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Infrastructure

Development and Application of a Methodology to Identify Projects of Energy Community Interest

DNV KEMA, REKK, EIHP

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EXECUTIVE SUMMARY

The Contracting Parties of the Energy Community[1] need substantial investments in their energy sectors over the coming years to foster the functioning of the regional energy market, enhance security of supply, increase energy efficiency and integrate more renewable energy sources. The scarcity of investment sources necessitates the identification of priorities for future development of the electricity, gas and oil infrastructure on Energy Community level.

The Energy Community Secretariat has contracted a consortium of DNV KEMA, REKK and EIHP to assist the Energy Strategy Task Force and the Energy Community Secretariat in the development and the application of a methodology to identify and assess Projects of Energy Community Interest (PECI). The project assessment methodology developed by DNV KEMA, REKK and EIHP includes two phases: a pre-assessment phase and an assessment phase.

In the pre-assessment phase the eligibility of the proposed projects has been checked, the submitted project data been verified and matching and complementary projects been identified. After the conduction of these pre-assessment steps, 82 projects and project clusters (out of a total of 100 submitted project proposals) have been recognised as eligible projects to be evaluated in the project assessment.

In the assessment phase we applied an integrated approach consisting of an economic Cost-Benefit Analysis (CBA) and a multi-criteria assessment. The economic CBA systematically compares the benefits with the costs arising over the life span of an investment project to all relevant groups of stakeholders within the region of the Energy Community (and neighbouring countries such as Bulgaria, Hungary, Greece and Romania). As a result of the economic CBA the change in socio-economic welfare resulting from the implementation of each investment project is calculated. In the economic CBA the costs are determined by the capital and operating expenditures of the project, while the socio-economic benefits are estimated and monetized through the project impact on market integration, improvement of security of supply and the reduction of CO_2 emissions. The net benefits are calculated by using quantitative electricity and gas market models.

Since not all possible costs and benefits can be quantified and monetised additional criteria have been selected as a complement to the economic CBA within a multi criteria approach. These ad-

[1] The current Contracting Parties to the Treaty establishing the Energy Community are Albania, Bosnia and Herzegovina, FYR of Macedonia, Moldova, Montenegro, Serbia, Kosovo* and Ukraine. Throughout the entire document, the designation of Kosovo* is without prejudice to positions on status, and is in line with UNSCR1244 and ICJ Opinion on the Kosovo declaration of independence.

On 1st of July 2013 Croatia has joined the European Union, thereby changing from the status as a Contracting Party of the Energy Community to an EU Member State. At the time of project submission by project promoters Croatia has however still been a Contracting Party of the Energy Community; throughout this report Croatia is therefore still treated as such.

ditional criteria include enhancement of competition, improvement of system adequacy, progress in implementation and support of renewable energy sources (the later for electricity generation projects only). For each of these criteria we defined indices and a scoring system that measure the fulfilment of each criterion by the respective investment project (or project cluster) on a scale between 1 (minimum) and 5 (maximum). Following the Analytic Hierarchy Process (AHP) technique, weights of the selected criteria have been set, based on a pairwise comparison of the relative importance of a criterion against any other criterion.

The different indices for each investment project have been calculated (including the Net Present Value as indicator for the change in socio-economic welfare within the framework of the economic CBA) and according scores have been assigned. By multiplying the score for each criterion with the weight of each criterion a total score has been calculated for each project based on which a ranking of all eligible projects – separate for electricity infrastructure, power generation and gas infrastructure – has been conducted. The ranking provides a basis for the identification and selection of Projects of Energy Community Interest (PECI).

Applying the above assessment methodology, 71 projects have been assessed in the areas of electricity generation, electricity infrastructure and gas infrastructure.[2] Projects ranking relatively high in all three categories are largely distributed across almost all Contracting Parties of the Energy Community. Also projects of various sizes (i.e. with smaller or larger capacities) or the technology of the project generally tend to rank high in each category. The proposed CHP power plants rank relatively high, whereas proposed pumped storage power plants rank relatively low. In the area of gas, the proposed LNG terminals and interconnection pipelines to emerging gas markets (i.e. markets currently not connected to the regional gas network) rank relatively high in the assessment. The proposed underground gas storages on the other hand tend to rank relatively low. The three eligible oil projects have been only evaluated qualitatively. It will be a choice of the Task Force, whether and which of the oil projects should be classified as PECIs.

The ranking order of the projects could also generally be confirmed in a sensitivity analysis, where among others higher and lower growth rates for electricity and gas consumption respectively have been assumed. For gas infrastructure projects it was furthermore tested whether the realisation of the South Stream pipeline would have a significant impact on the ranking of the gas projects; the inclusion of the South Stream pipeline did however not change the ranking of the projects.

[2] From the total of 82 eligible projects, six are classified as not assessed. In addition the two Moldova electricity infrastructure projects could also not be assessed within the project assessment methodology; a further three projects are in the area of oil infrastructure, which are not assessed within the assessment methodology.

1 INTRODUCTION AND PROJECT OBJECTIVES[3]

The Contracting Parties of the Energy Community[4] need substantial investments in their energy sectors over the coming years to foster the functioning of the regional energy market, enhance security of supply, increase energy efficiency and integrate more renewable energy sources. The scarcity of investment sources necessitates the identification of priorities for future development of the electricity, gas and oil infrastructure on Energy Community level.

The Energy Community Secretariat has contracted a consortium of DNV KEMA, REKK and EIHP to assist the Energy Strategy Task Force and the Energy Community Secretariat in the development and the application of a methodology to identify and assess Projects of Energy Community Interest (PECI). This assistance consists of four main tasks:

- Verification and classification of the submitted infrastructure projects
- Development of a project assessment methodology
  (including the definition of assessment criteria and indicators)
- Evaluation of all submitted and eligible projects according to the criteria and the methodology
- Ranking of all eligible projects according to the assessment results based on which PECIs can be identified

The purpose of this final report is to explain the project assessment methodology which has been applied for all proposed investment project submitted by project promoters until 31.12.2012 or during the public consultation phase (until April 29th 2013) and to present the results of the application of this methodology. In doing so this report also provides an overview of all submitted investment projects as well as on the modelling assumptions that have been made and agreed with the Task Force.

This report is therefore structured as follows. The next chapter (2) provides an overview to the general approach which the consortium partners have applied for the project assessment. Chapter 3 describes the submitted projects and provides a classification of these projects as regards their eligibility, possible complementarities and project matches. Chapter 4 presents the proposed project assessment methodology which consists of an economic cost-benefit analysis (CBA) and a

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[4] The current Contracting Parties to the Treaty establishing the Energy Community are Albania, Bosnia and Herzegovina, FYR of Macedonia, Moldova, Montenegro, Serbia, Kosovo* and Ukraine. On 1st of July 2013 Croatia has joined the European Union, thereby changing from the status as a Contracting Party of the Energy Community to an EU Member State. At the time of project submission by project promoters Croatia has however still been a Contracting Party of the Energy Community; throughout this report Croatia is therefore still treated as such.

set of additional criteria within a multi criteria approach that allows the integration of the economic CBA results with the assessment of the additional criteria. The application of the proposed methodology is discussed in chapter 5, while chapter 6 describes the general results of the assessment of all eligible projects according to the proposed methodology. The report concludes with a short summary and an outline for areas of improvement when conducting future PECI assessments (chapter 7). Furthermore, the appendix presents information on each individual proposed project.

2 GENERAL APPROACH

The approach for the assessment of the submitted investment projects proposed by the consortium and agreed by the Task Force includes two major parts, namely:

- Pre-assessment steps (see chapter 3)
  - Check of the eligibility of the proposed projects
  - Verification of the submitted project data
  - Identification of matching projects and identification competitive potentials between the proposed projects
  - Identification of complementarities between projects and clustering
- Project assessment (see chapter 3)
  - Application of an economic Cost-Benefit Analysis (CBA) for each project (or project cluster)
  - Assessment of additional qualitative and quantitative criteria and integration with the results of the CBA; calculation of a single score for each project or project cluster
  - Ranking of all eligible projects according to the calculated scores with separate lists for electricity infrastructure, power generation and gas infrastructure

Pre-Assessment Steps

All projects submitted by the project promoters until 31.12.2012 or during the public consultation phase (until 29th April 2013) are investigated according to the pre-assessment steps explained below.

The eligibility of the proposed projects has been assessed on the basis of the information provided in the separate project questionnaires, as well as any additional information given by the project promoters throughout the process. The eligibility check follows the criteria specified in the Energy Strategy of the Energy Community (see chapter 3 of this report). Based on this check the data provided by the project promoters has been compiled in a single. The accuracy of the submitted technical and commercial project data is then further verified to the best possible extent in order to achieve a complete set of the necessary project data which will serve as a basis for the project assessment.

In order to avoid duplication in the assessment we consider overlapping (or matching) projects (such as an interconnector between two countries consisting of sections in the two neighbouring countries or a run-of river power plant to be constructed directly at the border) as single projects. In addition, we group the observed complementary projects – these projects which necessarily require the implementation of specific other projects – as clusters and consider them as single projects in the assessment. Competing projects – projects that provide alternative solutions to the same tasks – are marked as such in the final ranking of projects.

Project Assessment

The aim of the project assessment is to evaluate the economic impact of the proposed investment projects on the different stakeholders within the Energy Community. On this basis, we apply an integrated approach consisting of an economic Cost-Benefit Analysis (CBA)[5] and a multi-criteria assessment.

A CBA is a common tool used to provide criteria for investment decision making by systematically comparing the benefits with the costs over the life span of an investment project. Whereas in the private sector, appraisal of investments and financial analysis of company's costs and benefits takes place against maximizing the company's net benefits, the economic CBA focuses on the overall long-term costs and benefits taking a broader perspective and including externalities, such as environmental and reliability impacts, to broader groups of stakeholders located in a wider geographic area (here the Energy Community) (see section 4.3). While costs are measured with the verified investment cost of the proposed projects, benefits are evaluated with regard to the impact on market integration/price convergence, security of supply and CO_2 emissions (see section 4.2 for further details on the definition of these criteria). These impacts are quantified by using electricity and gas market models (see chapter 5). As a result of the economic CBA the project-driven change in socio-economic welfare is calculated.

Since not all possible costs and benefits can be quantified and monetised – which is a requirement for an inclusion in the economic CBA – additional criteria have been selected and applied to complement the economic CBA. These criteria include enhancement of competition, improvement of system adequacy, progress in implementation and support of renewable energy sources whereas the latter applies for electricity generation projects only (see section 4.2 for further de-

[5] In this context the word '*economic*' relates to the point of view of the assessment; in that possible costs and benefits are evaluated for all stakeholders affected by an investment project taking into account the monetary costs and benefits of the investor as well as the costs and benefits to other stakeholders and the society as a whole.

tails). In order to integrate the CBA and the additional criteria we establish a multi-criteria assessment framework (see section 4.4). The multi-criteria assessment framework consists of the following steps:

- Selection of criteria (the results of the CBA – i.e. the change in socio-economic welfare – is included as one of the criteria) and specification of indices that characterise each criterion
- Definition of a scoring system to measure the fulfilment of each criterion by each investment project (or project cluster)
- Setting weights for the selected criteria, based on a pairwise comparison of the relative importance of a criterion against any other criterion (following the Analytic Hierarchy Process (AHP) technique)
- Calculation of the indices for each investment project and assignment of according scores
- Calculation of a total score for each project as the sum of the weight of each criterion multiplied with the score for each criterion

The total score of each project (or project cluster[6]) specifies the projects' relative ability to achieve the defined set of criteria. Based on the total score we rank the projects whereas the ranking is prepared separately for electricity infrastructure, power generation and gas infrastructure. Given the limited number of submitted oil infrastructure projects (four) and the specifics of the oil market, we only provide a qualitative evaluation of these projects within this report.

[6] Project clusters are assessed as single projects.

3 OVERVIEW OF SUBMITTED PROJECTS, PROJECT CLASSIFICATION AND PRE-ASSESSMENT STEPS

3.1 Short Description of the Process and Undertaken Steps

In November 2012, the Energy Community invited promoters to submit their project proposals in the area of electricity, gas and oil infrastructure. The project proposals were submitted by December 31st 2012 and collected by the Energy Community Secretariat. Any project promoter, within or outside the Energy Community was able to apply for PECI (Projects of Energy Community Interest) subject to the following conditions:

- the project is located in at least one Contracting Party and,
- it will impact at least two Contracting Parties, or a Contracting Party and an EU Member State.

In line with the practice at EU level for the identification of Projects of Common Interest (PCI), a public consultation on the list of submitted projects (including only the names of the projects and basic information) took place from 5 March to 29 April 2013. The aim of the public consultation was to collect a feedback and comments from stakeholders on the proposed projects and possible proposals for additional projects to be considered.

The submitted project proposals covered the Energy Community Contracting Parties area, namely Albania, Bosnia and Herzegovina, Croatia, former Yugoslav Republic of Macedonia, Kosovo*, Moldova, Montenegro, Serbia and Ukraine.

For the purposes of classification and pre-assessment the following steps have been carried out:

- all project proposals have been reviewed and classified into four groups (see next section)
- eligibility criteria have been suggested based on the Energy Strategy of the Energy Community and consequently projects which may not be eligible, or whose eligibility may be questionable, have been identified and presented to the Energy Strategy Task Force
- cross-border projects suggested by promoters from both sides of the border as individual projects (matching projects) have been identified and considered as single projects in the assessment process
- strongly complementary projects have been clustered and considered as single projects in the assessment process

- the project data has been verified using comparative cost analysis and engineering assessment to identify outliers, data errors and inconsistencies[7]
- where necessary missing data and clarifications were requested from the project promoters.

3.2 Project Classification

In total, 100 project proposals (85 project proposals until 31st December 2012, and 15 project proposals during public consultation) were submitted to the Energy Community Secretariat. In pre-assessment process these projects were reduced 82 due to non-compliance with eligibility (6 projects), complementarity (1 project) and matching (11 projects) (see also next sections).

For the purposes of our analysis we group the projects into four categories:

- Electricity Infrastructure Projects
- Electricity Generation Projects
- Gas Infrastructure Projects
- Oil Infrastructure Projects

These groups are in line with the guidelines contained in Energy Community Strategy which was adopted by the Ministerial Council of the Energy Community on October 18th 2012. The following table shows the classification of project proposals by Contracting Party and project group.

Table 3-1: Classification of project proposals by Contracting Party/project promoter and project group

Contracting Party/Project Promoter Country	Electricity infrastructure	Electricity generation	Gas infrastructure	Oil infrastructure	TOTAL
Albania	2	2	2	-	6
Bosnia and Herzegovina	3	15	4	-	22
Croatia	4	2	4	1	11
FYR of Macedonia	2	3	-	-	5

[7] It should be noted that the comparison of costs conducted here does not constitute a detailed international benchmarking of individual cost elements of the proposed projects, but rather provides a high level assessment. A detailed assessment of the cost efficiency of the proposed projects is not within the scope of this study.

Contracting Party/Project Promoter Country	Electricity infrastructure	Electricity generation	Gas infrastructure	Oil infrastructure	TOTAL
Kosovo*	6	4	-	-	10
Moldova	2	-	1	-	3
Montenegro	3	2	-	-	5
Serbia	6	13	9	2	30
Ukraine	2	2	2	1	7
Multi-Country Project – TAP	-	-	1	-	1
TOTAL	30	43	23	4	100

The location of the proposed electricity interconnection projects, new electricity generation projects and gas infrastructure projects is shown on the following maps.

Figure 3-1: Location of proposed electricity infrastructure projects[8]

[8] Source: ENTSO-E Interconnected Network System Grid Maps

Figure 3-2: Location of proposed electricity generation projects[9]

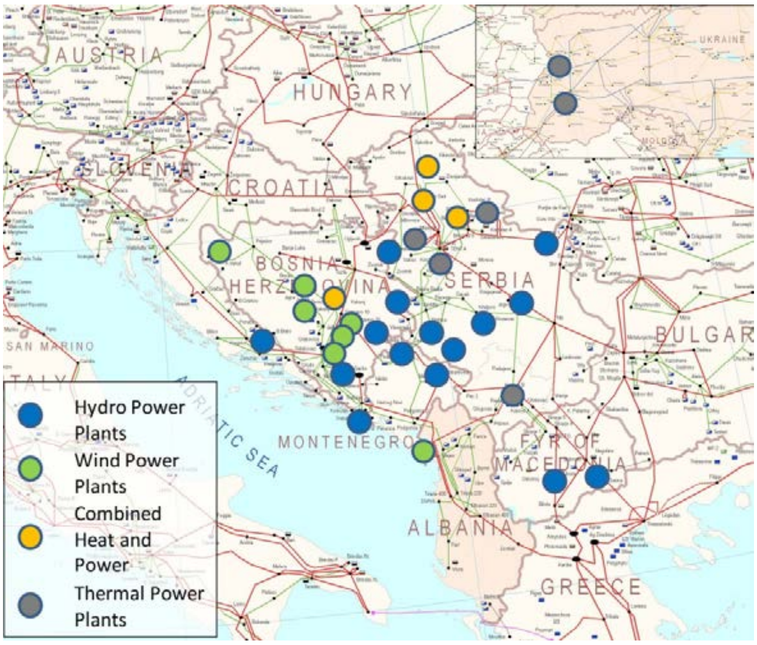
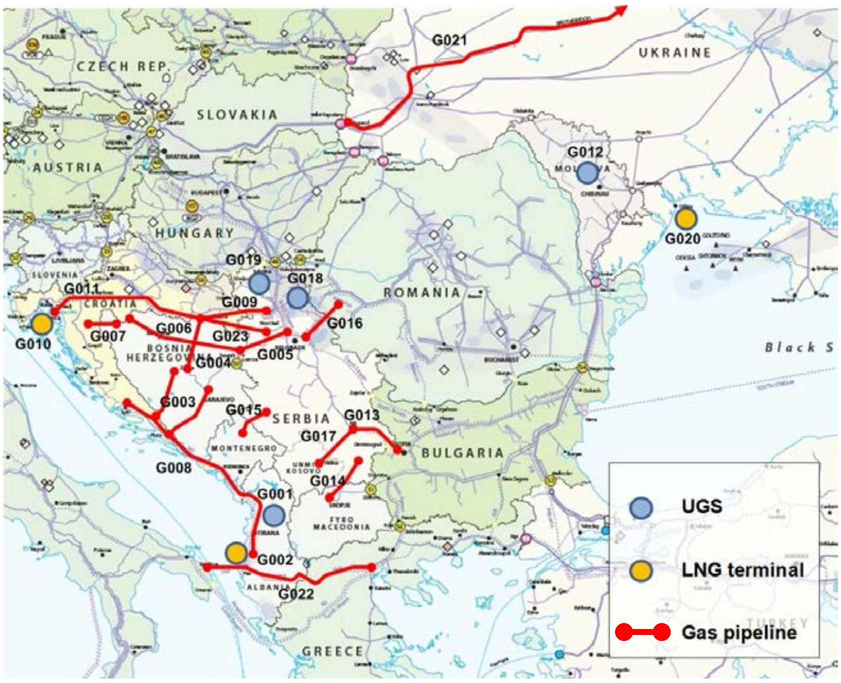


Figure 3-3: Location of proposed gas infrastructure projects[10]



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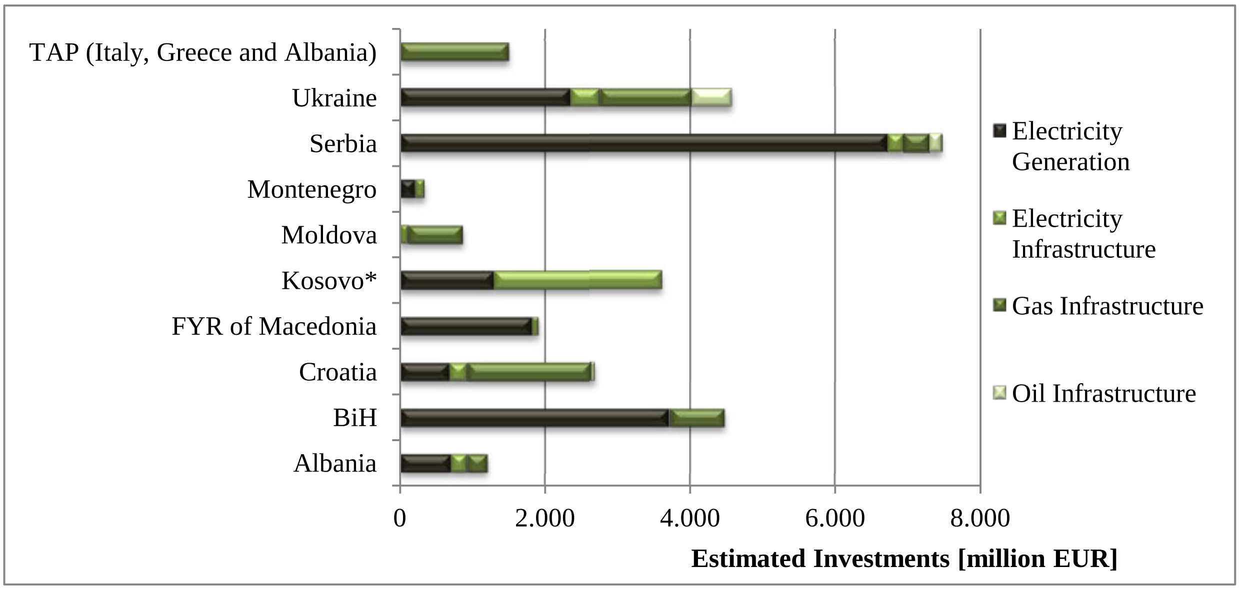
[9] Source: ENTSO-E Interconnected Network System Grid Maps

[10] Source: ENTSOG Transmission Capacity Map 2012
UGS = Underground Storage

The total investment volume of submitted project proposals (of those that indicated the investment cost) is estimated at approximately € 30.000.000.000. The following figure shows the estimated investment sums for each project group in each Contracting Party.

Figure 3-4: Estimated investments in million Euros by Contracting Party and project group



3.3 Project Eligibility

According to the Energy Community Strategy guidelines for the identification of Projects of Energy Community Interest[11], eligible projects, as already mentioned in 3.1, need to be located in one of the Contracting Parties and need to provide an impact for at least two Contracting Parties, or a Contracting Party and an EU Member State (first level criteria).

Furthermore, only the following categories of projects are eligible, according to the Energy Community Strategy:

1 Power Generation

a. New generation capacities (including bundling of different projects or adding new units to existing facilities), which have an added value in enhancing cross-border supplies and trade and grid stability in at least two Contracting Parties

[11] As published on the Energy Community website: http://www.energy-community.org/portal/page/portal/ENC_HOME/AREAS_OF_WORK/Regional_Energy_Strategy/PECIs#Evaluation

b. Modernisation, retrofitting of existing power plants which have an added value in enhancing cross border supplies and trade and grid stability in at least two Contracting Parties,[12] allowing for more efficient and environmentally safe production

2 Electricity Transmission

a. High voltage lines (overhead lines for minimum 220 kV, underground and submarine transmission cables, if they have been designed for a voltage of 150 kV or more)
b. Electricity storage facilities, including pump storage
c. Smart meters and ancillary equipment
d. Equipment for the safe, secure and efficient operation of the system

3 Gas Transmission

a. New transmission pipelines and related equipment (metering and compressor stations) for the transport of natural gas that form part of a network which mainly contains high-pressure pipelines, excluding high pressure pipelines used for upstream or local distribution of natural gas, with emphasis on bi-directional capacity
b. Equipment for the safe, secure and efficient operation of the system
c. Enhancing the capacity of existing transmission pipelines
d. Refurbishment of existing pipelines.

4 Gas Storage

a. New underground storage facilities
b. Expansion of existing underground gas storage facilities.
c. LNG, CNG facilities
d. LNG and CNG terminals (reception, storage and re gasification facilities)

5 Oil

a. Refinery improvements for facilitating improved fuel quality
b. Storage facilities to contribute to the security stockholding obligations
c. Pipelines used to transport crude oil

We checked whether the submitted projects fulfil the eligibility criteria listed above. The following table contains a list of the six projects that do <u>not</u> meet the eligibility criteria mentioned above. For proposed investment projects where the cross-border impact is not directly observable[13] the eligibility is assessed as part of the electricity and gas market modelling (see chapter 5).

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[12] According to the conditions stated in chapter 3.1, an impact to one Contracting Party and at least one EU Member is also eligible

[13] Examples of projects with a directly observable impact include interconnections of two (or more) Contracting Parties (or one Contracting Party and one EU Member State) or a hydro power plant located on the border with connections to both sides.

