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ENERGY TRANSITION IN CROATIA – MOVING TOWARDS EFFECTIVE MEMBERSHIP IN THE ENERGY UNION

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Contents

List of Abbreviations	4
Introduction	5
The Energy Union	6
Projects of Common Interest.....	7
Project Strengthening the Electrical Energy Interconnections between Slovenia, Croatia and Hungary	10
SINCRO GRID.....	11
LNG Krk	13
Investments at the National Level.....	19
Plomin C.....	20
Implementation Capacity	22
Conclusions.....	26
Recommendations.....	29
Literature	311
Annex.....	39

List of Tables

Table 1. A comparison of key goals for 2020 and 2030.....	6
Table 1: Overview of PCIs by sector and list, completed in the period 2013-2018.....	39
Table 2: PCI that include Croatia and their changes to their status.....	39
Table 3: Key parameters of the LNG terminal project.....	42
Table 4: Volume of investment in the energy sector 2015	43
Table 5: Investment projects in Government programmes	44
Table 6: Project on the list of strategic investment projects that involve energy	45
Table 7: Planned strategic investment projects according to the Energy strategy of Croatia	46

List of Abbreviations

BiH – Bosnia and Herzegovina

CEF – *Connecting Europe facility*

CO₂ – carbon dioxide

EIB – European Investment Bank

ELES – Elektro-Slovenija Ltd.

EU – European Union

HEP – Hrvatska elektroprivreda Inc. (Croatian Electricity Company Inc)

HEP ODS – Hrvatska elektroprivreda – operator distribucijskog sustava d.o.o. (Croatian Electricity Company – Distribution System operator Ltd.)

HOPS – Hrvatski operator prijenosnog sustava d.o.o. (Croatian Transmission System Operator Ltd)

HR – Croatia

HU – Hungary

JANAF – Jadranski naftovod d.d. (Adriatic Oil Pipeline Inc.)

kV – kilo Volt

kW – kilo Watt

PCI – Project of common interest

RH – Republic of Croatia

SI – Slovenia

SODO – Sistemski operater distribucijskega omrežja z električno energijo d.o.o. (System Operator of the Electrical Energy Distribution Network Ltd.)

TAL – Trans-Alpine Oil Pipeline

VCBCC – virtual cross-border control centre

Introduction¹

The EU has a significant influence on Croatia's energy policies. Traditionally, energy policies have concentrated on energy security; however, due to climate change, energy security goals must now be achieved with minimum greenhouse gas emissions.

The Energy Union is one of the key instruments for the decarbonisation of the EU economy. The newest analysis by the Intergovernmental Panel on Climate Change states that decarbonisation is required to avoid the severe and irreversible effects of climate change on people and ecosystems. This brings us to energy policy reforms and the implementation of climate policies. In Croatia, a portion of energy policy reforms was done during the EU membership accession process; however membership in the Energy Union will require energy transition.

Global challenges and instruments (like the Millennium Development Goals and Paris Agreement) and EU policies (mostly in the Energy Union framework) create the framework for the development of energy policies in Croatia. This paper will follow investments in order to map the development of Croatian energy policy measures whose goal it is to provide solutions to key challenges and actively participate in all five dimensions of the Energy Union: (i) security, solidarity and trust; (ii) integration into the internal energy market; (iii) energy efficiency; (iv) climate activities – decarbonisation of the economy and (v) research, development and competitiveness. The focus will be on strategic investments in Croatia and projects of common interest in the EU that include Croatia.

First, a description of the Energy Union and the role of investments in achieving its goals, with a focus on projects of common interest and investments at the national level in Croatia will be discussed. Using information on planned and implemented strategic investments in Croatia, estimating implementation capacity will be contrasted with the Energy Union's contribution to achieving Croatia's energy policy goals. The results have shown that strategic projects in Croatia do not have clearly defined goals, which makes their preparation and implementation as well as the realisation of positive effects on development more difficult.

This policy paper is a result of the implementation of the ERASMUS+ Jean Monnet project supporting institutions POLO-Cro28, whose role is to act as an observatory of public policies in Croatia, and Croatian Science Foundation project IP-2013-11-2203. The research is based on a common methodology and multidisciplinary approach to the POLO-Cro28 analysis;

¹ Special thanks to Juraj Gajski who helped prepare this paper.

during the project’s three-year implementation period six areas or policies are being monitored, one of which is energy policy, which is also a part of project IP-2013-11-2203.

The Energy Union

The foundations of the Energy Union were laid in the EU’s Framework for Climate and Energy 2020-2030 (European Commission, 2014) and the European Energy Security Strategy (European Commission, 2014). The initiative to form an Energy Union began in 2015 as one of the European Commission’s ten priorities, with the goal of providing secure, affordable and climate-friendly energy to Europe. The Energy Union encompasses five dimensions: (i) security, solidarity and trust; (ii) a fully-integrated internal energy market; (iii) energy efficiency; (iv) climate action – decarbonising the economy and (v) research, development and competitiveness.

The European Union aims to play a leading role in renewable energy and the fight against climate change. Based on the achievement of goals set for the period leading up to 2020, new goals were set for 2030; it is expected that the 2030 goals will be known in greater detail by 2019 (Table 1).

Table 1. A comparison of key goals for 2020 and 2030

	Reduction of greenhouse gas emissions	Renewable energy sources	Energy efficiency	Interconnection
2020	20%	20%	20%	10%
2030	≥ 40%	≥27%	≥ 30%	15%

Source: European Commission (2017)

At the beginning of 2018 (more specifically, 16 January 2018) the European Parliament adopted amendments on the proposal for a regulation regarding 2030 targets for energy efficiency (a 35%), a minimum 35% share of energy from renewable sources in gross final

consumption of energy and a 12% share of energy from renewable sources in transport (12%).²

In addition, the resolution foresees a ban on using palm oil in biofuels by 2021 (European Parliament, 2018). In order to meet these goals at the EU level, every member state must set its own national goal. Reference values have also been defined, outlining what must be achieved by 2022, 2025 and 2027 before achieving the final 2030 goal. The plans offer an element of flexibility with no requirements for the goals to be met in a linear fashion: by 2022, 20% of the goal must be reached; by 2025, 45% of the goal (which offers flexibility, because linearly at that point 50% of the goals should be achieved), and by 2027, 70% of the goal must be achieved (Simon, 2018).

In short, the Energy Union should enable the achievement of traditional energy policy goals (security of supply, affordability, environmental acceptability) while encouraging energy transition (improved market competition, decarbonisation, coherence with climate policies). This requires market integration at the EU level (and necessary investment) and measures at the national level.

Projects of Common Interest

The importance of investment in energy system linking the infrastructure of EU member states has been recognised at the EU level. Infrastructure should provide everyone with available and secure sustainable energy supply, long-term decarbonisation in accordance with the Paris Agreement, increase energy markets' competitiveness and facilitate the integration of renewable sources of energy into the energy system. Infrastructure projects which ensure the achievement of these goals are considered Projects of Common Interest (PCI). Projects of Common Interest are eligible for co-financing from Connecting Europe Facility (CEF) instruments. Energy projects in the CEF have been allocated 5.35 billion EUR for 2014-2020.³

In order to be included on the list of Projects of Common Interest, a project must contribute to the goals of the Energy Union, assessed on five criteria:

²Increasing energy efficiency is measured in relation to projections based on the PRIMES model. More information can be found at https://ec.europa.eu/clima/policies/strategies/analysis/models_en

³ The total budget of the CEF up to 2020 is 30 billion euros from the EU; in addition to energy the CEF also includes mechanisms for co-financing of transport and telecommunications projects.

- (i) Effect on energy markets (the project must have a significant effect on energy markets in at least two member states);
- (ii) Effect on market integration (the project must strengthen market integration in at least two EU member states);
- (iii) Effect on increasing competitiveness and consumer choice (the project must contribute to increasing competitiveness on the energy market by increasing consumer choices);
- (iv) Effect on security of supply (the project must contribute to security of supply);
and
- (v) Contribution to EU climate and energy goals (through the integration of renewable energy sources).⁴

Projects of common interest are grouped by theme (e.g. electricity interconnection) and regional groups (e.g. North Sea Network) in twelve corridors: five for electricity, four for gas, one for oil, smart grids and cross-border carbon dioxide networks (European Commission, 2017).

Gas corridors increase supply security and market integration. Gas is considered a transitional fossil fuel, and conditionally contributes to decarbonisation (if it is replacing coal projects). Similarly, electricity interconnections increase market integration and security of supply and create the preconditions for improving energy efficiency and decarbonisation (through electrification of energy consumption). Smart grids contribute to innovative solutions and competitiveness. Cross-border CO₂ networks allow for transition to a low-carbon economy by providing transportation of CO₂ from place of collection to place of storage and in this way contribute to projects which collect and store carbon dioxide.

