 2009), [http://www.ewea.org/fileadmin/files/library/publications/reports/Economics\\_of\\_Wind\\_Energy.pdf](http://www.ewea.org/fileadmin/files/library/publications/reports/Economics_of_Wind_Energy.pdf)

45 Fraunhofer Institute for solar energy systems ISE, 'Photovoltaics Report', (October 2014), <http://www.ise.fraunhofer.de/de/downloads/pdf-files/aktuelles/photo-voltaics-report-in-englischer-sprache.pdf>

- Impact of energy efficiency: The key benefit of energy efficiency is to reduce overall final consumption, which provides a direct financial return for countries with high electricity import dependency. None of the Energy Community countries has exploited energy efficiency potentials. This omission places significant financial burdens on national economies, industries and households.

In its 2013-2014 Implementation Report, the Energy Community identifies substantial annual electricity losses due to outdated infrastructure in all its member countries.<sup>46</sup> Reducing these energy losses also displaces some of the burden from energy imports, which is an additional cost on these countries. In order to determine the cost of electricity losses, we calculate the electricity price of one MWh. The price of generated electricity in each country is a weighted arithmetic mean of their respective energy mixes and the levelised electricity prices for each of the electricity source (based on Germany<sup>47</sup> and the UK<sup>48</sup> case studies). This gives us a crude financial measure of energy savings' benefits, as outlined in Figure 16. Wasteful usage is omitted because we were unable to quantify for the whole region.

Figure 16 - Annual cost of electricity losses

Country	Electricity losses (MWh)	Cost of electricity generation (€/MWh)	Electricity losses costs (€)
Albania	3,347,000	20	66,940,000
Bosnia and Herzegovina	1,496,000	37.5	56,100,000
Macedonia	1,294,000	41.6	53,830,400
Kosovo	1,859,000	44.5	82,725,500
Moldova	575,000	58.1	33,407,500
Montenegro	695,000	32	22,240,000
Serbia	5,602,000	38.45	215,396,900
Ukraine	21,984,000	52.81	1,160,975,040
<b>TOTAL</b>			<b>1,691,615,340</b>

Total savings would be over €1.5 billion across the Energy Community. Ukraine's economy pays over €1 billion annually in electricity losses, Serbia €215 million and Albania €67 million.

This preliminary overview puts into perspective the challenges faced by the Energy Community countries in terms of electricity mix and direction of investments on the short and mid-term. The Energy Community Strategy needs to factor the total cost of new build fossil fuel to allow for a genuine comparison with non-fossil fuel capacity. This would redraw the three scenarios outlined in the Energy Community Strategy.

<sup>46</sup> Energy Community Implementation Report, 2013-2014.

<sup>47</sup> Fraunhofer Institute for Solar Energy Systems ISE, 'Levelized cost of electricity renewable energy technologies' (November 2013), <http://www.ise.fraunhofer.de/en/publications/veroeffentlichungen-pdf-dateien-en/studien-und-konzeptpapiere/study-levelized-cost-of-electricity-renewable-energies.pdf>.

<sup>48</sup> Parsons Brinckerhoff, 'Powering the Nations: a review of the costs of generating electricity' (March 2010), [http://www.pbworld.com/regional/uk\\_europe\\_specialty/](http://www.pbworld.com/regional/uk_europe_specialty/).



# COUNTRY ANALYSIS

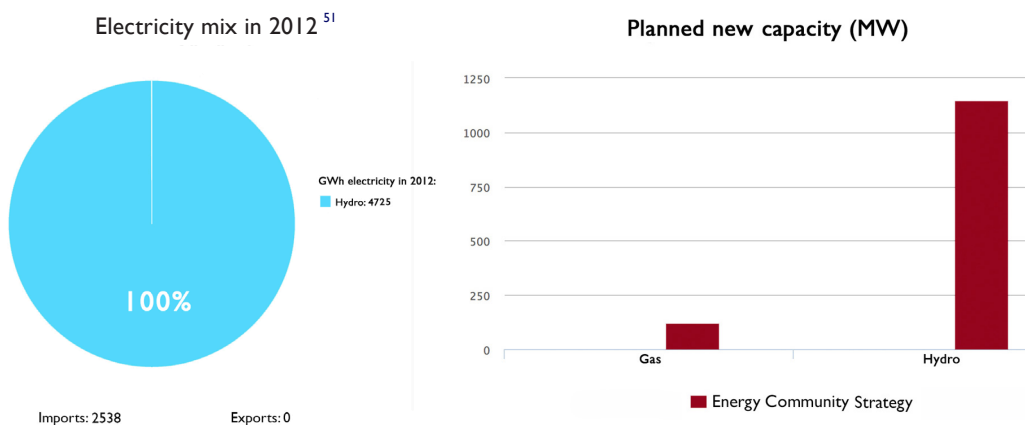
ALBANIA  
BOSNIA AND  
HERZEGOVINA  
MACEDONIA  
KOSOVO  
MOLDOVA  
MONTENEGRO  
SERBIA  
UKRAINE

# I. ALBANIA

## Energy and electricity mix analysis

Albania's electricity production is 99% reliant on hydropower. A 100 MW combined cycle gas turbine (CCGT) located in Vlora which uses natural gas or distillate fuel oil<sup>49</sup> has been constructed but not yet used commercially due to technical issues. It is unclear whether this will become operational.

Most current hydropower capacity was built between 1970-1980. Its maintenance and refurbishment costs put a significant burden on the country's finances. The EBRD and other financial institutions are currently investing in a €70 million safety makeover at the Komani hydropower plant.<sup>50</sup>



Geographical concentration, lack of diversity and susceptibility to climate change impacts undermine the country's overall energy security. The main challenge for the country is to diversify its electricity mix which is at high risk from changing weather patterns. Three of the largest and most important plants are located on the River Drin - Komani (600 MW), Fierza (500 MW) and Vau i Dejes (250 MW). Such concerns were recognised during the 2007 drought in the River Drin which led to severe electricity shortages and blackouts, affecting businesses and citizens alike.<sup>52</sup> Albania had to import electricity worth €90 million to compensate for these losses.<sup>53</sup> In 2014, Albania borrowed €118 million from the World Bank to help overhaul its state-run power sector and pay for electricity imports from other Balkan states.<sup>54</sup>

<sup>49</sup> South East European Consultants.

<sup>50</sup> EBRD, 'EBRD helps upgrade Albania's clean energy sources.' (October 2014). <http://www.ebrd.com/pages/news/press/2014/141030.shtml>.

<sup>51</sup> Energy Community, 'Energy Strategy, Ref: 10thMC/18/10/2012 - Annex 19/27.07.2012'.

<sup>52</sup> World Bank, 'Europe and Central Asia Knowledge Brief: Albania's Energy Sector: Vulnerable to Climate Change' (September 2010), [http://siteresources.worldbank.org/INTECALEA/Resources/ECA\\_KB\\_29\\_Albania\\_Energy.pdf](http://siteresources.worldbank.org/INTECALEA/Resources/ECA_KB_29_Albania_Energy.pdf).

<sup>53</sup> Reuters, 'Albania readies power imports to make up for drought.' (April 2014). <http://www.reuters.com/article/2014/04/11/us-albania-electricity-idUSBREA3A1AC20140411>.

<sup>54</sup> Salon, 'Albania borrows \$150 million to improve power grid.' (September 2014). [http://www.salon.com/2014/09/30/albania\\_borrows\\_150\\_million\\_to\\_improve\\_power\\_grid/](http://www.salon.com/2014/09/30/albania_borrows_150_million_to_improve_power_grid/).



## Renewable energy potential

Due to its location, Albania enjoys hot dry summers with long days of sunshine and mild winters of the Mediterranean region. This creates significant opportunities to exploit solar energy. The National Agency of Natural Resources (NANR) is running solar water heating awareness schemes which have already delivered an additional 10,700 m<sup>2</sup> of installed capacity (60% by services, 40% by households), bringing total installations to 52,000 m<sup>2</sup>, equivalent to around 70 GWh/year or 1% of electricity consumed by households in 2009.<sup>55</sup> The United National Development Programme (UNDP) operates an investment programme to support installation of an additional 520,000 m<sup>2</sup> of solar water heaters. By 2012 total installed capacity had increased by 25% to 112,000 m<sup>2</sup>.<sup>56</sup>

Currently, there is no installed wind capacity in the country.<sup>57</sup> 2,000MW investment in new wind energy capacity is foreseen. However, all of this is expected to be exported to Italy through long-term supply contracts.<sup>58</sup> Unless this new wind capacity also meets domestic demand it could act as an economic ceiling on future economic performance. In its National Renewable Energy Action Plan, Italy plans to import two thirds of Albania's 2009 production.

Renewable energy legislation introduced in 2013 grants a feed-in system in place for small hydro power plants up to 15 MW and tax exemptions for all renewables regarding equipment or fuel in the construction phase.<sup>59</sup> This puts increased pressure on hydro potential at the expense of diversifying into other renewable sources.

## Energy efficiency potential

To date, few measures have been enacted to deliver the 9% energy efficiency target to 2020 and the 14.5% target to 2030. The financial benefits of the energy savings are considerable especially as they would reduce the €90 million currently spent on importing energy from neighbours. Furthermore, they would also save €26,000,000 of current electricity losses.

## Conclusions

The government has taken steps to introduce a legislative framework to address energy efficiency and renewable energy investments. These will take time to generate supply chains, achieve planning consent, construction and operational impact. The following solutions will help sustainable growth:

**1. Carbon price signal on electricity mix:** Only the Vlora plant will pay GHG emissions if it becomes operational. A carbon price cannot be applied, as there are no GHG emissions in power generation at present.

**2. Impact of the Industrial Emissions Directive:** If the Vlora plant becomes operational, it is forecast to emit 2 tonnes of Particulate Matter (PM) per year, 98 tonnes of Nitrate Oxide (NO<sub>x</sub>) and 70 tonnes of Sulphur Dioxide (SO<sub>2</sub>). The financial cost of these pollutants is estimated to be €1 million per year according to a study from South East European Consultants Ltd. These costs are not internalised in the operation of the plant.<sup>60</sup>

**3. Renewable energy targets:** On paper, Albania has implemented a sound framework but for the wrong technology. It will take time for the benefits of this to materialise and, therefore, a 2030 target, together with financial support, should be established for non-hydro power plants.