In addition (see chapter 6), not all eligible projects have been assessed; this includes, for example, two electricity infrastructure projects for which a commissioning year after the next 10 years has been specified by the project promoters for which we recommend an evaluation in future PECI assessments.[14]

Table 3-2: List of non-eligible projects

Project ID	Project Type	Project Promoter	Project Name	Non-eligibility
ET012	Electricity Transmission	KOSTT - Transmission System and Market Operator, Kosovo*	110 kV OHL Dragash (KS) - Kukesh (AL)	Electricity transmission lines need to be minimum at 220 kV in order to fulfil the eligibility criteria
EG010	Electricity Generation	Kosovo Energy Corporation JSC, Kosovo*	Air Monitoring in Thermal Power Plant Kosovo B	Not a new generation capacity or modernization, retrofitting of existing power plants which have an added value in enhancing cross-border supplies and trade and grid stability
EG011	Electricity Generation	Kosovo Energy Corporation JSC, Kosovo*	Decommissioning and Clean-up projects of former Gasification Plant	Not a new generation capacity or modernization, retrofitting of existing power plants which have an added value in enhancing cross-border supplies and trade and grid stability
EG012	Electricity Generation	Kosovo Energy Corporation JSC, Kosovo*	Enlargement and Installation of New Electrostatic Precipitators in Thermal Power Plant Kosovo B	Not a new generation capacity or modernization, retrofitting of existing power plants which have an added value in enhancing cross-border supplies and trade and grid stability
G001	Gas	National Agency for Natural Resources, Albania	Underground Storage in Albania	Without any (inter-)connecting pipeline projects, there is no cross-border impact
OIL003	Oil	JP Transnafta, Serbia	Petroleum Products Pipeline System Through Serbia	For oil projects, only pipelines for crude oil transportation are eligible

[14] Furthermore for one electricity infrastructure project no increase in net transfer capacities (NTCs) has been provided by the project promoter. The two electricity infrastructure projects proposed by Moldova could also not be assessed within the project assessment methodology, since the Moldova system is not part of synchronous grid of Continental Europe (formerly known as the UCTE grid) and would therefore require a modelling of a completely different system (i.e. the IPS/UPS rather than the synchronous grid of Continental Europe).

3.4 Matching Projects

Matching projects are defined as projects that share the same transmission routes / branches / pipelines / facilities or at least a part of it. These are essentially the same projects, but proposed by different project promoters. Consequently such projects should be evaluated jointly, i.e. as single projects.

Among the proposed investment projects we found several matching projects. Some of the cross-border projects (transmission and gas projects, for instance) have been proposed as two different projects – one proposed by each Contracting Party – although they are part of the same interconnection. Matching projects also occur in the group of electricity generation, that is hydro power plant projects located on border rivers. Accounting for matching projects the total number of individual investment projects decreases to 84.

Matching projects in electricity transmission are listed below in Table 3-3: Matching projects in the category of *Electricity Transmission* ; matching projects in electricity generation are shown in Table 3-4.

Table 3-3: Matching projects in the category of *Electricity Transmission*

Project ID	Sub Project ID	Project Promoter	Project Name	Remark
ET001	ET001-1	OST (TSO), Albania	400 kV OHL SS Bitola (FYR of Macedonia) - SS Elbasan (AL)	Interconnection project between Albania and FYR of Macedonia, submitted by two different project promoters from both countries
	ET001-2	JSC MEPSO (TSO), FYR of Macedonia		
ET002	ET002-1	JP Elektromreza Srbije (TSO), Serbia	400 kV OHL Bajina Basta (RS) - Pljevlja (ME) - Visegrad (BiH)	The complete project has been submitted by Serbia, but two parts of the projects were also submitted by Bosnia and Herzegovina (RS - BiH interconnection) and Montenegro (RS - ME interconnection)
	ET002-2	NOS BiH (TSO), Bosnia and Herzegovina	400 kV OHL Visegrad (BiH) - Bajina Basta (RS)	
	ET002-3	CGES (TSO), Montenegro	400 kV OHL Bajina Basta (RS) - Pljevlja (ME)	
ET003	ET003-1	NOS BiH (TSO), Bosnia and Herzegovina	400 kV OHL Visegrad (BA) - Pljevlja (ME)	Interconnection project between Bosnia and Herzegovina and Montenegro, submitted by two different project promoters from both countries
	ET003-2	CGES (TSO), Montenegro		

ET004	ET004-1	NOS BiH (TSO), Bosnia and Herzegovina	400 kV OHL Banja Luka (BiH) - Lika (HR) with 400 kV SS Lika	Interconnection project between Bosnia and Herzegovina and Croatia, submitted by two different project promoters; project submitted by Croatian part (ET004-2) also includes the construction of SS Lika
	ET004-2	HEP OPS (TSO), Croatia		
ET008	ET008-1	JSC MEPSO (TSO), FYR of Macedonia	400 kV OHL Kosovo B (Kosovo*) - SS Skopje 5 (FYR of Macedonia)	Interconnection project between FYR of Macedonia and Kosovo*, submitted by two different project promoters from both countries
	ET008-2	KOSTT (TSO), Kosovo*		

Table 3-4: Matching projects in the category of *Electricity Generation*

Project ID	Sub Project ID	Project Promoter	Project Name	Remark
EG004	EG004-1	MH ERS, Bosnia and Herzegovina	Hydro Power Plant Dubrovnik (Phase II)	Power plant located both on the territory of Bosnia and Herzegovina and Croatia; project proposals submitted by project promoters from both countries
	EG004-2	HEP d.d., Croatia		
EG005	EG005-1	MH ERS, Bosnia and Herzegovina	Hydro Power Plants System Lower Drina	Power plant located both on the territory of Bosnia and Herzegovina and Serbia; project proposals submitted by project promoters from both countries
	EG005-2	EPS, Serbia		
	EG005-3	Elektroprivreda BiH, Bosnia and Herzegovina	KPP Kozluk	Project EG005-3 partly overlaps with projects EG005-1 and EG005-2
EG006	EG006-1	MH ERS, Bosnia and Herzegovina	Hydro Power Plants System Middle Drina	Power plant located both on the territory of Bosnia and Herzegovina and Serbia; project proposals submitted by project promoters from both countries
	EG006-2	EPS, Serbia		
	EG006-3	Elektroprivreda BiH, Bosnia and Herzegovina	HPP Tegare	Project EG006-3 partly overlaps with projects EG006-1 and EG006-2

Competing Projects

As defined earlier, competing projects are those that provide alternative solutions to the same situation. They can clearly be distinguished from the matched projects since they don't share the same routes/facilities/pipelines. Competitive projects are clearly marked as such in the final ranking of projects.

3.5 Complementary Projects

Complementarities have been defined as potential relations between projects which require the development of a specific project for the implementation of another (dependent) project. In other words, although the projects are defined as two (or more) single projects, their implementation is mutually dependent. Strongly complementary projects are grouped in clusters and evaluated as a single project.

3.5.1 Possible Clusters of Complementary Projects

We identified two possible clusters in the area of gas infrastructure, as presented in the following table.

Table 3-5: Possible clusters for strongly complementary projects

Project ID	Sub Project ID	Project Promoter	Project Name	Remark
Cluster 1	G001	National Agency for Natural Resources, Albania	Underground Storage in Albania	dependent project – gas storage project needs to be connected with one of the pipeline projects
	G002	Trans - European Energy B.V., Sh.A	EAGLE LNG Terminal	G001 depends on the development of either one of the stated projects (G002, G008 or G022)
	G008	Plinacro, Croatia	Ionian Adriatic Pipeline (IAP)	
	G022	Trans Adriatic Pipeline, AG	Trans Adriatic Pipeline (TAP)	
Cluster 2	G010	LNG Croatia Ltd.	LNG Terminal in Croatia	G011 depends on the development of G010
	G011	Plinacro, Croatia	LNG main gas transit pipeline Zlobin-Bosiljevo-Sisak-Kozarac-Slobodnica	dependent project – LNG pipeline project needs to be connected with LNG terminal project

On the other side, several projects can be developed as standalone projects, but their development potential and their benefits will be enhanced with the development of specific other projects. These projects are listed in the following table and are also grouped into clusters.

Table 3-6: Possible clusters of complementary gas projects

Project ID	Sub Project ID	Project Promoter	Project Name	Remark
Cluster 3	G003	BH-Gas d.o.o. Sarajevo, Bosnia and Herzegovina	Interconnection Pipeline BiH - HR (Ploce - Mostar - Sarajevo/Zagvozd - Posušje/Travnik)	dependent project
	G008	Plinacro, Croatia	Ionian Adriatic Pipeline (IAP)	development potential of G003 is enhanced with the development of G008
Cluster 4	G008	Plinacro, Croatia	Ionian Adriatic Pipeline (IAP)	dependent project – IAP project is developed as an idea to connect Croatian gas market to new supply source TAP
	G022	Trans Adriatic Pipeline, AG	Trans Adriatic Pipeline (TAP)	development potential of G008 is enhanced with the development of G022

Additionally, complementarities occur between different project groups, namely between power generation and electricity transmission projects. The following table shows how this situation occurs within the projects submitted by Ukraine. The Ukrainian power generation projects highly depend on the electricity interconnection projects with Hungary and Poland (also submitted by the Ukraine) because these projects would significantly enhance the possibility of these generation facilities to deliver electricity to the wider transmission grid.

Table 3-7: Possible complementarities between power generation and electricity transmission projects

Project ID	Sub Project ID	Project Type	Project Name	Remark
Cluster 5	EG025	Electricity Generation	DTEK Zakhidenergo PJSC, Ukraine	dependent project
	ET009	Electricity Transmission	MAVIR (Hungary) and DTEK Zakhidenergo PJSC (Ukraine)	ET009 provides a connection of EG025 to the transmission grid
Cluster 6	EG026	Electricity Generation	DTEK Zakhidenergo PJSC, Ukraine	dependent project
	ET023	Electricity Transmission	DTEK Zakhidenergo PJSC, Ukraine	ET023 provides a connection of EG026 to the transmission grid

3.5.2 Clusters of Complementary Projects Applied in the Project Assessment

Together with the Energy Strategy Task Force it was decided that possible complementary projects should only be clustered as single projects, if

- a strong technical dependency of projects can be observed (e.g. such as between a new LNG terminal, a gas storage or a power plant and gas pipelines or electricity lines connecting these projects to the transmission network), and
- if a treatment as a project cluster has also been agreed by the respective project promoters.

Potential clusters of projects shown in Table 3-5 demonstrate strong dependency of the projects G001 and G010 on the development of other projects. The underground Storage in Albania (G001) is dependent on the development of a transmission (and distribution) network in Albania that would allow the utilisation of the storage.

- Cluster 1: Since none of the promoters of the proposed projects (G002, G008 and G022) agreed to a clustering with project G001, it was decided **not to cluster** project **G001** with any other. As project G001 is dependent on gas interconnection capacities (which currently do not exist) to provide a cross-border impact with the neighbouring countries, it was decided that currently project G001 cannot be considered eligible (see Table 3-2), and that it should be re-evaluated in 2-5 years' time when Albania is connected to the neighbouring gas markets.
- Cluster 2: Project **G011** was **clustered** with project **G010** following the agreement of the two project promoters.

The potential clusters of projects shown in Table 3-6 and Table 3-7 do not demonstrate a strong technical dependency and can be developed on a stand-alone basis. It was therefore decided **not to cluster any of the projects shown in Table 3-6 and Table 3-7.**

3.6 Comparison of Project Data

The aim of this comparative analysis is to provide verification of the investment costs submitted by the project promoters for their electricity, gas and oil projects. For this purpose, we compare the project cost by technology against each other and with typical reference figures. The latter stem from publicly available data and engineering analysis, we also use our experience and previous work in the Contracting Parties and the internal data base.[15]

The comparative analysis is performed primarily in relation to the capital expenditures (CAPEX) representing the total investment costs. This is because the granularity of the data provided by the project promoters does not allow the analysis to be extended towards the different components of capital expenditures. The comparison applies single ratios across the project technologies as follows: generation CAPEX - €/MW, transmission CAPEX (electricity and gas) - €/km, other infrastructure CAPEX (oil / oil products storages, UGS and LNG terminals) - €/ mcm.

The comparative analysis is based upon the project data (investment costs and technical characteristics) available in the project application forms. It neither has access to data nor aims to benchmark the project cost performance. Its main objective is to provide an indication of possible outliers, possible data errors and inconsistencies. Where the analysis resulted in questions or identified gaps with respect to the submitted data, we requested additional information in order to complete the verification process. Where project promoters could or did not provide sufficient additional justification/explanation on the cost data, we indicated this as such in our final assessment of potential PECIs.

We found that the generation project costs are broadly within the range observed for similar projects in the region. Also the investment costs of the electricity transmission projects are broadly in range with similar projects in the region. Three projects could not be evaluated because no cost data has been provided. However due to their characteristics these projects were classified as not eligible.

We could also verify the costs for the majority of the gas infrastructure projects. They broadly fit into the range of average specific cost of comparable projects. In two cases the project cost could

[15] Access to different data only available to specific stakeholders as well as changes which occurred from the time of preparing this report may lead to some differences in the outcome.

not be verified and in one case only partially. Only a partial verification was also possible for one of the oil infrastructure projects.

4 PROJECT ASSESSMENT METHODOLOGY

4.1 General Approach

The assessment methodology aims to provide a framework for evaluating benefits and costs to the Contracting Parties caused by the individual projects and to rank them according to their economic feasibility. For this purpose we suggest applying a multi-criteria framework based on an economic Cost-Benefit Analysis (CBA)[16] and a set of additional criteria.

The economic CBA systematically compares the benefits with the costs arising over the life span of an investment project to all relevant groups of stakeholders within a geographic area. The conduction of an economic CBA is a widely used technique for project valuation and is also foreseen as a central element for both electricity and gas by the recently adopted EU Infrastructure Regulation[17]. Since not all possible costs and benefits can be quantified and monetised – which is a requirement for an inclusion in the economic CBA – additional criteria have been selected to complement the CBA.

Given the limited number of submitted and eligible oil infrastructure projects (three) and the specifics of the oil market, we only provide a qualitative analysis of these projects within this report.

The assessment of the proposed investment projects (and project clusters) is done from an overall economic point of view. Costs and benefits of the individual projects are, therefore, assessed in economic terms for all the effected stakeholders and for all Contracting Parties of the Energy Community. The assessment and the associated modelling provide a high level indication of the economic benefit of the investigated project proposals, which is then used to rank the different projects. They neither aim to nor can substitute detailed project feasibility studies focusing on the specific details related to every individual project. In this respect the exact implementation potential related to every single project can only be established by a detailed analysis of the project specifics and the legal and regulatory framework in the specific country (including the compli-

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[16] In this context *economic* relates to the point of view of the assessment, in that possible costs and benefits are evaluated for all stakeholders affected by an investment project taking into account the monetary costs and benefits of the investor as well as the costs and benefits to other stakeholders and the society as a whole.

[17] Regulation (EU) No 347/2013 on guidelines for trans-European energy infrastructure and repealing Decision No 1364/2006/EC and amending Regulations (EC) No 713/2009, (EC) No 714/2009 and (EC) No 715/2009.

ance with environmental legislation), which has been outside the scope of this project. The assessment does, furthermore, not imply any conclusion related to pending court cases on individual project proposals. The project funding scheme, the associated equity and debt structure and possible project grants are also not considered in the assessment. These categories are strictly relevant for the financial analysis of the projects but are not relevant for the adopted economic framework of the analysis.

The selection of the criteria has taken into account the criteria defined in the Energy Strategy of the Energy Community, the approach described in the proposed EU regulation[18], other relevant academic and applied studies on the assessment of infrastructure projects, as well as the expert opinion of the members of the consortium. These criteria have been further adjusted and condensed in order to:

- avoid duplications resulting from a strong correlation or an overlapping of criteria
- avoid a discrimination of projects because of differences in the quality and quantity of information submitted by the project promoters
- account for the fact that the analysis is conducted in economic terms and irrespective of any financing arrangements
- avoid a subjective and potentially discriminatory assessment based on a lack of detailed information that can only be provided by a detailed feasibility study or environmental impact assessment
- account for the specific characteristics of the electricity and gas markets within the Energy Community
- ensure the compatibility of the criteria with the proposed assessment framework

Criteria related to investors' perceived commercial attractiveness of specific projects or expected public support (governments or local communities) are not explicitly considered in the economic assessment.

It is therefore possible – if not likely – that the economic assessment of Projects of Energy Community Interest provides different results and ranking than an assessment carried out on national level (only) or by a financial investor.

[18] Regulation (EU) No 347/2013 on guidelines for trans-European energy infrastructure and repealing Decision No 1364/2006/EC and amending Regulations (EC) No 713/2009, (EC) No 714/2009 and (EC) No 715/2009.

4.2 Proposed Project Assessment Criteria

Based on the principles explained above the following criteria have been agreed with the task force to be applied in the project assessment.

Change in Socio-Economic Welfare

The changes of socio-economic welfare are estimated with the net benefits (benefits minus costs) that the individual investment projects (or project clusters) can bring to the Contracting Parties. The costs are determined by the capital and operating expenditures of the project. The socio-economic benefits are estimated and monetized through the project's impact on market convergence / price changes[19], improvement of security of supply (measured through the decrease of energy not supplied) and the reduction of CO_2 emissions. The change in socio-economic welfare therefore provides an aggregated criterion for several costs and benefits that will be quantified and measured within the CBA framework (see section 4.3 for a more detailed explanation). The net benefits are calculated based on electricity and gas market models (see chapter 5 for a more detailed description of the models as well as on the assumptions).

Market Convergence

The benefits of market integration are associated with the aggregate change in the socio-economic welfare of the Contracting Parties as a consequence of the wholesale price change. The latter results from the decreased congestion by the new infrastructure, access to sources with lower production costs and enhancement of competition. Total socio-economic welfare for a modelled period (year) is calculated as the sum of producer surplus, consumer surplus, the profit of the interconnector owners (sum of operating profit from transmission and cross-border auction revenues), and in the case of gas also for the operating profit of storage operators, the profit of traders (from inter-seasonal arbitrage) and the profit of long-term contract holders. These welfare measures for each stakeholder are equally weighted. The selection of the different stakeholders and the definition of their benefits resulting from the implementation of an investment project are further explained in sections 5.1.2 (for electricity) and 5.2.1, 5.2.2 (for gas).

For the purpose of the CBA we calculate the change in aggregate socio-economic welfare for the Contracting Parties of the Energy Community plus Bulgaria, Hungary, Greece and Romania resulting from the implementation of a project in comparison to the socio-economic welfare in the reference case (i.e. the business as usual case without the implementation of the respective pro-

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[19] For example electricity interconnection will reduce electricity prices in the region that imports electricity. Conversely, the exporting region will experience an increase to its electricity price such that the prices in the two regions will tend to converge. Generators in the exporting region will increase in output, while generation in the importing region will decline. Benefits would in this case accrue to consumers in the importing region and generators in the exporting region.

ject). The assessment is carried out with gas and electricity market models (see chapter 5 for a detailed description of the models and the underlying assumptions).

Security of Supply

Security of supply is a fundamental pillar of energy policy, particularly for countries heavily dependent on foreign supplies. Security of supply is also particularly addressed as a key element in the EU legislation[20] as well as the legal framework of the Energy Community.[21] To that end the value of energy security is a crucial element in the assessment of the economic viability of energy projects.[22]

In order to estimate security supply related benefits for electricity investment projects, reference data on non-supplied electricity and information on the contribution of generation, transmission and distribution to outages / non-supplied electricity is collected for the Contracting Parties (provided by Tetratech and from CEER report[23]). Where possible we used results from engineering models to provide additional information on the probability of system disturbances. The reduced volume of non-supplied energy multiplied with estimates of the value of lost load (VOLL) for the Contracting Parties provides an indication of the security of supply benefits due to the new electricity infrastructure.

For gas investment projects security supply related benefits are estimated, following a three step procedure. Security of supply related benefits of a project are measured by the change in economic welfare due to the implementation of the project in the case of a gas supply disturbance. A gas supply disturbance is assessed as a 30% reduction of gas deliveries on the interconnectors from Russia/Ukraine to the region in January for a given year. The economic welfare change due to the realization of the proposed infrastructure is calculated as the difference between the welfare under disturbance conditions with and without this project.

To calculate the project related aggregate change in socio-economic welfare for a given year, we first calculate the weighted sum of project related welfare changes under normal and disturbance

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[20] Provisions and obligations to enhance security of supply are particularly specified in Directive 2005/89/EC of the European Parliament and of the Council of 18 January 2006 concerning measures to safeguard security of electricity supply and infrastructure investment, and Regulation (EU) No 994/2010 concerning measures to safeguard security of gas supply and repealing Council Directive 2004/67/EC.

[21] See for example Articles 29 and 36 of the Treaty establishing the Energy Community and Procedural Act No 2008/02/MC-EnC of 11th December on the Establishment of a Security of Supply Coordination Group (11 Dec 2008)

[22] Energy security possesses public good characteristics (incomplete/asymmetric information and grid externalities) and the market may fail to provide the right level of security. Externalities or, alternatively, the willingness-to-pay for security not satisfied through the market need to be identified, quantified, and translated in monetary terms.

[23] CEER: Fifth Benchmarking Report on the Quality of energy Supply 2011.

conditions. Weights are the assumed probabilities for normal and disturbance scenarios to occur (90% versus 10%).

Reduction in CO_2 Emissions

Within the CBA the sustainability benefits are estimated by the impact of projects in changing greenhouse gas emissions. For the electricity network and generation projects this is done by directly estimating the changes in the regional electricity production patterns and the related CO_2 emissions.

In the case of gas infrastructure projects, the project related environmental benefit is estimated by multiplying the corresponding change in the countries' CO_2 emissions by an exogenous carbon value (based on the EC Low carbon roadmap values).

Enhancement of Competition

In some circumstances the price reductions caused by an interconnection or generation project may be driven not only by decrease of congestion and introducing sources with lower production costs, but can also occur due to the additional enhancement of competition. The latter does not affect the production costs but just transfers monopoly rents (the price-mark-ups over production costs), gained by producers / importers / traders (due to insufficient competition) to consumers.

For example a new transmission project can enhance market competition by both increasing the total supply that can be delivered to consumers and the number of suppliers that are available to serve load in a broader regional market. The addition of new generation capacity, can increase the level of forward energy contracting, and can also significantly reduce the ability of suppliers to exercise market power. LNG may also play a role of limiting market power of incumbents in countries where it can be feasibly transported to. Finally, storage facilities can also facilitate competition. Via access to storage, market players can gain additional flexibility and reduce their dependence on procuring gas at moments of peak demand.

As the market models used in the CBA assume competitive market equilibrium, we suggest incorporating an explicit additional criterion on enhancement of competition.

System Adequacy

An electricity transmission project could potentially enhance system reliability by reducing loading on parallel facilities, especially under outage conditions. A new electricity transmission facility can provide more options for the maintenance of outages, provide load relief for parallel facilities, and provide additional flexibilities for switching and protection arrangements. Moreover it can potentially increase reserve sharing and firm capacity purchases, and therefore decrease the amount of power plants that have to be constructed in the importing region to meet reserve adequacy requirements.

Similarly at the regional area level, the expansion of gas interconnection may also improve the overall system reliability and reduce the loss-of-load probability. The projects may also provide increased operational flexibilities for the TSOs and thus further enhance the reliability of the grid.

Electricity generation projects – in case they do not just replace existing power plants – may directly increase the reserve margin by providing additional generation capacities that can be particularly used in peak demand situations or when generation capacities are not fully available. The latter can for example be related to weather conditions (hydro, wind and solar generation)[24] or to unplanned or planned outages of power stations (e.g. revisions). When assessing the impact of wind power plants on system adequacy, it has also to be taken into account that wind power plants may increase balancing and reserve needs since production is not only intermittent but may also not coincide with demand.

Although CBA incorporates aspects of security of supply we suggest incorporating an explicit structural criterion to account for the system adequacy impact.

Progress in Implementation

This criterion aims to test the preliminary implementation potential and favours projects which have a clear implementation plan and/or have already commenced their preparatory activities. As already explained the exact implementation potential related to every single project can only be established with detailed analysis of the project specifics and the legal and regulatory framework in the specific country. At this stage the suggested criterion can only provide an early indication based on the information provided in the questionnaires for each project. Furthermore, as explain earlier in the report, the progress in securing the financing for a specific project and the commercial strength of a project have not been considered in our assessment.

Support of renewable energy sources

As mentioned above, the environmental impact of an individual project on the reduction of CO_2 emissions is already considered in the CBA.[25]

Since the promotion of renewable energy is one of the core areas of the Energy Treaty we propose to apply a separate criterion that looks at the contribution of the power plant projects to reach RES target levels and at the flexibility of different generation technologies to provide support to the integration of (intermittent) RES production. Electricity generation projects such as

[24] Throughout the project assessment and the market models we therefore apply availability factors for the generation capacities of all existing as well as the proposed hydro and wind power plants in the region, taking into account that due to weather conditions generation capacities can on average not be utilised to the full extent.

[25] Additional environmental impacts such as the impact of a project or project cluster on hydrology, soil, fauna or flora can only be assessed in a detailed project specific environmental impact assessment, which is outside the scope of this study.

hydro power plants or wind power farms directly contribute to the development of renewables. On the other hand the expansion of RES generation requires additional balancing support by conventional power stations in order offset the intermittency effects.[26]

In the case of for electricity or gas transmission projects such direct contribution on the development of RES cannot be easily observed. None of the hydro and wind power projects are directly associated with the proposed transmission projects. Similarly none of the proposed transmission projects is specifically constructed to evacuate RES generation (e.g. large scale offshore wind capacities). For this reason we suggest applying the criterion on RES support to electricity generation projects only.[27]

4.3 Economic Cost-Benefit Analysis

A cost-benefit analysis (CBA) is a common tool used to provide criteria for investment decision making by systematically comparing the benefits with the costs over the life span of an investment project. It is widely applied on the societal level (collective impact) as well as the company (i.e. the investor's) level (individual impact). Whereas in the private sector, appraisal of investments and financial analysis of company’s costs and benefits takes place against maximizing the company’s net benefits, the economic CBA focuses on the overall long-term costs and benefits taking a broader perspective and including externalities, such as environmental and reliability impacts, to broader groups of stakeholders. This gives the economic CBA a wider economic character with the objectives of maximizing welfare of a society (within a country or in this case the Contracting Parties of the Energy Community) as a whole.