The Projects of Common Interest list was first published in 2013 and included 248 projects. The list is updated every two years. To date, about thirty projects of common interest have been completed, and a further forty-seven are expected to be completed by 2020 (of 173 projects in total, see Appendix Table 1). Almost half of the projects in the fields of electricity and gas are late in receiving the necessary permits, or have been postponed due to insecurity in the project's commercial justification.

⁴ Detailed criteria are available in EU Directive no. 347/2013 by the European Parliament and Commission dated 17 April 2013.

The newest list, published in November 2017, includes 173 projects. Most of them involve electricity and gas interconnections between member states. Interconnecting oil pipelines remains a priority in Central and Eastern Europe, and includes six projects (linking Poland and Ukraine, two projects increasing national capacity in Poland, linking Austria and Slovakia, the Czech Republic and Germany, and increasing the capacity of the TAL oil pipeline between Italy and Germany). JANAF projects are no longer considered projects of common interest.

Among the projects of common interest, five involve LNG terminals (Krk, Gothenburg, LNG terminal in Sweden, increasing the capacity of the Świnoujście LNG terminal in Poland, LNG terminal in Shannon, Ireland and one terminal in Northern Greece). Of four projects involving smart grids, two are between new member states (Slovenia-Croatia, Czech Republic-Slovakia), and two are among old member states (Austria-Italy and France-Germany). Projects in the XI Priority Thematic Area Electricity Highways (32 projects) and XIII Cross-border carbon dioxide network (four projects) only rarely include new member states.⁵

Projects of common interest can seek co-financing from the Connecting Europe Framework (CEF). Of 17 projects approved for co-financing by CEF in 2017, with a total value of 873 million euros, eight are in the electricity priority area (a total of 680 million euros, or 78% of the approved funding), nine are in the gas sector (120 million euros). Four projects are currently in the construction phase (works are co-financed) and the remaining 13 being co-financed are in the study preparation phase.

A significantly lower level of funding was approved for CEF for gas projects than those in the electricity. Despite this, co-financing of gas projects is controversial because the European Commission is encouraging member states and the European Investment Bank (EIB) to decrease subsidies for fossil fuels, while at the same time it is co-financing gas projects as projects of common interest and seeking loans from EIB to construct a gas pipeline from Azerbaijan to the EU (compare Teffer, 2017).

A number of projects are no longer considered projects of common interest (e.g. the electricity interconnection between Croatia and BiH – Croatia-Bosnia and Herzegovina cluster, the JANAF-Adria oil pipeline), while others have become parts of projects of common interest clusters (e.g. the Zlobin – Bosiljevo – Sisak – Kozarac – Slobodnica (HR) gas pipeline which became part of PCI 6.5.2., see Table 2 in the Appendix). A project stops being a project of common interest for at least one of the following reasons: if it has already been completed or will soon be operational, if new information shows that the project does not fulfil general

⁵ Of 32 projects in the XI corridor two include Cyprus (in the framework of the Eurasia Inter-Connector, which connects Israel, Cyprus and Greece) while cross-border CO2 networks do not include any new member states.

criteria, if the project's promotor does not apply to be included on the EU list, or if it is assessed with poorer quality in relation to other suggested projects of common interest.

Projects that are no longer considered as projects of common interest (with the exception of projects that are already completed and working) can be included in the Union's next list (for more information see European Commission, 2017c). An example of this is when in 2015, the PCI 6.5.3. evacuation LNG gas pipeline between Omišalj – Zlobin (HR) – Rupa (HR) / Jelšane (SI) – Kalce (SI), was removed from the list it had been on since 2013, but was then later included again in 2017, as PCI 6.5.6. (see Appendix Table 2).

Six PICs include Croatia. As a comparison, Slovenia is included in three PICs, Hungary is included in eight, as is Slovakia. Projects that include Croatia are:

- One from Priority Corridor North-South Electricity Interconnections in Central Eastern and South Europe (Corridor III), interconnection between Žerjavenec (HR)/Hévíz (HU) and Cirkovce (SI) (PCI number 3.9.1)
- Four from Corridor VI, Priority Corridor North-South Gas Interconnections in Central Eastern and South Eastern Europe, of which three projects (PCI 6.5.1, ,6.5.5. and 6.5.6) are within the cluster of projects linked to the Krk LNG (PCI 6.5) and one from the Croatia-Slovenia-Austria cluster (PCI 6.26), including components of an interconnection between Croatia-Slovenia (Lučko - Zabok - Rogatec), PCI 6.26.1; and
- One from the sector for developing smart grids (Corridor X); Sincro Grid (PIC number 10.3), a project for the smart grid connection between Croatian and Slovenian electricity networks.

Project Strengthening the Electrical Energy Interconnections between Slovenia, Croatia and Hungary

The current goal of interconnection capacity is 10% (see Table 1), that is, each country should have in place electricity cables that allow at least 10% of the electricity produced by its power plants to be transported across its borders to neighbouring countries.

In October 2014, the European Council called for all EU countries to achieve interconnection of at least 15% of their installed electricity production capacity by 2030 (European Council,

2014), which European Parliament confirmed (see Table 1). Interconnection capacity is considered a precondition for energy transition (European Commission, 2017d).

The goal of 10% electrical energy interconnections encouraged the implementation of key cross-border projects. By implementing projects of common interest over the past few years, the level of interconnection has increased, and is expected to continue increasing until 2020.

The Croatian electrical energy system is linked at 400 kV, 220 kV and 110 kV voltage levels with systems in Bosnia.-Herzegovina, Serbia, Hungary and Slovenia.⁶

In 2017, Croatia achieved an interconnection level of 52%, Slovenia reached 84% while Hungary reached 58%. By 2020 it is expected that the level of interconnections will grow to 102% in Croatia, 132% in Slovenia and 98% in Hungary (European Commission, 2017d). A project increasing the electricity interconnections between Slovenia, Croatia and Hungary (PCI 3.9) will contribute significantly to the interconnection of these countries, but is not necessary for the achievement of the set goals. The component that relates to Croatia is the interconnection between Žerjavinec (HR)/Heviz (HU) and Cirkovce (SI) (PCI number 3.9.19). The greatest investment is related to constructing 80km of a new 400kV overhead power lines in Slovenia. These power lines will link the existing double 400kV overhead power lines in Heviz (HU)-Žerjavinec (HR) through a new transformer station at Cirkovice; completion is planned in 2019.

SINCRO GRID

Sincro Grid (PCI number 10.3) is a partner project between Croatian and Slovenian transmission system operators (HOPS d.o.o. and ELES d.o.o.) and distribution system operators (HEP ODS d.o.o. and SODO d.o.o.). Sincro Grid has been included in the list of projects of common interest since 2015, in the thematic area relating to smart networks. The Connecting Europe Facility (CEF) approved co-financing in the amount of 40.5 million euros in 2017 (51% of the project's total budget) (HOPS, 2017). The investment should be completed in 2020.

⁶ Croatia is linked to neighbouring countries with 400kV systems over a total of seven systems of overhead power lines, of which three are double, and four single; with Bosnia-Herzegovina (DV 400 kV Ernestinovo - Ugljevik i DV 400 kV Konjsko - Mostar), Serbia (DV 400 kV Ernestinovo – Sremska Mitrovica 2), Hungary (DV 2x400 kV Žerjavinec – Heviz, DV 2x400 kV Ernestinovo – Pecs) and Slovenia (DV 2x400 kV Tumbri – Krško, DV 400 kV Melina – Divača).

Croatian and Slovenian transmission and distribution systems operators have voltage problems, especially in the 220kV and 400kV grids, because of transit flows through two countries. These problems effect security of supply, and individual solutions (for Croatia and Slovenia separately) cannot provide a satisfactory level of operational security (CEF, 2017). It is also necessary to emphasise the ever-present issue of the lack of a secondary reserve in the electricity system.

In accordance, the project's goal is to link the operational security of the Croatian and Slovenian electricity systems by increasing transmission capacity (which is a precondition for the successful integration of renewable energy into the system, allowing use of electricity and increasing security of supply),⁷ solving the voltage problem, monitoring frequency and congestion. The project includes the construction of six compensation devices of which three are in Croatia (in the Konjsko, Melina and Mraclin transformer stations) to address at cross-border level overvoltage and voltage instability issue.

In addition to compensation devices reactive energy, the project also includes the construction of a dynamic thermal rating (DTR) system. This system offers insight into the real state of the power flows of the lines and allows for increased transmission capabilities and stability in the transmission system without physical interventions on power lines and poles. In Croatia, the system will be built on the 220kV overhead power lines at Konjsko – Brinje, Senj – Melina and Konjsko-Zakučac.