**4. Energy efficiency targets:** The Energy Efficiency Action Plan sets a target of 9% savings by 2020. However, a fund to support this investment has, to date, not been established. An estimated 2030 target of 14.5% would require significant effort, which would be offset by reducing import dependency.

55 Albanian Energy Association, 'Renewable Energy Resources and Energy Efficiency in Albania'. <http://aea-al.org/wp-content/uploads/2012/04/RENEWABLE-ENERGY-ALBANIA.pdf>

56 UNDP, 'Here comes the sun: Albania passes law on renewable energy' (8 July, 2013). John O'Brien. <http://europeandcis.undp.org/blog/2013/07/08/here-comes-the-sun-albania-passes-law-on-renewable-energy/>

57 Albanian Energy Association, idem.

58 CEE Bankwatch, 'A partnership of unequals' (2012).

59 Albanian Energy Association, idem.

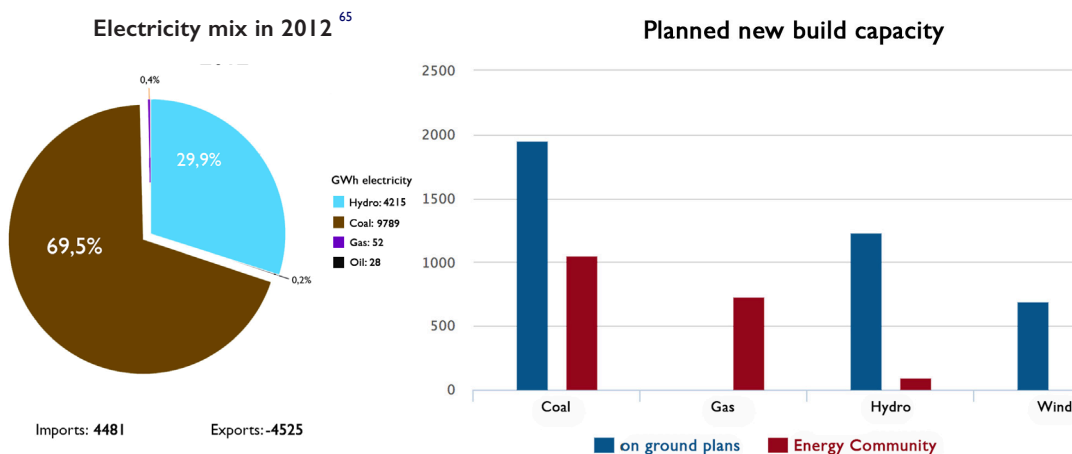
60 South East European Consultants, idem, p.50.



## 2. BOSNIA AND HERZEGOVINA

### Energy and electricity mix analysis

Coal accounted for 69% of electricity generation in 2012 with the remaining 30% emanating from hydropower.<sup>61</sup> The 1,775 MW total installed capacity comprises four thermal plants located in Tuzla (779 MW), Kakanj (578 MW), Gacko (300 MW) and Ugljevik (300 MW). Tuzla and Kakanj were built in the mid-1960s whilst Gacko and Ugljevik were built in the mid-1980s.<sup>62</sup> Additional investments are required for Tuzla and Kakanj plants to comply with the IED, especially with respect to dust, flue gas desulphurisation (FGD). Only Ugljevik is forecast to introduce FGD in 2017. The cost of NO<sub>x</sub>, SO<sub>2</sub> and PM externalities in 2012 was €2,244.7 million.<sup>63</sup> Application of the LCPD and IED would result in almost all of the plants closing earlier than 2030.<sup>64</sup>



Bosnia and Herzegovina's plans are to move even further into the use of coal, with 1.95 GW capacity to be added in the future, through the following units: Tuzla 7 (450 MW),<sup>66</sup> Kakanj 8 (300 MW),<sup>67</sup> Ugljevik III (600 MW)<sup>68</sup> and Banovici (300 MW).<sup>69</sup> Unfortunately, the lack of strong regulatory guidance leads the investment in potential stranded assets. A good example is the €550 million 300 MW thermal plant in Stanari, northern Bosnia, investment financed by the China Development Bank (CBD) through a €350 million loan.<sup>70</sup>

61 Stefan Ralchev, 'Energy in the Western Balkans: A Strategic Overview', Institute for Regional and International Studies, (August 2012).

62 South East European Consultants, idem.

63 South East European Consultants, idem.

64 South East European Consultants, idem.

65 Energy Strategy, Ref: 10thMC/18/10/2012 - Annex 19/27.07.2012.

66 Elektroprivreda FBiH, 'Informacija o aktivnostima na izboru projektnog partnera za Blok 7 u Parlamentu FBiH'. (July 2015). <http://www.elektroprivreda.ba/novost/14348/informacija-o-aktivnostima-na-izboru-projekt-nog-partnera-za-blok-7-u-parlamentu-fbih>

67 Elektroprivreda FBiH, Unit 8 TPP "Kakanj". <http://www.elektroprivreda.ba/eng/page/unit-8-tpp-kakanj>

68 Comsar Energy, 'Thermal power plants', <http://comsar.com/business-areas/power-generation/thermal-power-plants>

69 Vlada Federacije Bosne i Hercegovine, 'Utvrdeni prijedlozi proračuna fbihi zakona o izvršenju proračuna za 2014. Godinu' [http://www.fbihvlada.gov.ba/bosanski/sjednica.php?sjed\\_id=322&col=sjed\\_saopcenje](http://www.fbihvlada.gov.ba/bosanski/sjednica.php?sjed_id=322&col=sjed_saopcenje)

70 Financial Times, 'Bosnia energy: China sees potential'. (28 June 2012).



## Renewable energy potential

Bosnia and Herzegovina has a relatively high share of renewables of 24% in final energy supply.<sup>71</sup> This is based on a high use of hydropower for electricity generation and the use of firewood for heating and cooking purposes at about 4% of the energy balance.<sup>72</sup> However, the highest potential for future deployment of RES is within small hydropower although this is experiencing growing construction and development resistance from local communities. Residents set up a 24-hour watch to prevent work continuing on small hydro plant on the River Zeljeznice near Fojnice,<sup>73</sup> a much valued area of considerable beauty, biodiversity and tourism potential. Similar resistance was experienced in the Ljuta Canyon<sup>74</sup> and Medna hydro plant near the Sana river source.<sup>75</sup> Aside from hydro power, Bosnia and Herzegovina has planned to build 270 MW of wind in the short term and additional 420 MW later on<sup>76</sup> (estimated 2,000MW potential),<sup>77</sup> as well as solar and geothermal energy, but current low energy prices hinder the development of renewables and the comparatively low feed-in-tariffs for electricity from RES are not a motivation factor for foreign investors.<sup>78</sup>

As the European Commission has shown in its last report on Bosnia and Herzegovina, the complexity of the administrative structure, the lack of cooperation between Entities and the division of jurisdiction within the sector 'hampers the comprehensive countrywide promotion and development of the renewable energy sector'.<sup>79</sup> Moreover, the government has not provided any action plan for the implementation of the compulsory renewable target of 40% by 2020. The Commission expressed its worries that the country is falling behind meeting its obligations under the Energy Community Treaty.

## Energy efficiency potential

Another challenge for Bosnia and Herzegovina is the fact that equipment, technologies and plants are outdated and they generate huge energy losses of up to 40%. Other sources of inefficiency are the district heating and the housing sector.<sup>80</sup> Because Bosnia and Herzegovina applies a regulated energy price which is kept artificially low, power companies will have to absorb all CO2 costs without being able to pass on costs to consumers. This dramatically increases the costs burden of the new

investments.

## Conclusions

**1. A price signal on greenhouse gas emissions:** The dominance of lignite coal in the electricity mix and regulated energy prices carry a significant cost. In 2012, 9,841 GWh were produced in coal and gas-fired power plants, resulting in 9,523,930 tonnes of CO2 emissions. At a €5 carbon price this would cost €47,619,650 whilst a €30 carbon price would cost € 285,717,900.

The Energy Community Strategy's planned estimations of electricity production are short 3,200 GWh, the equivalent of nearly 3 million tonnes CO2.

**2. Impact of the Industrial Emissions Directive:** The plants need to comply with the LCDP by 2017 and the IED by 2027 and several of them are expected to close instead.<sup>81</sup>

**3. Planned new capacity:** Bosnia and Herzegovina plans to add 1.95 GW coal-capacity, which would entail a construction cost of over €4.5 billion. Electricity production would increase by 9,694 GWh and the total cost of emissions would reach nearly €300 million/year in a €30 carbon price scenario. The Energy Community Strategy mentions 2.5 GW (2 GW coal and 0.5 GW gas), which would entail even higher costs.

**4. Renewable energy targets:** Concentration in hydro increases security of supply concerns. Diversification into wind and solar is essential to meet 2020 and 2030 targets. Displacing the planned fossil-fuel capacity with renewable energy capacity would save a quarter of building costs (roughly €1 billion) if replaced by wind.

**5. Energy efficiency targets:** By failing to design a clear strategy to improve energy efficiency, the government and households will keep losing huge amounts of money.

71 Western Balkans Investment Project, Energy Sector, [http://www.wbif-ipf.eu/?page\\_id=327](http://www.wbif-ipf.eu/?page_id=327)

72 UN Economic Commission for Europe (UNECE), 'Policy Reforms to Promote Energy Efficiency and Renewable Energy Investments in Bosnia and Herzegovina' (October 2009), [http://www.unece.org/fileadmin/DAM/energy/se/pp/adhoc/EE21\\_I4\\_AHGE\\_Oct09/5\\_bh\\_poyry\\_pr\\_paolettil.pdf](http://www.unece.org/fileadmin/DAM/energy/se/pp/adhoc/EE21_I4_AHGE_Oct09/5_bh_poyry_pr_paolettil.pdf).

73 H-Alter, 'Otišao bager!' (July 2013), <http://www.h-alter.org/vijesti/otisao-bager>.

74 Klix, 'Gradani protestovali i zbog izgradnje visokih brana u kanjonu Ljute' (June 2013), <http://www.klix.ba/vijesti/bih/kanjon-ljute/130606111#4>.