CBA is also foreseen as a central element for both electricity and gas by the proposed EU Infrastructure Regulation[28]. Within the proposed EU Regulation it is planned that among others a system-wide CBA will have to be carried out for the identification of Projects of European Interest (PCI) and for the allocation of costs between different jurisdictions affected from an investment. The specific details for such a CBA on EU level are currently still under discussion.

ENTSO-E and ENTSO-G are currently developing such a framework for a cost benefit analysis, assessing costs and benefits – and the related indicators – of electricity and gas network develop-

[26] These effects are simply caused by meteorological conditions such as solar irradiation levels and wind speed. Depending on the meteorological conditions the electricity production volumes vary overtime.

[27] We recognise that the situation may change in the future and suggest monitoring the RES development in the Energy Community and eventually consider extension of the criteria towards transmission projects when conducting future assessments of PECIs.

[28] Regulation (EU) No 347/2013 on guidelines for trans-European energy infrastructure and repealing Decision No 1364/2006/EC and amending Regulations (EC) No 713/2009, (EC) No 714/2009 and (EC) No 715/2009.

ments respectively.[29] This framework will be applied for the ten-year network development plans (TYNDP) 2014 (electricity) and 2015 (gas) respectively, and for the future selection of candidate projects of common interest (PCI).

In our project assessment the CBA consists of the following main steps:

- Selection and definition of input data and model parameters
- Definition of costs and benefits
- Assumptions on future development of input data and definition of expected values
- Calculation of the total net economic benefit for different scenarios
- Sensitivity analysis of the results in order to determine critical input variables

For the purposes of this study the economic CBA is carried out with the application of two market models: the European Electricity Market Model (EEMM) and the Danube Region Gas Market Model (DRGMM).[30] Descriptions of the models are contained in chapter 5 of this report. The project costs (incremental cost) include the direct investment and operating costs of each project, after the verification checks explained earlier in the report. The project benefits (incremental benefits) are estimated and monetized (as explained in section 4.2 above) by their contribution to regional market integration, security of supply and the reduction of CO_2 emissions. The change in socio-economic welfare is calculated by summing-up all project benefits and costs.

Investment Appraisal Methods

There are several quantitative methods to calculate the net economic benefit (or the change in socio-economic welfare) of infrastructure projects, which are based on theory of dynamic investment appraisal. The most common forms apply the Net Present Value (NPV), the Internal Rate of Return (IRR) approach or the benefit/cost ratio.

In the context of an economic CBA the economic NPV discounts the incremental costs and benefits of an infrastructure project arising to all groups of stakeholders (consumers, generators, TSOs) back to their present values applying an appropriate social discount rate.[31] When deciding between different alternative infrastructure projects, the one with the highest NPV – providing the largest net benefit – should be selected. As explained earlier the analysis applies an economic

[29] A first draft "Guideline for Cost Benefit Analysis of Grid Development Projects" has been published by ENTSO-E in December 2012.

[30] A similar approach will be applied for oil infrastructure projects. However oil infrastructure projects will only be assessed within a CBA framework.

[31] All costs and benefits are discounted to the present value by applying a pre-determined social discount rate, so that they can be meaningfully used for comparison and evaluation purposes. The discount rate reflects the time value of money as well as the risk linked to future costs and benefits.

framework, hence the economic NPV is different from the financial NPV commonly applied by a financial investor. In the financial investment analysis the NPV takes all cash flows associated of a project and discounts them to their present value by using an appropriate interest rate (sometimes called the cost of capital or the cost of finance). The (financial) NPV applied by private investors therefore calculates the net benefits for the company or the investor carrying out the investment, whereas the economic NPV calculates the net benefits arising to all relevant stakeholders located in a wider geographic area (here the Energy Community).

The economic IRR describes the discount rate at which the present value of the projects costs equals the present value of the projects benefits; it is therefore closely related to the economic NPV. In this case the project with the highest economic IRR is representative when deciding between different alternative infrastructure projects.

A third approach is the benefit/cost ratio. This indicator calculates the project's present value as a ratio of the project's benefits in relation to the project's costs. When comparing different projects, the one with a higher benefit/cost ratio should be selected.

While the IRR tends to favour smaller projects, the NPV does directly calculate the net welfare effects arising from the implementation of an individual project. Given the wider application of the NPV in practice and its advantage in calculating the regional impact of an investment project, we do therefore apply the NPV approach when calculating the change in social welfare within the economic CBA.

Within the project assessment we apply the same social discount rate for all projects (and project clusters). Based on the existing practices in the EU,[32] we set the discount rate equal to 5%.

Perspective of the Analysis and Distributional Effects

The economic cost-benefit analysis studies the impact on the aggregated welfare of the parties affected by the project. The costs and benefits of an investment project may however be unevenly distributed between different stakeholders and across different states.

Clearly costs and benefits directly affect the project developers carrying out the investment. But costs and benefits also affect (indirectly) other market participants, such as other network operators, generators, suppliers or customers and the society as a whole. Different stakeholders are also likely to benefit to different extents from a specific investment project. Costs might for example only be borne by one market participant (e.g. the investor), whereas benefits might be split across a larger number of market participants (network operators, suppliers, customers, etc.). Costs might also mostly arise in the short-term, whereas some benefits of the investment might only

[32] See for example: European Commission, Directorate General Regional Policy (2008): Guide to Cost Benefit Analysis of Investment Projects; and European Commission (2009): Commission Impact Assessment Guidelines.

occur in the long-term. Furthermore extensions of electricity interconnections between two countries may result in reductions of electricity wholesale prices in one country and increases in another country.

We address in our analysis the distributional effects on stakeholders and regions / countries. The benefits per stakeholder groups (consumers, producers, TSOs, etc.) are aggregated by an equal weighting scheme (see also chapter 5). The CBA studies the total regional impact of each proposed investment project for the Contracting Parties of the Energy Community and the neighbouring countries Bulgaria, Hungary, Greece and Romania as defined by the Task Force at the March 14 meeting in Vienna.

It should be emphasised that the objective of this assessment – and therefore the calibration of the economic CBA – consists in deriving a ranking of all eligible projects. Accordingly the results should be understood as an indication on whether the implementation of one project is more or less advantageous than the implementation of other projects. Any decisions of regulatory nature on the cost allocation of the investment projects between Contracting Parties will require further analysis.

4.4 Multi-Criteria Assessment

The results of the CBA are complemented by the use of additional criteria that are relevant for the project assessment but are not incorporated within the CBA. For the overall integration of the CBA results and the additional criteria we apply the AHP (Analytic Hierarchy Process) technique.

The analytic hierarchy process (AHP) is a structured technique for organizing and analysing complex decisions. The methodology is usually applied when investment projects have to be assessed by using a set of multiple criteria. This methodology allows comparing the different criteria to each other in a rational and consistent manner.

In the context of our work we apply the AHP approach to determine adequate weights of the selected assessment criteria and to design a scoring system.

In practical terms the assessment consists of the following steps:

- Selection of criteria (the results of the CBA – i.e. the change in socio-economic welfare – is included as one of the criteria) and specification of indices that define each criterion
- Definition of a scoring system to measure the fulfilment of each criterion by each investment project
- Setting weights of the selected criteria, based on a pairwise comparison of the relative importance of a criterion against any other criterion
- Calculation of the total score for each project as the sum of the weight of each criterion multiplied with the score for each criterion and establishment of the ranking

Our motivation for the selection of additional criteria which have been agreed with the Task Force is described in section 4.2.

Scoring System

In order to measure the fulfilment of each criterion by each investment project, specific indicators are defined for each criterion. We allocate to the indicators scores reflecting the ability of each project to fulfil the respective criterion. Accordingly we attribute minimal points (one) to a project when the degree of fulfilment is low and maximal points when the degree of fulfilment is high (five). Scores between the minimum and the maximum values are allocated by using linear interpolation. The application of the indicators is explained below.

Change in Socio-Economic Welfare

As described earlier in the report we use the economic NPV as indicator for the incremental change in socio-economic welfare. The project with the lowest economic NPV in each category (electricity generation, electricity infrastructure, gas infrastructure) receives the minimum score of 1 and the project with the highest economic NPV receives the maximum score of 5. All other projects receive a score between the minimum and maximum scores according to the value of their economic NPV. Since the economic NPV is always calculated in relation to a reference scenario that reflects the state without the implementation of the specific investment project, the economic NPV accounts directly for the project incremental impact on the socio-economic welfare.

Enhancement of Competition

The competition enhancement is approximated with the change of market concentration measured with the Herfindahl-Hirschman Index (HHI). The HHI equals the sum of the actors' market shares squared. The higher the index, the more concentrated the market. In order to measure the incremental impact of an investment project, the HHI needs to be calculated two times, with and without the project. The project with the highest index change receives the maximal score of 5 and the project with the lowest index change receives the minimal score of 1. Scores between the minimum and maximum index change are allocated using linear interpolation.

For electricity projects the HHI is calculated by summing the squares of the individual market shares of all market participants. For electricity generation the HHI is based on the generation capacities in the respective countries; and for electricity infrastructure the HHI is calculated based on the interconnection and generation capacities in the respective countries. Whereas all existing and proposed generation capacities have been assigned according to the ownership of the power plants,[33] electricity interconnection capacities have been considered as independent players each. For gas projects a simplified HHI (Diversity Index) of system entry, production and storage capacities in the respective countries is applied.

System Adequacy

To measure the additional impact on system adequacy – explicitly accounting for the structural change of capacities by providing an additional source of supply[34] – we suggest applying a system adequacy index. It compares the available production and interconnection capacity with the national system peak load.

For electricity the index is defined as (generation capacity + interconnection capacity – system peak demand) / system peak demand. The generation capacity is measured with the installed net capacity (after auxiliary needs) adjusted to account for the potentially limited availability of intermittent and hydro generators. The interconnection capacity is set equal to the net transfer capacity (NTC) applied in the modelling process. The system peak demand is the highest hourly demand in the respective year.

For gas the adequacy index is defined as (entry capacity + local production capacity + storage extraction capacity + LNG extraction capacity – system peak demand) / system peak demand. The entry capacity is the maximum entry capacity of the international interconnection points in the country. The storage extraction capacity is the maximum extraction capacity of the storage facilities and the LNG extraction capacity is the maximum extraction capacity of the LNG facilities. The system peak demand is the highest daily domestic demand in the respective year.

We calculate the system adequacy index two times, with and without the project (or project cluster). In this way we measure the incremental impact of the project on the system adequacy index. The index change is measured in the year of the project commissioning.

The project with the highest index change receives the maximal score of 5 and the project with the lowest index change receives the minimal score of 1. Scores between the minimum and maximum index change are allocated using linear interpolation.

[33] For capacities of hydro and wind power plants availability factors are applied, considering that the production of these plants will depend on the weather conditions. Where power plants are owned by different companies, market shares have been allocated to each of the owners based on their shares in equity. Also different companies owned by the same parent company have been attributed accordingly.

[34] It can be argued that an ideal quantitative model with integrated network, perfect planning assumptions and very robust estimation of value of unsupplied energy, may completely internalize and monetize the security of supply benefits.

Implementation Progress Indicator

The progress in the implementation of each project is tracked by the information provided in the questionnaires with respect to the following development phases: [35]

- No pre-feasibility study carried out or no information provided
- Pre-feasibility study
- Feasibility/FEED study
- Final Investment Decision (FID)
- Permitting
- Construction

Based on the response provided in the questionnaires we allocate scores whereas the maximum score (e.g. five points) is granted to projects that have reached a significant stage of progress in realisation and have already started the construction. The projects that are in a rather early stage, e.g. have not undergone a pre-feasibility study, receive the minimum score (e.g. one point).

RES Support Indicator

The RES support indicator assesses the contribution of each proposed electricity generation project for the RES development by either directly increasing the RES market share or by provision of flexibility of conventional generation. The maximum score is granted to RES generation projects such as hydro or wind power projects as well as for pumped storage hydro power plants. The scores granted to the conventional power plants are lower and are differentiated by technology: combined heat and power plants (CHP), coal-fired power plants and lignite power plants.

Determination of Weights

The weights for each criterion are set according to the AHP approach. We conduct a pairwise comparison of the proposed criteria through a numerical rating scale from 1 to 9. This scale expresses the relative importance of one indicator over another (conducted separately for each group), whereas the reciprocal of this value is assigned to the other criterion in the pair. The weights of each criterion are then calculated using the eigenvectors.

[35] In some cases it may also be the case that the final investment decision is only made after all necessary permits have been granted. Both sequences of steps have been assessed in the sensitivity analysis; however, given the small number of projects in an advanced implementation state, no impact on the ranking of the projects could be observed.

Table 4-1: Scale for the measurement of the relative importance of criteria

Scale	Relative Importance
1	Both criteria are equally important
3	Criterion A is slightly more important than criterion B
5	Criterion A is more important than criterion B
7	Criterion A is much more important than criterion B
9	Criterion A is absolutely more important than criterion B

The pairwise comparison has been carried out separately by the experts of the consortium partners (DNV KEMA, EIHP and REKK) and a single weight for each criterion has been calculated by equally weighting the assessments of each consortium partner. The suggested weights for the different groups are presented below. Since oil infrastructure projects are not assessed within the multi-criteria framework no weights are provided for oil infrastructure projects in the following tables.

Table 4-2: Criteria weights for electricity generation projects (or project clusters)[36]

Criteria	Weight
Socio-economic welfare (Results of the CBA)	47%
Enhancement of Competition	19%
System Adequacy	17%
Facilitation of RES	6%
Progress in Implementation	11%

[36] As we apply for electricity generation an additional criterion (facilitation of RES) in the assessment, the weights for the other four criteria also applied in the assessment for electricity and gas infrastructures are slightly lower for electricity generation.

Table 4-3: Criteria weights for electricity infrastructure projects (or project clusters)

Criteria	Weight
Socio-economic welfare (Results of the CBA)	48%
Enhancement of Competition	20%
System Adequacy	18%
Progress in Implementation	14%

Table 4-4: Criteria weights for gas infrastructure projects (or project clusters)

Criteria	Weight
Socio-economic welfare (Results of the CBA)	48%
Enhancement of Competition	20%
System Adequacy	18%
Progress in Implementation	14%

Calculation of Total Scores and Final Ranking

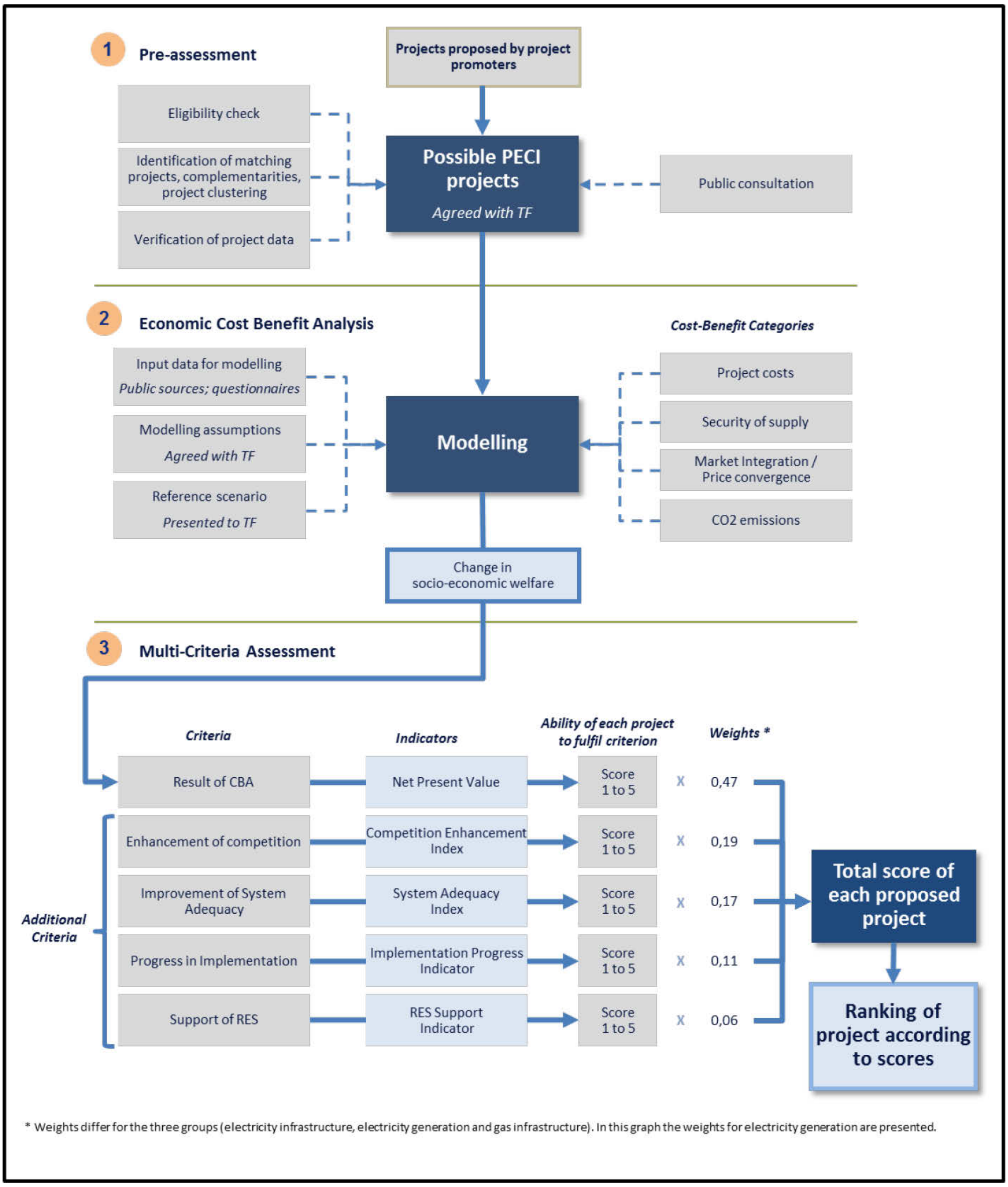
The total score for each project is calculated as the sum of the weight of each criterion multiplied with the score for each criterion. Then we rank the projects according to the total score. The ranking is prepared separately for the project categories: electricity infrastructure, power generation and gas infrastructure.

The following graph summarises the different steps of the project assessment methodology described above.

The different steps of the project assessment methodology have been outlined in an interim report and two short summary documents[37] and presented to, discussed with and agreed by the Energy Strategy Task Force in four meetings.[38]

[37] The Discussion Paper on project assessment methodology criteria and weights has been distributed to the Energy Strategy Task Force per e-mail on 13 February 2013, the Interim Report on 2 April 2013, and an Explanatory Note on 22 March 2013.

Figure 4-1: Proposed Project Assessment Methodology to be conducted for each investment project



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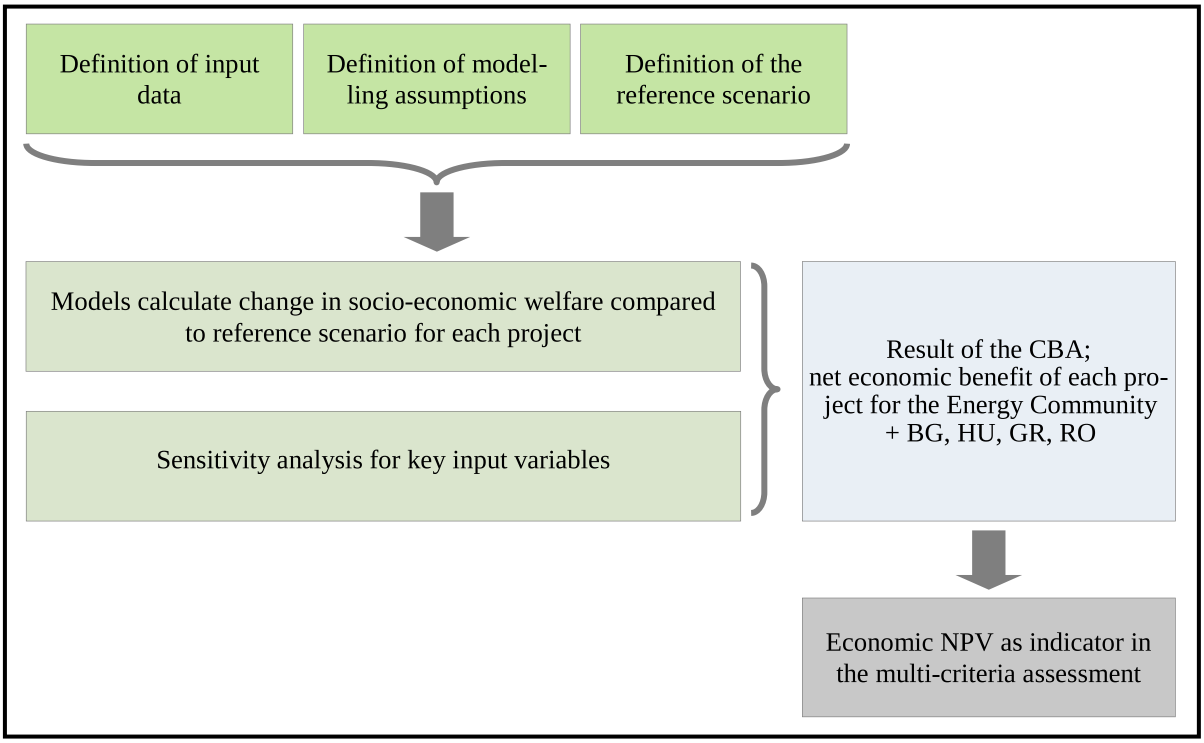
[38] These four Energy Strategy Task Force meeting took place on 25 January, 13 March, 14 May and on 29 May 2013.

5 APPLICATION OF THE PROPOSED METHODOLOGY

This chapter provides further details on the economic market models used in the economic CBA to monetize the project-driven change in socio-economic welfare for the region of the Energy Community and Bulgaria, Hungary, Greece and Romania. The change is determined against a reference scenario (step 2 in the summary chart 4.1 shown above) and by using electricity and gas market models. We apply two different market models, one for the electricity infrastructure projects (EEMM) and one for the gas infrastructure projects (DRGMM).

The major properties of both models and its major assumptions have also been outlined in the Interim Report and presented to the Energy Strategy Task Force.[39] In this section we provide an overview of the general model properties, major input parameters, data sources and assumptions made.

Figure 5-1: Major elements of the market modelling



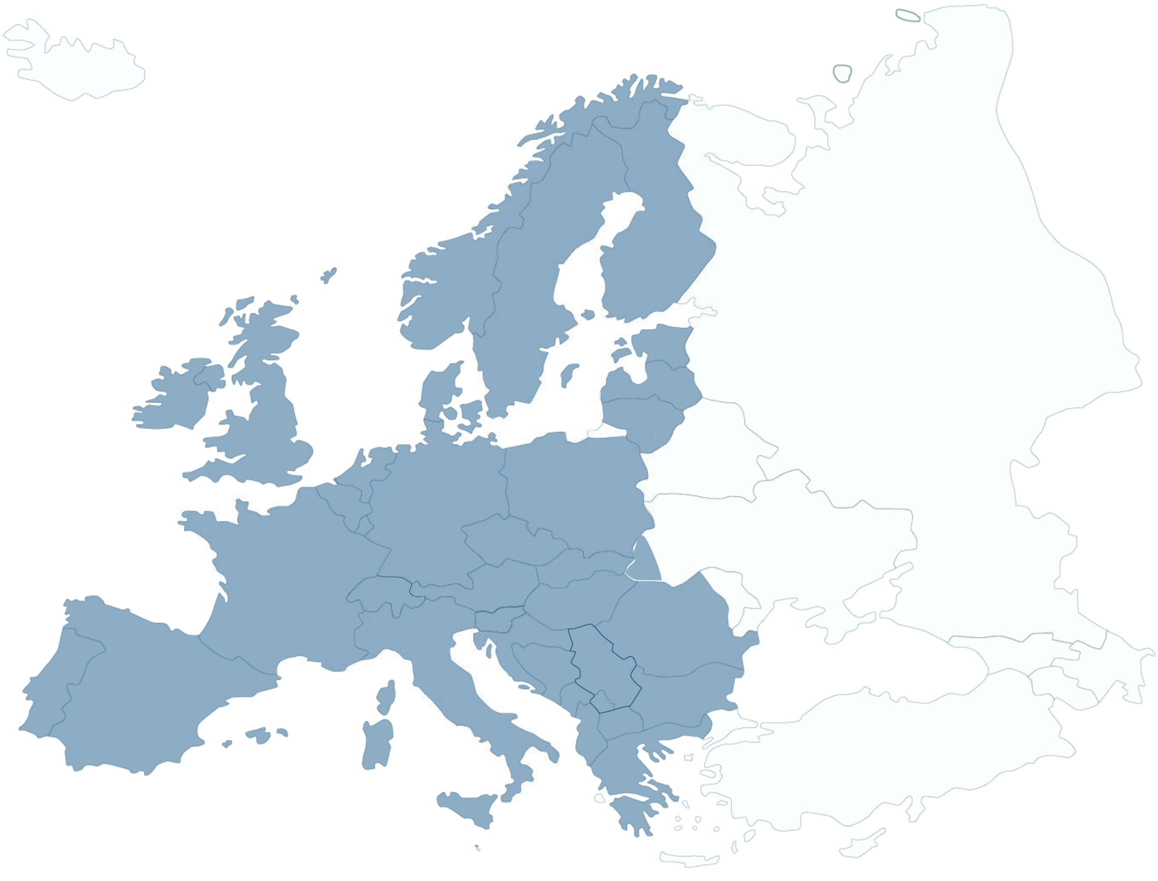
[39] We refer here to the meetings of the Task Force that took place on 25 January, 13 March, 14 May and on 29 May 2013.