The project also includes deployment of electricity storage system and the development of a virtual cross-border control centre (VCBCC) for coordinating and optimising the voltage in the electricity systems in Croatia and Slovenia, coordinating secondary regulation power reserves, frequency and consumption. VCBCC links national dispatch centres of the transmission and distribution networks and uses modern Information Communication Technology (ICT) and innovative software solutions and programs.

The transmission system operators (HOPS d.o.o. and ELES d.o.o) are responsible for the implementation of planned technologies on their own grids. Distribution system operators (HEP distribucija d.o.o. and SODO d.o.o) will improve their distribution network monitoring systems, with the goal of using tools to better forecasting.

Sincro Grid therefore contributes to the goals of decarbonisation, allows for energy transition and encourages cross-border collaboration between Croatia and Slovenia.

⁷ These are part of a mostly national strategy, see more in e.g. HOPS, 2016

Gas Interconnection Croatia-Slovenia

The Croatia-Slovenia gas interconnection has been on the list of common interest projects since 2013. Since 2015 this project has been part of the Croatia-Slovenia-Austria cluster and includes:

- The construction of new sections, modernisation and expansion of the gas pipelines between Croatia and Slovenia in the Bosiljevo-Karlovac-Lučko-Zabok-Rogatec sector for a total of 150 km and daily capacity of 15 million cubic metres
- A compressor station in the Croatian transportation system (see Appendix, Table 3).

The project will secure an additional supply route, increase interconnection in the single EU market and increase security of supply.

LNG Krk

A Liquefied Natural Gas (LNG) terminal is facility for regasifying the liquefied natural gas (LNG) shipped in by LNG. A conventional terminal has four functions: berthing of LNG tankers and unloading or reloading of cargoes, storing LNG in cryogenic tanks (at -160 degrees Celsius), turning the liquid into a gas (regasification) and delivering it to the gas transmission grid, berthing and unloading (Elengy, 2018).

According to the most recent available data (April 2018) the Krk Island terminal will include three main elements:

- LNG storage tanks and vaporization units on a permanently moored FSRU;
- The Jetty consisting of a berth and mooring facilities, flexible loading/unloading arms and highpressure gas platform;

- Gas connecting pipelines and other gas infrastructure located within the limits of the Terminal including pigging station;

And all appliances, parts, instruments, appurtenances, accessories, equipment, buildings, civil

engineering works, infrastructure and other property that may be incorporated or installed in, or otherwise necessary or convenient for the ownership, operation and maintenance of, any of the foregoing.

- tanks for storing LNG and units for turning it back into a gas at the permanently moored

- all other equipment, parts and infrastructure necessary for the work, management or maintenance of the main parts (LNG Croatia 2018)

Liquefied natural gas has a smaller volume, making transport simpler and more flexible, and instead of by pipelines it is transported in special, low-temperature and high-pressure reservoirs (by road, rail or ship). LNG allows gas to be procured from different sources and on transported through different routes, and contributes to the diversification of sources and supply routes, as well as to security of supply. It is often more expensive compared to gas procured through a gas pipeline, but on the other hand, it also supports and strengthens the negotiation position when negotiating price for pipeline-supplied gas (IEA, 2017, Elliot, Reale, 2017, Hinchey, 2017).

The capacity for LNG (LNG terminals and gasification ships) as an alternative source to mostly Russian gas must be available to every EU member state, directly or through the Security-Sharing Agreement. However, despite announcements that an LNG Action Plan would be prepared in 2009, which would define the role of LNG in energy security, this approach has been abandoned. The EU strategy for liquefied natural gas and gas storage was published much later, in 2016, and has influenced the definition of criteria for supply security.⁸ To some extent, the Strategy and Regulation have decreased the grey areas with regard to using LNG and its role in supply security, and can be used as a framework for a more realistic assessment of the necessary capacities and final investment decision for LNG Krk, which is expected in the first half of 2018.

The idea of an LNG terminal on the Island of Krk is not a new one. The first studies were conducted in 1995 with the goal of creating a new supply route for gas that could be sold on the Croatian but also Slovenian, Austrian, Italian and Hungarian gas markets. The operative

⁸ Regulation 17/1938 by the European Parliament and Commission dated 25 October 2017 concerning measures to safeguard the security of gas supply and repealing Regulation (EU) No 994/2010.

steps happened ten years later, when an international energy consortium called LNG Adria Ltd. was brought together, whose goal was to construct the terminal. LNG Adria Ltd., registered to conduct studies, was founded in 2007 at the Commercial Court in Zagreb. The company's areas of business were development and project studies for the regasification of liquefied natural gas and other plants necessary for its storage in addition to business and management consulting. The company was founded by five shareholders from four countries (Austria, Germany, Slovenia and France) with foundation capital in the amount of 38 million HRK, of which:

- E.On Rughrigas (Germany) 11.84 million HRK (31%),
- OMV Gas (Austria) 9.72 million HRK (25%),
- RWE Gas (Germany) 6.34 million HRK (17%),
- Total Gas & Power Venture (France), 9.72 million HRK (25%) and
- Geoplin d.o.o. (Slovenia), 380,000 HRK (1%).

The presence of the largest natural gas suppliers was supposed to make it easier for Croatia to be included in the single European energy market, and contribute to goals on participation in international projects (see the Republic of Croatia's Energy Development Strategy, National Gazette, 130/2009).

After the LNG Adria company was founded, the LNG project began to be explicitly mentioned in national strategic documents – first in the Program of the Government of the Republic of Croatia 2008-2011 and later in the Energy Development Strategy of the Republic of Croatia (NG 130/2009). According to the Strategy, the LNG terminal construction project was a measure to increase the security of supply by diversification of the gas sources and routes. The Program of the Government of the Republic of Croatia 2011-2015 explicitly states that investments will be made in the LNG terminal. The Program of the Government of the Republic of Croatia 2016-2020 recognises the energy sector as “an important area for new investments because energy is a precondition for the development of the economy as a whole” but does not mention individual projects. It later states that “the Government will ensure a secure and financially accessible source of gas in the future” as a measure to increase the security of gas supply in Croatia and the EU (Government of RH, 2016). In

addition, in 2015 the Government decided to proclaim the LNG terminal to be a strategic project,⁹ a decision which was further expanded in 2018 (NG 78/2015, 11/2018).¹⁰

Some of the preparatory studies were conducted by LNG Adria (the terminal's feasibility study for storage and regasification and further distribution, 2008; environmental impact study) and in 2010 it obtained a location permit for a terminal with a capacity of 15 billion cubic metres per annum (a starting capacity of 10 billion cubic metres per annum, with a final capacity of 15 billion). This capacity is much higher than Croatia's annual demand (total demand about 3 billion cubic metres per annum, with imports based on long-term contracts of up to 1 billion cubic metres per annum), so the intended markets included Italy, Austria, Slovenia and Hungary. This was one of the reasons for the construction of a new gas pipeline between Croatia and Hungary. The investment was estimated at about 800 million euros (between 700 million and one billion euros) (see Appendix, Table 4, column LNG Adria). It was estimated that Croatian companies would be included in the company, with a share of about 25% (about 12 million HRK) – this was to be INA (with 14%) and a consortium consisting of HEP and Plinacro (total 11%).

However, instead of the expected collaboration of Croatian partners in LNG Adria, in 2010 a new company, LNG Hrvatska d.o.o. was formed, registered for doing business with liquefied natural gas. The founders of this new company were HEP d.d. and Plinacro d.o.o., two companies fully owned by the Republic of Croatia. The business area of the new company as registered was similar to that of LNG Adria.¹¹ The company was founded with minimal foundation capital (20,000 HRK) and much lower than the planned investment for Croatian companies in LNG Adria (12 million HRK) in the total foundation capital of LNG Adria (total of 36 million HRK). It was only after three consecutive increases of its foundation capital, in 2011 (up to 220,000 HRK) and twice in 2012 (in June with 1.73 million HRK and December with 24.3 HRK) did the foundation capital reach the level of the foundation capital of LNG Adria. In 2013, the foundation capital was lowered to 1.73 million HRK.

⁹ A strategic investment project is every project that the Government of the Republic of Croatia deems to be so according to the procedure in the Strategic Investment Project Act (NG 29/2018). The measurable criteria are related to the size of the investment's capital expense (which must be higher than 75 million HRK not including value-added tax, that is 10 million HRK if the project is being co-financed by the EU, is located on an island or an area of agricultural, fishery or forest production). Details are discussed in the section on implementation capacity.

¹⁰ The Head of the Operational Committee is Zvonimir Novak, assistant to the Minister of the Economy, Entrepreneurship and Crafts.