75 Energy, Transport and Natural Resources, 'A postcard for the Prime Minister of the Republic of Srpska from the sources of Sana river' (July 2014), <http://etnar.net/a-postcard-for-the-prime-minister-of-the-republic-of-srpska-from-the-sources-of-sana-river/>

76 Energy, Transport and Natural Resources, 'A postcard for the Prime Minister of the Republic of Srpska from the sources of Sana river' (July 2014), <http://etnar.net/a-postcard-for-the-prime-minister-of-the-republic-of-srpska-from-the-sources-of-sana-river/>

77 Foreign Investment Promotion Agency of Bosnia and Herzegovina, 'Bosnia and Herzegovina Energy Sector' (2011), <http://fipa.gov.ba/doc/brosure/Energy%20sector.pdf>.

78 UNECE idem.

79 European Commission, 'Commission staff working document Bosnia and Herzegovina 2013 progress report', SWD (2013) 415 final, (October 2013), pp.45, [http://ec.europa.eu/enlargement/pdf/key\\_documents/2013/package/ba\\_rapport\\_2013\\_en.pdf](http://ec.europa.eu/enlargement/pdf/key_documents/2013/package/ba_rapport_2013_en.pdf)

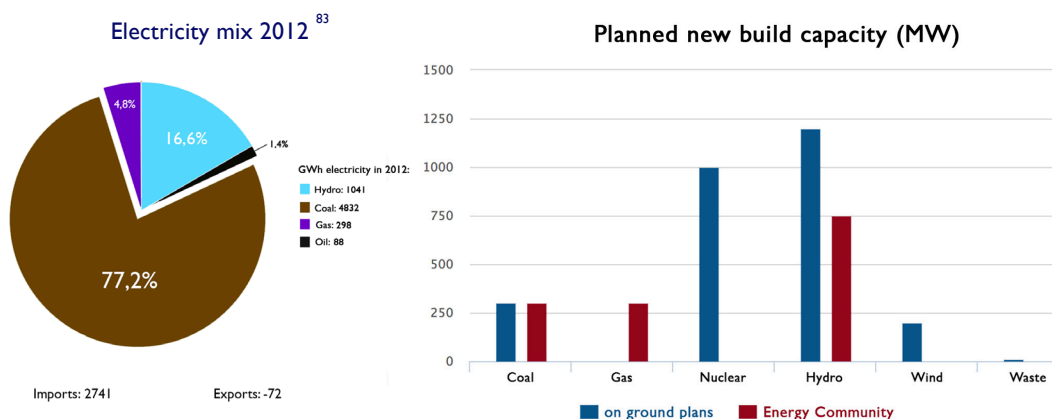
80 UNECE idem.

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# 3. MACEDONIA

## Energy and electricity mix analysis

Coal has a 50% share of the total energy mix in Macedonia and over 75% in electricity generation. Macedonia is highly sensitive to climate change because of the significant share of agricultural activities in the economy, both as output and employment, poor infrastructure and already high levels of air pollution. The energy sector contributes 3/4 to the country's greenhouse gas emissions.<sup>82</sup>



Macedonia has two thermal power plants - Bitola (675 MW) and Oslomej (125 MW) – and two combined heat and power plants - Skopje (227 MW) and Kogel (30 MW), both in operation since 2012. The government plans to increase their capacity and to open a new mine in Zivojno<sup>84</sup> to secure increased supply for the Bitola power plant.<sup>85</sup> Macedonia has a back-up power plant fuelled by heavy oil in Negotino (210 MW).<sup>86</sup> According to South East European Consultants, the cost of PM, NOx and SO2 in 2012 was €3,551.9 million on this capacity.<sup>87</sup>

Energy dependency is the other key element of energy policy. The country is unable to produce sufficient electricity to respond to the increasing demand (18% increase from 2000 to 2010, while domestic supply decreased by 3%),<sup>88</sup> and has an energy dependency of 32%.<sup>89</sup> They plan to reduce import dependency to 2% by 2035. Electricity imports mainly come from Bulgaria and Serbia.<sup>90</sup>

82 World Bank, 'FYR Macedonia Green Growth Country Assessment', (March 2014), pp. 56 [http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2014/07/14/000442464\\_20140714101503/Rendered/PDF/ACS81790ESW0wh0h0Country0Assessment.pdf](http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2014/07/14/000442464_20140714101503/Rendered/PDF/ACS81790ESW0wh0h0Country0Assessment.pdf)

83 Energy Community, 'Energy Strategy of the Energy Community', Ref: I0thMC/18/10/2012 - Annex 19/27.07.2012.

84 ELEM Macedonian Power Plants, 'Coal mine Zivojno Bitola' (2012). [http://elem.com.mk/images/stories/objekti/3\\_ProjectConceptNote\\_Zivojno\\_ANG.pdf](http://elem.com.mk/images/stories/objekti/3_ProjectConceptNote_Zivojno_ANG.pdf)

85 idem.

86 EBRD, 'FYR Macedonia Country Profile', (September 2008), pp. 128, <http://www.ebrd.com/downloads/legal/irc/countries/macedonia.pdf>

87 South East European Consultants, idem.

88 IEA, 'FYR of Macedonia Balances', [www.iea.com](http://www.iea.com)

89 World Bank, 'FYR Macedonia Green Growth Country Assessment', (March 2014), p. 30.

90 Stefan Ralchev, idem.





## Renewable energy potential

Hydroelectric generation has been steadily decreasing (12% in 2012).<sup>91</sup> The government is planning to invest in the modernisation of existing hydropower plants and the construct new ones. However, the World Bank estimates that the competition for water between industry, agriculture and domestic use will pose challenges by 2020, unless inefficiency problems are tackled. Thermal plants are already facing water shortages and the water supply-demand gap will increase by 90% until 2020.<sup>92</sup> Therefore, the government should focus investments not only to enhance hydroelectricity generation, but also to improve storage and conservation. With wind facilities barely developing at present, the government plans future investments worth €100 million in small hydro and photovoltaic by 2020.<sup>93</sup> A recent draft of the revised energy strategy to 2035 indicates that Macedonia seeks to achieve 8% of final energy consumption from RES.

## Energy efficiency potential

The 2nd draft of the Energy Efficiency Action Plan (EEAP) is currently pending adoption. According to the 2014 Energy Community compliance report, Macedonia sets a less ambitious energy efficiency target than the previous EEAP - 9% instead of 12.2% by 2018.<sup>94</sup> The government has submitted a detailed planning programme of energy savings measures in over 2,000 buildings, with an estimated investment of nearly €100 million.

## Conclusions

**1. A price signal on current greenhouse gas emissions:** Total CO<sub>2</sub> emissions in 2012 were 4,850,940 tonnes. At a carbon price of €5 this would cost the electricity generators €24,254,700. With a carbon price of €30 this would cost €145,528,200.<sup>95</sup>

**2. Planned new fossil fuel capacity:** Macedonia may be considering building another coal-fired plant, with a total capacity of 0.3 GW.<sup>96</sup> This would add 1,854 GWh to the amount of domestic electricity and would emit over 1.7 million tonnes CO<sub>2</sub>.

**3. Impact of the Industrial Emissions Directive:** Application of the IED would lead to nearly €371.6 million additional costs,<sup>97</sup> as well as considerable health benefits from reduced pollution.

**4. Renewable energy targets:** The country suffers from considerable water stress at present with coal, hydro plants, agriculture and industry competing for the same limited resource. Water stress testing new power generation capacity is key to avoid considerable security of supply challenges. Encouraging non-hydro RES capacity is essential in diversifying the electricity mix and in reducing dependency on external sources.

**5. Energy efficiency targets:** Energy efficiency programs and initiatives are essential for Macedonia's attempts to reduce its energy dependence on imports, as well as its energy intensity and consumption of energy. A reduction of electricity losses due to outdated infrastructure could save nearly €54 million yearly.

91 IEA, 'FYR of Macedonia Balances', [www.iea.com](http://www.iea.com)

92 World Bank, 'FYR Macedonia Green Growth Country Assessment', (March 2014), p. 30.

93 IENE, idem.

94 Energy Community Secretariat, 'Annual implementation report' (August 2014), <http://www.energy-community.org/pls/portal/docs/3356393.PDF>.

95 Change Partnership calculations based on IEA data. Lignite is used as the fuel source in all calculations.

96 Ministry of the Economy, 'Strategija razvoja energetike crne gore do 2030. Godine', p.46 (2014). [http://www.energetska-efikasnost.me/uploads/file/Dokumenta/Strategija%20razvoja%20energetike%20CG%20do%202030.%20godine%20-%20Bijela%20knjiga\\_10072014.pdf](http://www.energetska-efikasnost.me/uploads/file/Dokumenta/Strategija%20razvoja%20energetike%20CG%20do%202030.%20godine%20-%20Bijela%20knjiga_10072014.pdf)

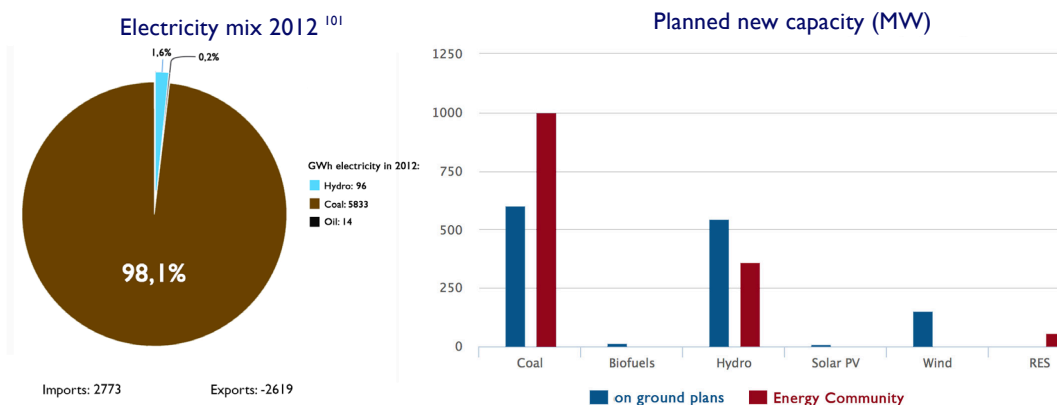
97 South East European Consultants, idem.