5.1 Description of the European Electricity Market Model

5.1.1 Modell Overview

The European Electricity Market Model (EEMM) is applied for the CBA of the proposed electricity generation and electricity infrastructure projects. The model assumes perfect competition amongst market participants and geographically covers the whole EU as well as the Contracting Parties of the Energy Community (except the non-ENTSO-E part of Ukraine), as illustrated in the following figure.

Figure 5-2: Geographical coverage of the European Electricity Market Model *



*Coloured countries are modelled in EEMM.

The model simulates short-term market competition (e.g. day-ahead) based on SRMC (short-term marginal cost) of the generating units. The SRMC comprise of three main components: fuel costs, variable OPEX and costs of purchasing CO_2 emission rights (in countries which are obliged to follow the emission trading scheme).[40]

There are three types of market participants in the model: producers, consumers, and traders. All of them behave in a price-taking manner, i.e. they take the prevailing market price as given and cannot influence it.

Consumption is represented in the model in an aggregated way by price-sensitive demand curves. This relationship is approximated by a downward sloping linear function, where demand response is highly inelastic.

Cross-border trade takes place on capacity constrained interconnectors between neighbouring countries, where each country is represented as one node. Cross border capacities are represented by net transfer capacity (NTC) values.

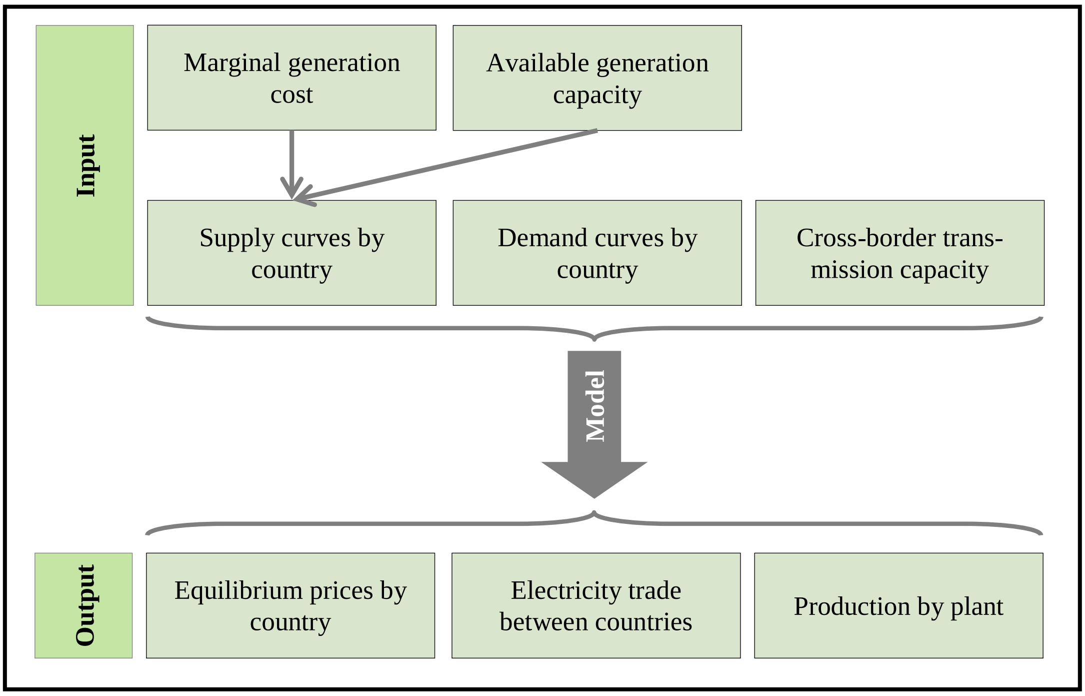
The model establishes a simultaneous and unique equilibrium in all investigated markets with the following properties:

- Producers maximize their short term profits given the prevailing market prices
- Total domestic consumption is given by the aggregate electricity demand function in each country
- Electricity transactions (export and import) occur between neighbouring countries within the limits of available transmission capacity. In the absence of transmission constraints the model generates uniform electricity price within the unconstrained area
- Energy produced and imported is in balance with energy consumed and exported

The following figure illustrates the model inputs and outputs for electricity.

[40] For the non-EU countries that do not participate in the emission trading scheme, such as the Contracting Parties of the Energy Community, CO_2 costs are not included in the marginal generation costs and therefore addressed separately (as discussed further below).

Figure 5-3: Input and output data in the electricity market model



5.1.2 Welfare in the Electricity Market Model

Total Surplus

In the electricity market model, as in any economic model, *welfare* (or *total surplus*) is defined as the difference between what consumers are willing to pay in the wholesale market for electricity and the short-run variable cost of generation and transmission.

In the electricity market model, the total surplus is, depending on market prices and transmission conditions, shared between consumers, producers, and TSOs in the form of *consumer surplus*, *producer surplus* (or short-run profit, excluding fixed costs), and *congestion revenue*. Their relationship is shown in the Table below.

Table 5-1: Relationship of welfare components in the electricity market model

Welfare component	Verbal definition				
Consumer surplus	what consumers are willing to pay	minus	what consumers have to pay		
Congestion revenue	what consumers have to pay	minus	what producers receive	minus	what it costs to transmit
Producer surplus	what producers receive	minus	what it costs to produce		
Total surplus (welfare)	what consumers are willing to pay	minus	what it costs to produce	minus	what it costs to transmit

Consumer Surplus

Consumer surplus[41] is the difference between what consumers are willing to pay for electricity (consumer value) and what they actually pay. The willingness to pay is embodied in the demand function which is defined hourly for the modelled markets. The consumer value at a certain level of consumption is given by the area under the demand function. This value is netted by the consumer payment, the market price multiplied by the quantity consumed, to arrive at the consumer surplus.

Producer Surplus

Producer surplus is the difference between what generators receive for electricity in revenues and what it costs them to produce it in the short-run. Revenues are the product of the market price prevailing in the generators' location and the amount of energy sold by the plant. The short-run variable costs include fuel costs, the price of CO_2 allowances, and a variable OPEX component. The difference of these revenues and costs measures the incremental profit that a producer gains by selling into the market.

Congestion Revenues

We assume no internal congestions within the national markets, and hence a single wholesale price prevails for consumers and producers within the same locality. As a result, there are no intra-market congestion revenues. It is possible, however, that inter-market constrains occur when

[41] The economic terminology often distinguishes between gross and net consumer surplus. The former denotes the total value of consumption, without taking into account the amount paid for the product. We use the term consumer surplus in the net sense.

the capacity of the interconnector between two neighbouring national markets is insufficient to accommodate all commercially attractive cross-border exchanges. In this case, two price market areas will appear: low and high price market area. Traders buying in the low-price market area and selling into the more expensive one would earn the gains from the price differences netted of the transmission cost. On the other hand, traders will also compete with each other for this margin, and hence will be prepared to pay up to the same amount to gain access to the interconnection capacity (bidding in capacity auctions).[42]

The interconnection capacity can be directly allocated on the basis of the traders' bids into the electricity market situated on the other side of the interconnector, where they compete with local bids. The interconnector capacity will be allocated to the highest bids until it is full. The possibly remaining price difference between these bids over the interconnector and the bids from the local generators is retained by the TSO as congestion rent from its "brokering" activities.[43] This is the approach used in the model.

5.1.3 Modelling Inputs and Data Sources

Electricity Demand Growth

The following table shows the present and forecasted consumption levels based on the assumed growth rates for the Contracting Parties used in the latest Energy Community Strategy (2012). For Kosovo* and Serbia updated values have been received in March 2013 and consequently used for the consumption forecast.

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[42] One way to think about cross-border transmission costs is to include the expected margin that traders would require to carry out a cross-border deal. Presumably, they would compete away any price difference in excess of this margin in a well-run capacity auction scheme.

[43] This reflects the logic of the implicit capacity auctions (e.g. market coupling). Under such auctions, congestion revenues are determined in the same way automatically, without a cross-border capacity auction.

Table 5-2: Average yearly electricity consumption and the growth rates of electricity consumption 2012-2020

Contracting Party	2012, GWh	2020, GWh	Average yearly growth rate between 2012-2020 in %
Albania	7,855	10,476	3,7%
Bosnia and Herzego-vina[1]	11,575	15,500	3,7%
Croatia	17,440	20,938	2,3%
FYR of Macedonia	8,777	10,573	2,4%
Kosovo*[2]	4,986	6,493	2,8%
Moldova[3]	4,478	6,225	4,2%
Montenegro	4,262	5,134	2,5%
Serbia[2]	37,910	42,814	1,5%
Ukraine (Bursthyn area)[3]	4,446	4,820	1.1%

1 For Bosnia and Herzegovina (BH) the estimated growth rate by the TSO is used.

2 Serbia and Kosovo* communicated new values in March 2013

3 For Ukraine, only the Burshtyn area is modelled. Moldova was not modelled.

Installed Capacities in Contracting Parties

The following table shows the installed capacity values used for the base year 2012 for modelling of the electricity markets. For Albania, Kosovo* and Serbia updated values have been received in March 2013 and applied in the modelling.

Table 5-3: Net installed capacities (MW) in 2012

Contracting Party	Coal	Natural Gas	Oil	Nuclear	Hydro	RES	Total
Albania[1]	0	0	9	0	1,480	0	1,577
Bosnia and Herzegovina	1,855	0	0	0	2,188	46	4,089
Croatia	330	999	786	398	2,191	180	4,884
FYR of Macedonia	818	280	210	0	538	0	1,846
Kosovo*[1]	1,288	0	0	0	46	1	1,336
Montenegro	210	0	0	0	676	0	886
Moldova[2]	0	380	0	0	16	0	396
Serbia[1]	3,914	336	0	0	2,883	3	7,136
Ukraine (Bursthyn area)[3]	2,175	0	0	0	27	0	2,202

[1] Albania, Serbia and Kosovo* communicated new values in March 2013.

[2] Source of data for Moldova (2011) is the Energy Community Secretariat Annual Report on the Implementation of the Acquis under the Treaty Establishing the Energy Community 2012. Moldova was not modelled.

[3] For Ukraine, only the Burshtyn area is modelled.

The new installed capacities for the period of 2012-2020 and the decommissioning rates are taken from the Energy Community Strategy (excluding potential PECIs), while own estimations are used for the rest of the modelled countries.

Carbon Values Applied in the Modelling and CBA Calculation

For the CO_2 price, we use estimations of the European Commission (EC) for the countries participating in the Emission Trading Scheme (ETS).[44] The EC estimates a price of 16.5 €/tCO_2eq carbon values for 2020 and a price of 36 €/tCO_2eq in 2030. Starting from the present level of 3.6 €/tCO_2eq, we assume a linear growth for the modelling period of 2012-2021.

[44] European Commission Impact Assessment to the Roadmap for moving to a competitive low carbon economy in 2050, SEC(2011) 288 final

Infrastructure Assumptions

The starting values of the net transfer capacity (NTC) of the interconnectors in the EU member countries are based on ENTSO-E data. For the Contracting Parties we apply the values reported in the Energy Community Strategy. The extensions of transmission interconnection capacity are based on the TYNDP (excluding potential PECIs in the reference scenario) for both Contracting Parties and EU member countries.

The proposed interconnection projects are incorporated into the modelling process with their NTCs. Where the project promoters do not provide these values, we approximate the NTC by using the total transfer capacity (TTC) adjusted by the NTC/TTC ratio for the respective country or region.

Fuel Price Assumptions

The following two tables summarise the various sources and actual values for the fuel prices applied in the model.

Table 5-4: Source of information for fuel prices in the EEMM model

Fuel type	Information source
Oil price	Based on US Energy Information Administration (EIA), International Energy Agency (IEA) and Economist Intelligence Unit (EIU) forecasts.
Natural gas price	West-European gas price: Based on EIU and IEA other forecasts East-European gas price: Mix of the oil-indexed gas price and West-European gas price. Natural gas prices are harmonised with those values applied in the gas model.
Coal price	Hard coal price: ARA price is used for setting the initial level. Future coal price forecasts are based on EIU and IEA forecasts. For the lignite price 70% of the hard coal price is used, whereas in case of Serbia 50%.
Nuclear	Fuel price is based on research reports.
Heavy fuel oil, Light fuel oil	Indexed to crude oil price

Table 5-5: Actual values for fuel prices in the EEMM model

	Crude oil price (in $ 2011 / bbl)	Hard coal price (in € 2011 / GJ)	Lignite price (in € 2011 / GJ)	West European natural gas price (in € 2011 / GJ)	South-East European natural gas price (in € 2011 / GJ)
2012	107.7	3.13	2.19	7.35	12.30
2013	96.8	2.74	1.92	7.75	10.70
2014	97.0	2.98	2.08	7.54	10.70
2015	95.9	3.24	2.27	7.59	10.60
2016	97.0	3.27	2.29	7.23	10.70
2017	99.1	3.30	2.31	7.09	11.00
2018	101.2	3.34	2.33	8.16	11.20
2019	103.4	3.37	2.36	8.24	11.50
2020	105.6	3.40	2.38	8.31	11.70
2021	107.8	3.41	2.38	8.37	12.00

5.1.4 CBA Assumptions Using Modelling Results

In the economic CBA analysis three main impact areas are monetised: change in socio-economic welfare, reduction of carbon emissions and security of supply (SoS) benefits caused by the implementation of the new PECI projects.

The (aggregate) socio-economic welfare is calculated as the sum of producer, consumer surplus and congestion surplus (earned by the owners the interconnectors), weighted equally. For the purpose of the economic CBA we calculate the change in the socio-economic welfare for the Contracting Parties resulting from the implementation of a project.

Carbon emission impact is monetised by the model as the corresponding change in the countries' CO_2 emission multiplied by an exogenous carbon value (based on the EC Low carbon roadmap 2050 values). Non-EU countries emissions are not taxed for the modelling of the competitive outcome. However to account for the carbon impact in the economic CBA, CO_2 emissions for the different types of power production are calculated, monetised by the carbon value and integrated into the analysis. For EU member states the costs of CO_2 emissions are directly internalised in the market model and effectively increase the SRMC of the power plants.

The impact of each proposed electricity project on security of supply is calculated outside of the model, using exogenous estimates for non-supplies electricity and the probability of resulting outages. We use reference data on non-supplied electricity and information on the contribution of generation, transmission and distribution to outages / non-supplied electricity for the Contracting

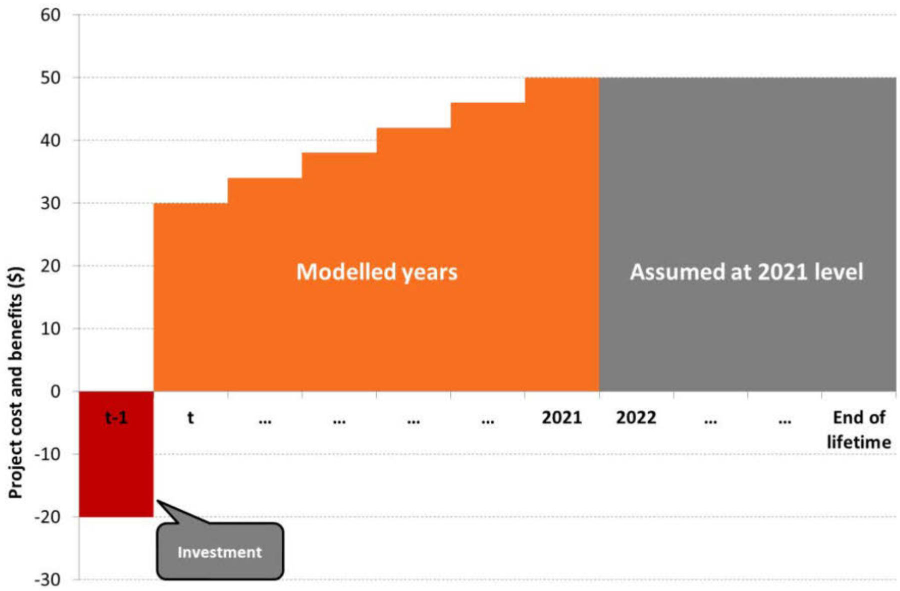
Parties. The physical values are monetised with a proxy of the VOLL (Value of Loss Load) defined as GDP/electricity consumption for the Contracting Parties.

The impact of each assessed proposed is measured against a reference case, where we add the investigated projects one by one, or by groups if they are complementary projects.

We model every year in the period of 2012-2021 and calculate the annual project impact. After 2021 the costs and benefits are maintained at the level of 2021 till the end of the project lifetime. Investment costs occur one year before the actual commission date.

The following figure illustrates the typical cash flow assumed for the modelling of an investment project.

Figure 5-4: Projects costs and benefits for NPV calculations



The sample output of the modelling of electricity generation projects' is summarized in the following table.

Table 5-6: Sample modelling results for electricity generation projects

						Discounted values							
PECI Code	Short description	Year of commissioning	Lifetime	Capacity	Investment cost	Consumer surplus change	Producer surplus change	Rent change	Welfare change due to price changes	CO2 benefit	Total social welfare change	Investment cost	NPV
			Year	MW	m€	m€	m€	m€	m€	m€	m€	m€	m€
						a	b	c	d=a+b+c	e	g=d+e	h	j=g-h
EGXX	HPP	2020	50	600	xxx	20	-558	-70	-608	0	-620	xxx	-928,457
EGXX	TPP	2019	50	700	xxx	4533	-1538	54	3049	-1215	1834	xxx	815,6995
EGXX	TPP	2020	50	400	xxx	1940	-550	3	1393	-530	863	xxx	415,3112

The table shows that larger sized thermal plants generally exhibit higher NPV scores, due to their size and higher impact on the prices in the host and neighbouring countries (the last two examples in the table). Producer surplus decreases because of lower wholesale prices and the significant CO_2 costs. However these negative effects are outweighed by increase in consumer surplus due to the lower wholesale price. In the first example the hydro project does not bear CO_2 emission cost and does not bring substantial price reductions in the region. Nevertheless we observe also in this case a decrease of producer surplus in the range of the smaller thermal project.

After quantifying the aggregate socio-economic benefit of a project for each year of its lifetime, we calculate the project's net present benefit by using a 5% social discount rate.[45] The project's net present value equals its net present benefit minus the investment cost.

5.2 Description of Danube Region Gas Market Model

5.2.1 Modell Overview

The Danube Region Gas Market Model simulates the operation of the wholesale natural gas market in the Central and South-East European (CSEE) region.

Markets endogenously analysed in the model are represented in Figure 5-2. The large external markets (Germany, Italy, Russia, and Turkey) are represented by exogenously assumed market prices, long-term supply contracts and physical connections to the CSEE region.

[45] A social discount rate of 5% is in line with the rates commonly applied at European level, for example in European Commission, Directorate General Regional Policy (2008): Guide to Cost Benefit Analysis of Investment Projects or in European Commission (2009): Commission Impact Assessment Guidelines

Figure 5-5: Geographical coverage of the Danube Region Gas Market Model

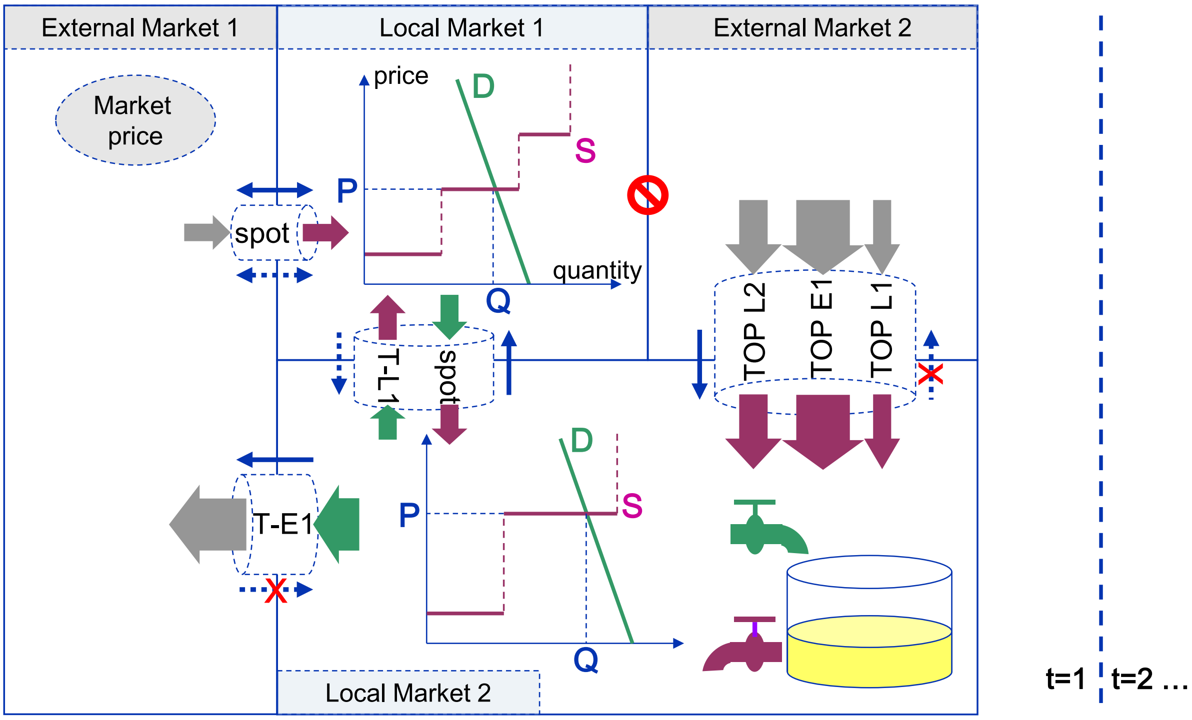
The model consists of several building blocks: local (national) demand, local (national) supply, gas storages, external markets and supply sources, cross-border pipeline connections, take-or-pay (TOP) contracts and spot trading.

All market participants in the model behave in a price-taking manner, i.e. they take the prevailing market price as given, and assume their actions have a negligible effect on the prices.

Gas consumption is represented by linear downward sloping local demand functions similarly specified for each month of the modelling year. Local supply shows the relationship between the local market price and the amount of gas that local producers are willing to deliver into the system at that price if it exceeds the marginal cost of production. Gas storages are capable of storing natural gas from one period to another, arbitraging away market price differences larger than storage cost. Cross-border trade takes place on capacity constrained interconnectors between countries, where each country is represented as one node without representation of the internal gas transmission systems. Capacity on interconnectors is reserved for the long-term contracts. The remaining capacity is "auctioned" where the capacity price equals the equilibrium market price difference between the adjacent markets. Take-or-pay contracts are represented by monthly and annual minimum and maximum off-take quantities, a delivery price, a monthly proportional penalty imposed in the case of violation of the off-take provisions and specified delivery routes.

Based on the input data, the model calculates a dynamic and simultaneous competitive market equilibrium for the endogenously modelled countries. The equilibrium takes into consideration the constraints resulting from the physical gas infrastructure and contractual arrangements. The equilibrium is calculated monthly for 12 consecutive months (a full gas year).

Figure 5-6: Scheme of the Danube Region Market Model



The model generates several outputs: monthly market prices, pipeline flows, production, consumption and trading quantities, storage utilization levels, long-term contract deliveries and measures of socio-economic welfare.

5.2.2 Welfare in the Gas Market Model

Total Surplus

In the gas market model, *welfare* (or *total surplus*) is defined as the difference between what consumers are willing to pay in the wholesale market for gas and the short-run variable cost of production, long-distance imports, transportation and storage.

Depending on market prices and transmission and storage conditions, total surplus in the model is shared between consumers, producers, importers, traders, TSOs and storage system operators (SSOs) in the form of:

1. Consumer surplus [to consumers]
2. Producer surplus (or short-run profit, excluding fixed costs) [to producers]
3. Profit on long-term take-or-pay contracts [to importers]
4. Congestion revenue on cross-border spot trading [to TSOs]
5. Profit on inter-temporal arbitrage via gas storage [to traders]

6. Cross-border transportation profit (excluding fixed costs) [to TSOs]
7. Storage operation profit (excluding fixed costs) [to SSOs]

Consumer Surplus

Consumer surplus[46] is the difference between what consumers are willing to pay for natural gas, and what they actually pay. The willingness to pay is embodied in the demand function, which we define for all periods and markets. Since the demand function shows what people would be willing to pay for an additional unit of natural gas at any consumption level, the total value of gas consumed is given by the area under the demand function. From this, we subtract the amount paid, that is, the market price multiplied by the quantity consumed, to arrive at the consumers' surplus. This is the measure in the model that best reflects the well-being that consumers derive from participating in the gas market.

Producer Surplus

Producer surplus is the difference between what producers receive for natural gas in revenues and what it costs them to extract the gas in the short-run. Revenues are the product of the market price in the producers' locality and the amount of energy sold. The short-run variable costs are mainly the variable OPEX. The difference of these revenues and costs measures the incremental profit that a producer gains by selling into the market.

Profit on Long-Term Take-or-Pay (TOP) contracts

In welfare terms, TOP contracts work similar to production. Importers pay a price for the gas delivered into the destination market from a third country via the existing pipeline system. The cross-border transmission capacity is allocated directly to the importers and all applicable transmission fees are paid by the importer along the route. .

Congestion Surplus

We assume no internal congestions within markets, and hence a single wholesale price prevails for consumers and producers within the same locality. As a result, there are no intra-market congestion revenues.