¹¹ The preparation of projects related to the terminal for LNG regasification and associated plants for LNG storage, designing the terminal for LNG regasification and associated plants for LNG storage, business and management consulting for the LNG terminal.

The reasons why the plan for including Croatian companies in LNG Adria, which would be in accordance with the 2009 Energy Strategy, was abandoned, are not publicly available. LNG Hrvatska d.o.o. registered the LNG terminal project as a project of common interest grouped in the cluster of projects of common interest LNG Krk.¹² Ships for regasification and connecting to gas pipelines were also added to the list of projects of common interest in 2013 as part of the priority north-south gas corridor connecting Central, Eastern and South-Eastern Europe (NSI East Gas). After this, in 2014 the consortium LNG Adria made a decision to close the company, accepted the final financial and liquidator's reports. The company was erased from the court register in 2017.

The LNG Project is considered an important factor in the “diversification of natural gas supply and increasing the security of natural gas supply in central and south-eastern Europe” (LNG Croatia, 2017), and its uses are as a transition fuel through “implementing an environmentally friendly source of energy in the region, decreasing CO₂ in the region, and facilitating economic development” (*Ibid.*).

Two years after it was named a project of common interest, the Government of Croatia proclaimed the LNG Terminal Project a strategic investment project for Croatia (NG 78/2015). However, the Government’s decision does not mention the floating terminal. The list of necessary activities is generic and the overall budget is much lower than that prepared by the PCI (400-640 billion euros, in comparison to 1.1 billion euros expressed on the PCI application, where the first phase was estimated at 360 billion euro; see Appendix, Table 3).

The description of the strategic project does not mention the planned capacity or construction timelines. It identifies the expected effects on employment – during construction about 400, and about 65 direct and 120 indirect employees in operational phase.

Revised Decision defining the LNG Krk project as strategic (NG 11/2018) identifies two phases of construction (phase one floating terminal, phase two land terminal) and that both are strategic (see Appendix Table 3). However, there is still no information on the capacity, timelines or the scope of activities (and budget).

As a comparison, the project description provided by the LNG Krk Cluster was changed after it was first included as a project of common interest and contains more information. It identifies three phases of development (two preparatory and the first phase of construction), capacity phase by phase, provides more details on the preparatory study and the cost is

¹² The responsible partner for the remaining projects in this cluster (gas lines and compressor station) is Plinacro.

expressed for each phase (Appendix, Table 3). After the approval of co-financing from the EU CEF-Energy instrument in the amount of 102.4 million euros, with 747,000 euros for co-financing the study and 101.4 million euros for co-financing the construction, preparatory activities intensified.¹³

The project does not have the support of the local community, which was clear during the public consultation on the Environmental Impact Study and demonstrations held in March 2018. The local community has not been adequately included in the preparation of the project, and they are worried that the project will have a negative effect on (i) the air quality, (ii) the water quality, (iii) noise and (iv) structural and visual landmarks in the local landscape, which could have a negative effect on tourism.

The Environmental Impact Study identified that the project's socio-economic effects could be significant (Ekonerg, 2017). The project's lead, LNG Hrvatska, believes that the construction in phases (e.g. implementing a transition phase from the floating to the land terminal) will ensure financial cost-effectiveness.¹⁴ The study on cost-effectiveness is not public, and the analysis, which is a part of the environmental feasibility study, the economic benefits include only local construction taxes, which is not in accordance with EU methodology¹⁵.

The cost-effectiveness will depend on how well the demand meets supply; however the suppliers are not clearly defined. Croatian President Kolinda Grabar-Kitarović has supported the project because it allows LNG to be imported from the United States, while Qatar was a supplier that had previously been discussed (more about this in Telegram, 2017 and Energypress, 2017).

¹³ This is: (i) a study researching the seabed in Sepen Cove, which was necessary because the project concept was changed (from a land-based to a floating terminal); (ii) preparation of a FEED (*Front-End Engineering Design*) for a floating terminal, which included the design and construction of moorings, attachment gas lines and high-pressure installations with an attachment cleaning station, water line and drainage, supporting plants and buildings; (iii) preparation of a preliminary design of the floating LNG terminal and attaching gas lines; (iv) starting the procurement process for the Floating Storage Regasification Unit (FSRU) as a part of the Krk LNG Terminal; (v) starting the procurement process for work on constructing the receiving LNG terminal; (vi) preparation of the FSRU Environmental Impact Study, public debate and obtaining approval from the Ministry; (vii) preparing the first draft of the LNG Rules of operation; (viii) conducting public debates on the LNG Rules on operation.

¹⁴ As a result, the mayor of Omišalj Ms. Mirela Ahmetović was sceptical. More information available in the Public Consultation Report, LNG Croatia, 2017.

¹⁵ It must be noted that EU methodology for preparing cost and usefulness analyses, taxes, fees and other payments which are not defined in accordance with the ready to pay principle must be removed from the economic analysis. More information can be found at EU Commission Implementation Regulation 2015/207 dated 20 January 2015 Boromisa, 2016, page 150.

LNG is usually more expensive than gas delivered by pipelines; currently gas in Croatia is imported from Russia.¹⁶ The possibility of importing (more expensive) LNG from the United States as a supplement and/or replacement for (cheaper) Russian gas highlights the project's political significance.

The fact that the Hungarian minister in charge of energy was present at the signing of the project grant contract (December 2017) shows the political support for the project and the Hungarian interest for gas imports, but does not guarantee the purchasing of the necessary volume of gas. In addition, at the end of 2017 *Prvo plinarsko društvo* (First Gas Society, or PPD) signed a ten-year agreement on gas supply whereby Russian Gazprom will supply one billion cubic metres per annum (HINA, 2017).

This agreement practically covers all of Croatia's needs for annual gas imports.

The planned capacity of the terminal is not included in the Government decision to proclaim the project as strategic. Capacity affects the investment and operative costs, and the rate of capacity used is directly related to the project's financial sustainability and profitability. As a result a realistic estimate of demand is needed to adequately plan the size of the facility. Price fluctuations and market development in the future are uncertain and present a risk for LNG Hrvatska Ltd. LNG Hrvatska is a company owned by two 100% state owned companies. This means that the market risk belongs solely to the Republic of Croatia.

Including partners in the project lowers this risk. However, companies who were interested in investing in the Krk LNG terminal ten years ago (shareholders of LNG Adria) currently do not show any interest for investment. Coupled with the lack of information on parameters used to conduct the feasibility study, the question of financial sustainability and market justification remains unanswered (Telegram, 2017).

Investments at the National Level

Investments in the energy sector are an integral part of the Program of the Government of Croatia. The Government has identified 17 projects as strategic, and of these two are in the energy sector: the already-discussed LNG terminal (valued at 2.9 billion HRK) and Plomin C (valued at 6.3 billion HRK). According to the Strategic Investment Projects Act, in addition to the projects identified by the Government as strategic, there is also a list of strategic projects that are defined by the Committee for Assessing and Defining Strategic Project Recommendations. Most of the members of this Committee are also members of the

¹⁶ See IEA (2016), Image 1 of the Appendix or Elliot et al. (2017).

Government; more specifically, the vice-president of the Government is the president of the Committee, the other permanent members are ministers (or state secretaries) and two rotating members are representatives of local and regional governments, the mayor (of the city of county), depending on the location of the project.

At the time of writing (March 2018), 36 projects were on the list of strategic projects, with a total value of 29.8 billion HRK; of these, nine include the energy sector (see Appendix, Table 6). The list of strategic projects includes information on the name, value and location of the project and the leader of the operational committee. Information on the planned date of completion are not included, and sometimes information on capacity is also not included.

Plomin C

The Plomin C project, officially known as the “Reconstruction of the Plomin Thermal Power Plant – replacement of existing block 1 with block C, with the goal of modernising and increasing the plant’s capacity” is the first project that the Government defined as being a strategic project of the Republic of Croatia (NG 61/2014). The project involves the replacement of block 1 (125 MW) with a new block called block C (500 MW) at the Plomin Thermal Power Plant. Block 1 was supposed to be closed by the beginning of 2018 because it is no longer in accordance with EU legislation.¹⁷ Its replacement with a new block was supposed to allow for the keeping air quality, at category one, while decreasing the emission of harmful gasses and increasing security of supply. During the permitting phase, the project was not in accordance with local spatial planning documents, which limited the plant’s capacity to a maximum of 335 MW for existing and planned plants, and did not allow for coal to be used as fuel. This problem was solved in 2016, when Spatial Plan of the Region of Istria was changed¹⁸ which increased the maximum possible power for the Plomin Plant (from 335 MW to 710 MW). With regard to fuel choice, the plan states that “the most modern generation technologies and most effective air quality safety measures must be used, using fuels such as gas or renewable sources” (Official Gazette of the Region of Istria, 14/2016).

