SEE CHANGE NET
FOUNDATION

South East Europe
Sustainable Energy
Policy

South East Europe 2050 Energy Model

SEE Change Net compilation of inputs, suggestions and responses on South East Europe 2050 Energy Model Call for Evidence

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* According to the UN, Kosovo is "under the United Nations Interim Administration Mission in Kosovo (UNMIK) established pursuant to Security Council Resolution 1244". Hereinafter reffered to as Kosovo.

** According to the UN, the official name for Macedonia is "The former Yugoslav Republic of Macedonia". Hereinafter reffered to as Macedonia.

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Contents

South East Europe Sustainable Energy Policy Programme

With approximately 25 million potential new EU citizens in South East Europe, who are all energy consumers, energy is perhaps one of the most complex issues which is facing the region. It has inter-related and far reaching impacts on several areas, including society, the economy and the environment, particularly as South East Europe faces the imminent deregulation of the market in 2015 in a less than ideal governance environment.

The South East Europe Sustainable Energy Policy (SEE SEP) programme is designed to tackle these challenges. This is a multi-country and multi-year programme which has 17 CSO partners from across the region (Albania, Bosnia and Herzegovina, Croatia, Kosovo*, Macedonia**, Montenegro and Serbia) and the EU, with SEE Change Net as lead partner. It is financially supported by the European Commission.

The contribution of the SEE SEP project will be to empower CSOs and citizens to better influence policy and practice towards a fairer, cleaner and safer energy future in SEE.

Supported by

Background to Call for Evidence

We are currently developing energy models for 7 countries of South East Europe – as well as a regional model – which will allow us to make sensible choices about our energy future in line with EU goals. The name of the model we are using is the South East Europe 2050 Energy Model and it is based on the UK Department of Energy and Climate Change (DECC) 2050 Calculator.

The key facts for the project are described below:

- *Where*: The 7 countries from SEE region involved in this activity are: Albania, Bosnia and Herzegovina, Croatia, Kosovo*, Macedonia**, Montenegro and Serbia.
- *Who*: SEE Change Net as Lead organization together with 17 CSO partners.
- *What*: The project uses an energy model called OPE2RA – Open Source Prospective Energy & Emissions Road Mapping – based on the DECC's "My 2050 Calculator". Technical support and training in Energy Modelling for 11 Civil Society researchers from South East Europe has been provided by ClimAct who also provided technical support to the recently completed 2050 Pathways Calculator for Belgium and the IEA Global Calculator.

The steps which have been undertaken so far by the CSO researchers in creating these energy models are:

- Mapping sectors and stakeholders
- Literature review
- Sectorial analysis including Demand side sectors (buildings, transport, steel, cement, aluminum, agriculture, waste) and Supply side (Oil, Gas and Coal Power; Hydro Power; other Renewables)
- Consolidated modeling
- Technical consultations – including industry, government and academia
- Scenario modeling
- Development of user friendly interface

As part of the Technical Consultation described above and in order to ensure the maximum transparency regarding the data used and assumptions made in the models, we ran the "South East Europe 2050 Energy Model Call for Evidence" from 23rd of March 2015 until 30th of April 2015. More information is available on the SEE Change Net website.

Introduction to Call for Evidence

After 18 months, more than 500 consultations with key stakeholders and relevant experts in the region and a long process of data gathering, in March 2015 we published energy models and related documents. This comprised of Excel spreadsheets and PowerPoint presentations that included historical trends, assumptions and ambition levels for different sectors (demand side: buildings, transport, cement, steel and aluminium and supply side: oil, gas and coal power, hydro power and other renewables) covering 7 countries of South East Europe: Albania, Bosnia and Herzegovina, Croatia, Kosovo, Macedonia, Montenegro and Serbia.

We published the analysis as a Call for Evidence to test with a wider range of experts and stakeholders. This examined whether the assumptions and data underpinning the model were considered to be sound and based on the best available evidence.

All the SEE SEP[1] partners in all the countries of the region held events to promote the Call for Evidence and to invite relevant stakeholders and energy experts to comment on data.

SEE Change Net also invited regional stakeholders to access the data on Call for Evidence during the Statistical Workshop on JODI Training in Energy Community Secretariat in Vienna.