It is possible, however, that inter-market constrains occur when the capacity of the interconnector between two neighbouring national markets is insufficient to accommodate all commercially attractive cross-border exchanges. In this case, two price market areas will appear: low and high

[46] The economic terminology often distinguishes between gross and net consumer surplus. The former denotes the total value of consumption, without taking into account the amount paid for the product. We use the term consumer surplus in the net sense.

price market area. Similar to the electricity case, the gas model allocates the congestion rent to the TSO.

Profit on Inter-temporal Arbitrage via Storage

If the price differences on commodity markets in different periods systematically exceed the storage fees, then traders will use storage services to profit from these margins. Since traders compete against each other, arbitrage profit from use of storage services will only arise if there is insufficient storage capacity to bring down the (discounted) price differences to the level of storage fees. In a way, this profit is similar to the congestion rent described in the previous section.[47] However, since storage apply pre-set tariffs instead auctions, the rents arising from capacity shortage are kept by the traders.

Transportation Operating Profit

The model distinguishes between transportation fees and variable transmission costs. In reality, transportation fees are often higher than incremental transportation costs to allow for the recovery of fixed cost elements. Although transportation fees are the influencing factor in cross-border trading decisions, the actual welfare change depends on the incremental cost of transporting an additional unit of gas. Therefore, the difference between transportation fees and costs, multiplied by the shipped quantity, counts towards the profit of the TSO.

Storage Operating Profit

Similar to transportation revenue, we also allow for the deviation of storage fees from costs. The difference between the two, multiplied by the amount of gas stored, constitutes part of the storage operator's profit.

5.2.3 Gas Modelling Assumptions

Within the modelling we use reference scenarios for two characteristic years: 2015 and 2020. Since the Energy Community Strategy provides natural gas demand forecasts for 2015 and 2020, these two years were selected as reference years for the modelling work as well. The choice for 2015 is further justified by the fact that no project was submitted to the Energy Community Secretariat with a commissioning date earlier than 2015. Furthermore out of the 23 submitted gas infrastructure projects only a few provided a commissioning date. Note also the fact that many of the projects that have been submitted were proposed already 5-10 years ago. Therefore it was

[47] The arbitrage is across time, rather than across space.

decided by the Task Force to assume uniformly that the projects will enter the market in 2015, and investment costs occur in the previous year.[48]

Sources of Input Data

Table 5-7 below shows the different parameters and sources of input data used in the model.

Table 5-7: Summary of modelling input parameters and data sources

Category	Data Unit	Source
Consumption	Annual Quantity (bcm) Monthly distribution (% of annual quantity)	Energy Community data, Eurostat, ENTSO-G
Production	Minimum and maximum production (mcm/day)	Energy Community data, ENTSO-G
Pipeline infra-structures	Daily maximum flow	GIE, ENTSO-G, Energy Community data
Storage infra-structures	Injection (mcm/day), withdrawal (mcm/day), working gas capacity (mcm)	GSE
LNG infrastruc-tures	Capacity (mcm/day)	GLE
TOP contracts	Yearly minimum maximum quantity (mcm/year) Seasonal minimum and maximum quantity (mcm/day),	Gazprom, National Regulators Annual reports, Platts

Demand and Production Assumptions

For both reference years we use Energy Community Strategy information for the contracting parties and ENTSO-G forecasts otherwise.

The following table shows the assumed consumption levels and growth rates for the Contracting Parties based on the latest consumption forecast provided by the Energy Community Secretariat in March 2013.

[48] The questionnaires, submitted by the project promoters did not provide data on how the investment cost is distributed throughout the project life cycle. The assumption allows to evaluate the projects on an equal basis.

Table 5-8: Assumed yearly gas consumption in the modelled years and gas consumption growth rates

Contracting Party	2015, mcm	2020, mcm	Average yearly growth rate between 2015 and 2020, %
Albania	10	96	172%
Bosnia and Herzegovina	478	902	18%
Croatia	3,830	4,670	4%
FYR of Mace-donia	0	0	0%
Kosovo*	0	0	0%
Moldova	908	1,069	4%
Montenegro	2,323	2,579	2%
Serbia	3,203	3,817	4%
Ukraine	55 273	54405	0%

Infrastructure Assumptions

For the two reference years we assume that the infrastructure projects of the latest TYNDP are built We do not include the projects that are submitted for a potential PECI status in the reference case. We also excluded South Stream from the reference scenario, but carried out a scenario analysis for the case that South Stream would be built. We allow virtual reverse flow (non-physical backhaul) transactions on the pipelines where it is offered according to the ENTSO-G capacity map.

The exact lists of new pipelines in the reference scenario are listed in the followings two tables (Table 5-9 and Table 5-10).

Table 5-9: List of infrastructure projects and their daily capacity (mcm/day) added to the 2015 reference scenario

Projects added to the 2015 reference case		Capacity (mcm/day)
from market	to market	
HU	SK	13.70
SK	HU	13.70
MV	RO	2.74
RO	MV	2.74
BG	RO	4.11
RO	BG	4.11
LNG_PL	PL	13.68
SI	HR	27.36

Projects added to the 2015 reference case		Capacity (mcm/day)
from market	**to market**	
HR	SI	39.32
Reverse flow projects		
PL	CZ	0.40
SI	AT	7.12
HR	SI	5.07
BG	GR	3.60
GR	BG	3.23
HU	AT	12.16
RO	HU	4.87

Table 5-10: List of infrastructure projects and their daily capacity (mcm/day) added to the 2020 reference scenario

Projects added to the 2020 reference case		Capacity (mcm/day)
from market	**to market**	
AT	CZ	24.13
CZ	AT	24.13
PL	CZ	14.30
CZ	PL	18.50
PL	SK	12.24
SK	PL	16.22

Price Assumptions for the Markets External to the Model

Our external price assumptions are the same for 2015 and 2020. For the German and Italian markets we apply 2012 annual average TTF[49] spot price. The Russian spot contracts are traded at a premium to TTF contracts as well as to the Russian TOP contracts. The Russian long-term contract prices are calculated by 80% oil price and 20% spot price indexation (uniform for all countries). Long-term contracts expiring until 2015 (HU, HR) are assumed to be renewed with a reduced rate of annual contracted capacity (80% of the former contract) but at the same price.

[49] TTF (Title Transfer Facility) is a virtual trading point for natural gas in the Netherlands, the most liquid gas hub on the continent, the second in Europe after National Balancing Point (NBP), the British virtual trading point for natural gas.

Since modelling results are mainly affected by relative, instead of nominal prices (seasonal spread, TOP/spot spread etc.), in the case of Western-European markets we assume seasonal (winter-summer) spread, and an average assumed spread between oil- indexed and TTF spot gas prices.

Transmission Tariff Assumptions

In the model we use effective 2013 transmission tariffs for a standardized transmission service. Tariffs are expressed in a common measurement unit (€/MWh) for the following standard service:

- The duration of the transmission contracts is one year.
- Contracts refer to firm transportation services.
- The booked maximum hourly capacity is 10,000,000 kWh/h/y).
- Shippers are able to pool the demands of final consumers, enabling them to better utilize booked capacities. The load factor (i.e. the average rate of capacity utilization) is 80 per cent.

Storage Tariff Assumptions

The storage tariffs used in the model are the 2013 prices set by the storage operators. However, the actual tariffs in Austria, Slovakia and Poland appear to be too high compared to the seasonal spot gas price spread estimated for Germany. In medium and long-term such a difference may discourage the use of storage service and lead to a significant underutilization of storage facilities. Therefore we cap the Austrian, Slovak and Polish storage tariffs at the level of 5.30 €/MWh which is roughly in line with international estimation of long-term average incremental storage cost. The same storage tariff is used for pricing new storage investment projects.

LNG Tariff Assumptions

The LNG tariffs used in the model are the 2013 prices set by the LNG operators. For pricing new LNG facilities a uniform 4,5 €/MWh fee was used.

Strategic Storage Assumptions

In the case of Austria, Bulgaria, Croatia, Czech Republic, Poland, Romania, Serbia, Slovakia, and Ukraine and we assume that storage will meet the supply obligation of EU Regulation 994/2010 to serve residential consumers for a maximum of 30 days in winter peak periods. We consider the respective amount as 'strategic storage' so that this quantity of stored gas will only be available for customers under supply crisis situations. Since Hungary is the single modelled country that has a physically dedicated strategic storage site, we use a strategic stock figure that corresponds to the prevailing regulation (815 mcm). Concerning Ukraine in absence of data available we assume a strategic stock quantity which could satisfy the country's gas consumption for 30 days.

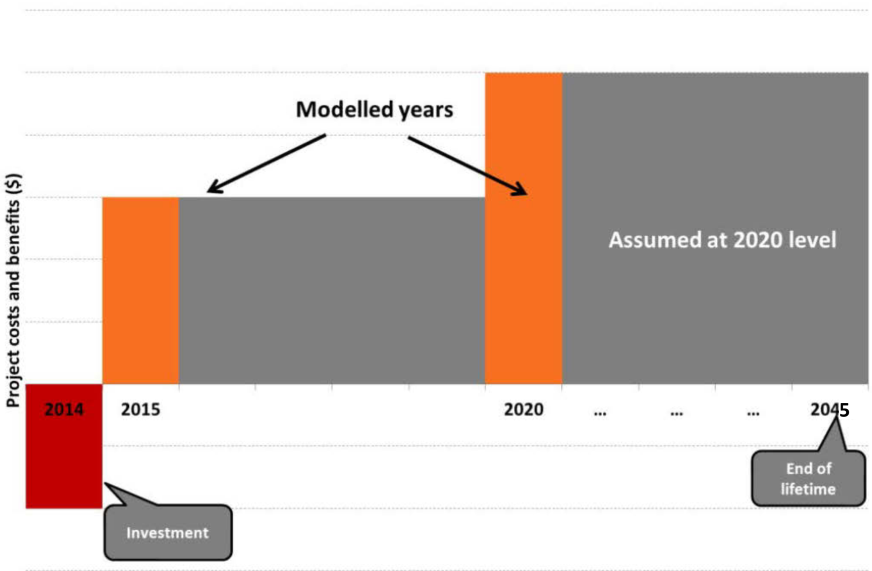
5.2.4 **CBA Analysis Using Modelling Results**

We use the model to quantify / monetize three project related classes of economic benefits: a) the change in socio-economic welfare implied by project related wholesale gas price changes; b) project related welfare improvement in gas supply crisis situations (security of supply); and c) benefits due to project related changes in CO_2 emissions.

The total socio-economic welfare for a modelled period (year) is calculated as the sum of producer surplus, consumer surplus, the profit of the interconnector owners (sum of operating profit from transmission and congestion revenues from cross-border auctions), the operating profit of storage operators, the profit of traders (from inter-seasonal arbitrage) and the profit of long-term contract holders. These welfare measures are equally weighted.

For the purpose of the economic CBA we calculate the change in the aggregate economic welfare for the Energy Community Contracting Parties plus Bulgaria, Hungary, Greece and Romania due to the implementation of a project (or project cluster) compared to the economic welfare in the reference case. As described above, all projects are evaluated one by one assuming that they enter the market by 2015. Their economic benefits are quantified for 2015 and 2020 and are extrapolated for the projects' lifetime (30 years) as illustrated in Figure 5-7. We assume that investment costs occur in 2014.

Figure 5-7: Projects' costs and benefits for NPV calculations

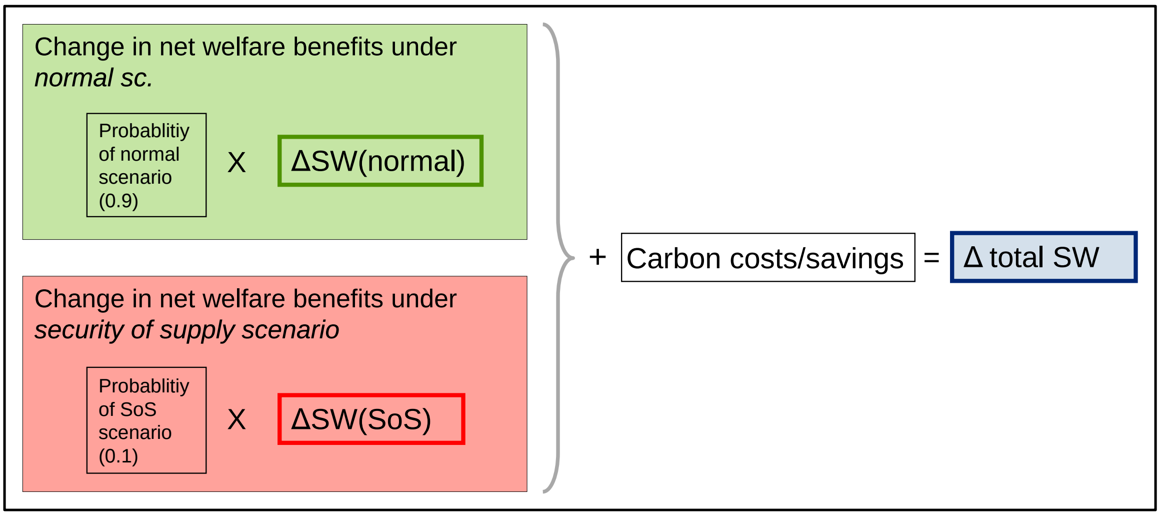


The project related environmental benefit is estimated by multiplying the corresponding change in the countries' CO_2 emissions by an exogenous carbon value (based on the EC Low carbon roadmap 2050 values).

Security of supply related benefits of a project is measured by the economic welfare change due to the implementation of a project in the case of a gas supply disturbance. Within the model disturbance means a 30% reduction of gas deliveries on the interconnectors from Russia/Ukraine to the region in January. The economic welfare change due to the realization of the proposed infrastructure is calculated as the difference between the welfare under disturbance conditions with and without this project.

To calculate the project related aggregate change in economic welfare (SW) for a given year, we first calculate the weighted sum of project related welfare changes under normal and disturbance (security of supply, SoS) conditions. Weights are the assumed probabilities for normal and disturbance scenarios to occur (90% versus 10%). Then we add the benefit due to changes in CO_2 emissions (carbon cost savings).

Figure 5-8: Calculation method of project related aggregate economic welfare change



The sample output of the modelling of natural gas infrastructure projects' is summarized in the following table.

Table 5-11: Sample modelling results for natural gas projects

Project			2015				2020				CBA results	
Project ID	Project description	Investment cost	Welfare change (normal)	Welfare change (SOS)	CO2 quota cost saving change	Total welfare change	Welfare change (normal)	Welfare change (SOS)	CO2 quota cost saving change	Total welfare change	NPV	Score Scale 1 (min) to 5 (max)
	Calculation Method	Input	Model	Model	Model	D*0,9+E*0,1+F				H*0,9+I*0,1+J		Scaling
		million €	million €	million €	million €	million €	million €	million €	million €	million €	million €	
G0XX	Interconnector to a new market	16	70	68	-1	69	70	66	-2	68	1 030	4,2
G0XX	LNG	617	55	66	-1	55	100	286	-4	115	556	3,5
G0XX	Interconnector between existing markets	94	0	0	0	0	36	59	-4	35	288	3,1
G0XX	Storage	37	0	-21	0	-2	0	-2	0	0	-48	2,7

For each project (or project cluster) we carried out 4 model runs: for the two modelled years (2015, 2020) with the new infrastructure in place under normal conditions and under security of supply assumptions. In our sample table only the change in social welfare, compared to our reference scenario, is reported. The welfare change of the given year under normal and SOS conditions are weighted and added to the CO_2 quote cost saving change that was also calculated by the model.

The NPV was then calculated for the lifetime of the project, assuming that cost occur in 2014, as described above. NPV calculation is based on the modelled benefits and the (verified) reported cost data using a 5% social discount rate. A final score was attributed to the calculated NPV value on a 1 to 5 scale with linear exploration.

6 ASSESSMENT RESULTS

Since some of the data, which has been used within this assessment, is of commercially sensitive nature, we cannot present the detailed results including the scores and ranks of individual projects within this report. The results of the application of the project assessment methodology, i.e. the scores and ranks of individual projects have however been communicated to each project promoter individually. The detailed results have also been made available to the Energy Strategy Task Force.

Explanatory Notes on Results

For the interpretation of the project assessment results according to the methodology described within this report the following issues should be taken into account.

Wider environmental impacts such as the impact of a project on hydrology, soil, fauna or flora can only be assessed in a detailed project specific environmental impact assessment, which is outside the scope of this study. The results of the assessment conducted within this project are therefore without prejudice to the results of an environmental impact assessment to be carried out in line with the Contracting Parties' obligations under the Energy Community Treaty, as well as any other relevant standards and procedures applicable under national or international law.

The assessment conducted here does neither aim to nor can substitute detailed project feasibility studies focusing on the specific details related to every individual project. In this respect the exact implementation potential related to every single project can only be established by a detailed analysis of the project specifics and the legal and regulatory framework in the specific country (including the compliance with environmental legislation), which has been outside the scope of this project. Furthermore the assessment does not imply any conclusion on pending court cases on individual project proposals.

The assessment is conducted from an overall economic point of view. Costs and benefits of the individual projects are therefore assessed in economic terms for all effected stakeholders and for all Contracting Parties of the Energy Community.

It may also be considered, as in the EU Regulation on guidelines for trans-European energy infrastructure (in the context of identifying Projects of Common Interest PCI), that the status of PECI may facilitate the realisation of projects that show a clear net economic benefit for the region, but which may not be commercially viable for the individual investors.

It is therefore possible – if not likely – that the economic assessment conducted in this project provides a different result than an assessment carried out on national level (only) or by a financial investor.

Not being assigned the status of Project of Energy Community Interest (PECI) does therefore not provide any indication on whether the proposed project is

- of national interest (since a national perspective does not consider impacts on neighbouring countries)
- financially beneficial for the individual investor (since the investor does among others not (necessarily) consider impacts on other stakeholders)

Regardless of the ranking in the PECI assessment, projects may therefore provide net-benefits *at national level or for the individual investor* that justify their realisation. Also investors may come up with a different assessment and ranking of projects, when conducting an internal financial assessment of different projects, compared to the results in the context of identifying Projects of *Energy Community Interest*.

The assessment is based on project specific information / data taken from the questionnaires. Where the provided data has been questionable or where data has not been complete further verification checks have been conducted including further communication with the project promoters. Where no further information could be obtained from project promoters or has been provided to us by the Task Force, the questionnaires have been the general source for project specific data.

It has furthermore to be noted that the project assessment conducted here is only a relative ranking of all eligible projects. Accordingly the scores or ranks do not indicate whether a project is beneficial as such, they only provide an indication on whether the realization of other projects proposed as potential PECI would be more or less beneficial than the realization of the specific project. Since the ranking only shows the relative benefit of a project, the difference in the ranks does not provide information on the absolute difference of the welfare impact between two projects (i.e. whether the welfare effects of two projects are close to each other or much different). More specifically, since the assessment approach (indicators, weights, modelling details) has some specific features for the different project categories (electricity generation, electricity infrastructure, gas infrastructure) reflecting the technological characteristics, comparisons of the results across the project categories cannot be made (e.g. whether electricity generation projects on rank 1 to 5 are more/less/equally beneficial as gas projects on rank 1 to 5).

In several cases we did not assess the projects and marked them as "na" (not assessed). The classification "na" does only indicate that the project could not be assessed on the basis of the available information or that the project has not been assessed because a project is not considered as eligible. Accordingly this does not provide any indication on the costs and benefits of these projects.

The classification "na" has been driven by the following reasons:

- no regional impact in at least 2 Contracting Parties or 1 Contracting Party and 1 EU Member State, i.e. project not eligible
- commissioning date is not within the next 10 years (2012 - 2022)
- no (individual) increase of NTC / capacities has been provided

In addition the two electricity infrastructure projects proposed by Moldova could also not be assessed within the project assessment methodology. The Moldova electricity system is not part of the synchronous transmission network of Continental Europe (formerly known as the UCTE grid) and would therefore require a completely different modelling approach in order to assess the cross-border impacts (i.e. a modelling of the IPS/UPS system rather than the transmission system of Continental Europe).

After deducting the non-assessed projects,[50] a total of 71 electricity generation, electricity infrastructure and gas infrastructure projects have been assessed using the assessment methodology described in the previous chapters. In the following we describe some general results of the assessment of the investment projects in the areas of electricity generation, electricity infrastructure, gas infrastructure and oil infrastructure.

Assessment of Electricity Generation Projects

For the proposed electricity generation projects the following trends can be observed. Almost all types of generation technologies (wind, lignite, hydro or gas CHPs) are represented among the projects ranking relatively high on the list. Furthermore the size of the generation capacity does not seem to be a decisive factor for the rank of the project in the assessment. Also high as well as low ranking generation projects are located in most Contracting Parties.

Three electricity generation projects – each consisting of a number of individual hydro power projects – have been proposed on the river Drina (the upper, middle and lower Drina projects EG002, EG005 and EG006). Given the nature of these three hydro power projects, they may be regarded as competing projects. Depending on the cap on the number of PECIs, it may therefore be considered not to classify all the three hydro power projects on the river Drina as PECIs.

Table 6-1: Assessed electricity generation projects

Project ID	Project Name	Comment
EG001	Wind Park Dajc-Velipoje	
EG002	Hydro Power System Upper Drina	One of three Drina river hydro power projects
EG003	Hydro Power Plant Dabar	
EG004	Hydro Power Plant Dubrovnik (Phase II)	
EG005	Hydro Power Plants Lower Drina	One of three Drina river hydro power projects
EG006	Hydro Power Plants Middle Drina	One of three Drina river hydro power projects

[50] From the total of 82 eligible projects, six are classified as not assessed. In addition the two Moldova electricity infrastructure projects could also not be assessed within the project assessment methodology; a further three projects are in the area of oil infrastructure, which are not assessed within the assessment methodology.

Project ID	Project Name	Comment
EG007	Hydro Power Plants Crna River	
EG008	Hydro Power Plants Vardar River	
EG009	Hydro Power Plants HS Zletovica Phase 3	
EG013	Kosova e Re Power Plant project (KRPP)	
EG014	Hydro Power Plants Cehotina River	
EG015	Hydro Power Plants Lim River	
EG016	Hydro Power Plants Brodarevo	
EG017	Combined Heat and Power Plant Novi Sad	
EG018	Hydro Power Plants Velika Morava	
EG019	Hydro Power Plants Ibarske	
EG020	Pumped Storage Hydro Power Plant Bistrica	
EG021	Pumped Storage Hydro Power Plant Djerdap 3 (Phase I)	
EG022	Thermal Power Plant Kolubara B	
EG023	Thermal Power Plant Kostolac B3	
EG024	Thermal Power Plant Nikola Tesla B3	
EG025	Construction of a new unit at Burshtyn TPP	
EG026	Construction of a new unit at Dobrotvir TPP	
EG027	Combined Heat and Power Plant KTG Zenica	
EG028	Flue Gas Desulphurization on unit 6 in TPP Tuzla	
EG029	Wind Park Bitovnja	
EG030	Wind Park Borisavac	
EG031	Wind Park Medvedjak	
EG032	Wind Park Podvelezje	
EG033	Wind Park Rostovo	
EG034	Wind Park Vlasic	
EG035	Combined Heat and Power Combined Cycle Gas Turbine Plant in Pancevo	
EG036	Small CHP plants in the Republic of Serbia	
EG037	Pumped Storage Scheme Korita	
EG038	Hydro Power Plant Skavica	
EG010	Air Monitoring in Thermal Power Plant Kosovo B	non-eligible
EG011	Decommissioning and Clean-up projects of former Gasification Plant	non-eligible
EG012	Enlargement and Installation of New Electrostatic Precipitators in Thermal Power Plant Kosovo B	non-eligible

Assessment of Electricity Infrastructure Projects

The assessed eligible electricity infrastructure projects include one HVDC cable, two HVDC overhead lines and twelve 400kV (AC) overhead lines, most of which are cross-border interconnections. Some overhead lines do not cross borders, but provide a cross border impact by providing in-country capacities that support the utilisation of the cross-border capacities. Half of the proposed and eligible 400kV overhead line projects are either located within Serbia or connect Serbia with one of its neighbouring countries.

Seven projects have not been assessed as the commissioning date of the proposed project lies not within the next 10 years, no NTCs have been provided or no regional impact of the project could be shown. As projects ET010, ET011 and ET013 do not increase the physical capacity on a cross-border transmission line their cross-border impact could not be validated within this assessment.

In addition, the two interconnection projects of Moldova are also not evaluated within this assessment, since the Moldova system is not part of the synchronous transmission system of Continental Europe (formerly known as the UCTE grid) and would therefore require a modelling of the IPS/UPS systems. It will be up to the Task Force to prepare a qualitative assessment of the two Moldova projects.

Two of the proposed electricity infrastructure projects connect the substations in Visegrad in Bosnia and Herzegovina and Pljevlja in Montenegro. While ET003 connects the two substations directly, ET002 provides a connection between Visegrad and Pljevlja via Bajna Basta in Serbia. These two electricity infrastructure projects may be regarded as competing projects. It may therefore be considered to classify only one of them as a PECI project.