¹⁷ Plomin 1 was offline earlier than planned (in May 2017) because of a fire. The closing requirement comes from the application of European Parliament and Commission Directive 2001/80/EZ dated 23 October 2001 on the limitation of emissions of certain pollutants into the air from large combustion plants (SL L 309, 27.11.2001.) and European Parliament and Commission Directive 2008/1/EZ dated 15 January 2008 concerning integrated pollution prevention and control (Codified version) (SL L 24, 29.1.2008.). The Accession of Croatia to the EU Agreement defines a transition period that ends on 1 January 2018.

¹⁸ Thanks to the Strategic Investments Act and the fact that Plomin C has been classified a project of strategic interest, the fact that the project is not in accordance with the municipal and regional spatial plan is not a problem for implementation. However, permits were issued before the project was classified as strategic, and for this reason Zelena akcija (Friends of the Earth Croatia) has taken the issue to court.

There is no publicly available information on the project's status nor is there information about preparation process. In September 2017 the head of the operational committee for Plomin C changed, with Mate Rebić being replaced by Domagoj Validžić, assistant to the Minister of the Environment and Energy. Based on this appointment, we can conclude that the project is still active. At the same meeting, Domagoj Validžić was also appointed head of the operational committee for three other energy projects that are on the list of strategic projects. In October 2017, HEP Proizvodnja Ltd. requested changes and supplements to the Decision on Common Environmental Conditions for the Plomin Thermal Power Plant from the Ministry of the Environment and Energy. Through modernising and installing DeNOx and desulphurisation equipment, the request includes lengthening the lifespan of Plomin 1 for another 15 to 20 years (MZOIE, 2017).

The goals of the strategic project involve phasing out Plomin 1 because it does not fulfil EU regulations (with a transition period that run until 1 January 2018) and security of supply.¹⁹ The deadline and HEP's request seem to suggest that there is no longer any interest in the strategic project, however this conclusion is not supported by official Government documents.

In addition to strategic projects, smaller and cluster projects also have the potential to encourage energy transition. Although Croatia meets its goals regarding share of renewables by 2020, there is significant potential for continued integration of renewables which has not been used. There are more than 2500 energy communities²⁰ in the European Union. In Germany for example, 50% of generation capacity is owned by private persons, and the costs

¹⁹ In accordance with the decision to classify the project strategic, the project's goal is to "construct a long-term, secure and stable source of electrical energy that can replace the power generated at the Plomin 1 block. This contributes to achieving electrical energy independence for the Republic of Croatia and decreases its dependence on imported electrical energy. The construction of Block C creates balance in the use of different fuels to generate electrical energy which contributes to the stability of the electrical-energy system. The project will encourage economic growth and development in Croatia and have a double effect on the growth of GDP (local electrical energy generation with direct foreign investment). The reconstruction of the Plomin Plant will ensure existing jobs in Plomin 1, result in new jobs during the construction phase and have a general positive effect on services in the tertiary sector. Service and maintenance jobs will be created during the plant's lifespan in addition to significant taxes and other budget income that will be generated through increased employment, taxes and fees paid during the plant's lifespan." (Government of Croatia, 2014).

²⁰ The energy community is one form of active customers. In addition to individual active customers, who can have their own deliveries, non-profit organisations with various legal forms are also developed (charities, cooperatives, partnerships, non-profit organisations etc., marked by the fact that they are controlled by local stakeholders, shareholders or members). This form of organisation is generally not geared towards generating profits, but instead generates value. They are included in distributing energy created and in doing the work of a distribution system operator, supplier or aggregator at the local level, including abroad. The suggested changes to European Parliament and Commission Directive on mutual rules for the internal electrical energy market (COM 2016 064 final/2) foresee the definition of the energy community and other active customers.

of this type of electricity can compete with the costs of large market companies (European Commission, 2017f). Local initiatives have made key contributions to the energy generation from renewable sources at the local level, and a significant number of cities (about 7500) are participating in the Covenant of Mayors Agreement initiative. Thanks to this, more than 31% of the EU population lives in areas with ambitious climate and energy initiatives (*Ibid*).

Stable and predictable regulatory framework is key for mainstreaming cost-effective use of renewables. Examples of successful projects are mostly in old EU member states (such as the Netherlands and Denmark) and have shown that investors have confidence in technological advances with well-designed policies and reforms of electricity market.

Implementation Capacity

The EU monitors investments at the member state level; the size of investments (in relation to GDP) is considered an indicator for the level of challenge and efforts each member state is investing in achieving the Energy Union goals (see European Commission 2017e, European Commission 2017f for examples). The amount of investment varies among member states and from year to year. For example, during 2012-14 Bulgaria's level was at 4% of GDP, while in 2015 this decreased to 0.3% of GDP. In 2015, among individual countries, energy investments varied from 0.3% (Bulgaria) to 2.5% (Estonia) of GDP. Member states can be put into four groups with regard to their level of investment:

- Countries where investments in the energy sector (electricity and gas) are between 1.5-2.5% of GDP: the Czech Republic, Latvia, Estonia, Spain, Slovakia, Slovenia
- Countries where investments in the energy sector (electricity generation and gas) are between 0.6-1.4%: Austria, Denmark, Finland, France, Italy, Luxembourg, the Netherlands, Portugal and the UK;
- Countries where investments in the energy sector (electricity generation and gas) are less than 0.5% of GDP: Bulgaria, Belgium, Ireland, Hungary, Greece, Germany, and
- Countries for which data on investment size are not available; this group only includes new EU member states: Croatia, Cyprus, Lithuania, Malta, Poland and Romania; information for these countries is not available for earlier years either (details Appendix, Table 4).

The necessary level of investment depends on the situation in each individual member state and their level of ambition, more specifically on the goals they have set. Each member state must prepare an integrated climate-energy plan for 2021-2030 based on its own specific situation. According to Commission data, Hungary, Finland, Germany, Italy, the Netherlands, UK and Sweden are in an advanced phase of preparing these documents. All the new member states (save already-mentioned Hungary) are in the initial development phase of their integrated climate-energy plan, in addition to Denmark, Luxembourg, Portugal and Spain. Croatia plans to revise its energy strategy by the end of 2019, which should form the basis for the climate-energy plan together with the Low-Carbon Development Strategy 2030. The National Reforms Program 2016 planned for the Low-Carbon Development Strategy to be passed by the end of 2016 (Government of RH, 2016b); the National Reforms Program 2017 moved that deadline to June 2017 (Government of RH, 2017a), but to date it still has not been passed. Existing strategic energy documents for RH (Energy Development Strategy, NG 130/2009 and the National Renewable Energy Action Plan) do not give any climate change adaptation guidelines for the energy sector, despite the fact that Croatia ranks 33rd (of 182) on the Global Climate Risk Index 1997-2006 as a result of its being exposed and fragile to extreme climate conditions.²¹ New member states, like the Czech Republic (72), Slovenia (42), Hungary (61), Slovakia (106) and Poland (61) are less exposed and fragile (Eckstein, Kuenzel, Schaefer, 2017). On the other hand, Government programs and other strategic documents recognise the importance of investments for achieving energy policy goals. For example, the Energy Development Strategy estimates that about 15 billion euros will be needed to achieve the goals it sets out for 2020, of which about 60% accounts for investments in the electricity, 30% for oil and gas production, processing, transport and storage sector and 10% for the heating sector. Estimates show that the highest investments would be during 2011-2014 after a two-year preparatory phase (2009-2011) and that from 2015 onwards investment would stabilise at a level of about 1.2 billion euros per annum.²²

Planned investments included international projects and national infrastructure. Since passing the Energy Development Strategy in 2009, the program of every Croatian government included investment in the energy sector. Some explicitly described the investment projects (e.g. the Government of RH in 2011) while others were more broad (e.g. Government of RH, 2016). In addition to energy policy goals, planned investments were supposed to contribute to foreign policy goals, including taking advantage of Croatia's geo-strategic position and taking a leading role in the region (Orešković, 2016). Some of the projects included in the Government of RH's plans ten years ago (Government of RH, 2008)

²¹ The first ten, in order, are: Honduras, Haiti, Myanmar, Nicaragua, the Philippines, Bangladesh, Pakistan, Vietnam, Thailand and the Dominican Republic.