1 SEE SEP (South East Europe Sustainable Energy Policy) is a multi-year, multi-country, EU funded regional programme that intends to use fact-based advocacy to allow civil society groups to go beyond protest and argue for more citizen friendly and EU-orientated energy policies in the countries of the South East Europe. A key component of SEE SEP is the development of a publicly accessible energy model to allow decision makers and others to see the impacts of their current and future policies. SEE SEP network consists of 18 CSO partners, coming from 7 countries of South East Europe: Albania, Bosnia and Herzegovina, Croatia, Kosovo, Macedonia, Montenegro and Serbia, plus World Wide Fund for Nature, CEE Bankwatch Network and Climate Action Network Europe and SEE Change Net Foundation as lead partner.

The following sections of the report will describe in more detail the components of the model and discuss the various inputs received from the Call for Evidence and will highlight the decisions which have shaped the latest version of the energy models in preparation for a wider release to the public.

Next steps are:

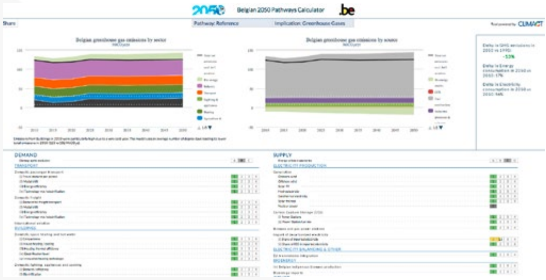
By September 15th: Consolidated Excel files and web tools for all countries published

By October 15th: Video interface for all countries published

By using these tools we hope to continue to have informed and fruitful discussions in our societies about pathways that take us towards a safer, cleaner and energy efficient energy system in South East Europe.

The 2050 Calculator

My 2050 Calculator – UK



2050 Pathways Calculator – Belgium

The energy model used to create SEE 2050 Energy Models is based on the DECC's 2050 Calculator.

The 2050 Calculator is an open source model of energy and emissions that can be used to identify a range of physically possible scenarios for the future. This could be with the aim of reducing emissions to tackle climate change, improving air quality, or reducing dependence on fuel imports, among other possible end goals.

The calculator can answer questions such as:

- How much energy can we supply from different technologies?
- How much energy do different sectors use and how can we change this?
- What is the cost of different energy pathways?
- Which sectors are the ones we should focus on? Which are less important?
- How can we achieve our emissions targets?
- What impact would different pathways have on our air quality and land area?
- What could happen to our energy dependency and security?
- What technology options are publically acceptable?

Users can control the calculator by making choices using a number of *"levers"*. These levers make a change in either the supply or demand of energy in a particular sector, for example building hydro power stations, or reducing the distance people travel by car. The combination of these choices creates a "*pathway*", and the calculator then displays the implications of the pathway over time (for example in terms of energy demand, supply, emissions or air quality).

For each lever there is a number of options to choose from – most will have four possible "*levels*" labeled 1, 2, 3 and 4.

Levels 1 to 4 are defined in the following way:

- Level 1: no effort
- Level 2: effort described by most stakeholders as achievable
- Level 3: effort needing significant change – hard but deliverable
- Level 4: the maximum possible due to physical/engineering/behavioral constraints only

Changes to the South East Europe 2050 Energy Model

The Call for Evidence consisted of a series of folders (one for each country) which contained two sub-folders: An Excel model with Demand and Supply spreadsheets populated with data and PowerPoint presentations with trends, assumptions and ambition levels.

Folder 1. The country level Excel model with Demand and Supply spreadsheets

This Excel file contains the data that runs the South East Europe 2050 Energy Models, and includes several default sheets such as OUTPUT, CHARTS, COSTS etc., and a CONTROL sheet in used to change levers. Every time a lever is changed, there is a corresponding impact on energy demand and supply, emissions, the climate, resource availability, and many other factors. This is visualized by graphs on the various tabs.