# 4. Kosovo

## Energy and electricity mix analysis

According to the IEA, Kosovo was the largest per capita greenhouse emitter in the Energy Community, in 2012. 98% of its electricity emanates from lignite.<sup>98</sup> The main thermal power plants are situated in the vicinity of the capital city, Pristina. They have a total installed capacity of 1,478 MW.<sup>99</sup> Kosovo A, a 50 years old plant with 345 MW capacity has received €174 million European funding for rehabilitation after having been thunder-struck in 2002.<sup>100</sup>



With an up-wards trend in electricity demand (doubled from 2000 to 2012), Kosovo is a net electricity importer.<sup>102</sup> The energy transmission system, managed by KOSTT j.s.c. since the restructuring of the energy system in 2006, has good interconnections with neighbouring Montenegro (400 kV line), Macedonia (400 kV line), Albania (220 kV line) and Serbia (400 kV, 220 kV and 110 kV lines).<sup>103</sup>

The Ministry of Energy and Mining plans to invest in the following capacity building and modernisation projects:<sup>104</sup>

- TPP new Kosova: G1 (300 MW), G2 (300 MW)
- HPP Zhuri G1, G2, G3 (305 MW), initially planned for 2016, but unlikely to be built on schedule
- Small HPPs by 2020 (240MW)
- 4 wind farms, by 2020 (150 MW)
- Biomass, by 2020 (14 MW)
- Solar, by 2020 (10 MW).

The World Bank may use the controversial grounds of “exceptional circumstances” (outdated existing facilities and the lack of time to develop

<sup>98</sup> IEA data, [www.iea.com](http://www.iea.com).

<sup>99</sup> Energy Regulatory Office, Statement of Security of Supply for Kosovo (Electricity, Natural Gas and Oil), July 2013 [https://www.energy-community.org/portal/page/portal/ENC\\_HOME/DOCS/2422181/Statement\\_of\\_Security\\_of\\_Supply\\_for\\_Kosovo\\_%28Electricity\\_Gas\\_Oil%29\\_Final\\_Eng.pdf](https://www.energy-community.org/portal/page/portal/ENC_HOME/DOCS/2422181/Statement_of_Security_of_Supply_for_Kosovo_%28Electricity_Gas_Oil%29_Final_Eng.pdf).

<sup>100</sup> European Agency for Reconstruction, 'Rebuilding the energy sector in Kosovo\*', (July 2007), <http://ec.europa.eu/enlargement/archives/ear/publications/main/documents/EnergyKosovoJuly07.pdf>.

<sup>101</sup> Energy Community, 'Energy Strategy of the Energy Community' Ref: 10thMC/18/10/2012 - Annex 19/27.07.2012.

<sup>102</sup> Stefan Ralchev, 'Energy in the Western Balkans: A Strategic Overview', Institute for Regional and International Studies, (August 2012).

<sup>103</sup> Daniel M. Kammen, Maryam Mozafari and Daniel Prull, 'Sustainable Energy Options for Kosovo: An analysis of resource availability and cost', (May 2012), <http://coolclimate.berkeley.edu/sites/all/files/Kosovo20May2012.pdf>.

<sup>104</sup> Energy Regulatory Office, idem.



enough renewable energy to ensure security of supply) to contribute to building new lignite-fired capacity.<sup>105</sup> Kosovar Civil Society has put immense pressure on the World Bank to reconsider its funding plans.<sup>106</sup>

### Renewable energy potential

In 2013, the government adopted its renewable energy targets for 2013-2020, committing to a 28% share of energy from renewable sources in gross final consumption by 2020. The Energy Regulatory Office (ERO) has set feed-in tariffs for wind and hydro generation and biomass, but tariffs have to be further developed for solar, geothermal and other renewable energy sources, according to the European Commission. Unfavourable tariffs and complicated licensing and permit procedures are some of the obstacles to the further development of renewables.<sup>107</sup>

### Energy efficiency potential

The World Bank has approved in 2014 a €25 million loan for Kosovo Energy Efficiency and Renewable Energy Project, an investment programme aimed at reducing energy consumption and fossil fuel use in public buildings.<sup>108</sup> Public buildings have, according to the World Bank, the highest energy efficiency potential: 38-47% in municipal buildings and 49% in central government buildings. Implementing energy efficiency measures to value the entire potential would require an investment of €1.37 billion, which would, in exchange, generate cost savings of €198 million/year.<sup>109</sup>

## Conclusions

**1. A price signal on current greenhouse gas emissions:** Total emissions in 2012 were 5,658,010 tonnes CO<sub>2</sub>. At a carbon price of €5 this would cost the electricity generators €28,290,050. With a carbon price of €30 this would cost €169,740,300.<sup>110</sup> The Energy Community Strategy estimations of electricity production in 2012 are 500 GWh far from the actual reality, which means that nearly 500,000 tonnes CO<sub>2</sub> have not been taken into account.

**2. Planned new fossil fuel capacity:** Kosovo is planning to add 0.6 GW of coal capacity, with build costs estimated at €1.4 billion,<sup>111</sup> to which additional pollution costs of over to €66 million/year would have to be considered if Kosovo joins the EU ETS by 2030.

**3. Impact of the Industrial Emissions Directive:** Kosovo is rehabilitating or replacing its TPPs and has already planned decommissioning of the Kosovo A, the most problematic of them, by 2017. The compliance costs with IED mount to €84 million.<sup>112</sup>

**4. Renewable energy targets:** The exclusive focus on hydro as a renewable source of electricity entails some security of supply risks, which is why the government should come up with a sound strategy and investment plan for wind, solar and geothermal. Displacing planned fossil-fuel capacity with renewables would save nearly half of the building costs (€1.3 billion) if replaced with wind.

**5. Energy efficiency targets:** Programmes for energy savings are crucial for Kosovo. Around €83 million are wasted yearly only through electricity losses.

<sup>105</sup> Bloomberg BusinessWeek, 'Coal-Fired Plant in Kosovo Tests World Bank Clean-Air Pledge' (June 2014), <http://www.businessweek.com/news/2014-06-01/coal-versus-poverty-in-kosovo-tests-world-bank-clean-air-pledge#p1>

<sup>106</sup> U nrepresented Nations and People Organization, 'Kosova: World Bank Urged To Find Alternative To Coal-fired Power Plant', (August 2013), <http://www.unpo.org/article/16261>.

<sup>107</sup> European Commission, 'IPA II Instruments - Indicative strategy paper for Kosovo (2014-2020)' (August 2014).

<sup>108</sup> World Bank, 'National Building Energy Efficiency Study for Kosovo' (February 2013), [http://www.worldbank.org/content/dam/Worldbank/Feature%20Story/ECA/kosovo/Kosovo%20Eptisa%20Final%20Report\\_2013.04.13.pdf](http://www.worldbank.org/content/dam/Worldbank/Feature%20Story/ECA/kosovo/Kosovo%20Eptisa%20Final%20Report_2013.04.13.pdf).

<sup>109</sup> World Bank, *idem*.

<sup>110</sup> Change Partnership calculations based on IEA data. Lignite is used as the fuel source in all calculations.

<sup>111</sup> See [https://www.energy-community.org/portal/page/portal/ENC\\_HOME/DOCS/3532156/Realising\\_PECI\\_merged.pdf](https://www.energy-community.org/portal/page/portal/ENC_HOME/DOCS/3532156/Realising_PECI_merged.pdf)

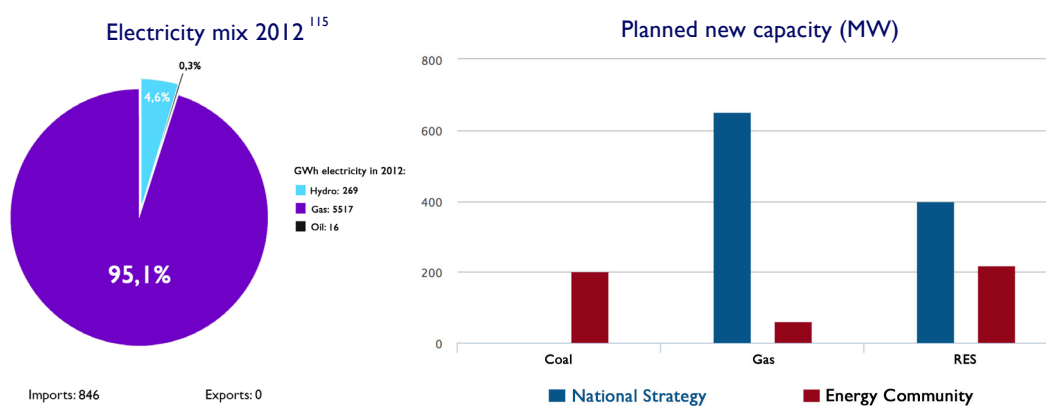
<sup>112</sup> South East European Consultants, *idem*.



# 5. MOLDOVA

## Energy and electricity mix analysis

Moldova faces considerable energy security issues. 98% of energy consumed is imported at a cost of 17% of its annual GDP.<sup>113</sup> Gas, sourced almost exclusively from Russia, is the main source for electricity and heat generation. Coal and oil are used only in the thermal facilities that are not supplied with gas and serve as reserve for gas-supplied areas. Since 2000, Total Primary Energy Supplied (TPES)/population has increased by 16.5%, with electricity consumption/population decreasing by 8%. This has led to a 3.5% increase in CO2 emissions.<sup>114</sup>



Gas transmission and distribution is managed by MoldovaGaz, a corporate entity owned 50% by Gazprom + 1 “golden” share, 35.3% by the Government of Moldova, 13.4% by Transnistria and 1.3% individual shareholders.<sup>116</sup>

The energy production capacities have a non-uniform territorial repartition, as more than 80% are concentrated in the frozen conflict area of the left bank of the Dniestr, Transnistria: Moldovan Thermal Power Plant in Dnestrovsc and Hydroelectric Power Plants in Dubasari. Apart from these, there are nine CHP sugar facilities, operating only during sugar beet season, three CHP nearby Chisinau and another one in Balti.<sup>117</sup>

The European Union has been continuously supporting the Republic of Moldova in its attempts to reduce energy dependency and diversify its sources. A first gas interconnector between Moldova and Romania (Ungheni-Iasi) was inaugurated in 2014, but has yet to be made functional. The gas pipeline has a 1.5 million tonnes capacity and was financed through a European grant worth €7 million (European Neighbourhood Policy Instrument – ENPI) and a €9 million contribution from the Romanian government.<sup>118</sup> For the same purpose, a 110 kV electricity cross-border connection between Falcu and Gotesti was also completed in 2014.<sup>119</sup>

<sup>113</sup> World Bank, 'World Bank Group in Moldova – Country Snapshot' (October 2014), <http://www.worldbank.org/content/dam/Worldbank/document/Moldova-Snapshot.pdf>

<sup>114</sup> IEA Database Service.