²² As a comparison, using 2015 data that would be about 2.7% of GDP.

have been realised (e.g. the international gas pipeline Croatia-Hungary), some have been abandoned (e.g. hydropower plant Ombla) and others are still considered strategic (LNG terminal, see Appendix, Table 7). The goals are not always measurable (e.g. the modernisation of oil refineries in Rijeka and Sisak) and some are too ambitious. For example, when presenting its program, Tihomir Orešković's government placed energy sector investments in the field of the "first wave" of transformation, whose results could be expected as early as 2016 (Orešković, 2016). When assessing the timeline and effects it could be concluded that the projects were well prepared or already in an advanced stage of realisation, with a strong transformative effect. However, it was not clear what projects were exactly being referred to. Similarly, the Government Program 2008-2011 planned more than the Energy Strategy until 2020: completing the construction of a hydropower plant, completion of four gas-powered thermal power plants (in Zagreb, Sisak, Slavonia and Dalmatia). Within four years the completion of two gas electric plants was foreseen, but their location was defined only at the regional level (Slavonia, Dalmatia).

It is not unusual then, that large investments were not realised. In order to hasten investments, a special institution was formed in 2012 called the Centre for Monitoring Business and Investments in the Energy Sector (CEI). The Strategic Investment Project Act (NG 133/13) tried to simplify the procedures and remove barriers to investment, that is to hasten the preparation and implementation of investment projects in the public and private sector with the goal of job creation in as short a period as possible, as well as to shorten and hasten the process of obtaining permits necessary for strategic project realisation.

The Strategic Investment Project Act defined the basic criteria to be used for defining whether a project was strategic or not; these were: investment of more than 150 million HRK,²³ compliance with national and European strategic documents, including spatial planning documents.²⁴ However, despite corrections to the Act (NG 152/14, 22/16) there

²³ For projects that can be co-financed through EU funds and programs this amount is 75 million HRK, in supported areas, on islands in in areas with agriculture, manufacturing or fisheries the amount is 20 million HRK.

²⁴ The issue of accordance with spatial planning documents is controversial. According to the Strategic Investments Act (NG 133/13, 152/14, 22/16) accordance with lower-level plans is not a problem for projects of strategic interest; the goal of the Act is to make investments in Croatia easier, by, among other things, removing restrictions set by lower-level regulations. As a result, the Ministry of Environment and Energy issued a Decision on Plomin C (planned installation power 500 MW) despite the fact that the Spatial Plan of the Region of Istria (Official Gazette of the Region of Istria no. 2/02, 1/05, 4/05 14/05, 10/08) limits the production capacity to a maximum of 335 MW for existing and planned plants, and foresees natural gas as the fuel to be used. The Municipality of Kršan's Spatial Plan states that the maximum capacity is 350 MW and also foresees natural gas as a fuel. On the other hand, when preparing the Pelješac Bridge Project, the approach is different; during the pre-feasibility study stage, ferry connections were deemed inappropriate because a ferry

were difficulties in implementation and a new Strategic Investment Act was prepared (and passed in Parliament on 16 March 2018).

The new Act should make the preparation and implementation of the previous Act faster (which was also the intention of the first edition of the Act) and allow for the implementation of EU Regulation 347/2013 on guidelines for trans-European energy infrastructure.²⁵ Croatia has not been implementing this regulation properly, and as a result the Commission has initiated the first, informal phase of dealing with the issue, also known as the pilot.²⁶

The new Strategic Investment Project Act includes a lower threshold for the value of a strategic project (from 150 to 75 million HRK), the criteria for proving financial capacity (from 10% to 5% of the total investment), implements a new model which should ensure the implementation of the project. It also redefines the use of state-owned real estate and foresees the automatic inclusion of projects that are on the list of projects of common interest on the list of strategic projects.

The institutional structure for implementation is being adapted as a result of the closing of the Centre for Monitoring Business and Investment in the Energy Sector (CEI). The closing of the CEI was explained by the need to close certain legal entities as a result of “inadequate efficacy in state administration bodies, a large number of legal entities whose work and relevant areas overlapped and the excessive costs for the state budget for the public and state administration” and in order to “rationalise activities, optimise processes and organisational structures” (Government, 2017). The document that foresaw the closing of the CEI stated savings of about 866,000 HRK per annum in 2018 and 2019 (office space and director’s salary), but without an estimate of the cost of closure or effect on increasing the efficacy of other public administration bodies. As a result of the closure of the CEI, the new Strategic Investment Projects Act has taken the administrative application checks once done by the CEI to the Ministry of Economy, Entrepreneurship and Crafts (for public projects) and the Agency for Investment and Competition (for private and public-private partnership projects).

The model that is supposed to ensure the implementation is the Preparation and Implementation of Strategic Projects Agreement, whose parties are the investor and head of the central state administration body in charge of the economy. The agreement is to be

harbour was not included in local spatial plans. More information available at Ministry of Environment and Energy (2012) and Boromisa, Božičević-Vrhovčak, Rogulj (2016.), Boromisa (2016).

²⁵ The Regulation is legally binding and is directly applicable in all member states.

²⁶ Pilot ref.no. 8663/16/ENERG

signed before an official Government decision to classify a project as strategic. The Agreement should prove that the project is serious enough to be implemented, describe its technical preparations and implementation, the length of the investment, final deadline for realisation and penalties to be paid for not fulfilling the agreement. The Act describes an agreement-penalty in the amount of 0.1% of the total value of the strategic project should the project be delayed as a result of the investor's error, or if the investor decides not to realise the strategic project after all. It does not describe other penalties depending on the length of any delays – the penalty is the same regardless of whether the delay is one day, one year, five years or totally abandoning the project.

Should the final deadline be exceeded where the fault lies with someone other than the investor, the deadline can be extended based on a detailed request from the investor (which must be filed three months before the final deadline).

Although the automatic inclusion of PCI on the list of strategic projects is foreseen, it is the Committee for Assessing and Defining Strategic Project Recommendations that proposes inclusion of projects which are on the EU PCI list on the list of strategic projects. The proposal is to be made in accordance with the regulation prepared by the minister in charge of the economy (Government, 2018). In addition to PCIs, projects that are co-financed from European structural and investment funds during the 2014-2020 financial framework or in the future financial perspective can be added to the List of Strategic Projects automatically, at the request of the Committee. The inclusion of "infrastructure which goes along with and is necessary for the realisation of projects on the List of Strategic Projects as a sub-project of an included strategic project" is also automatic. Once the Committee makes its request, which includes a detailed description from the lead of the Operational Committee, this infrastructure is added to the list.

Conclusions

The Energy Union should facilitate the achievement of energy policy goals (security of supply,, affordability for consumers, care for the environment) while encouraging energy transition (increased market competitiveness, decarbonisation) and achieving climate goals. To achieve this, measures are required on both the EU and national levels. Investments are necessary in all five dimensions of the energy union relating to sources of energy – fossil fuels and renewables, supply routes, modernising the network, distributed generation and managing demand consumption and research.

Projects of common interest in the energy sector are identified based on criteria that are in harmony with the dimensions of the Energy Union. Of 173 projects of common interest for the EU, six include Croatia. The number of PICs Croatia is participating in is the same level of inclusion demonstrated by other new members; Croatia mostly participates in projects linking the electricity and gas systems.

A significant step forward from traditional projects is Croatia's participation (with Slovenia) in one of four PCIs that relate to smart grids (Sincro Grid). Up until the passing of the new Strategic Investment Project Act this project was not considered a project of strategic interest for Croatia, which demonstrates that Croatia does not encourage investment in energy transition (renewables, smart grids, management of supply).

In the field of energy security, Croatia is achieving goals of electricity interconnection (greater than 10%). Market integration requires close collaboration with neighbouring countries. Part of Croatia's interconnection capacity is not used because of inadequate coordination between neighbouring operators of the distribution system and regulatory bodies. Coordination is important because it can significantly increase operational security and transmission capacity as integration of renewables.

Croatia has not begun preparing a national energy and climate plan for 2020-2030, although this is planned to be developed based on new energy and low-carbon development strategies. As compared to the timeframes planned in the National Reform Strategy, part of the European Semester, the adoption of the Low-Carbon Development Strategy is late. Climate goals are not being considered together with energy goals, which can make the preparation of an energy-climate plan more difficult.

Together with the other new EU member states, Croatia is not participating in projects of common interest for cross-border CO₂ networks; the oil projects which included Croatia are no longer considered to be of common interest.

The structure of projects chosen for co-financing from the CEF in Croatia is different from the EU average. In the EU, 78% of the total co-financing is regarding electricity, which allows for decarbonisation and the development of competitiveness, while in Croatia 70% of co-financing is linked to gas projects.

The Government of Croatia has classified two energy projects as strategic: the LNG Terminal (two years after it first appeared on the PCI list) and Plomin C (coal-fuelled) which shows that public investment projects in the energy sector are focused on fossil fuels. The goals of the Government's program include energy but these are not measurable and are often too ambitious.