Sectors and sheets that we modelled for each country of the region correspond to the following headings:

Supply

- I.a – Hydrocarbon fuels
- III.a.1 – Onshore wind
- III.b – Large hydro
- III.c – Small hydro
- IV.a – Solar PV
- IV.b – Solar thermal
- V.a and V.b – Biomass

Demand

- IX.a, IX.c, X.a, X.b – Buildings (residential and services)
- XI, XI.a, XI.b, XI.c, XI.l l – Industry (steel, cement, aluminium and others)
- XII.a, XII.b, XII.c – Transport

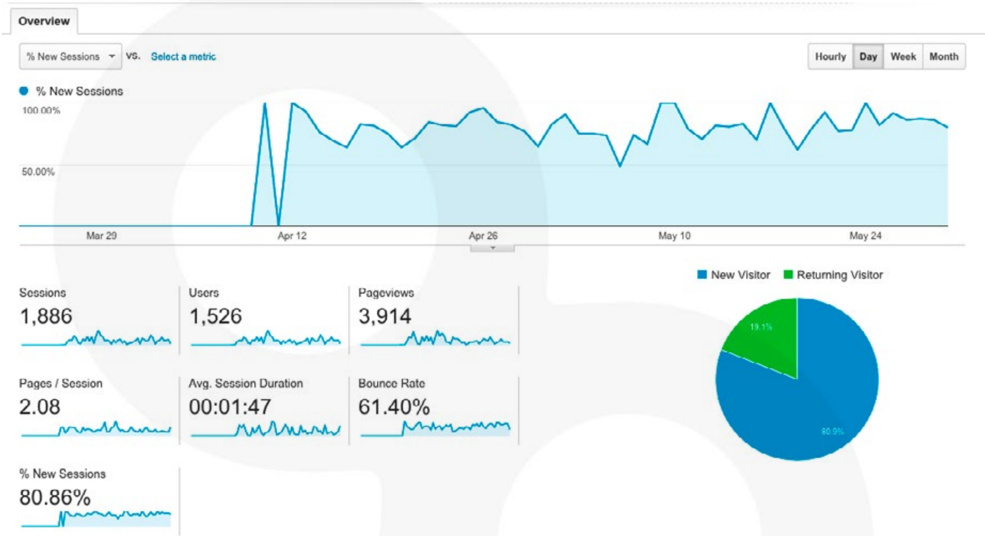
Folder 2. The PowerPoint Presentations with trends, assumptions and ambition levels

To ensure that we used the best available data, included the most accurate assumptions, and took into account the full range of opinions when we looked into what is possible in the future, we consulted more than 500 experts from across all sectors (government, academia, major industry companies etc.) and had more than 30 technical consultation meetings.

To prepare for technical consultation meetings, we created PowerPoint presentations for each sector in each country of the South East Europe region to better organize the data hosted in the spreadsheet.

These presentations contain all collected data for baseline year 2010 and planned trends and assumptions up to 2050.

The Call for Evidence generated 1886 website visits (shown below), numerous comments, feedbacks, and submissions. Altogether, this amalgamated to over 150 of participants at public consultations in Vienna and local consultations in the countries of the region.



An overview of website visits during the Call for Evidence

Following is a structured record of these inputs, suggestions and recommendations first addressing supply side inputs, followed by the demand side.

We are very grateful to all the respondents who took part in the Call for Evidence. Below are described all the changes that are made based on their inputs.

SUPPLY SIDE OF THE MODEL

Coal Lever

Before the Call for Evidence we had only had one trajectory for the coal power evolution until 2050. This was based on the original 2050 Calculator (UK version). However after the Call for Evidence we have introduced a coal lever which allows us to have different levels of ambition for fossil fuels as well as for renewable energy sources which was determined as a more appropriate representation of the region.

In our region low grade lignite currently accounts for nearly 50% of all generation capacities with significant plans to increase this supply. According to the Energy Community Legal Framework and current age profile of existing thermal power plants which indicate that 39 blocks would need to be retired, power generation from coal was given its own lever.

Levels of ambition for coal have been defined as follows:

	Assumptions for coal lever
Level 1	Additional retrofits on existing plants to meet the requirements of the IE Directive are made and stations close when they are 50 years old. New capacities, those planned to be built until 2025, are assumed to be constructed
Level 2	No additional retrofits made on existing plants and they close by the end of their lifetime. But new capacities, those planned to be built until 2020, are assumed to be constructed
Level 3	Additional retrofits on existing plants to meet the requirements of the IE Directive are made and stations close when they are 50 years old. No new plants built by 2050.
Level 4	Additional retrofits on existing plants to meet the requirements of the IE Directive are made and stations close when they are 40 years old. No new plants built by 2050.