Table 6-2: Assessed electricity infrastructure projects

Project ID	Project Name	Comments
ET001	400 kV OHL SS Bitola (FYR of Macedonia) – SS Elbasan (AL)	
ET002	400 kV OHL SS Bajina Basta (RS) - SS Pljevlja (ME) - SS Visegrad (BA)	Competing with project ET003 Visegrad - Pljevlja
ET003	400 kV OHL Visegrad (BiH) - Pljevlja (ME)	Competing with project ET002 Visegrad - Bajna Basta - Pljevlja
ET004	400 kV OHL Banja Luka (BiH) – Lika (HR) with 400 kV SS Lika	
ET007	400 kV OHL Brinje – Lika – Velebit – Konjsko including 400 kv substation Brinje	
ET009	750kV HVDC OHL between Albertirsa (HU) and Ukraine	
ET014	400 kV OHL Tirana (AL) - Pristina (Kosovo*)	
ET017	400 kV OHL Pljevlja - Lastva	
ET018	400 kV OHL SS Kragujevac - SS Kraljevo	
ET019	400 kV OHL SS Jagodina - SS Pozarevac with the building of new 400 kV SS Pozarevac	

Project ID	Project Name	Comments
ET020	400 kV OHL between SS Resita (RO) and SS Pancevo (RS)	
ET021	400 kV OHL SS Obrenovac - SS Bajina Basta	
ET022	400 kV OHL SS Bajina Basta - SS Kraljevo	
ET023	HVDC OHL between Poland and Ukraine	
ET024	DC cable Vlora (AL) - Bari West (IT)	

ET015	OHL Balti (MD) - Suceava (RO)	As non ENTSO-E member projects in Moldova are not assessed within the Electricity Market Model
ET016	OHL Straseni (MD) and Iasi (RO)	As non ENTSO-E member projects in Moldova are not assessed within the Electricity Market Model, also no NTC increase reported

ET005	400 kV OHL Konjsko (HR) - Mostar (BiH) with extensions of 400 kV substations	Commissioning date of 2025 not within the next 10 years (2012 - 2022)
ET006	400 kV OHL Đakovo (HR) - Tuzla /Gradačac (BiH) with extensions of 400 kV substations	Zero increase of NTC reported
ET008	400 kV OHL Kosovo B (Kosovo*) - SS Skopje 5 (FYR of Macedonia)	Commissioning date of 2023 not within the next 10 years (2012 - 2022)
ET010	Installation of OPGW (Optical Ground Wire) on interconnection lines	No regional impact (in at least 2 Contracting Parties or 1 Contracting Party and 1 EU Member State)
ET011	Load Frequency Control (Kosovo*-AL)	No regional impact (in at least 2 Contracting Parties or 1 Contracting Party and 1 EU Member State)
ET012	110 kV OHL Dragash (Kosovo*) - Kukes (AL)	non-eligible
ET013	Installation of Metering group on Interconnection lines	No regional impact (in at least 2 Contracting Parties or 1 Contracting Party and 1 EU Member State)

Assessment of Gas Infrastructure Projects

Both interconnection pipelines as well as LNG terminals can be found among the gas infrastructure projects scoring relatively high; only underground gas storage projects tend to score relatively low in the assessment. While the large multi-country interconnectors TAP and IAP rank at the top of the list also much smaller cross-country interconnection pipelines can be found among the top scoring gas infrastructure pipelines.

There are four main categories of gas projects: (1) interconnectors between existing markets; (2) interconnector to a completely new natural gas market; (3) LNG facilities bringing new source to the market, and (4) storage facilities. In the following we provide further explanations for some of these categories of gas projects.

Interconnectors between existing gas markets

While no directly competing projects could be identified, several projects have been proposed that interconnect the gas market of Bosnia and Herzegovina with the Croatian gas market.[51] Although they interconnect different parts of Bosnia and Herzegovina with the Croatian gas network – including parts of Bosnia and Herzegovina currently not connected to the gas network at all – it may be considered that the joint realization of all four interconnection pipelines would result in lower net benefits than the sum of the individual net benefits.

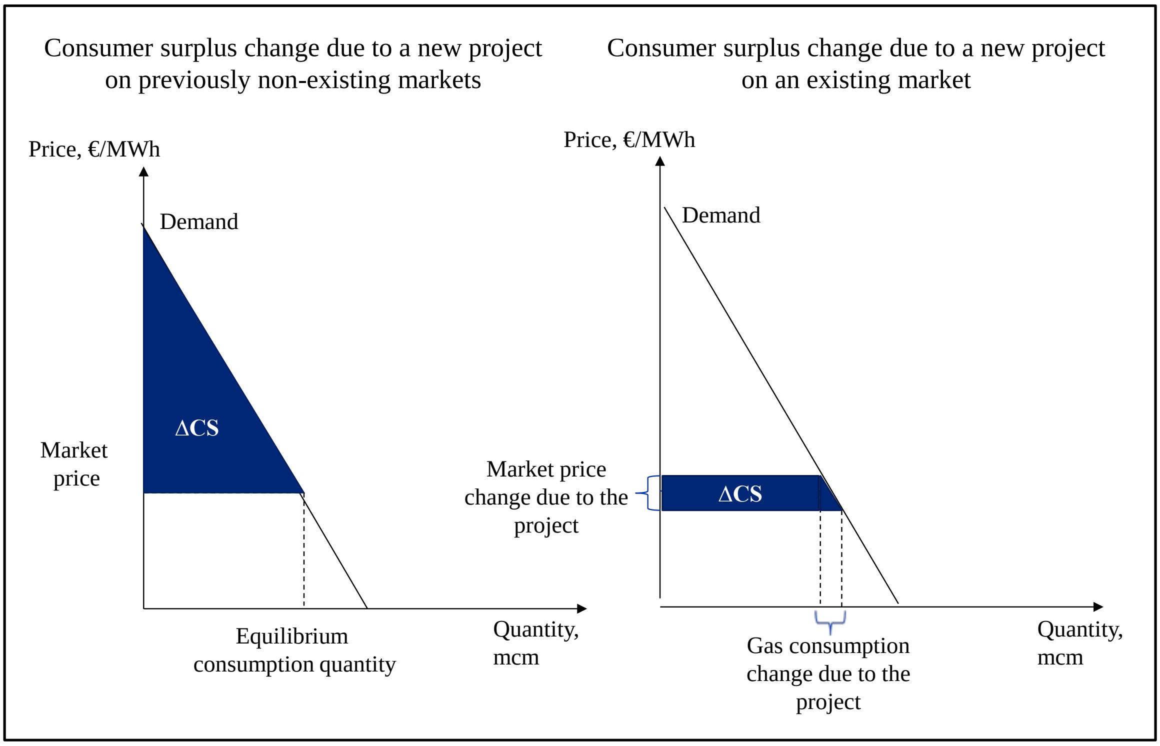
The modernization of the Ukrainian Pipeline (G021) has no effect on capacity; therefore the assessment has been adjusted adequately, evaluating only the security of supply effects for the whole region. We assume that an increased security of supply risk can be avoided with the implementation of this project. Therefore the results of this project should be adequately interpreted and compared with those for the other gas infrastructure projects.

Projects that connect new gas markets to the regional network

There are Contracting Parties with present zero or close to zero natural gas consumption, called emerging natural gas markets (Albania, Montenegro, Kosovo*). These markets differ substantially from the mature gas markets in the EU. The specific situation in these countries has to be taken into account when evaluating new projects in the Energy Community. The first gas molecule arriving to a country that has not consumed gas before is likely to provide a very high value for the consumers. The welfare change in countries with no gas market prior to the implementation of the project will be significant due to the fact that the welfare in the reference scenario is equal to 0 (see next chart). This will result in a very high NPV for all projects that connect new markets to the gas network. In the same way also the impact on system adequacy and competition can be assumed to be very positive. Accordingly, projects that connect new gas markets to the regional network are likely to score and rank relatively high.

[51] This includes for example the Slobodnica - Bosanski Brod - Zenica interconnection pipeline (G006), the Ploce - Mostar - Sarajevo/Zagvozd - Posušje/Travnik interconnection pipeline (G003) and the Lička Jesenica - Tržac - Bosanska Krupa interconnection pipeline (G007) between Bosnia and Herzegovina and Croatia, as well as the Batajnica - Bijeljina - Banja Luka - Novi Grad interconnection pipeline (G004) between Serbia, Bosnia and Herzegovina and Croatia.

Figure 6-1: Changes in consumer surplus on new and existing gas markets following the implementation of a gas project



Albania, Montenegro and Kosovo* do not have gas consumption at the moment. In the case of Montenegro and Kosovo* the Energy Strategy does not envisage gas consumption in 2015 and in 2020. However, one should assume a certain consumption level in these countries when the evaluated project is designed to bring gas to the national markets. Accordingly, we assume for 2015 a certain level of national gas consumption when evaluating projects related to those countries (G002 Albanian LNG, G008 IAP, G015 SB-ME, G022 TAP, G017 (Serbia – Kosovo*).[52]

LNG projects

By providing new sources and routes of supply LNG projects score relatively high. An exception is the Ukrainian LNG terminal, where the LNG price assumed for Ukraine is not the competitive LNG price (TTF), but a higher LNG price. The premium is due to larger costs to ship gas to the Black See, and the limited number of suppliers. Also the maximum capacity for the Ukrainian LNG terminal is relatively small compared to the two other proposed LNG terminals (and compared to the existing entry capacity of the Ukrainian market) which also limits the impact on system adequacy and competition.

[52] The assumed consumption for Albania amounts to 414 mcm which is in line with the questionnaire and the project promoter's estimate. For Kosovo* it is equal to 67 mcm and for Montenegro to 55 mcm.

Underground storage projects

The underground storage projects have a rather limited effect on price changes and their regional impact is much smaller. The modelling results show that the proposed storage investments fulfil the eligibility criterion of having impact on two Contracting Parties or EU member countries. On the other hand, the modelling results also show that the rules for the already existing storage facilities as of the Security of Supply regulation provide the most important safety tool to the region.

Table 6-3: Assessed gas infrastructure projects

Project ID	Project Name	Comments
G002	EAGLE LNG Terminal	
G003	Interconnection Pipeline BiH - HR (Ploce - Mostar - Sarajevo/Zagvozd - Posušje/Travnik)	
G004	Interconnection Pipeline RS - BiH - HR	
G005	Interconnection Pipeline upgrade Batajnica (RS) - Zvornik (BiH)	
G006	Interconnection Pipeline BiH - HR (Slobodnica-Bosanski Brod-Zenica)	
G007	Interconnection Pipeline BiH - HR (Lička Jesenica-Tržac-Bosanska Krupa)	
G008	Ionian Adriatic Pipeline (IAP)	
G009	Interconnection Pipeline HR - RS (Slobodnica-Sotin-Bačko Novo Selo)	
G010 + G011	LNG Terminal in Croatia + LNG main gas transit Pipeline Zlobin-Bosiljevo-Sisak-Kozarac-Slobodnica	
G012	Cazaclia Underground Gas Storage	Investment costs could not be verified
G013	Interconnection Pipeline RS - BG	Investment cost for the entire route has been calculated
G014	Interconnection Pipeline RS - FYR of Macedonia	
G015	Interconnection Pipeline RS - ME	
G016	Interconnection Pipeline RO - RS	Investment cost for the entire route has been calculated
G017	Transport Gas Pipeline Nis (RS) - Pristina (Kosovo*)	
G018	Underground Gas Storage Banatski Dvor	Investment costs could not be verified
G019	Underground Gas Storage Banatski Itebej	
G020	LNG Terminal Ukraine	
G021	Modernization of Urengoy-Pomary-Uzhgorod Pipeline	
G022	Trans Adriatic Pipeline (TAP)	
G023	Gas interconnector RS - HR	

Project ID	Project Name	Comments
G001	Underground Storage in Albania	Dependent project, without inter-connecting pipeline non-eligible

Assessment of Oil Infrastructure Projects

Four oil infrastructure projects have been proposed by project promoters, whereas one of the projects (OIL003 Petroleum Products Pipeline System through Serbia) is not considered as eligible, since it is not belonging to one of the categories defined in the Energy Community Strategy (see also chapter 3.3).

The oil project OIL001, inspection, evaluation, rehabilitation, upgrading and reconstruction of existing JANAF oil pipeline may provide additional capacity via alternative source by providing new reverse flow possibilities,

Oil project OIL004, construction of the Brody (UA) – Adamowo (PL) oil pipeline, will provide alternative route/source (Caspian oil coming in at Odessa) to Russian oil from the Druzhba pipeline. It may furthermore improve security of supply / mitigate supply disruptions (e.g. due to disputes between Russia and Belarus/Ukraine as observed in the past).

The construction of crude oil tanks in Serbia (OIL002) may provide the possibility that other countries may use the storage for their security stockholding obligations; however eligibility of this project may appear ambiguous.

The upgrade of the JANAF oil pipeline and the construction of the Brody – Adamovo oil pipeline are to our knowledge also likely to be considered as Projects of Common Interest by the EU. It has been agreed with the Task Force that oil infrastructure projects will be selected by the Task Force.

7 SUMMARY AND OUTLOOK

In order to evaluate whether investment projects submitted by project promoters until 31.12.2012 or during the public consultation phase (until April 29th 2013) are of Energy Community Interest engaged a consortium of DNV KEMA, REKK and EIHP to develop and apply a project assessment methodology. The major ideas and steps of this project assessment methodology have been outlined in an interim report and two short summary documents[53] and presented to, discussed with and agreed by the Energy Strategy Task Force in four meetings.[54]

This final report presents the project assessment methodology which has been applied for all submitted projects. In doing so this report also provides an overview on all submitted investment projects as well as on the modelling assumptions that have been made and agreed with the Task Force.

The methodology developed by DNV KEMA, REKK and EIHP includes two phases: a pre-assessment phase and an assessment phase.

In the pre-assessment phase the eligibility of the proposed projects has been checked, the submitted project data been verified and matching and complementary projects been identified. After the conduction of these pre-assessment steps, 82 projects and project clusters (out of a total of 100 submitted project proposals) have been recognised as eligible projects to be evaluated in the project assessment.

In the assessment phase we applied an integrated approach consisting of an economic Cost-Benefit Analysis (CBA)[55] and a multi-criteria assessment.

The economic CBA systematically compares the benefits with the costs arising over the life span of an investment project to all relevant groups of stakeholders within the region of the Energy Community (and neighbouring countries such as Bulgaria, Hungary, Greece and Romania). As a result of the economic CBA the change in socio-economic welfare resulting from the implementation of each investment project is calculated. In the economic CBA the costs are determined by the capital and operating expenditures of the project; the socio-economic benefits are estimated and monetized through the project impact on market integration, improvement of security of sup-

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[53] The Discussion Paper on project assessment methodology criteria and weights has been distributed to the Energy Strategy Task Force per e-mail on 13 February 2013, the Interim Report on 2 April 2013, and an Explanatory Note on 22 March 2013.

[54] These four Energy Strategy Task Force meeting took place on 25 January, 13 March, 14 May and on 29 May 2013.

[55] In this context the word '*economic*' relates to the point of view of the assessment; in that possible costs and benefits are evaluated for all stakeholders affected by an investment project taking into account the monetary costs and benefits of the investor as well as the costs and benefits to other stakeholders and the society as a whole.

ply and the reduction of CO_2 emissions. The net benefits are calculated within electricity and gas market models.

Since not all possible costs and benefits can be quantified and monetised additional criteria have been selected as a complement to the economic CBA within a multi criteria approach. These additional criteria include enhancement of competition, improvement of system adequacy, progress in implementation and support of renewable energy sources (the later for electricity generation projects only). For each of these criteria we defined indices and a scoring system that measure the fulfilment of each criterion by each investment project (or project cluster) on a scale between 1 (minimum) and 5 (maximum). Following the Analytic Hierarchy Process (AHP) technique, weights of the selected criteria have been set, based on a pairwise comparison of the relative importance of a criterion against any other criterion.

The different indices for each investment project have been calculated (including the Net Present Value as indicator for the change in socio-economic welfare within the framework of the economic CBA) and according scores have been assigned. By multiplying the score for each criterion with the weight of each criterion a total score has been calculated for each project based on which a ranking of all eligible projects – separate for electricity infrastructure, power generation and gas infrastructure – has been conducted. The ranking provides a basis for the identification and selection of Projects of Energy Community Interest (PECI).

Applying the above assessment methodology, 71 projects have been assessed in the areas of electricity generation, electricity infrastructure and gas infrastructure.[56] Projects ranking relatively high in all three categories are largely distributed across almost all Contracting Parties of the Energy Community. Also projects of various sizes (i.e. with smaller or larger capacities) or the technology of the project generally tend to rank high in each category. The proposed CHP power plants tend to rank relatively high, whereas proposed pumped storage power plants rank relatively low. In the area of gas, the proposed LNG terminals and interconnection pipelines to emerging gas markets (i.e. markets currently not connected to the regional gas network) rank relatively high in the assessment. The proposed underground gas storages on the other hand tend to rank relatively low. The three eligible oil projects have been only evaluated qualitatively within this project. It will be a choice of the Task Force, whether and which of the oil projects should be classified as PECIs.

The ranking order of the projects could also generally be confirmed in a sensitivity analysis, where among others higher and lower growth rates for electricity and gas consumption respectively have been assumed. For gas infrastructure projects it was furthermore tested whether the

[56] From the total of 82 eligible projects, six are classified as not assessed. In addition the two Moldova electricity infrastructure projects could also not be assessed within the project assessment methodology; a further three projects are in the area of oil infrastructure, which are not assessed within the assessment methodology.

realisation of the South Stream pipeline would have a significant impact on the ranking of the gas projects; the inclusion of the South Stream pipeline did however not change the ranking of the projects.

For future assessments of PECIs, we recommend to align the approach for the Energy Community with the cost-benefit analysis framework that is currently developed on EU level for the future identification of Projects of Common Interest (PCI) and the ten-year network development plans of ENSO-E and ENTSO-G. In particular since most of the Contracting Parties of the Energy Community are also members of ENTSO-E. It will also be critical to regularly update and further improve the demand and generation/production forecasts for the Contracting Parties of the Energy Community. This applies in particular to those gas markets that are still developing. Furthermore the development of electricity generation from renewable energy sources (RES) in the Contracting Parties of the Energy Community should be closely monitored. With a further rise in the share of intermittent RES generation, the impact of different types of electricity generation and the need for transmission network extensions might significantly change. In this case it may be necessary to also apply a RES indicator for electricity (or even gas) infrastructure projects to account for direct contributions of electricity (and gas) infrastructure projects for the development of RES. Also direct links between specific RES generation and electricity infrastructure projects as well as future contributions of electricity infrastructure projects to export excess RES generation from one region to another may be specifically considered.

Furthermore it will be necessary to re-evaluate those investment projects in future PECI assessments, who are currently still in a very early stage of project development, since many of the project details such as project capacity, investment costs, the exact location, the future owner or the commissioning year may significantly change during the planning process. The latter can have a significant impact on the net benefits created by the project. This may particularly be relevant for those projects that have already been proposed for a long time. Also those proposed projects that have not been assessed within this project assessment, either for reasons of eligibility or other arguments (e.g. a commissioning year after 2022), should be able to re-apply in future PECI assessments.

APPENDIX A – DESCRIPTION OF ALL PROJECT PROPOSALS

The following descriptions of each proposed investment project are taken from the information provided by the project promoters in the questionnaires. Any statements on possible impacts and benefits made therein do hence only replicate the statements made by the project promoters and are not in any way linked to the results of the project assessment described throughout this report.

A. Electricity Infrastructure

ET001 - 400 kV OHL SS Bitola (FYR of Macedonia) – SS Elbasan (AL) **Project Promoter(s):** OST (AL) and MEPSO (MK)
The proposed project consists of: new 151 km cross-border single circuit 400kV OHL between existing substations, new 400 kV Commutation point in Elbasan3, with 6 line-bays and 400 kV shunt reactor and new 400/110 kV substation in Ohrid area connected in/out to the new 400 kV line Bitola - Elbasan. The undertakings involved in this project include OST (Albania) and MEPSO (FYR of Macedonia). The proposed project is included in TYNDP 2012 under the investment number 51.239. Year of commissioning: 2017

ET002 - 400 kV OHL SS Bajina Basta (RS) - SS Pljevlja (ME) - SS Visegrad (BiH) **Project Promoter(s):** JP Elektromreza Srbije (RS), NOS BiH (BiH) and CGES (ME)
The project proposal consists of new double circuit 400kV OHL connecting existing substation Pljevlja (ME) and substation Bajina Basta (RS) and new double circuit 400kV OHL connecting existing substation Visegrad (BIH) and substation Bajina Basta (RS). In the first phase one 400 kV circuit would be equipped. In the second phase new SS Bistrica would be connected to the exisitng double circuit 400 kV OHL between SS Bajina Basta, SS Visegrad and SS Pljevlja. Total length of the line is 103 km. New 400 kV interconnection between Serbia, Montenegro and Bosnia and Herzegovina is included in TYNDP 2012 under the investment numbers 28.109 and 28.111. Year of commissioning: 2020

ET003 - 400 kV OHL Visegrad (BiH) - Pljevlja (ME) Project Promoter(s): CGES (ME)
The project proposal consists of new 400kV interconnection line connecting substation Pljevlja (ME) and substation Visegrad (BIH) to increase cross-border capacity between the two countries.Total length of the line is expected to be around 70 km. This project proposal is included in TYNDP 2012 under investment number 28.232. Year of commissioning: 2017

ET004 - 400 kV OHL Banja Luka (BIH) - Lika (HR) with 400 kV SS Lika **Project Promoter(s):** HEP OPS (HR) and NOS BiH (BIH)
The project proposal consists of new 400kV interconnection line between Bosnia and Herzegovina and Croatia with new 400 kV substation Lika (HR), which is the key pre-condition for this new interconnection line to Bosnia and Herzegovina. Total leght of the line is 155 km (45 km in Croatia, and 110 km in BiH). This project proposal is included in TYNDP 2012 under investment numbers 27.227 and 27.A107. Year of commissioning: 2020

ET005 - 400 kV OHL Konjsko (HR) - Mostar (BIH) with extensions of 400 kV substations Project Promoter(s): HEP OPS (HR)
The project proposal consists of new 400kV interconnection line between Bosnia and Herzegovina and Croatia with needed new bays for its connection in both 400 kV substations. Total legth of the line is 115 km (69 km in Croatia, and 46 km in BiH). Year of commissioning: 2025

ET006 - 400 kV OHL Đakovo(HR) - Tuzla/Gradačac (BIH) with extensions of 400 kV substations Project Promoter(s): HEP OPS (HR)
The project proposal consists of upgrading existing ageing 220 kV interconnection lines between substations Tuzla and Gradačac in Bosnia and Herzegovina and substation Đakovo in Croatia to the 400 kV voltage level with needed new bays for its connection in 400 kV substations. Year of commissioning: 2022

ET007 - 400 kV OHL Brinje – Lika – Velebit – Konjsko including 400 kv substation Brinje Project Promoter(s): HEP OPS (HR)
The project proposal consists of a new 400 kV overhead line between Bosnia and Herzegovina and Croatia consisting of: Lika – Brinje, new 55 km single circuit 400 kV OHL (upgrade of 220 kV OHL), Lika – Velebit, new 60 km single circuit 400 kV OHL (upgrade of 220 kV OHL), 400 kV substation Brinje • Konjsko – Velebit, new 100 km single circuit 400 kV OHL (upgrade of 220 kV OHL). The project proposal is included in TYNDP 2012 under investment numbers 27.A105, 27.A106, 27.A108 and 27.A114 Year of commissioning: 2020

ET008 - 400 kV OHL Kosovo B (Kosovo*) - SS Skopje 5 (FYR of Macedonia) **Project Promoter(s):** MEPSO (MK) and KOSTT (Kosovo*)
The project proposal consists of a new 85 km long 400 kV OHL relevant to planning investment of 2,000 MW of TPP in the area of Kosovo*. The project proposal is included in TYNDP 2012 under investment number 49.237. Year of commissioning: 2023

ET009 - 750 kV HVDC OHL between Albertirsa (HU) and Ukraine **Project Promoter:** DTEK Zakhidenergo PJSC (UE)
The project proposal consists of Rehabilitating the existing 750 kV Zakhidnoukrainskaya – Albertirsa line into 400 kV line and installation of the HVDC Interconnector with 600 MW capacity. Year of commissioning: 2017

ET010 - Installation of OPGW (Optical Ground Wire) on interconnection lines Project Promoter(s): KOSTT (Kosovo*)
KOSTT has developed the internally communication infrastructure within the SCADA /EMS & Telecommunication project, but is s not fulfilling completely requirement of Operational Hand Book –Policy 6. To comply with Policy 6 KOSTT should have the EH with interconnectivity

points Montenegro, Serbia , Albania and FYR of Macedonia. Main objective of this project is installation of the earth wire OPGW (till the border with neighbouring countries) and telecommunication equipment in existing interconnection 400kV,220kV and 110kV lines. This action foresees the installation of the earth wire OPGW (till the border with neighbouring countries) and telecommunication equipment at the existing interconnection 400kV overhead lines as follows:

OHL 437, SS Peja 3 – Border with Montenegro, with total length 69 km

OHL 407, SS Kosova B – Border with Serbia, with total length 41 km

OHL 2303, SS Prizren – Border with Albania, with total length of 45 km

OHL 205/1, SS Podujeve – Border with Serbia, with total length of 14.5 km

Year of commissioning: 2015

ET011 - Load frequency control Kosovo* - AL Project Promoter(s): KOSTT (Kosovo*)
Currently the Kosovo power transmission system is part of the control area of the Serbian TSO Elektromreza Srbije (EMS). Therefore the load frequency control for the entire control area including Kosovo* is done by EMS transmission control centre in Belgrade and KOSTT exclusively reports to EMS. OST operates its own control area for the territory of Albania KOSTT currently considers the possibilities to enter into an agreement with Albanian TSO OST in order to form a joint frequency control area Kosovo* – Albania. Year of commissioning: 2016