Traditionally, one of the factors which decides the geo-strategic importance of a given country is its importance for the transportation of oil and gas. With decarbonisation, the geostrategic significance of the transport of fossil fuels decreases. The strategic (and commercial) significance of flexible sources (such as LNG) depends on certain investors and markets they are intended for. This information is not public for the LNG Terminal on the Island of Krk, and could have an impact on the relationship with the current (Russia) and potential (USA and Qatar) suppliers. The relationship between suppliers and the market determines project's commercial value, the lack of support at the local level, insecurity regarding the price and size of the potential market raises the question of the project's sustainability. The project itself should create the preconditions for the diversification of gas supply and strengthen market flexibility.

The sequencing of actual investments effects their profits, in addition to effecting other planned projects.²⁷ As a result the sequencing of investments also effects the diversification of energy sources and supply routes and the achievement of energy and climate policy goals at the national and EU levels.

The planned strategic investments in Croatia surpass the needs of the Croatian energy system. Their realisation can therefore limit investments in decarbonisation and energy transition.

In order to develop the market and competitiveness, investments should be based on market principles. This requires a stable, predictable and effective regulatory and legislative framework which will allow realistic planning and provides for dispute settlement mechanisms. In this way the state can decrease risks and make investment decisions easier, without favouring individual projects. Croatian governments have recognised the need for investment in the energy sector, but have been slow in achieving them.

For now Croatia's strategic projects in the energy sector have only been those where the promoters were 100% state-owned. This shows that energy transition in Croatia is still in its infancy and that the energy sector has not been liberalised. Project implementation has been slower than planned. Difficulties in implementing certain legislation have brought about the development of specific solutions – the foundation of a special institution (CEI) and new legislation (Strategic Investment Project Act). These solutions have not given the necessary results, and are being changed. Changes (such as the closing of the CEI and the new Strategic Investment Project Act) have come about without comprehensive analyses of current and

²⁷ For example, the decision about the new gas-fired power plant in Plomin effects the justification and profits of the LNG terminal.

expected effects of the measures, which makes the assessment of the need for changes difficult.

The new Strategic Investment Project Act provides for automatic inclusion of projects of common interest among Croatia's strategic projects using a special procedure. In the case that the project is no longer considered a PCI, the procedure is not defined. The automatic nature of this procedure is unclear, as well as the status of the project which is removed from PCI list, which could create difficulties in the implementation phase.

The decisions to classify individual investment projects as strategic do not include all the relevant information that define the project (e.g. scope/capacity, timeline, project components). Individual projects are promulgated strategic before feasibility studies are completed. The new Strategic Investment Projects Act provides for inclusion of infrastructure necessary for the realisation of a strategic project in the list of strategic projects, i.e. the strategic project does not have to be a functional unit.

There are a number of procedures for defining strategic investment projects in Croatia: through sectoral strategies (passed by the Government or Parliament) and according to the Strategic Investment Projects Act; the implementation and monitoring procedures are the same, which makes defining priorities difficult.

The heads of operational committees for strategic projects are politically-appointed heads of relevant state administration bodies. Each leads a number of strategic project operational committees and as a result it can be concluded that the role of the head of the operational committee is formal, not operational. Appointment makes horizontal coordination between other state administration bodies possible.

Recommendations

Systematically increasing the capacities for active achievement of all the dimensions of the Energy Union which would create preconditions for the integration of energy-climate goals.

Consider the possibility of achieving traditional energy policy goals (security of supply) while respecting the other dimensions of the Energy Union: decarbonisation, market integration, energy efficiency, research and development.

Create preconditions for the development of an Energy-Climate Plan 2021-2030, which requires the adoption of a Low-Carbon Development Strategy.

Before making the final decision on the LNG Terminal on the Island of Krk, define the market, sales possibilities and access conditions. Define the relationship between this project and Croatia's participation in trans-European gas networks from the aspect of improving security of supply and development of competition.

Croatia meets the 2020 goals regarding the share of renewables, but a significant potential for their continued integration is not being used. A stable and predictable regulatory framework is key for facilitating the cost-effective implementation. Good practices identified by successful projects provide lessons that should be used in Croatia, including the development of a model of developing energy cooperatives, promoting the idea of energy democracy, simplifying the conditions for the development of self-supply.

Through strengthening the capacity for the development of policies and through consumer education enable the implementation of new technologies and the systematic implementation of energy market reforms.

Allow the implementation of local initiatives and support cities in joining the Covenant of Mayors.

Decrease the state's role in choosing individual projects, strengthen support for energy transition through a stable regulatory framework that is in accordance with EU regulations.

Clearly define the goals of public investment projects, their implementation dynamics, monitoring and revisions. Investment decisions should be made based on sustainability studies and their contribution to the goals of each individual project.

Define priorities and in accordance with these allocate financial and human resources for project preparation and implementation.

Develop capacities for project preparation and implementation including clearly defined project scope, goals and monitoring.

Improve project preparation and institutional structures for the implementation and monitoring by improving the organisation of relevant state administration bodies.

Systematically improve the capacities for regulation preparation and implementation.

Suggest new solutions based on the analyses of problems, needs and their effects in relation to the reference (existing) status, taking into account that a stable, predictable and effective regulatory and legislative system allows for realistic planning and ensures mechanisms for dispute settlement, which can affect risk-reduction and make investment decisions easier.

Implement the European Commission's recommendations for Croatia's 2017 Reform Program, mostly regarding the gaps in public administration, complex business environment, slow implementation of strategies for combating corruption, restrictive legislation in key infrastructure sectors and the strong presence of the state in the economy.

Define generic procedures for inter-sectoral collaboration and increase procedural transparency by preparing a list of necessary administrative steps and the expected timeframe for project preparation, depending on the project's scope and type.

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Annex

Table 1: Overview of PCIs by sector and list, completed in the period 2013-2018

	Electricity	Smart Grids	Gas	Oil	Carbon capture and storage	Total
PCI from the 1st and 2nd lists to be completed* between 2013-2018	22	0	8	0	N/A	30
PCIs included in the 3rd list	106	4	53	6	4	173
PCIs from the 3rd list expected to be completed* by 2020	31	0	14	2	0	47

*Projects to be completed include projects which are either about to obtain a permit or are already under construction and which can realistically be completed by the end of the indicated period.

Table 2: PCI that include Croatia and their changes to their status

Description		2013	2015	2017
3.5. Cluster Bosnia and Herzegovina – Croatia	3.5.1 Interconnection between Banja Luka (BA) and Lika (HR)	Included on the list ✓	3.5. Not a PCI anymore	-
	3.5.2 Internal lines between Brinje, Lika, Velebit and Konjsko (HR)	Included on the list ✓	3.5. Not a PCI anymore (built)	-
3.9. Cluster Croatia – Hungary – Slovenia between Žerjavenec/Heviz and Cirkovce	3.9.1 Interconnection between Žerjavenec (HR)/Heviz (HU) and Cirkovce (SI)	Included on the list ✓	Included on the list ✓	Included on the list ✓

6.5 Cluster Krk LNG Regasification Vessel and evacuation pipelines towards Hungary, Slovenia and Italy	6.5.1 LNG Regasification vessel in Krk (HR)	Included on the list ✓	Reformulated into 6.5.1 Phased development of a LNG terminal in Krk (HR)	Development of a LNG terminal in Krk (HR) up to 2.6 bcm/a – Phase I and connecting pipeline Omišalj – Zlobin (HR)
	6.5.2 Gas pipeline Zlobin – Bosiljevo – Sisak – Kozarac – Slobodnica (HR)	Included on the list ✓	Included on the list ✓	Became part of 6.5.6.
	6.5.3 LNG evacuation pipeline Omišalj – Zlobin (HR) – Rupa (HR)/Jelšane (SI) – Kalce (SI)	Included on the list ✓	Not a PCI anymore	Included on the list as a new PCI, 6.5.6.
	6.5.4 Gas pipeline Omišalj (HR) – Casal Borsetti (IT)	Included on the list ✓	Not a PCI anymore	
	6.5.5. "Compressor station 1" at the Croatian gas transmission system	-	-	New PCI included in 2017 ✓
	6.5.6. Expansion of LNG terminal in Krk (HR) above 2.6 bcm/a – Phase II and evacuation pipelines Zlobin – Bosiljevo – Sisak – Kozarac – Slobodnica (HR)	-	-	New PCI included in 2017 ✓

6.6. PCI Interconnection Croatia – Slovenia (Bosiljevo – Karlovac – Lučko – Zabok – Rogatec (SI))		Included on the list ✓	Became PCI no 6.26.1, Interconnection Croatia – Slovenia (Lučko – Zabok – Rogatec), 4,8 mil grant for feasibility study	6.26.1. Included on the list ✓
6.21 PCI Ionian Adriatic Pipeline (Fieri (AB) – Split (HR))		Included on the list ✓	Not a PCI anymore	Not a PCI anymore
9.3 PCI JANAF-Adria pipelines: reconstruction, upgrading, maintenance and capacity increase of the existing JANAF and Adria pipelines linking the Croatian Omisalj seaport to the Southern Druzhba (Croatia, Hungary, Slovak Republic)	Oil pipeline capacity and operational safety increase	Included on the list ✓	Included on the list ✓	Not a PCI anymore

Source: author's custom overview, derived from European Commission (2013), European Commission (2013a), European Commission (2015), European Commission (2017).