<sup>115</sup> Energy Community, 'Energy Strategy of the Energy Community' Ref: 10thMC/18/10/2012 - Annex 19/27.07.2012.

<sup>116</sup> EBRD, 'Moldova Country Profile', <http://www.ebrd.com/downloads/legal/irc/countries/moldova.pdf>.

<sup>117</sup> UNECE, 'Republic of Moldova: National Energy Policy Information for Regional Analysis', (September 2009), pp.3, <http://www.clima.md/public/102/en/EnergyPolicyInformationForRegionalAnalysisMoldova.pdf>

<sup>118</sup> European Commission, 'Commissioner Oettinger inaugurates the works of Romanian-Moldavian gas pipeline' (August, 2013), [http://europa.eu/rapid/press-release\\_IP-13-792\\_en.htm](http://europa.eu/rapid/press-release_IP-13-792_en.htm)

<sup>119</sup> European Commission, 'Implementation of the European Neighbourhood Policy in the Republic of Moldova Progress in 2013 and recommendations for action', SWD(2014) 93 final, (March 2014), p.19, [http://eeas.europa.eu/enp/pdf/2014/country-reports/moldova\\_en.pdf](http://eeas.europa.eu/enp/pdf/2014/country-reports/moldova_en.pdf).



## Renewable energy potential

As far as RES are concerned, their development is in its early stage, with a 6% share of energy consumption. The Moldovan government has committed to a 17% RES share in final consumption by 2020. UNECE estimate 2.7 Mtoe potential for hydro, biomass, wind and solar.<sup>120</sup>

The EBRD provides €42 million for small-scale energy efficiency and RES in SMEs through the Moldovan Sustainable Energy Financing Facility (MoSEFF), a project complemented by an EU grant worth €10 million (EU Neighbourhood Investment Facility – NIF).<sup>121</sup>

An UNDP Biomass burning project is also on-going, providing support to the most viable and readily available local source of renewable energy. The projected cost is about €14 million.<sup>122</sup>

The main challenge for the Moldovan energy sector is not necessarily the use of coal, but the dependency on imports and the reliance on Russian gas. However, the increasing trends in coal imports might indicate a preference for cheap coal, without the cost of externalities included, rather than RES, in the government's attempts to secure supply, which would be incompatible with the European energy acquis and 2030 targets.

## Energy efficiency potential

Moldova's energy efficiency is two times lower compared to best available technologies. Electricity losses through distribution amount to 20%.<sup>123</sup> Energy intensity in Moldova is 1.24, meaning that 1.24 tonnes of oil equivalent are used to produce \$1,000 of GDP. This is more than seven times the energy used in the EU to produce the same amount of GDP, which further proves the need for immediate measures to improve energy efficiency.<sup>124</sup> Moldova's target for energy efficiency in 2020 is currently set at 20%.

## Conclusions

**1. A price signal on current greenhouse gas emissions:** Total emissions from coal and gas power plants in 2012 were 3,034,350 tonnes CO<sub>2</sub>. At a carbon price of €5 this would cost the electricity generators €15,171,750. With a carbon price of €30 this would cost €91,030,500.<sup>125</sup> The electricity production forecasted by the Energy Community Strategy for 2012 is almost four times smaller than what the IEA actually reported for that year. This means an underestimation of emissions of almost 2.5 million tonnes CO<sub>2</sub>.

**2. Planned new fossil-fuel capacity:** The Energy Community Strategy mentions plans to build a 200MW coal-fired plant by 2030, which would require nearly €0.5 billion in construction investment, to which CO<sub>2</sub>-related operational costs of up to €35 million/year need to be added.

**3. Impact of the Industrial Emissions Directive:** Existing CHPs already meet the Directive's standards.<sup>126</sup>

**4. Renewable energy:** The government has set an ambitious target for 2030 and the great potential for renewables only is only waiting for a clear financial support.

**5. Energy efficiency:** Investments and plans to improve energy efficiency are on a good track, with assistance from the EU and other international organisations. Reducing energy losses and, especially, electricity losses, would help Moldova save over €33 million/year.

<sup>120</sup> UNECE, *idem*, p.5.

<sup>121</sup> EBRD, 'Sustainable Energy Initiative - Donor support' (May 2013), [http://www.ebrd.com/downloads/research/factsheets/sei\\_donor.pdf](http://www.ebrd.com/downloads/research/factsheets/sei_donor.pdf)

<sup>122</sup> Friedrich Ebert Stiftung, 'Resource Efficiency Gains and Green Growth Perspectives in Moldova' (September 2012), p. 15, <http://library.fes.de/pdf-files/id-moe/09410.pdf>.

<sup>123</sup> IEA Database Services, [www.iea.com](http://www.iea.com)

<sup>124</sup> Friedrich Ebert Stiftung, *idem*, p. 15.

<sup>125</sup> Change Partnership calculations based on IEA data. Lignite is used as the fuel source in all calculations.

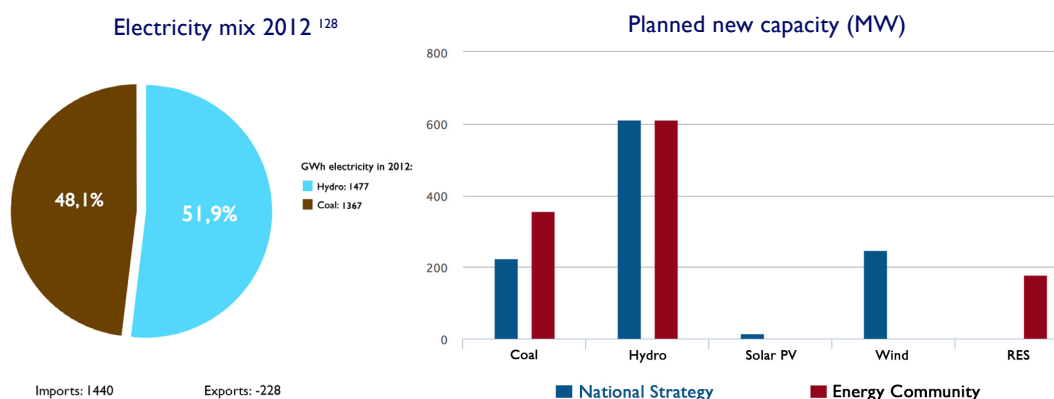
<sup>126</sup> South East European Consultants, *idem*, p.55



## 6. MONTENEGRO

### Energy and electricity mix analysis

Like other countries in the region, the bulk of Montenegro's electricity is generated through coal and hydropower. However from 2006 to 2012 their shares have significantly changed. In 2006, coal's contribution to electricity generation was 35% whilst hydropower contributed 65% of total production. By 2012 coal contribution increased to 49%, a 6% rise whilst hydropower's contribution declined by 15% to 51%.<sup>127</sup>



Electricity generation capacity comprises Pljevlja, a 210 MW lignite plant first commissioned in 1982<sup>129</sup> and two hydropower plants Piva (360MW) and Perucica (307 MW).<sup>130</sup> For years they were unable to cater for increasing demand which led to 35% of Montenegro's electricity consumption being satisfied by imports from neighbouring countries.<sup>131</sup> In 2013 Montenegro exported more than it imported for the first time since 2010, presumably due to the demise of the KAP Aluminium factory, a significant electricity consumer. For the future, Montenegro's Energy Strategy foresees KAP Aluminium working at half capacity, or 84 MWh of electricity consumption, less than half of consumption in 2006.<sup>132</sup>

Montenegro is currently fully dependent on imported oil products. Most of the products are imported from Greece as the largest oil company, Jugopetrol, is owned by Hellenic Petroleum.<sup>133</sup>

Montenegro plans to reduce energy dependency by 2020 by increasing coal and hydro capacity, developing gas infrastructure and achieving 33% renewable energy share of final energy consumed by 2020. Nevertheless, there is a marked difference between the plan and reality, especially with respect to finance. A new thermal plant (220-250 MW) worth €300-350 million is supposed to be built in Pljevlja, and €710 million are to be invested in large hydro.<sup>134</sup> As far as gas is concerned, authorities plan to invest in interconnecting pipelines, notably the Ionian-Adriatic Pipeline branch of the Trans-Adriatic Pipeline (TAP).<sup>135</sup>

<sup>127</sup> IEA Database Services

<sup>128</sup> Energy Community idem.

<sup>129</sup> Global Energy Observatory. See <http://globalenergyobservatory.org/geoid/42685>

<sup>130</sup> UNDP, 'Montenegro reconfigures its energy strategy', <http://www.eurasia.undp.org/content/rbec/en/home/ourwork/environmentandenergy/successstories/montenegro-reconfigures-its-energy-strategy/>

<sup>131</sup> IEA Database Services

<sup>132</sup> Montenegro Government, 'Energy balance of Montenegro for the year 2015', <http://www.gov.me/ResourceManager/FileDownload.aspx?rId=187142&rType=2>

<sup>133</sup> European Commission, 'Screening Report Montenegro - Chapter 15 Energy' (September 2013), [http://ec.europa.eu/enlargement/pdf/montenegro/screening\\_reports/screening\\_report\\_montenegro\\_ch\\_15.pdf](http://ec.europa.eu/enlargement/pdf/montenegro/screening_reports/screening_report_montenegro_ch_15.pdf)

<sup>134</sup> Ministry of the Economy, 'Strategija razvoja energetike crne gore do 2030. Godine' (2014), [http://www.energetska-efikasnost.me/uploads/file/Dokumenta/Strategija%20razvoja%20energetike%20CG%20do%202030.%20godine%20-%20Bijela%20knjiga\\_10072014.pdf](http://www.energetska-efikasnost.me/uploads/file/Dokumenta/Strategija%20razvoja%20energetike%20CG%20do%202030.%20godine%20-%20Bijela%20knjiga_10072014.pdf)

<sup>135</sup> EBRD, 'Montenegro country profile', (September 2008). <http://www.ebrd.com/downloads/legal/irc/countries/montenegro.pdf>



## Renewable energy potential

Montenegro has set an ambitious target of 33% share of renewable in the final energy consumption by 2020. To that end, 35 small hydropower plants are currently being developed, 97 MW wind farm capacity will become operational shortly afterwards and a €20 million investment is foreseen in solar and geothermal energy.<sup>136</sup> According to the Energy Strategy, waste from the wood processing industry alone amounts to an equivalent of 204 GWh per year, a figure which is projected to grow to 330 GWh/year by 2030.<sup>137</sup>

However, it is difficult to say if the target will be reached, as there are still many bottlenecks related to the issuing of permits and the estimations of water potential.<sup>138</sup>

## Energy efficiency potential

In its Energy Efficiency Action Plan 2013-2015, the Montenegrin government sets an indicative target of 9% to be achieved by 2018 through the complete implementation of the Law on Energy Efficiency, the engagement of all stakeholders in applying best energy saving practices, the introduction of significant normative tax and through the mobilisation of 'significant financial resources'.<sup>139</sup> Also, the government plans to further liberalise the energy market and foster public-private partnerships in the area of energy efficiency.