Table: Summary of levels for coal lever

Hydroelectricity

Levels of ambition for Large Hydro

Based on comments during the Call for Evidence and a need to better define hydropower levels, also in terms of their interplay and impact on environment, we created "Hydropower Working Group". Members of the group included the SEE SEP partners Pippa Gallop from CEE Bankwatch Network, Petra Remeta from WWF Adria[2] and Igor Kalaba from the Center for Environment.

The group suggested the following definition of levels of ambition that have been adopted by the modelling team:

	Assumptions for Large Hydro
Level 1	No significant development, only existing plants and those under construction during 2010 year will remain by 2050
Level 2	Existing plants, plants that are under construction during the baseline year 2010 and proposed plants that are not in protected areas as well as proposed or discussed plants on river stretches considered of outstand-ing importance installed by 2050
Level 3	Existing plants, plants that are under construction during the baseline year 2010 and proposed or discussed plants that are not in protected areas installed by 2050
Level 4	Technical potential that can really be implemented installed by 2050

Table: Summary of levels for Large Hydro

2 WWF – World Wide Fund for Nature

Levels of ambition for Small Hydro

Because of the lack of the data on exact locations on planned small hydropower projects, the Hydropower Working Group suggested the following definition of levels of ambition:

	Assumptions for Small Hydro
Level 1	No significant development, only existing and under construction plants in baseline 2010 year will remain in 2050
Level 2	33% of technically feasible potential installed by 2050
Level 3	66% of technically feasible potential installed by 2050
Level 4	100% of technically feasible potential installed by 2050

Table: Summary of levels for Small Hydro

Capacity factor

Capacity factor for hydropower was calculated in two steps:

- *Step 1:* we calculated actual capacity factor for each country in baseline year 2010 by using the following formula:

$$CF\ (\%) = \frac{Production\ (GWh)}{24h \times 365 \times Installed\ capacity\ (GW)} \times 100$$

- *Step 2:* we calculated average capacity factor for the five last years and since it is difficult to predict if a capacity factor will change over time in hydropower (improvements in technology it can grow, but changes in water level is still hard to predict), we consulted with energy experts in the region and concluded that it is the best to keep a constant capacity factor until 2050.

Onshore Wind

Based on the newly issued Wind Atlas Balkan commissioned by KFW and very detailed data on capacity factors measured on different locations commissioned by SEE Change Net from Sander and Partner we adopted new values for onshore wind data in the models.

According to this data average capacity factors in productive areas in the region range from 25% in Albania to 32% in Montenegro.

Country	Average capacity factor in 2010	Average capacity factor in 2050	Maximum technical potential in 2050
Albania	25%	35%	2.55 GW
BiH	31%	39%	7.55 GW
Croatia	31%	33%	4.97 GW
Kosovo	25%	33%	1.55 GW
Macedonia	28%	33%	1.25 GW
Montenegro	32%	37%	0.72 GW
Serbia	30%	39%	10.36 GW

Table: Onshore wind capacity factors (%) and maximal technical potential (GW) in the region

As the Call for Evidence received the Wind Atlas Balkan and subsequent interpretive data from Sander and Partner very late in the process, the criteria for the four levels of ambition for onshore wind potential are not yet aligned with those of the hydropower potentials. So far we have not yet had an opportunity to compare the wind potentials maps with protected areas and to categorize them in the same manner as we did the hydropower potentials. This activity will be carried out in due course and the wind potentials will be adjusted accordingly. Still, this analysis provides a clear signal that wind as a source of clean and low impact renewable energy is largely underestimated in our region.

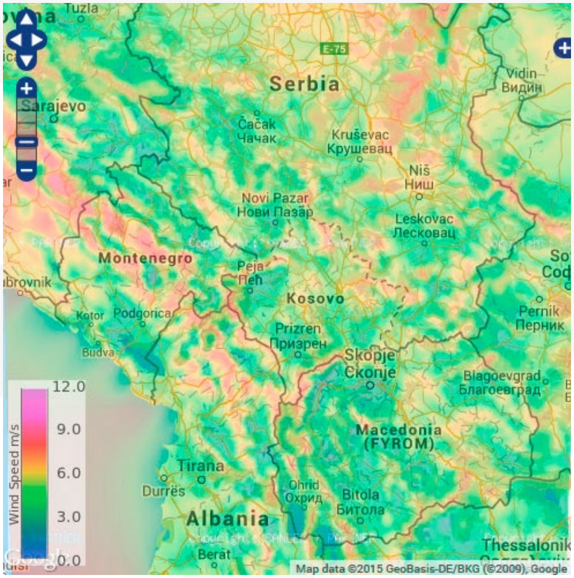


Image of Balkan Wind Atlas

For now, levels of ambition are described as follow:

	Assumptions for Onshore Wind
Level 1	Existing plants (no further extension of wind power in the future)
Level 2	The "monetary" view: only best locations, with highest capacity factors
Level 3	The "save the climate" view: best locations and a few other locations that are less financially viable
Level 4	100% of technically feasible potential installed by 2050

Table: Summary of levels for Onshore Wind

In all levels productive areas exclude as follow:

- areas where topographic altitude is above 1800m (data source: SRTM 90m)
- areas where slope of the topography is steeper than 20% (data source: SRTM 90m)
- wooden areas (data source: Open-Street-Map OSM)
- areas with a circle of 900m around villages (data source: OSM)

Solar PV

Based on many comments received during the Call for Evidence and using various studies[3] we also increased ambition levels for solar PV installments in the SEE region.

Among others, most useful inputs came from Ms. Nadia Ameli from Organisation for Economic Co-operation and Development (OECD) and Dr. Daniel Kammen, director of Renewable and Appropriate Energy Laboratory at the University of California, Berkeley.

Ms. Nadia Ameli submitted two reports[4]. The first one refers to growth of solar PV use in Italy, which was very useful given that Italy has a similar climate to SEE. The second one discusses results by an expert elicitation survey on solar technologies.

Dr. Daniel Kammen (See biography in Annex 2: SEE 2050 Energy Model – Biographies of Team), suggested that roughly 1/3 of electricity production across the region in 2050 may come from solar PV based on least-cost scenario for western North America and global forecast for solar PV price decrease[5].

In this case we decided to use the approach from the Belgium model. We calculated total roof space available for solar PV (taking into account solar thermal panels) on residential and public buildings based on the existing data for Household and Commercial sectors in the models. By using average solar irradiation we calculated a maximum technical potential for each country. This method proves that even without use of arable land to build solar parks, there is huge potential in this technology.

3 For example Technology roadmap – Solar photovoltaic energy

4 Critical assessment of support for the evolution of photovoltaics and feed-in tariff(s) in Italy
The future prospect of PV and CSP solar technologies: An expert elicitation survey

5 http://www.researchgate.net/publication/250307174_SunShot_Solar_Power_Reduces_Costs_and_Uncertainty_in_Future_Low-Carbon_Electricity_Systems

We defined levels of ambition by 2050 as follow:

	Assumptions for Solar PV
Level 1	20% of maximum technical potential
Level 2	50% of maximum technical potential
Level 3	70% of maximum technical potential
Level 4	100% of technically feasible potential installed by 2050

Table: Summary of levels for Solar PV

Solar thermal

Using the UK model as best available source and consulting with regional experts, we assumed that solar thermal installations would occur in residential and public buildings to help meet hot water demand. Table below summarizes the different levels of ambition modelled for solar thermal.

Level	2010	2015	2020	2025	2030	2035	2040	2045	2050
1	0	0.125	0.25	0.375	0.5	0.625	0.75	0.875	1
2	0	0.25	0.5	0.75	1	1.25	1.5	1.75	2
3	0	0.375	0.75	1.125	1.5	1.875	2.25	2.625	3
4	0	0.5	1	1.5	2	2.5	3	3.5	4

Table: Domestic solar thermal installed area m² (average, per household)

Bioenergy

Teams entered the data for bioenergy: solid biomass, biofuel and biogas based on calculations described below.

It is important to note that while we acknowledge that sustainable bioenergy is a vital part of a low carbon energy system we also recognize that the potential for its expansion in the future given the space and sustainability constraint remains contentious and uncertain. Switching sections of agricultural land to bio crops or potential for innovative agriculture and chemical engineering to drive forward the productivity of bioenergy has not been considered at this stage (could be refined at later stage).

Solid biomass

Following the suggestion of the Ms. Gabriela Cretu, electricity expert from Energy Community, data for baseline year 2010 has been sourced from the most relevant and reliable study covering all countries of the region from the "Study on the Biomass Consumption for Energy Purposes in the Energy Community".

Assumptions about solid biomass potential increase by 2050 include improved management and forestation. No energy crops are considered and no imports (only domestic production).