ET012 - 110 kV OHL Dragash (Kosovo*) - Kukesh (AL) Project Promoter(s): KOSTT (Kosovo*)
The project proposal consists of construction of a new OHL 110 kV between Dragash in Kosovo* and Kukes in Albania. Year of commissioning: 2017

ET013 - Installation of the Metering group on Interconnection lines Project Promoter(s): KOSTT (Kosovo*)
To comply with the obligations established in the document *Metering Code for Kosovo** both as transmission network operator and as market operator, KOSTT must ensure that appropriate 15 minute data is available from all of its boundaries with other network operators, customers and, generators. The existing meters group (VT , CT and meters) in interconnection points are not able to measure the power/energy in different tariffs, they measure in only one tariff and measuring of energy in different tariffs which are not in compliance with ENTSO-E requirements. Year of commissioning: 2015

ET014 - OHL 400 kV Tirana (AL) - Pristina (Kosovo*) Project Promoter(s): KOSTT (Kosovo*)
The project proposal consists of a new 238 km 400 kV OHL between Tirana in Albania and Pristina in Kosovo*. On 78 km the circuit will be installed on the same towers, as the Tirana – Podgorica OHL currently in construction, the rest will be built as single circuit line. The project proposal is included in TYNDP 2012 under investment number 49.235. Year of commissioning: 2016

ET015 - OHL Balti (MD) - Suceava (RO) **Project Promoter(s):** SE Moldelectrica (MD)
The project proposal consists of construction of a new 400 kV interconnection line between Balti in Moldova and Suceava in Romania, extension of 330 kV Balti substation – a new 400 kV switchyard and two 400/330 kV autotransformers, and a new 400 kV bay in Suceava substation. The project is a direct cross border interconnection. It is estimated by the project promoter that the project allows for an increase of transfer capacity of up to 325 - 400 MW on the Moldova – Romania interface. Year of commissioning: 2019

ET016 - OHL Straseni (MD) - Iasi (RO) **Project Promoter(s):** SE Moldelectrica (MD)
The project proposal consists of construction of a new 400 kV interconnection line between Straseni in Moldova and Iasi in Romania, extension of 330 kV Straseni substation – a new 400 kV switchyard and two 400/330 kV autotransformers and a new 400 kV bay in Straseni substation Year of commissioning: 2020

ET017 - OHL 400 kV Pljevlja - Lastva Project Promoter(s): CGES (ME)
The project proposal consists of construction of a new transmission line connecting existing substation Pljevlja and new substation 400/110kV Lastva, even including SS Lastva and the connection of SS Lastva itself to the existing 400kV OHL Trebinje-Podgorica . It is part of the new HVDC interconnection project ME-IT. The project proposal is included in TYNDP 2012 under the investment number 28.233b. Year of commissioning: 2016

ET018 - OHL 400 kV SS Kragujevac - SS Kraljevo Project Promoter(s): EMS (RS)
The project proposal consists of a construction of new 400kV OHL between substation SS Kraljevo 3 and SS Kragujevac 2. Upgraded SS Kraljevo 3 (400kV) will be connected to existing Kragujevac 2 (400 kV) substation. Project is part of upgrading whole Western and Central Serbia to 400 kV voltage level. One of the reasons for the upgrade to 400 kV voltage level is currently very old 220 kV network that connects major SSs in that part of Serbian transmission network. Year of commissioning: 2016

ET019 - 400 kV OHL SS Jagodina - SS Pozarevac with the building of new 400 kV SS Pozarevac Project Promoter(s): EMS (RS)
The project proposal consists of a construction of new 400 kV SS Pozarevac together with new OHL 400 kV connecting SS Jagodina with SS Pozarevac. It is a part of major regional corridors East – West, Northeast - Southwest. One of the reasons for the upgrade to 400 kV voltage level is currently very old 220 kV network that connects major SSs in that part of Serbian transmission network. Year of commissioning: 2022

ET020 - 400 kV OHL SS Resita (RO) - SS Pancevo (RS) Project Promoter(s): EMS (RS)
The project proposal consists of a construction of new 131 km double circuit 400kV OHL between existing substations in Romania and Serbia (63 km on Romanian side and around 70 km on Serbian side). This project connects West boundary of Romania and Bulgaria with the rest of Continental South East Europe. The project proposal is included in TYNDP 2012 under investment number 50.238. It is major part, sort of "backbone", of the regional Southwest - Northeast corridor. Year of commissioning: 2018

ET021 - OHL 400 kV SS Obrenovac - SS Bajina Basta Project Promoter(s): EMS (RS)
The project proposal consists of a construction of new double circuit 400 kV OHL between new substation Bajina Basta, and substation Obrenovac, as a part of upgrade of the overall 220 kV to 400 kV voltage level network in Western Serbia region. Year of commissioning: 2018

ET022 - 400 kV OHL SS Bajina Basta - SS Kraljevo Project Promoter(s): EMS (RS)
The project proposal consists of a construction of new 400kV OHL between substation SS Kraljevo 3 and SS Bajina Basta. Upgraded SS Kraljevo 3 (400kV) will be connected to Kragujevac 2 (400 kV) substation, and in the next phase to SS Nis and further on to SS Sofia West (Bulgaria). The project proposal is included in TYNDP 2012 under investment number 50.A118. It is part of the regional East - West corridor. Year of commissioning: 2018

ET023 - HVDC OHL between Poland and Ukraine **Project Promoter(s):** DTEK Zakhidenergo PJSC (UE)
The project proposal consists of Rehabilitating the existing 750 kV Khmelnytsk NPP (KhNPP)-Rzeszów line into 400 kV line, connecting the line to the Dobrotvir TPP, resulting in an increase in exports capacities by 265 MW (all capacities of DobTPP to be exported) and construction of HVDC Interconnector with capacity of 600 MW at Dobrotvir TPP. Total increase in cross-border capacity between Poland and Ukraine resulting from the project is 865 MW or 4700 GWh annually (both ways, but primarily export form Ukraine). Year of commissioning: 2016

ET024 - DC cable Vlora (AL) - Bari West (IT) **Project Promoter(s):** National Agency of Natural Resources (AL)
The project proposal consists of a construction of undersea DC cable connecting new 400 kV substation in Vlora area with Italy. Total legth of the underground cable is around 150 km. The project proposal is included in TYNDP 2012 under PPER 51. Year of commissioning: 2014

B. Electricity Generation

EG001 - Wind Park Dajc-Velipoje **Project Promoter(s):** Energia Rinnovabile Shkoder SH.P.K (AL)
Energia Rinnovabile Shkoder SH.P.K is working to implement new WPPs in Albania near Skadar lake. The main presumptions for study database building and analyses are: Scenario 1, 2016 - WPP Dajc-Velipoje 75 MW injecting to SS Dajc (in 2015) Scenario 2, 2020 - WPP Barbullush 45 MW injecting to SS Dajc (in 2017) - WPP Bushat 26 MW injecting to SS Dajc (in 2017) - WPP Ulcinj 40 MW injecting to SS Ulcinj 2 (in 2020) Year of commissioning:2015-2020

EG002 - Hydro Power System Upper Drina Project Promoter(s): MH ERS (BIH)
In the upper course of the Drina River Hydro Power System of Upper Drina is planned to be constructed. This implies construction of three hydro power plants (HPP Buk Bijela, HPP Foca and HPP Paunci) on the Drina River and one HPP Sutjeska on the Sutjeska River, a left tributary of the Drina River. The scheduled hydro power plants are of adjacent type, gravity concrete, while HPP Sutjeska is a diversion plant with an earthfill dam. Planned installed capacity is as follows: HPP Buk Bijela - 93,52 MW, HPP Foca - 44,15 MW, HPP Paunci - 36,6 MW, HPP Sutjeska - 35 MW. Year of commissioning: 2019 - 2021

EG003 - Hydro Power Plant Dabar Project Promoter(s): MH ERS (BIH)
The HPP Dabar is a diversion power plant with the reservoir situated in the Nevesinjsko polje (plain). The HPP Dabar basic segments are as follows: “Pošcenje“ dam, “Nevesinje“ reservoir, reservoir intake structure, headrace channel, headrace tunnel and surge tank, penstock, powerhouse and auxiliary structures, channel through the Dabarsko polje (plain). The diversion HPP Dabar uses water from the reservoir situated in the Nevesinjsko polje, which was formed by construction of the “Pošcenje“ dam. Water is delivered from the reservoir to the powerhouse in the Dabarsko polje by diversion tunnel and tunnel pressurized pipeline. Total planned installed capacity of HPP Dabar is 159,15 MW. Year of commissioning: 2017

EG004 - Hydro Power Plant Dubrovnik (phase II) **Project Promoter(s):** HEP (HR) and MH ERS (BIH)
The first phase of the hydropower system on the Trebisnjica River consisting of reservoir, power plants, tunnel system and compensation reservoir was constructed in the 60’s of the last century. The HPP Dubrovnik is the last stair within the hydropower system on the Trebisnjica River. The HPP Dubrovnik is a diversion power plant situated at the seaside nearby the place of Plat, about 15 km southeast of Dubrovnik in Croatia. The HPP Dubrovnik construction was planned to be carried out in two phases. The HPP Dubrovnik – I phase has been constructed so far having installed capacity of 216 MW. Certain facilities and some parts of the facilities concerning the Dubrovnik second phase have been constructed within the first phase.

The basic idea of the project HPP Dubrovnik II is to increase the HPP Dubrovnik installed discharge from current 90 m^3/s to 210 m^3/s. It includes construction of new tunnel having lenght of 16.5 km, out of which 16 km belong to the territory of the Republic of Bosnia and Herzegovina, while 0.5 km belongs to the Republic of Croatia, together with new surge tank, penstock, tailrace tunnel and complete equipment in the powerhouse and switchyard. Water overflow at the Gorica dam, as well as additional water flooding the Dabarsko polje (plain) and the Fatnicko polje (plain), being evacuated through already constructed hydro-technical tunnels Dabar – Fatnica and the Fatnicko polje – Bileca reservoir, would be used in this way. Total planned installed capacity of Dubrovnik II is 304 MW.

Year of commissioning: 2017

EG005 - Hydro Power Plants Lower Drina **Project Promoter(s):** MH ERS (BIH), EPS (RS) and Elektroprivreda BiH (BIH)
The concept of Lower Drina hydro power potential utilization is based on construction of the hydro power plants in cascade with the powerhouse adjacent to the dam (distance between profiles is about 15km). The reservoirs formed during the construction of dams are between the side embankments at the left and the right bank of the Drina River. Utilization of energy head is mostly achieved by construction of dams and digging out the river bed downstream from them. The concept of hydro power potential utilization covers construction of four adjacent hydro power plants at this section: HPP Kozluk, HPP Drina 1, HPP Drina 2 and HPP Drina 3. Planned installed capacity is as follows: Kozluk - 88,5 MW, Drina 1 - 87,7 MW, Drina 2 - 87,8 MW, Drina 3 - 101 MW. Year of commissioning: 2018-2020

EG006 - Hydro Power Plants Middle Drina **Project Promoter(s):** MH ERS (BIH), EPS (RS) and Elektroprivreda BiH (BIH)
The Drina River in its middle course is a border river between Bosnia and Herzegovina (Republic of Srpska) and the Republic of Serbia. The Drina course, provisionally named the Middle Drina, has gross head of about 70 m and covers a section from the end of the backwater of HPP Zvornik to the tail water level of HPP Bajina Bašta (the section covers 81.35km of the river course). The Middle Drina represents the most important part of the Drina River in terms of energy and water management and requires the complex solution of this section. The proposed technical solution of the Middle Drina hydro power potential utilization schedules construction of three hydro power plants in cascade: HPP Dubravica (87,23 MW), HPP Tegare (120,94 MW) and HPP Rogacica (113,28 MW). All three hydro power plants are run-off-river plants, without reservoirs which volumes would enable water regulation. Year of commissioning: 2019 - 2023

EG007 - Hydro Power Plants Crna River **Project Promoter(s):** Ministry of Environment and Physical Planning (MK)
The Project is for generation of electricity from hydropower plants on Crna River in a joint venture with a public power company, JSC ELEM. The project comprises the following elements: The concession for water from Crna River for production of electricity, including exclusive right to design, build operate and maintain HPP Gebren (with indicative minimum installed capacity between 315 MW and 333 MW) and HPP Galiste (with indicative capacity between 185 MW and 197 MW) and exclusive right to operate and maintain the existing TPP Tikves (with installed capacity of 116 MW) during the period of 52 years, subject to a water use licence to be delivered by the relevant administrative body, and

Establishment of a joint venture with ELEM on the conditions specified and transfer to the concession to this newly created joint venture. The percentage of shares of ELEM in the share capital of the joint venture shall be not lower than 39%. The ELEM;s contribution in the capital of the joint venture would include in particular the transfer of the existing HPP Tikves as well as other contributions. Year of commissioning: 2020 - 2026

EG008 - Hydro Power Plants Vardar River **Project Promoter(s):** Ministry of Economy(MK)
Basic aim of the project is complex organization of the space on the river Vardar, and understands concept for sustainable development, planning, managing and protection of the environment. Realization of systems for water supply and irrigation is envisaged as well as, use of the water for energy purposes, that is, generation of electricity. Twelve HPPs on the river Vardar are envisaged for construction with aim to use the hydro potential of the river Vardar. Total installed capacity is envisaged to be up to 324,44 MW and will consist 12 units from which two are with accumulation HPP Veles with installed capacity of 93 MW and HPP Gradec 54,6 MW. The rest 10 HPPs are run of river with installed capacity of 176,84 MW. Year of commissioning: 2021

EG009 - Hydr Power Plants HS Zletovica Phase 3 Energetics **Project Promoter(s):** Public Enterprise for water supply activities Hydrosystem Zletovica Probistip, (MK)
HS Zletovica is multipurpose system utilized for the following purposes : Water supply of 100 000 beneficiaries with drinking water in the municipalities Probistip, Stip, Sveti Nikole, Karbinci, Lozovo and Kratovo. Production of electrical energy, in the function of necessity of watersupply and irrigation. Energetic utilization of the water that are issued for the necessity of watersupply and irrigation and is predicted to perform construction of 8 small hydro power plants: HPP Knezevo, HPP Zletovo 1, HPP Zletovo 2, HPP Zletovo 3, HPP Emiricka 1, HPP Emiricka 2, HPP Probistip and HPP Kratovo. Total planned installed power of Hydro System Zletovica is 9,383 MW. Year of commissioning: 2017

EG010 - Air Monitoring in Thermal Power Plant Kosovo B Project Promoter(s): KEK (Kosovo*)
In accordance with the Law on air protection, the facilities with causes air pollution are obliged to organize internal monitoring related to monitoring of pollution levels. In Kosovo Environmental Action Plan (KEAP), the key environmental problems in the energy sector are identified as follows: weakness in law enforcement, lack of monitoring systems and low environmental performance. A reliable system of air quality monitoring is an urgent need to verify environmental effects from the operation of power plants. Year of commissioning: 2016

EG011 - Decommissioning and Clean-up projects of former Gasification Plant Project Promoter(s): KEK (Kosovo*)
The former gasification plant is situated near the Power Plant Kosovo A and it includes a surface of approximately 20 ha. There are a number of buildings, belt conveyors, pipes and tanks constructed in this area. The plant has not been in use for 20 years. The treatment of hazardous mate-

rials on this plant is currently being treated through the project financed by the World Bank and Dutch Government The next stage is the study of hazardous materials remaining in pipes and different Tanks. Elaboration of a detailed action plan for decommissioning and cleaning of former Gasification plant, including environmental management plan and cost estimation as well as the Terms of Reference for a detailed implementation design. Basically, Decommissioning should include dismantling of existing facilities and converting the area into beneficial use. Year of commissioning: 2014-2017

EG012 - Enlargement and Installation of New Electrostatic Precipitators in Thermal Power Plant Kosovo B Projetc Promoter(s): KEK (Kosovo*)
Kosovo B is the second largest Power Plant in Kosovo*. It consists of two units, B1 and B2 with installed capacity of 339 MW each. Kosovo B power plant is commissioned in the years 1983-1984. The design of Electrostatic Precipitators at Kosovo B1 & B2 is not foreseen to meet the requirements of EC Directive for emissions. EIA report funded by EAR, shows that it is necessary to increase or change Electrostatic Precipitators. Also replacement of electric auxiliary equipment and control system are required to have substantial reductions of the fly ash emission and other pollutants according to EU standards. Discharge levels of air pollutants are above levels set by EU Directives. But within the program compiled by KEK is foreseen that by 2017, the emissions of pollutants into the air from the Power Plants chimneys should be in accordance with Kosovo* and EU Environmental Standards (LCP Directive 2001/80/EC) Directive. Calculated emissions are almost in accordance with current design of ESP's (TPP B1-150 mg/m3N / TPP B2-260 mg/m3N). Year of commissioning: 2017

EG013 - Kosova e Re Power Plant project (KRPP) **Project Promoter(s):** in phase of receiving bidder offers
The Kosova e Re Power Plant is an ongoing transaction process and it's on the phase of recieving bidder offers. It is comprised on constructing new generation capacities and opening a new lignite open cast lignite mine. The Kosova e Re power plant will be located approximately at the middle of the country and connected at the substation of Kosovo B power plant, where the existing 400kv interconnection lines are connected with Serbia, Montenegro and Macedonia. From the 2014 in this substation will be connected the new interconnection line 400kv, between Kosovo* and Albania, and the second planned 400kv interconnection line with Macedonia. The installed generation capacity envisaged to have the range of 2x300MWgross is a base load capacity which will impact on increasing regional base load and ensure security of supply. The net annual electricity generation over the first 20 years is 4,200GWh/year. Year of commissioning: 2017

EG014 - Hydro Power Plants Cehotina River **Project Promoter(s):** Reservoir Capital Corporation
Planned the construction a small hydroelectric power plants system on the River Cehotina (Montenegro) main course and these are: SHPPs "Milovci", "Mekote", "Gradac" and "Otilovici". Planned construction of SHPPs is between Pljevlja and border with Bosnia and Herzegovina. Capacity of the project is 32,566 MW, and the average net annual generation over the first 20 years is 136,872 GWh.

Year of commissioning: 2017

EG015 - Hydro Power Plants Lim River
Project Promoter(s): Reservoir Capital Corporation

Planned the construction a small hydroelectric power plants system on the River Lim (Montenegro) main course and these are: SHPPs ‘’Plav’’, ’’Murino’’, ’’Kruševo”, ’’Mostine’’, ‘’Jagnjilo’’, ‘’Andrijevica’’, ‘’Lukin Vir’’, ’’Berane 1’’, ’’Berane 2’’, ‘’Poda’’, “Bijelo Polje 1’’ and “Bijelo Polje 2’’. Capacity of the project is 92,7 MW, and the average net annual generation over the first 20 years is 459,2GWh..

Year of commissioning: 2017

EG016 - Hydro Power Plants Brodarevo
Project Promoter(s): Reservoir Capital Corporation

Construction of two hydropower plants on the Lim River, being HPP "Brodarevo 1" and HPP "Brodarevo 2", which will be located in the territory of Prijepolje municipality (Serbia), near border with Montenegro. HPP “Brodarevo 1” at “Junakovine” section will be located 3 km upstream of the Brodarevo settlement, next to the existing Brodarevo-Bijelo Polje (Belgrade – Podgorica) arterial road. HPP “Brodarevo 2” at “Lučice” section will be located about 10 km upstream of the town of Prijepolje, next to the existing Brodarevo-Bijelo Polje (Belgrade – Podgorica) arterial road. Installed total capacity for HPP “Brodarevo 1 and 2” is 59,2 MW. The each hydropower plant will have 3 generating units, and each having the discharge of 50 m3/s. Total rated discharge of the each hydropower plant will be 150 m3/s.

Year of commissioning: 2014

EG017 - Combined Heat and Power Plant Novi Sad
Project Promoter(s): Energija Novi Sad (RS)

The project proposal consists of a construction of new CCGT- CHP unit at the city of Novi Sad. Existing Novi Sad CHP (units 1 and 2) is an irreplaceable basic heat source of Novi Sad district heating system, supplying more than 80 000 households and other consumers. If the temperature is below 5 ºC degrees the current heating facilities of the city of Novi Sad, without Novi Sad CHP units, are not sufficient. The new CCGT-CHP Novi Sad unit will be used to generate electricity, for the city of Novi Sad heating and steam for Oil Refinery needs. Novi Sad CHP will use as a fuel imported natural gas. Planned installed capacity is 450 MW electrical and 300 MW heat load. The annual generation will reach the level of 2500 GWh.

Year of commissioning: 2016

EG018 - Hydro Power Plants Velika Morava
Project Promoter(s): Moravske hidroelektrane d.o.o. (RS)

Velika Morava HPPs is a system of run-of-river power plants, utilizing the hydropower potential of the Velika Morava River. It consists of five facilities: Ljubicevo HPP, Trnovce HPP, Svilajnac HPP, Mijatovac HPP and Varvarin HPP. Planned installed generation capacity is 147.7 MW. Average net annual generation capacity is 645.5 GWh.

Year of commissioning: 2016-2021

EG019 - Hydro Power Plants Ibarske
Project Promoter(s): Ibarske hidroelektrane d.o.o. (IT) and EPS (RS)

Ibarske HPPs is a system of run-of-river power plants, jointly using the Ibar River hydropower potential. It consists of ten plants: Bojanici HPP, Gokcanica HPP, Usce HPP, Glavica HPP, Cerje HPP, Gradina HPP, Bela Glava HPP, Dobre Strane HPP, Maglic HPP and Lakat HPP. System of ten power plants is located on the Ibar River, on the territory of Kraljevo and Raska Municipalities. Planned installed generation capacity is 118 MW. Average net annual generation capacity is 443 GWh. Year of commissioning: 2016 - 2021

EG020 - Pumped Storage Hydro Power Plant Bistrica Project Promoter(s): EPS (RS)
Bistrica PSHPP comprises: Klak dam with a spillway and a diversion tunnel; headrace tunnel with an inlet structure, valve chamber, draft tube across the Rutoska River and the associated bottom outlet; surge tank and surge tank valve chamber; penstock; powerhouse with access roads; tailrace tunnel with outlet structure; other structures (switchyard, access roads, etc.); adapted Radojinja dam and spillway. Powerhouse is located at the right bank of the Lim River, on Lake Potpec within the zone of the Belgrade-Bar railway. Planned installed generation capacity is 700MW. Average net annual generation capacity is ca. 600GWh. Year of commissioning: 2020

EG021 - Pumped Storage Hydropower Plant Djerdap 3 (Phase I) Project Promoter(s): EPS (RS)
Pumped storage hydro-power plant Djerdap 3 was designated initially in 1974. It was envisaged as a facility capable of daily and seasonal water regulation with installed capacity of 2400 MW. It was planned for utilization in neighbouring system as well, both in the pumping and generator mode. Water is captured from Lake Djerdap and pumped over to the reservoir formed on the Pesaca River, where it is stored in the first upper reservoir. Planned installed generation capacity of Djerdap 3 PSHPP – Phase I is 600MW. Average net annual generation capacity is 600GWh. Year of commissioning: after 2020

EG022 - Thermal Power Plant Kolubara B Project Promoter(s): EPS (RS)
The project proposal consists of a construction of a new lignite power plant Kolubara . It will be situated in Serbia, 60km south-west from Belgrade, in the vicinity of the Kalenic village. Planned installed capacity will be 2x375 MW, with planned electricity generation of 5000 GWh annually. Year of commissioning: 2019

EG023 - Thermal Power Plant Kostolac B3 Project Promoter(s): EPS (RS)
By 1991 the first construction phase was executed including two units with total installed capacity of 697 MW, and two more units of the same power anticipated to be constructed at the same location by the design documents. During the first Kostolac B construction phase, some joint facilities and structures were constructed for the needs of the second construction phase. This project proposal consists of construction of a new unit in the existing thermal power plant Kostolac B. It is situated on the right bank of the Mlava River, in the Drmno village area, close to the town of Kostolac. Planned installed capacity of a new unit is 350 MW and annual generation in the first 20 years will be over 2.5/5 TWh. It will be a highly efficient thermal power plant; with generation based on lignite, coming from the Kostolac Mining Basin open cast mines.