## Conclusions

**1. A price signal on current greenhouse gas emissions:** Total emissions from coal and gas-generated electricity were 1,325,990 tonnes CO<sub>2</sub> in 2012. At a carbon price of €5 this would cost the electricity generators €6,629,950. With a carbon price of €30 this would cost €39,779,700.<sup>140</sup> The Energy Community Strategy has underestimated the amount of electricity produced in 2012 by 250 GWh, and therefore presented a more optimistic vision of what emissions and emissions-related costs look like.

**2. Planned new fossil fuel capacity:** Montenegro is planning to build a new coal-fired plant (220-250 MW), with construction costs estimated at almost €300-350 million, to which additional pollution costs of up to €40 million/year would have to be considered if Montenegro joins the EU ETS.

**3. Impact of the Industrial Emissions Directive:** Compliance with IED requires an investment of over €50.9 million, just to bring NO<sub>x</sub> and SO<sub>2</sub> within the prescribed limits.<sup>141</sup>

**4. Renewable energy:** Despite very ambitious plans on paper, Montenegro is likely to miss its 2020 RES target due to administrative bottlenecks, inefficient implementation of existing provisions and over-concentration on large hydro in sensitive locations with questionable economics e.g. investment in Moraca. Displacing planned fossil-fuel capacity with renewables would save a third of the building costs (nearly €4 billion) if replaced with wind.

**5. Energy efficiency:** Montenegro must follow its Action Plan and make sure the right investments are done. Almost €22 million could be saved just by cutting off electricity losses.

<sup>136</sup> IENE idem.

<sup>137</sup> Montenegro Government, 'Montenegro Energy Strategy'. [http://www.energetska-efikasnost.me/uploads/file/Dokumenta/Strategija%20razvoja%20energetike%20CG%20do%202030.%20godine%20-%20Bijela%20knjiga\\_10072014.pdf](http://www.energetska-efikasnost.me/uploads/file/Dokumenta/Strategija%20razvoja%20energetike%20CG%20do%202030.%20godine%20-%20Bijela%20knjiga_10072014.pdf).

<sup>138</sup> UNDP, idem.

<sup>139</sup> Ministry of Economy, 'Energy Efficiency Action Plan of Montenegro for 2013-2015', [http://www.energetska-efikasnost.me/uploads/file/Dokumenta/Energy%20Efficiency%20Action%20Plan%20for%20the%20period%202013-2015\\_final.pdf](http://www.energetska-efikasnost.me/uploads/file/Dokumenta/Energy%20Efficiency%20Action%20Plan%20for%20the%20period%202013-2015_final.pdf).

<sup>140</sup> Change Partnership calculations based on IEA data. Lignite is used as the fuel source in all calculations.

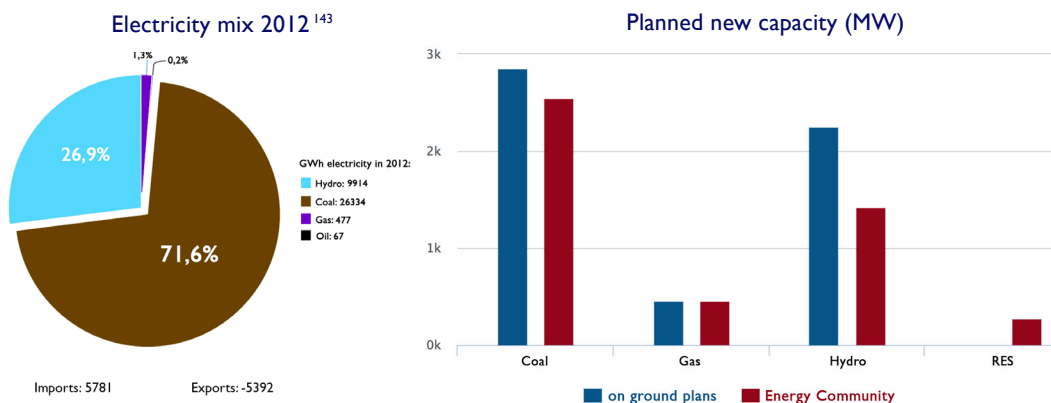
<sup>141</sup> South East European Consultants, idem.



# 7. SERBIA

## Energy and electricity mix analysis

Serbia's economy is the third most and greenhouse gas intensive among the Energy Community countries. It consumes 2.7 times more energy per unit of output than an average OECD country.<sup>142</sup> It also has the highest rate of coal production compared to other Energy Community countries. Two thirds of the electricity consumed is coal-generated. The remainder comes from hydropower with 1% from gas-based CHP.



Its 3.935 MW total capacity is organised into three regional government-owned entities - Nikola Tesla, Kostolac and Panonske. Nikola Tesla and Kostolac operate six lignite-based thermal power plants. Panonske operates three CHP with a total capacity of 353 MW.<sup>144</sup> Oil production has doubled over the last 10 years, while gas production has been increasingly replaced with imports. Serbia's current dependence on natural gas, which is imported from Russia through Ukraine and Hungary, exceeds 80%,<sup>145</sup> which makes it highly sensitive to price shocks and endangers its security of supply. Moreover, the oil and gas company Naftna Industrija Srbije is co-owned by Gazprom Neft (56.5%) and the Government of the Republic of Serbia.<sup>146</sup>

The Serbian authorities have announced the phase-out of some of their outdated TPPs by 2025, and to build several new coal-fired plants:<sup>147</sup>

- 2 x 750 MW to utilise Kolubara mine (Nikola Tesla B3 and Kolubara B - completion date unknown)
- TPP Novi Kovin: 2 x 350 MW
- TPP Stavalj: 300 MW
- TPP Kostolac B3 (350 MW - new unit in existing TPP Kostolac B).

According to IENE, Serbia has planned to invest over €3.8 billion in lignite-fired plants (rehabilitation and new capacity), €3.8 billion in large hydro and €0.6 billion in renewables by 2020.

<sup>142</sup> European Commission, 'IPA II – Indicative Strategy paper for Serbia (2014-2020)', (August 2014), pp. 28-29. [http://ec.europa.eu/enlargement/pdf/key\\_documents/2014/20140919-csp-serbia.pdf](http://ec.europa.eu/enlargement/pdf/key_documents/2014/20140919-csp-serbia.pdf).

<sup>143</sup> Energy Community, idem.

<sup>144</sup> Ministry for Infrastructure and Energy, 'Security of Supply Statement of the Republic of Serbia', (September 2011), pp. 7, <http://www.energy-community.org/pls/portal/docs/1218179.PDF>.

<sup>145</sup> European Commission, idem.

<sup>146</sup> Gazprom Neft, 'The NIS refining complex consists of one refinery in two locations – in Pančevo and Novi Sad' <http://www.nis.eu/en/about-us/our-business/crude-refining>

<sup>147</sup> Serbian National Assembly, 'Razvoja energetike Republike Srbije do 2025. Godine sa rojekcijama do 2030. Godine' (2014), p. 29, [http://www.parlament.gov.rs/upload/archive/files/lat/pdf/akta\\_procedura/2014/113-14Lat.pdf](http://www.parlament.gov.rs/upload/archive/files/lat/pdf/akta_procedura/2014/113-14Lat.pdf).





## Renewable energy potential

In 2011, the share of renewable sources of energy in the final energy consumption was 17.8%.<sup>148</sup> Most of this is generated through large hydro-power plants, organised in two Economic Associations with a total installed capacity of 2,831 MW - Djerdap and Drinsko-Limske.<sup>149</sup> The government plans to upgrade the existing hydropower facilities, as well as the construction of several new ones - HPP Velika Morava (150 MW), HPP Ibar (103 MW), HPP Upper Drina (250 MW), HPP Middle Drina (320 MW), Reversible HPP Bistrica (680 MW), Reversible HPP Djerdap 3 (600 MW).<sup>150</sup>

In September 2014, a 1 MW solar power plant opened in the Beočin municipality, near Novi Sad, in northern Serbia. The investment was worth €2 million, with €1.4 million secured from an (Austrian) Erste bank loan.<sup>151</sup>

However, the use of renewable energy must be increased to meet the Energy Community Treaty target of 27% of final energy consumption by 2020. Investments could unlock a renewable potential of 4.3 Mtoe:<sup>152</sup>

- 2.7 Mtoe biomass
- 0.6 Mtoe hydro
- 0.2 Mtoe geothermal
- 0.2 Mtoe wind
- 0.6 Mtoe solar

## Energy efficiency potential

Serbia's per capita's energy consumption is currently four times that of Germany,<sup>153</sup> with electricity losses of up to one fifth of the final consumption, which leads to high energy prices and shortages. In October 2013, Serbia adopted its Second National Energy Efficiency Plan to comply with Energy Community Treaty obligations. It sets out the target of a 9% reduction of the final domestic energy consumption by 2018 compared with a 2008 baseline.<sup>154</sup> So far the government has only analysed the savings potential in buildings and has implemented training programmes for energy efficiency experts. According to GIZ, private and public support measures are not well coordinated and a clear roadmap has yet to be delivered.<sup>155</sup>

## Conclusions

**1. A price signal on current greenhouse gas emissions:** Total coal and gas generated electricity emissions, in 2012, were 25,806,330 tonnes CO<sub>2</sub>. At a carbon price of €5 this would cost the electricity generators €129,031,650. With a carbon price of €30 this would cost €774,189,900.<sup>156</sup>

**2. Planned new fossil fuel capacity:** Serbia is planning to build an extra 2.85 GW coal-fired capacity, with construction costs estimated at €6.7 billion, to which a carbon cost of €419 million/year should be added.