Table 3: Key parameters of the LNG terminal project

	LNG Adria	Government – declaration of the project as strategic in 2015 and revision in 2018	PCI
Capacity (billion cubic meters per year)	10 (initial) 15 (final)	N/A	2 (first phase, floating) 3,5 (second phase, onshore) 5-6 (third phase, onshore)
Value of investment	800.000.000€	3-4.8 billion HRK (400-640 million EUR)	Pre-investment phase: a) 9.800.000 € (maximum EU contribution 4.900.000 €) b) 1.100.000.000€ (max. EU co-funding 550.000.000€) First phase of construction: 363.180.516€ (max. EU co-funding 101.400.000, 27.92%)
Implementation deadline	N/A	Two phases; floating terminal and onshore terminal. Implementation deadline N/A	Pre-investment phase: a) 2014-2017 b) 2015-2016 First phase of construction 2018-2019
Main operations and activities	N/A	Location permit obtainment Construction permit obtainment Construction of the infrastructure (LNG terminal facilities and equipment) Technical inspection and obtainment of usage permit	Pre-investment phase: a) Business, legal and financial consulting during all preparation stages Conceptual design Main project Studies on the energy sources and connecting to the grid Environmental impact assessment Design, procurement and construction contracts preparation b) Studies examining geological, geotechnical, geophysical, seismic and archaeological aspects for the floating and onshore components, as well as additional geodesic and hydrographic studies for the onshore component – preconditions for the construction permit

Source: author's systematization

Table 4: Volume of investment in the energy sector 2015

Member state	% BDP-a	Euro	GDP in EUR (Eurostat), 2015
Austria	0,70%	2.411.452.400,00	344.493.200.000,00
Belgium	0,50%	2.052.176.000,00	410.435.200.000,00
Bulgaria	0,30%	135.859.500,00	45.286.500.000,00
Croatia	-	-	44.521.700.000,00 €
Cyprus	-	-	17.742.000.000,00 €
Czech Republic	1,50%	2.527.099.500,00 €	168.473.300.000,00 €
Denmark	0,90%	2.445.999.300,00 €	271.777.700.000,00 €
Estonia	2,50%	508.692.500,00 €	20.347.700.000,00 €
Finland	1,00%	2.096.040.000,00 €	209.604.000.000,00 €
France	0,70%	15.359.701.000,00 €	2.194.243.000.000,00 €
Germany	0,40%	12.174.600.000,00	3.043.650.000.000,00
Greece	0,20%	352.624.000,00	176.312.000.000,00
Hungary	0,50%	553.614.500,00	110.722.900.000,00
Ireland	0,40%	1.048.149.600,00	262.037.400.000,00
Italy	0,6%*	-	1.652.152.500.000,00
Latvia	1,50%	365.296.500,00	24.353.100.000,00
Lithuania	-	-	37.426.600.000,00
Luxembourg	0,60%	312.611.400,00	52.101.900.000,00
Malta	-	-	9.266.100.000,00
Netherlands	1,00%	6.834.570.000,00	683.457.000.000,00
Poland	-	-	430.054.700.000,00
Portugal	0,9%*	1.618.281.900,00	179.809.100.000,00
Romania	-	-	160.313.700.000,00
Slovakia	1,70%	1.341.238.800,00	78.896.400.000,00
Slovenia	1,6% *	621.385.600,00	38.836.600.000,00
Spain	1,8% *	19.439.964.000,00	1.079.998.000.000,00
Sweden	1,15%	5.163.670.200,00	449.014.800.000,00
United Kingdom	0,70%	18.214.977.200,00	2.602.139.600.000,00

*data for 2014, Eurostat, 2018

Table 5: Investment projects in Government programmes

	2016-2020	T. Orešković Government	Government 2011-2015	2008-2011
LNG	Not explicit	Not explicit	Planned	Planned ✓
Sisak and Rijeka refineries modernization	Not explicit	Not explicit	Planned	Planned ✓
2 underground gas storages	Not explicit	Not explicit	Not explicit	Planned ✓
Bosiljevo-Split gas pipeline construction	Not explicit	Not explicit	Not explicit	Planned ✓
Ionian Adriatic pipeline project, connecting the Croatian and Hungarian pipeline network at Donji Miholjac, connecting the Croatian and Serbian pipeline network	Not explicit	Not explicit	Not explicit	Planned ✓
Involvement in PEOP (Pan-European Oil Pipeline)	Not explicit	Not explicit	Not explicit	Planned ✓
Družba Adria Oil Pipeline	Not explicit	Not explicit	Planned	-
Completion of a hydropower plant construction, as well as completion of construction of a gas thermal power plants in Zagreb, Sisak, Slavonia and Dalmatia	Not explicit	Not explicit	Not explicit	Planned ✓
400 kV Ernestinovo-Pecs double overhead power line and other cross-border power lines into neighbouring countries	-	-	-	Planned ✓
Geothermal power plant Kutnjak-Lunjkovec, Bjelovar construction initiation	-	-	-	Planned ✓

Table 6: Project on the list of strategic investment projects that involve energy

Name	Value, in HRK	Description	Operational group leader
Bio-power plant – thermal power plant BE-TO Sisak 2 MWe/10 MWt,	127.500.000	Public investment project, added to the list on February 20 th 2015	Domagoj Validžić, assistant to the minister of environment and energy
Bio-power plant – thermal power BE-TO Osijek 1,5 MWe/10 MWt	75.000.000	Public investment project, added to the list on February 20 th 2015	Domagoj Validžić, assistant to the minister of environment and energy
Replacement of bloc A with new CCGT operational facility EL-TO Zagreb	1.063.000.000	Public investment project, added to the list on August 31 st 2016	Domagoj Validžić, assistant to the minister of environment and energy
Electric power facilities for powering the bridge Land-Pelješac and long-term electric energy development of the peninsula Pelješac	123.000.000	Public investment project, added to the list on September 26 th 2017	Domagoj Validžić, assistant to the minister of environment and energy
1 phase of the Vis Viva project: reversible hydropower plant and power evacuation transmission line with switchyard	4.500.000.000	Private investment project, added to the list on September 26 th 2017	Domagoj Validžić, assistant to the minister of environment and energy
Karlovac county waste management centre "Babina gora"	230.000.000	Public investment project, added to the list on February 20 th 2015	Anamarija Matak, assistant to the minister of environment and energy
Biomass power plant and greenhouse in Ogulin	208.500.000	Private investment project, added to the list on July 8 th 2015	Boris Draženović, chairman of the board, Center for monitoring business activities in the energy sector and investments
Innovation Centre Nikola Tesla (ICENT)	350.000.000	Public investment project, added to the list on July 27 th 2016	doc. dr. sc. Matko Glunčić, state secretary of the ministry of science and education
Hybrid geothermal power plant AAT-geothermae Draškovec	573.830.729	Private investment project, added to the list on August 31 st 2016	Boris Draženović, chairman of the board, Center for monitoring business activities in the energy sector and investments

Source: author's systematisation based on data available from <https://www.mingo.hr/page/kategorija/strateski-investicijski-projekti-rh>

Table 7: Planned strategic investment projects according to the Energy strategy of Croatia

International projects	National energy infrastructure
<p>Pan-European Oil Pipeline (PEOP) Konstanza-Trst [JANAF left the project in 2010]</p> <p>Družba Adria Oil Pipeline [not considered as a strategic project anymore]</p> <p>Liquefied Natural Gas Terminal [continues to be a strategic project]</p> <p>Interstate Gas Pipeline Croatia-Hungary (Varosfed-Slodobnica) [completed]</p> <p>400 kV Power Line Croatia-Hungary [completed]</p>	<p>300 MW newly built capacity in big HP plants [HP plant Lešće constructed - 42 MW, HP plant Ombla was abandoned]</p> <p>1200 MW in natural gas thermal power plants [thermal power plant Peruča was abandoned]</p> <p>1200 MW coal thermal power plant [thermal power plant Ploče was abandoned, Plomin prospects uncertain]</p> <p>300 MW cogeneration in counterpressure steam cycle [approximately 113 MW achieved]</p> <p>85 MW biomass power plants [approximately 30 MW achieved]</p> <p>10 MW microgeneration and small cogeneration units [achieved]</p> <p>1 million m² solar thermal collectors installed</p>

Source: author's systematization