Year of commissioning: 2020

EG024 - Thermal Power Plant Nikola Tesla B3 Project Promoter(s): EPS (RS)
By 1985, the first construction phase of thermal power units was complete at the Vorbis site, near Obrenovac, when two units with total capacity of 2 x 620MW were built (Nikola Tesla B TPP). The 1984 project documentation envisaged the construction of two more units of the same capacity using lignite supplied from the Kolubara Mining Basin as primary fuel. This project proposal consists of a construction of a new unit in the existing therma power plant Nikola Tesla. The project is located on the right bank of the Sava River near the town of Obrenovac, some 60 km upstream from Belgrade. Planned installed capacity of a new unit is 744 MW and annual generation during the first 25 years will be over 5 TWh. Generation is based on lignite, coming from open cast mines of the Kolubara Mining Basin, with unit efficiency ratio >40%. Year of commissioning: 2020

EG025 - Construction of a new unit at Burshtyn TPP **Project Promoter(s):** DTEK Zakhidenergo (UE)
The project assumes the construction of a new coal fired energy unit with capacity up to 800 MW at the existing site of Burshtyn TPP. The project has a cross-border impact as the electricity generated by the unit can be both consumed within Ukraine or be exported to Hungary, potential export capacity is 800 MW and the net annual electricity supply is 4 500 GWh. The suggested size of the unit will be determined taking into consideration the upcoming Energy strategy of Ukraine up to 2030 and ensuing consequences for DTEK's own long-term strategy, as well as the respective positions of system operators and regulators. Year if commissioning: 2019

EG026 - Construction of a new unit at Dobrotvir TPP **Project Promoter(s):** DTEK Zakhidenergo (UE)
The project assumes the construction of a new coal fired energy unit with capacity up to 660 MW at the existing site of Dobrotvir TPP. The project has a cross-border impact as the electricity generated by the unit can be both consumed within Ukraine or be exported to Poland, potential export capacity is 660 MW and the net annual electricity supply is 3 700 GWh. The suggested size of the unit will be determined taking into consideration the upcoming Energy strategy of Ukraine up to 2030 and ensuing consequences for DTEK's own long-term strategy, as well as the respective positions of system operators and regulators. Year of commissioning: 2019

EG027 - Combined Heat and Power Plant KTG Zenica **Project Promoter(s):** KTG Zenica d.o.o. (BIH)
The project will be one of the largest investments in Bosnia and Herzegovina in the post-war period.. In addition, the plant will, in the heating season, replace the current consumption of around 700 tons of coal per day thereby significantly contributing to pollution reduction. The gas fired plant with an installed electrical capacity of 390MWel and an installed thermal capacity of 170MWth will have degree of flexibility to cover the fluctuating power demand in Bosnia and Herzegovina. The technical plant concept of the Project is based on two gas turbines with electrical output of approx. 126Mwel, two heat recovery steam generators and one steam turbine with the estimated maximum electrical output of 135 MWel. The gas turbines will operate on natural

gas fuel. The steam turbine will be equipped with steam extraction taps to provide the required amount of steam to cater for the thermal requirements of 170 MWth for the district heating system. The plant's district heating facilities will be connected to the existing municipality's district piping.
Year of commissioning: 2015-2016

EG028 - Flue Gas Desulphurization on unit 6 in TPP Tuzla **Project Promoter(s):** JP Elektroprivreda Thermal Power Plant Tuzla (BIH)
Due to continuously operation of unit 6 in TPP Tuzla in year 2018 relating to EU Directives of Emission limit values of pollutants, it is necessary to install FGD system. It will provide continues operation of the unit 6 in next 20 years according EU Directives relating to emissions. Year of commissioning: 2017

EG029 - Wind Park Bitovnja **Project Promoter(s):** Elektroprivreda BiH d.d. – Sarajevo (BIH)
The wind farm Bitovnja is planned to be located at about 30 km west of Sarajevo, at an altitude of 1656 m a.s.l. The estimated capacity of the site is 45.0 MW, with a capacity factor of 30.4 % (120 GWh p.a.). Measurements according to IEC 61400-12 is performed since July 2010. The Feasibility study for this location has been completed in October 2012. Wind farm will be situated on mountain Bitovnja – Municipality of Konjic. Total planned installed capacity is 45.0 MW, consisting of 18 turbines (2.5 MW/turbine), and the expected average power generation over the first 20 years of project implementation is 120 GWh/year. A more detailed analysis will be subject to coming investigation works. Year of commissioning: 2018

EG030 - Wind Park Borisavac **Project Promoter(s):** Elektroprivreda BiH d.d. – Sarajevo (BIH)
The wind farm Borisavac is planned to be located at about 19 km away from the town of Konjic, at an altitude of 1171 m a.s.l. The estimated capacity of the site 48.0 MW, with a capacity factor of 22.6 % (95 GWh p.a.). Measurements according to IEC 61400-12 is performed since July 2010. Wind farm will be situated on mountain Prenj – Municipality of Konjic. Total planned installed capacity is 48.0 MW, consisting of 16 turbines (3.0 MW/turbine) and the expected average power generation over the first 20 years of project implementation is 95 GWh/year. Year of commissioning: 2021

EG031 - Wind Park Medvedjak **Project Promoter(s):** Elektroprivreda BiH d.d. – Sarajevo (BIH)
The wind farm Medvedjak is planned to be located at about 25 km away from the town of Bihac, at an altitude of 970 m a.s.l. The estimated capacity of the site is 33.0 MW, with a capacity factor of 25.6 % (74 GWh p.a.). Measurements according to IEC 61400-12 is performed since end of 2010. Wind farm will be situated on mountain Grmec – Municipality of Bihac. Total planned installed capacity is 33.0 MW, consisting of 11 turbines (3.0 MW/turbine) and the expected average power generation over the first 20 years of project implementation is 74 GWh/year. Year of commissioning: 2016

EG032 - Wind Park Podvelezje **Project Promoter(s):** Elektroprivreda BiH d.d. – Sarajevo (BIH)
The wind farm Podvelezje is planned to be located at about 5 km away from the town of Mostar, at an altitude of 750 m a.s.l. The estimated capacity of the site is 40.0 – 48.0 MW, with a capacity factor of 24.0% (84.1 – 100.9 GWh p.a.). Wind farm will be situated on plateou Podvelezje – Municipality of Mostar. Total planned installed capacity is 40.0-48.0 MW, consisting of 16 turbines (2.5-3.0 MW/turbine) and the expected average power generation over the first 20 years of project implementation is 84.1-100.9 GWh/year. Year of commissioning: 2014

EG033 - Wind Park Rostovo **Project Promoter(s):** Elektroprivreda BiH d.d. – Sarajevo (BIH)
The wind farm Rostovo is planned to be located at about 12 km away from the town of Bugojno, at an altitude of 1318 m a.s.l. The estimated capacity of the site is 12.0 – 18.0 MW, with a capacity factor of 19.0 – 22.2 % (20 – 35 GWh p.a.). Measurements according to IEC 61400-12 is performed since July 2010. Wind farm will be situated on mountain Rostovo – Municipality of Bugojno. Total planned installed capacity is 12.0-18.0 MW, consisting of 6 turbines (2.0-3.0 MW/turbine) and the expected average power generation over the first 20 years of project implementation is 20-35 GWh/year. Year of commissioning: 2016

EG034 - Wind Park Vlasic **Project Promoter(s):** Elektroprivreda BiH d.d. – Sarajevo (BIH)
The wind farm Vlasic is planned to be located at about 8 km away from the town of Travnik, at an altitude of 1700 m a.s.l. The estimated capacity of the site is 50.0 MW, with a capacity factor of 27.4% (120 GWh p.a.). Measurements according to IEC 61400-12 is performed since November 2011. Wind farm will be situated on mountain Vlasic – Municipality of Travnik. Total planned installed capacity is 50 MW, consisting of 20-25 turbines (2.0-2.5 MW/turbine) and the expected average power generation over the first 20 years of project implementation is 120 GWh/year. Year of commissioning: 2016

EG035 - Combined Heat and Power Cycle Gas Turbine Plant in Pancevo **Project Promoter(s):** NIS j.s.c. Novi Sad (RS)
CHP plant shall supply electricity to the local and regional market and electricity and process steam to Chemical and Petrochemical factory ‘‘HIP Petrohemija Pancevo‘‘ and ‘‘Refinery Pancevo‘‘. The plant shall apply Combined Cycle Gas Turbine technology consisting of Dry-Low NOx gas turbines, Heat Recovery Steam Generators (HRSG) with supplementary firing and one condensing/extraction steam turbine offering high CHP efficiency. The future plant will be situated in the city of Pancevo, 20 km east from Belgrade. CCGT plant consists of 3 identical gas turbines, 3 Heat Recovery Steam Generators (HRSG) with supplementary firing and 1 condensing-extraction steam turbine and associated balance of plant (BoP). Year of commissioning: 2016

EG036 - Small CHP plants in the Republic of Serbia **Project Promoter(s):** NIS j.s.c. Novi Sad
Small CHP plants are to be used for electricity generation for the market, as well as heat production for heating of the process facilities and equipment at the drilling rigs Velebit , Sirakovo, Kikinda, Turija, Boka, Bradarac, and Srbobran. Heating at the sites is currently provided from steam and/or hot water boilers fired by available flare gas. However, only a small amount of flare gas is used in boiler plants while the largest portion is burnt at flambeaus. Small CHP plants will be situated in the municipalities of Velebit, Sirakovo, Kikinda, Turija, Srbobran, Boka, Bradarac in the Republic of Serbia. In total 9 CHP units with total electric capacity of 7.5 MWe shall be installed in year 2013, namely Velebit 2 x 995 kWe, Sirakovo 1 x 850 kWe, Kikinda 1 x 995 kWe, Turija 1 x 999 kWe, Boka 350 kWe, Bradarac 300 kWe, and Srbobran 2 x 995 kWe. Year of commissioning: 2013

EG037 - Pumped-Storage Scheme Korita **Project Promoter(s):** Hrvatska elektroprivreda d.d. (HR)
River Cetina cascaded hydropower system comprises five hydroelectric power plants, two large reservoirs (Peruća and Buško Blato), a smaller reservoir (Mandak) and four compensation reservoirs (Lipa, Đale, Prančevići, Nejasmić). This project proposal consists of introducing new capacity of pumped-storage scheme Korita. PSS Korita is positioned in the middle of the Cetina cascaded hydropower system, thus regulating the water regime not only for electricity generation, but for the flood protection and irrigation of "Sinjsko polje" field as well. Total planned installed capacity is 660 MWgen/693 MWpump. Annual production of peak energy is calculated up to 1600 GWh of electricity, and the energy needed for pumping in that case would be 2200 GWh over the year. Year of commissioning: n/a

EG038 - Hydro Power Plant Skavica **Project Promoter(s):** National Agency of Natural Resources (AL)
Skavica HPP will be constructed in the upper side of the Drin river cascade. The reservoir will be entirely located in Albanian territory. The installed capacity is about 350 MW and the electricity production is foreseen 1,05-1.1 TWh/year. The Skavica reservoir allows planning the electricity production through the optimization of the water recourse use. More electricity, 200-300 GWh, can be produced from the downstream power plants of Fierza, Komani and Vau Dejes; The DAM ABUTMENT is located at the end of a narrow erosion gorge, about 5 km long, which has been hollowed out from the Drin River in Upper Triassic dolomite non stratified grey lime stones. Year of commissioning: 2015

C. Gas Infrastructure

G001 - Underground Storage in Albania **Project Promoter(s):** National Agency of Natural Resources (AL)
Gas storage is one of the sub-projects that shall accompany the gas study, as an important element for covering the peak demand and balancing seasonal supply. Possible potentials for gas storage are exploited sources of gas, oil and salt-formation (salt-cellar) (Dumre zone). In exploited sources of natural gas can stock about 1.8 BCM like the object of Tortonian in Povelce, Divjaka and Frakulla sources. With big perspective is presented Dumreja, for considerable reserves that can stock in it. By preliminary evaluations results that Albania has a storage capacity big enough, not just for our country, but and for the other countries of region which are part of TAP project. Year of commissioning: n/a

G002 - EAGLE LNG Terminal **Project Promoter(s):** Trans-European Energy B.V., Sh.A (IT)
Eagle LNG is a 4-8 Bcma floating LNG import terminal (FSRU vessel) located offshore the Albania coast, integrated with an 8 Bcma, 110 km subsea gas interconnector to Italy and Albania. The project is expected to be operational ny 2015 and is split in two phases. Phase 1: Capacity of 4-6 Bcma through: 1) an LNG FSRU moored 6 km offshore the Albanian coast in the Fier district and guaranteed by a long term chartering and O&M contract; 2) construction of a 8 Bcma subsea pipeline to Italy and to Albania. Phase 2: capacity of 8 Bcma, through an upgrade/replacement of the FSRU with a larger vessel. Although Albania doesn't currently have a high-pressure gas grid,, according to the project promoter: Albania will initially off take 0.5 Bcma and then up to 1 Bcma. Year of commissioning: Dec 2015

G003 - Interconnection Pipeline BiH - HR (Ploce - Mostar - Sarajevo/Zagvozd - Posušje/Travnik) **Project promoter(s):** BH-Gas d.o.o. Sarajevo (BIH)
The pipeline covers the countries Bosnia and Herzegovina and Croatia and it will be the part of Energy Community Gas Ring. I Option is (98 km in total): the pipeline goes from Split, passing Zagvozd and Imotski in Croatia; it will enter in Bosnia and Herzegovina in node Posušje with further extension branch to Mostar and the second branch to Tomislavgrad and connection in existing pipeline in Travnik. II Option is (95 km in total): the route goes from Ploče in Croatia and entering to BiH in Čapljina and extends to Mostar and Konjic reaching the existing system in Sarajevo. Year of commissioning: n/a

G004 - Interconnection Pipeline RS - BiH - HR **Project Promoter(s):** joint venture company between GAS RES (BIH) and GAZPROM (RU)
This is new project of branch pipeline starting near Belgrade (Batajnica), Serbia, and going west towards BiH/Serbia border (Bijeljina –new planned interconnection), further west towards Banja Luka, and further to west to Croatia/BiH border(Novi Grad – possible new interconnection and possibility of connecting to main Croatian gas pipeline Pula – Zagreb at main node Bosiljevo, in close proximity of Slovenia/Croatia border and EU gas system). Total length of pipeline is 340 km (250 km in BiH and 90 km in Serbia). Year of commissioning: 2015

G005 - Interconnection Pipeline upgrade Batajnica (RS) - Zvornik (BIH) **Project promoter(s):** JP „SRBIJAGAS“ Novi Sad (RS)
This project proposal consists of increase of capacity of the existing transmission pipeline – supply route to Bosnia and Herzegovina Current capacity of the pipeline is 2,01 mcm/day, and upgrade is planned up to 2,88 mcm/day. Year of commissioning: n/a

G006 - Interconnection Pipeline BiH - HR (Slobodnica-Bosanski Brod-Zenica) **Project Promoter(s):** BH-Gas d.o.o. Sarajevo (BIH)
The pipeline covers the countries Bosnia and Herzegovina and Croatia and it will be the part of Energy Community Gas Ring. The pipeline goes from Slavonski Brod (Slobodnica) in Croatia; it will cross the Sava river to Bosanski Brod in Bosnia and Herzegovina with further extension via Doboj to Zenica. Total length of the pipeline is 146 km (140 km in BiH and 6 km in Croatia). Year of commissioning: n/a

G007 - Interconnection Pipeline BiH - HR (Licka Jesenica-Trzac-Bosanska Krupa) **Project Promoter(s):** BH-Gas d.o.o. Sarajevo (BIH)
The pipeline covers the countries Bosnia and Herzegovina and Croatia. On Croatian side route begins in Lička Jesenica and through Rakovica reaches Croatian/BiH border. Total length on Croatian side is 30 km. On BiH side route begins in Tržac (Croatia-B&H border) and goes to Bosanska Krupa (length: 35 km), and has branches: Gornji Nadarevići – Bihać (length 21,5 km) Gornji Nadarevići - Velika Kladuša (lenght 24 km) including branch line Pećigrad – Bužim (lenght 11 km**)** Year of commissioning: n/a

G008 - Ionian Adriatic Pipeline (IAP) Project Promoter(s): Plinacro (HR)
IAP is the regional project in the South Eastern Europe, which has received a support of the Energy Community and the European Commission. The Ionian-Adriatic Pipeline Project (IAP) is to interconnect both the existing and planned gas transmission system of the Republic of Croatia with the Trans Adriatic Pipeline (TAP) or a similar project (Interconnector Turkey – Greece – Italy (ITGI) . Estimated off-take points of this transmission supply project, of 540 km total length, are: 1bcm for Albania + 0.5 bcm for Montenegro + 1 bcm for Bosnia and Herzegovina + 2.5 bcm for Croatia. Year of commissioning: 2018

G009 - Interconnection Pipeline HR - RS (Slobodnica-Sotin-Bačko Novo Selo) Project Promoter(s): Plinacro (HR)
Slobodnica-Sotin-Bačko Novo Selo is the gas pipeline which will connect the Croatian and Serbian gas transmission systems and provide gas transmission in both directions, with a capacity up to 6 bcm/y. Total length of the pipeline is 100 km (98 km in Croatia and 2 km in Serbia). The implementation of this project provides the connection of the Croatian gas transmission system to the new supply projects. Year of commissioning: n/a

G010 - LNG Terminal in Croatia **Project Promoter(s):** LNG Croatia Ltd. (HR)
The geographic position of the Republic of Croatia enables an access to CEGH Baumgarten and from there an access to the markets of the CEE and SEE (Austria, Slovenia, Hungary, Slovakia, Czech Republic) as well as the western Balkan countries (Serbia, Bosnia and Herzegovina, Montenegro...). The LNG project will be located on the island of Krk. Year of commissioning: n/a

G011 - LNG main gas transit pipeline Zlobin-Bosiljevo-Sisak-Kozarac-Slobodnica Project Promoter(s): Plinacro (HR)
This proposed main transit gas pipeline Zlobin-Bosiljevo-Sisak-Kozarac-Slobodnica will connect several in the future exceptionally important points of the Croatian gas transmission system. The main transit gas pipeline Zlobin-Bosiljevo-Sisak-Kozarac-Slobodnica is a continuation of the existing Hungarian – Croatian interconnection (gas pipeline Varosföld-Dravaszerdahely-Donji Miholjac-Slobodnica), will be connected to the future Ionian Adriatic Pipeline (IAP) and will be connected to the future LNG solution in Omišalj. This gas transmission pipeline Zlobin-Bosiljevo-Sisak-Kozarac consists of the following sections: the main gas pipeline Zlobin-Bosiljevo (58 km) the main gas pipeline Bosiljevo-Sisak (100 km) the main gas pipeline Sisak-Kozarac (22 km) and the main gas pipeline Kozarac-Slobodnica (128 km) Year of commissioning: n/a

G012 - Cazaclia Underground Gas Storage **Project promoter(s):** JSC Moldovagaz (MD)
Republic of Moldova, Romania and other countries from the Balkan region could be provided with gas from the Cazaclia UGS in case of need through the existing major pipelines. The working gas volume of the Cazaclia Underground gas storage would be about 7410 mln.m3. According to the pre-feasibility study made on the underground gas storage, the estimative values of Max. daily withdrawal capacity and Max. daily injection capacity are 1.78 mln.m3 and 1,9 mln.m3 Year of commissioning: n/a

G013 - Interconnection Pipeline RS - BG **Project Promoter(s):** JP „SRBIJAGAS“ Novi Sad (RS)
The project proposal consists of a construction of new gas pipeline route for Serbia connecting it with Bulgarian market. Total planned length of pipeline is 150 km (out of which108 km is in Serbia) with daily capacity of pipeline of 4,93 mcm/day. Project provides new route of supply to Serbia, and provides access to the present UGS Banatski Dvor and the future Banatski Itebej. Year of commissioning: n/a

G014 - Interconnection Pipeline RS - FYR of Macedonia **Project Promoter(s):** JP „SRBIJAGAS“ Novi Sad (RS)
The project proposal consists of a construction of new gas pipeline route for Serbia connecting it with Macedonian market. Total planned length of pipeline is 42 km with daily capacity of pipe-

line of 1,3 mcm/day. Project provides new route of supply to Serbia, and provides access to the present UGS Banatski Dvor and the future Banatski Itebej Year of commissioning: n/a

G015 - Interconnection Pipeline RS - ME **Project Promoter(s):** JP „SRBIJAGAS“ Novi Sad (RS)
The project proposal consists of a construction of new gas pipeline route for Serbia connecting it with Montenegro and provides access to gas for areas which had not been previously gasified. Total planned length of pipeline is 81 km with daily capacity of pipeline of 0,3 mcm/day. Project provides new route of supply to Serbia, and provides access to the present UGS Banatski Dvor and the future Banatski Itebej Year of commissioning: n/a

G016 - Interconnection Pipeline RO - RS **Project Promoter(s):** JP „SRBIJAGAS“ Novi Sad (RS)
The project proposal consists of a construction of new gas pipeline route for Serbia connecting it with Kosovo* and provides access to gas for areas which had not been previously gasified. Total planned length of pipeline is 76 km (out of which 6 km are in Serbia) with daily capacity of pipeline of 4,38 mcm/day. and provides access to the present UGS Banatski Dvor and the future Banatski Itebej Year of commissioning: n/a

G017 - Gas interconnector Nis (SR) - Pristina (Kosovo*) **Project Promoter(s):** JP „SRBIJAGAS“ Novi Sad (RS)
The project proposal consists of a construction of new gas pipeline route for Serbia connecting it with Romania. Total planned length of pipeline is 114 km with daily capacity of pipeline of 3,3 mcm/day. Project provides new route of supply to Serbia, and provides access to the present UGS Banatski Dvor and the future Banatski Itebej Year of commissioning: n/a

G018 - Underground Gas Storage Banatski Dvor **Project Promoter(s):** JP „SRBIJAGAS“ Novi Sad (RS)
The project proposal consists of an extension of the existing underground gas storage Banatski Dvor. Total planned extension of working gas volume 300 mcm (current capacity is 500 mcm, extension is planned up to 800 mcm). Year of commissioning: n/a

G019 - Underground Gas Storage Banatski Itebej **Project Promoter(s):** JP „SRBIJAGAS“ Novi Sad (RS)
The project proposal consists of construction of underground gas storage Banatski Itebej and corresponding pipeline connecting it to Serbian gas network. Total planned working gas volume is 1000 mcm and total length of pipeline is 10 km. Year of commissioning: n/a

G020 - LNG Terminal Ukraine **Project Promoter(s):** State enterprise "LNG Terminal"
This project proposal consists of construction of LNG terminal in Ukraine. It's expected average volume is 4 - 8 bcm/year. Year of commissiong: 2015-2017

G021 - Modernization of Urengoy-Pomary-Uzhgorod Pipeline **Project promoter(s):** Affiliated company "UKRTRANSGAS" of national joint-stock company "NAFTOGAS OF UKRAINE"
The subject of this project proposal is modernization of five pipeline sections, of total length of 115,3km (CS Sofiyivka - CS Gusyatin) 1) (3616,8-3626,6 km) L=7,2 km 2) (3729-3749 km) L=19,2 km 3) (3851,3-3878,9 km) L=27,6 km 4) (3975-4008,5km) L=33,7 km 5) (4101,3-4128,4 km) L=27,1 km Year of commissioning: 2016

G022 - Trand Adriatic Pipeline (TAP) **Project Promoter(s):** Trans Adriatic Pipeline AG
Trans Adriatic Pipeline project proposal consists of construction of both onshore and offshore pipeline system connecting Italy, Albania and Greece. Total length of the pipeline is 791 km (686 km onshore and 105 km offshore) with daily capacity of 30.1 bcm. TAP is committed to give Albania physical access to the gas infrastructure, consequently contributing to the development of the domestic gas market, and connecting Albania both to an abundant and reliable source of gas and to developed gas markets (Italy and Greece). Year of commissioning: 2018

G023 - Gas interconnector Serbia - Croatia **Project Promoter(s):** JP „SRBIJAGAS" Novi Sad (RS)
The project proposal consists of a construction of new gas pipeline route for Serbia connecting it with Croatian market. Total planned length of pipeline is 25 km with daily capacity of pipeline of 4,13 mcm/day. Project provides new route of supply to Serbia, in same time integrating Serbian existing and planned gas storage capacities into the Regional market. Project also provides access to the present UGS Banatski Dvor and the future Banatski Itebej Year of commissioning: n/a

D. Oil Infrastructure

OIL001 - Project of Inspection, Evaluation, Rehabilitation, Upgrading and Reconstruction of the existing JANAF Oil Pipeline in Croatia Project Promoter(s): JANAF Plc. (HR)
The purpose of Project of Inspection, Evaluation, Rehabilitation, Upgrading and Reconstruction of JANAF Oil Pipeline is a pipeline analyses and proposals for the best technical solutions to maintain and extend the life of the pipeline and the extension system, and to increase the security of oil supply in EU and Southeast Europe. Total length of the pipeline (Omišalj Terminal-Sisak Terminal-Virje Terminal-CRO /HU border; Sisak Terminal-Slavonski Brod Terminal-HR/BIH border; and Slavonski Brod Terminal- Sotin (HR/RS border). for upgrade and rehabilitation is 622 km. Year of commissioning: 2015-2016

OIL002 - Construction of crude oil tanks in Serbia Project Promoter(s): JP Transnafta (RS)
Planned storage capacity of crude oil tanks to be constructed within this project proposal is 2 x 20.000 m^3. Year of commissioning: 2014

OIL003 - Petroleum products pipeline system through Serbia Project Promoter(s): JP Transnafta (RS)
It is planned that the pipeline system will extend from Sombor on the north to Niš southward and with the following route sections: Novi Sad – Sombor, Novi Sad - Pančevo, Pančevo – Beograd and Pančevo – Smederevo – Jagodina – Niš. A terminal with its basic function of dynamic servicing of the system is scheduled at each of these locations. Total planned length of the petroleum products pipeline is 402 km, with maximum technical capacity of 4.3 MTA. From Terminal Pančevo products will be transported to north (Novi Sad, Sombor), south (Smederevo, Jagodina, Niš) and to Beograd. Also,Petroleum Products Pipeline **Year of commissioning:** 2017

OIL004 - Construction of the Brody – Adamowo oil pipeline **Project Promoter(s):** MPR Sarmatia Sp z.o.o
The project proposal consists of a construction of new oil pipeline starting near Brody in Ukraine and ending near Adamowo in Poland. total planned lenght of the pipeline is 396.3 km, with maximum technical capacity of 30 MTA (10 MTA at first stage of the project). At first stage of the project, utilization of existing storage capacities in Brody and Adamowo (total storage capacity 815,000 m^3) is also planned. Full implementation of the project also includes construction of additional storage capacity of 460,000 m^3. Year of commissioning: 2015