**3. Implementation of the Industrial Emissions Directive:** Plant modernisation and/or replacement in line with the directive's provisions would require an investment of €2.7 billion, by 2018.<sup>157</sup>

**4. Renewable energy:** Serbia has a great potential to develop renewable energy and further investments should be channeled in this area, with a view to its future membership of the EU. Displacing planned new coal with renewable energy to generate a similar amount of electricity would save up to €2.5 billion (if replaced by wind).

**5. Energy efficiency:** With almost half of its energy imported and an increasing electricity demand, Serbia must swiftly address the efficiency issues related to its energy system through better coordination of policies and actions, significant financial support and coherence between public and private investments. Its current electricity losses mount to over €215 million per year.

<sup>148</sup> European Commission, idem.

<sup>149</sup> Ministry of Infrastructure and Energy, idem.

<sup>150</sup> Ministry of Infrastructure and Energy, idem.

<sup>151</sup> B92, 'Solar park opens in northern Serbia' (September 2014), [http://www.b92.net/eng/news/business.php?yyyy=2014&mm=09&dd=11&nav\\_id=91573](http://www.b92.net/eng/news/business.php?yyyy=2014&mm=09&dd=11&nav_id=91573)

<sup>152</sup> IENE, idem.

<sup>153</sup> Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), 'Advisory service for energy efficiency', <https://www.giz.de/en/worldwide/21212.html>

<sup>154</sup> European Commission, idem.

<sup>155</sup> GIZ, idem.

<sup>156</sup> Change Partnership calculations based on IEA data. Lignite is used as the fuel source in all calculations.

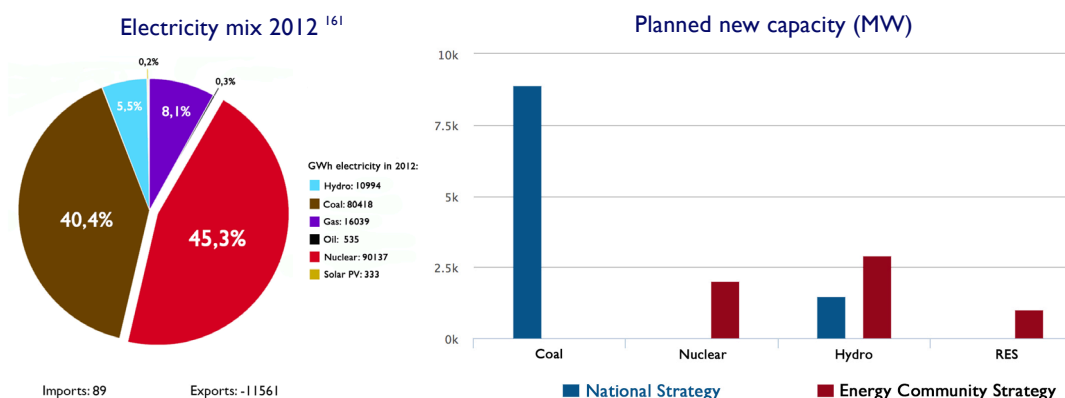
<sup>157</sup> IED compliance will cost €719 million and should be completed either by the time Serbia joins membership of the EU or in accordance with its national emissions reductions plan (currently unpublished).

## 8. UKRAINE

### Energy and electricity mix

Ukraine has the largest geographical landmass and population of all Energy Community countries. Since the Maidan square uprising, Ukraine's energy profile has changed dramatically. Ukraine is a transit country for 20% of the gas and 10% of the oil consumption of the EU, both of Russia. Moreover, it is an energy producer, with electricity surpluses exported to Slovakia, Poland, Hungary and Romania.<sup>158</sup> Therefore, the energy security of Ukraine is tightly connected to the energy security of the EU.

The largest source for electricity output is nuclear, with an increasing share of coal over the last ten years. Coal is the main energy source for thermal power plants (with heavy oil and natural gas used only for technical reasons), while imported natural gas is the main fuel in most of the combined heat and power installations. The total installed electricity-generation capacity is of 53.2 GW, of which only 47 GW are operational.<sup>159</sup> However, there is a surplus of installed generation capacity that, along with outdated technologies and old units, lead to high inefficiency: the load factor is only 36%.<sup>160</sup>



Ukraine is a net electricity exporter (to Moldova, Slovakia, Poland, Hungary and Belarus), with electricity consumption falling over the past few years due to the recession.<sup>162</sup> However, with most of the coal mines located in the Donbass region of military conflict, Ukraine is likely to be confronted with high electricity shortages.<sup>163</sup> Four coal units (1.2 GW total) at Trypilska TPI have already seized operation due to total depletion of coal storage. Another TPP, Zmiivska has 5.7 thousand tonnes of coal left, which is a reserve for only a couple of days.<sup>164</sup> On December 30 2014, the problem of the electricity deficit was partly solved as Ukraine agreed with Russia to import Russian electricity in exchange to providing electricity for Crimea from continental Ukraine.<sup>165</sup>

<sup>158</sup> European Commission, 'Market Observatory for Energy – Country file Ukraine', (April 2010), [http://ec.europa.eu/energy/observatory/doc/country/2010\\_04\\_ukraine.pdf](http://ec.europa.eu/energy/observatory/doc/country/2010_04_ukraine.pdf)

<sup>159</sup> Ministry of Energy and Coal Industry of Ukraine, 'Statement on security of energy supply of Ukraine', (September 2012), pp. 11, [http://www.energy-community.org/portal/page/portal/ENC\\_HOME/DOCS/1676177/Report\\_on\\_SoS\\_-16\\_02\\_Ukraine.pdf](http://www.energy-community.org/portal/page/portal/ENC_HOME/DOCS/1676177/Report_on_SoS_-16_02_Ukraine.pdf)

<sup>160</sup> Energy Community Secretariat, 'Annual implementation report' (August 2014), <http://www.energy-community.org/pls/portal/docs/3356393.PDF>

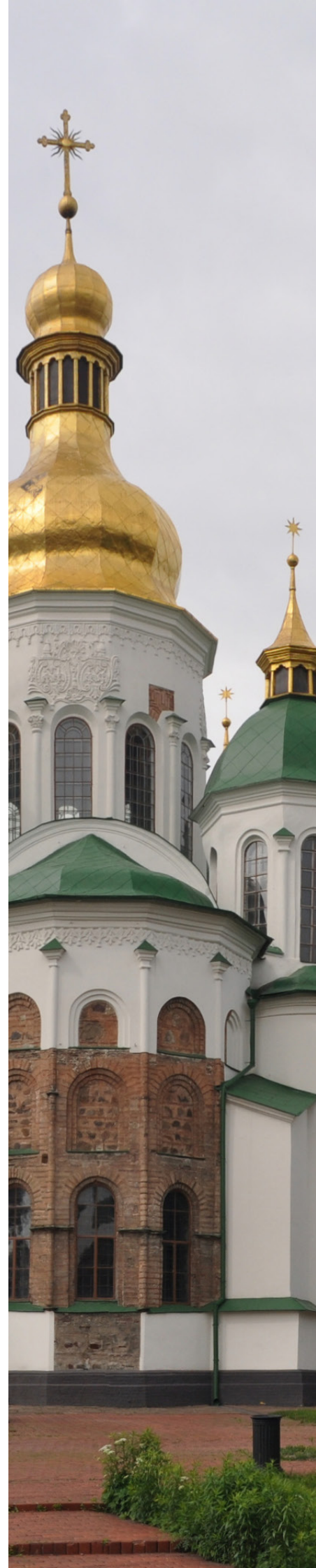
<sup>161</sup> Energy Community, 'Energy Strategy of the Energy Community' Ref: 10thMC/18/10/2012 - Annex 19/27.07.2012.

<sup>162</sup> The Economist Intelligence Unit, 'Industry Report Energy – Ukraine' (June 2014), p. 6.

<sup>163</sup> Business Insider, 'Ukraine faces coal shortage with rebels controlling mines' (November 2014), <http://www.businessinsider.com/afp-ukraine-faces-coal-shortage-with-rebels-controlling-mines-2014-11#ixzz3Mewlj2uD>

<sup>164</sup> Censor.net, 'Trypilska power plant ran out of coal; last coal power unit stopped' (December 2014), [http://en.censor.net.ua/news/317412/trypilska\\_power\\_plant\\_ran\\_out\\_of\\_coal\\_last\\_coal\\_power\\_unit\\_stopped](http://en.censor.net.ua/news/317412/trypilska_power_plant_ran_out_of_coal_last_coal_power_unit_stopped)

<sup>165</sup> Mirror Weekly, 'Україна підписала з Росією два контракти на імпорт електроенергії' (2014), [http://dt.ua/ECONOMICS/ukrayina-pidpisala-z-rosiyeu-dva-kontraktu-na-import-elektroenergiyi-160485\\_.html](http://dt.ua/ECONOMICS/ukrayina-pidpisala-z-rosiyeu-dva-kontraktu-na-import-elektroenergiyi-160485_.html)



The government's objective is to minimise the import dependency and to diversify sources of supply. The current plan, which is in the process of being revised, believed the best short-term solution is the investment in new coal mines and thermal power plants, with 8,927 MW thermal plants capacity to be built by 2015.<sup>166</sup> Previous energy strategies aimed to double the annual domestic gas production from 2012 to 2014 up to 44 bcm. At the moment Ukraine can cover only 30% of its gas needs through domestic production. Ukraine already failed at both of these goals, as they were unrealistic from the very beginning. Furthermore there are no prerequisites for successful realisation of any new large scale infrastructure projects in Ukraine in next 2-3 years. Instead there is an urgency for rehabilitation projects, strategic increase in energy efficiency and demand side-management. According to the Economist Intelligence Unit, without rapid and full scale deployment of renewable energy and demand-side management Ukraine is believed to remain reliant on Russian supply until the middle of the next decade.<sup>167</sup>

Current coal capacity will reduce considerably due to its age. Oleg Savitsky from the National Ecological Centre of Ukraine estimates that 2.6 GW will be retired by 2018, 7.5 GW by 2023 and 15.3 GW by 2030.<sup>168</sup>

### Renewable energy potential

Renewable target for 2020 is set at 11% of the total balance of installed capacity, which would translate into roughly 12 GW, including large hydro.<sup>169</sup> According to the National Institute of Strategic Studies, 45.7 GW of renewable energy capacity can be installed by 2030.<sup>170</sup>

A "Green Tariff", in place since 2009, is used to stimulate development of renewables. The level of the green tariff will decrease over time. It will be reduced by 10% by 2014, 20% by 2019 and 30% by 2024.<sup>171</sup> In the first two years following its adoption, 87 objects of alternative power generation have been put into operation in Ukraine.<sup>172</sup> The green tariff is planned to fully expire in 2030.

Recent geopolitical developments put under question the share of solar energy in the final energy consumption, as production of solar electricity takes place in the southern regions of the country, mainly in Crimea. The largest solar power plants Perovo (100 MW), Okhotnikove (80 MW), Dzherelne (7.5 MW), which can supply more than 15% of the total power demand of the region, are located there. All plants were installed in 2011 and two of them are among the top-10 largest solar power plants in the world.<sup>173</sup> The same goes also for some of the wind farms installed in 2011 and located mainly in Crimea and the Donetsk region.

By 2030, the Ukrainian authorities plan to build 3 – 4 GW of wind generation capacity, 1.5 – 2.5 GW of solar capacity, 0.4 – 0.8 GW of small hydro, bringing the total renewable energy capacity to around 7 GW,<sup>174</sup> but it is difficult to assess their achievability, given the current complicated political context. However, it must be kept in mind that the whole scale utilisation of the renewable energy potential in Ukraine would permit to cover 43% total demand of energy and will save 76 bcm of natural gas.<sup>175</sup>

### Energy efficiency potential

The financial envelope needed for the energy efficiency measures' implementation and the development of RES was estimated at €34,600 million in 2010-2015, with only a 6.5% contribution from the national and local governments.<sup>176</sup>

The Energy Efficiency Action Plan was submitted to approval in 2012 and, due to general political situation it has neither been approved yet, nor has a term for its approval been established. This poses problems for Ukraine which falls short of compliance, with significant primary and secondary legislation to be adopted. Its first priority must be compliance with Energy Community provisions and the second one the strengthening of its institutional structures for an effective coordination and for the public engagement on energy saving plans.<sup>177</sup>

<sup>166</sup> Ministry of Energy and Coal of Ukraine, idem.

<sup>167</sup> The Economist Intelligence Unit, 'Industry Report Energy – Ukraine' (June 2014), p. 3.

<sup>168</sup> Energy Post, 'Ukraine's coal power plants need a planned phase out, not CCS' (December 2014), <http://www.energypost.eu/ukraines-coal-power-plants-need-planned-phase-ccs/>.

<sup>169</sup> Ministry of Energy and Coal Industry of Ukraine, 'National renewable energy action plan up to 2020', (October 2014), pp. 1. [http://www.energy-community.org/portal/page/portal/ENC\\_HOME/DOCS/3430146/Ukraine\\_NREAP\\_adopted\\_1Oct2014\\_ENG.pdf](http://www.energy-community.org/portal/page/portal/ENC_HOME/DOCS/3430146/Ukraine_NREAP_adopted_1Oct2014_ENG.pdf)

<sup>170</sup> National Institute of Strategic Studies, 'Status and prospects of development of renewable energy in Ukraine'. p19. [http://www.niss.gov.ua/content/articles/files/Cyxodolya\\_Energ-7463d.pdf](http://www.niss.gov.ua/content/articles/files/Cyxodolya_Energ-7463d.pdf)

<sup>171</sup> OECD, 'Policy Handbook - Attracting investment in renewable energy in Ukraine' (November 2012), p.31, <http://www.oecd.org/countries/ukraine/UkraineRenewableEnergy.pdf>.

<sup>172</sup> Ministry of Energy and Coal Industry of Ukraine, 'Statement on security of energy supply of Ukraine', (September 2012), p. 11, [http://www.energy-community.org/portal/page/portal/ENC\\_HOME/DOCS/1676177/Report\\_on\\_SoS\\_-16\\_02\\_Ukraine.pdf](http://www.energy-community.org/portal/page/portal/ENC_HOME/DOCS/1676177/Report_on_SoS_-16_02_Ukraine.pdf).

<sup>173</sup> Deloitte, 'Renewable energy in Ukraine' (2012), pp. 10-11, [http://investukraine.com/wp-content/uploads/2012/06/Renewable-energy-in-Ukraine\\_230\\_230\\_WWW.pdf](http://investukraine.com/wp-content/uploads/2012/06/Renewable-energy-in-Ukraine_230_230_WWW.pdf)

<sup>174</sup> Ministry of Energy and Coal industry of Ukraine, idem.

<sup>175</sup> United Nations Economic Commission for Europe, 'Investment Policy Reforms of Renewable Energy in Ukraine' (September 2010), [http://www.unece.org/fileadmin/DAM/energy/se/pp/eneff/Astana\\_EEForum\\_Sep2010/d2s2\\_5\\_%20Veremiychy.pdf](http://www.unece.org/fileadmin/DAM/energy/se/pp/eneff/Astana_EEForum_Sep2010/d2s2_5_%20Veremiychy.pdf)

<sup>176</sup> Energy Charter, idem.

<sup>177</sup> Energy Community Secretariat, idem.

## Conclusions

**1. A price signal on current greenhouse gas emissions:** Total emissions in 2012 were 86,826,910 tonnes CO<sub>2</sub>. At a carbon price of €5 this would cost the electricity generators €434,134,550. With a carbon price of €30 this would cost €2,604,807,300.<sup>178</sup> The Energy Community Strategy has largely underestimated the 2012 electricity production and the respective emissions, translating into an almost €100 million in current carbon price.

**2. Planned new fossil fuel capacity:** Ukraine plans to build some extra 8.9 GW of coal-fired plants to reduce its energy dependency and respond to the increasing demand. This would require and over €20 billion initial investment, to which CO<sub>2</sub>-related costs of over €700 million/year<sup>179</sup> should be added if Ukraine joins the EU ETS. However, the Energy Community Strategy document does not mention any planned fossil capacity. A new strategy is being prepared which could alter these findings.

**3. Implementation of the Large Combustion Plant Directive and Industrial emissions Directive:** Emissions compliance would mean over €5 billion investment and the conservation of over 9 GW capacity,

which would increase the load factor to 54%.<sup>180</sup>

**4. Renewable energy:** Considering the latest geopolitical developments (loss of entire RES capacity located in Crimea, Russian cut-off of coal supply, loss of control over most important coal mines in Donbass region), Ukraine must urgently revise its energy strategy and secure supply on the short and long terms. The government must put a bigger emphasis on the development of renewables, as there is a massive under-utilised technical potential and they are the only sustainable and stable source of supply on the long-term.

**5. Energy efficiency:** Improving energy savings would lead to the reduction of energy imports, and therefore, of Ukraine's dependency on Russia. Moreover, Ukraine loses over €1.1 billion-worth electricity every year due to the outdated infrastructure and leaks, which is only further proof of the immediate need to address this policy area. Demand side management and increase of efficiency at system scale should be seen as a first priority, while any measures at supply side alone are unable to deliver both energy security and optimal functionality of Ukraine's power grid, as well as its integration into EU energy system ENTSO-E.

<sup>178</sup> Change Partnership calculations based on IEA data. Lignite is used as the fuel source in all calculations.

<sup>179</sup> Carbon price of €5/tonne.

<sup>180</sup> South East European Consultants, idem.



# **RECOMMENDATIONS**



# RECOMMENDATIONS

The Energy Community Strategy has the potential to be a vital tool to aid successful orientation of energy investment in Contracting Parties. After agreement of the EU 2030 climate and energy framework, given recent revisions to Contracting Party energy investment plans and significant omissions such as the need to assess future plans against climate change externalities and implementation of the Industrial Emissions Directive, the Energy Community Strategy needs to be revised. In particular, the revision needs to focus on:

**New and revised Contracting Party investment plans:** Countries such as Ukraine and Moldova are in the process of revising their strategies whilst others have done so since the original Strategy was produced. This provides a good opportunity to update the Strategy to accommodate these latest developments.

**A carbon price signal:** This is the most important driver for low-carbon investment in the EU. Although Contracting Parties are not obliged to introduce a carbon price signal, shadow carbon pricing should be applied to help inform Contracting Parties of the likely costs of new build capacity, especially if it they are based on fossil fuels. Failure to use a carbon price to assess investments does not provide Contracting Parties with accurate guidance on investment decisions, will be counterproductive and very costly, especially where Contracting Parties seek or are in the process of joining the European Union.

**IED implementation:** The IED has not been fully implemented across Energy Community countries and needs to be factored into the operational costs of current capacity. For Contracting Parties on the verge of joining the EU this is an urgent issue requiring immediate decisions. Ensuring all countries implement this aspect of the Energy Community is of paramount importance.

**Greater attention to climate policy risk:** Given the EU's commitment for deeper emission reductions to 2030, there is a risk that indirectly, Energy Community countries could face negative impacts, such as, for example, the application of a California-style Emissions Performance Standard which stipulates that electricity generated outside of California must apply the same standards. If applied in the EU, this would have considerably negative impacts on Energy Community countries, especially those focused on exporting electricity to the EU.

## Message to Contracting Parties

We appreciate the effort undertaken by Contracting Parties in preparing legal architectures to deliver energy investments and revising their energy strategies in the context of the Energy Community Strategy. However, waiting for the Energy Community Strategy should not preclude governments from continuing on their own accord. In particular, Contracting Parties should focus on:

**Delivering energy efficiency:** There are considerable employment benefits, import dependency and health savings emanating from energy efficiency investments in households, industry and transport. This provides a clear incentive for investment in these local solutions. Where countries have fossil fuel capacity, recycling the cost of these externalities into the energy savings and renewables provides direct benefits to local communities.

**Diversifying renewable energy plans:** Many of the current renewable energy investment projections concentrate on hydropower. Although this can provide important storage and backup solutions, over-reliance on this single technology will increase the risk of security of supply considerations. It is up to governments to look for a balance between wind, solar, sustainable, bio-energy, geothermal and other renewable solutions.

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