Levels of ambition for solid biomass in countries of the region are as follow:

	Assumptions for Biomass
Level 1	Plus 10% until 2050 in comparison with 2010
Level 2	Plus 20% until 2050 in comparison with 2010
Level 3	Plus 25% until 2050 in comparison with 2010
Level 4	Plus 30% until 2050 in comparison with 2010

Table: Summary of levels for Biomass

Biofuels

Biofuel and biogas are considered to be zero in baseline year 2010 in all countries of the region (according to existing national statistics). Ambitions for 2050 have been estimated based on TOP DOWN[6] approach.

Levels of ambition for biofuels in countries of the region are as follow:

	Assumptions for Biofuels
Level 1	10% of transport fuel demand in 2050[7] replaced by biofuels
Level 2	intermediary
Level 3	intermediary
Level 4	20% of transport fuel demand in 2050 replaced by biofuels

Table: Summary of levels for Biofuels

In Level 1, biofuels are assumed to be used up to the level of the 2020 targets since the impact of 1st generation fuels is under discussion, and 2nd generation ones are still in R&D stage. Level 4 however stretches the 2020 targets and assumes that up to 20% of the fuel demand for transport will be replaced by biofuels by 2050 (either through domestic production or through imports).

6 A **top-down** approach (also known as stepwise design and in some cases used as a synonym of *decomposition*) is essentially the breaking down of a system to gain insight into its compositional sub-systems.

7 By 2020, defined by Renewable Energy Directive and the Fuel Quality Directive, 10% of the transport fuel of every EU country should come from RES (biomass/biogas)

Imports of electricity

Based on suggestions received from many stakeholders during the technical consultation meetings as well as comments on Call for Evidence, the modelling teams entered the data for imports of electricity. Values for 2010 baseline year are based on IEA[8] data, and levels of ambition by 2050 were entered based on energy experts' opinions as follows:

	Assumptions for Imports of electricity
Level 1	2010's percentage of imports for each country[9] (stays the same)
Level 2	20% of total electricity production
Level 3	10% of total electricity production
Level 4	5% of total electricity production

Table: Summary of levels for Imports of electricity

Assumed reduction of imports in higher ambition levels, as has been demonstrated by the model, is due to the fact that countries have enough potential to produce domestic electricity from their own renewable energy sources and increase its energy independence.

8 IEA stands for International Energy Agency

9 The average import of electricity in the region in 2010 was 26%

Grid distribution losses

Based on existing Electric Power Utilities reports and national studies, the modelling teams entered distribution, technical and commercial, losses in country energy models. Average distribution losses in the region, in baseline year 2010 were 21%. Based on stakeholders and energy specialists' suggestions, we have assumed linear decline down to 7% in all countries by 2050.

Country	2010	2015	2020	2025	2030	2035	2040	2045	2050
Albania	29%	26%	24%	21%	18%	15%	13%	10%	7%
BiH	14%	13%	12%	11%	10%	9%	9%	8%	7%
Croatia	7%	7%	7%	7%	7%	7%	7%	7%	7%
Kosovo	41%	36%	32%	28%	24%	20%	15%	11%	7%
Macedonia	19%	18%	16%	15%	13%	12%	10%	9%	7%
Montenegro	23%	21%	19%	17%	15%	13%	11%	9%	7%
Serbia	15%	14%	13%	12%	11%	10%	9%	8%	7%

Table: Grid distribution losses in countries of the SEE region

Cost assumptions

During the Call for Evidence, Mr. Guy Turner of Trove Research (See biography in Annex 2: SEE 2050 Energy Model – Biographies of Team) prepared detailed report of supply sector costs in SEE. Mr. Turner analyzed LCOE (Levelized Cost Of Electricity) and investment costs for different supply technologies.

Main findings of the report used in South East Europe 2050 Energy Models are in a table below. The whole report is available online.

Technology	2010	2015	2020	2025	2030	2035	2040	2045	2050
Coal	2300	2300	2300	2300	2300	2300	2300	2300	2300
	1600	1600	1600	1600	1600	1600	1600	1600	1600
Gas	800	738	723	712	701	686	672	657	642
	700	688	674	664	654	640	626	612	599
Onshore wind	1550	1400	1330	1313	1295	1292	1288	1274	1260
	1300	1200	1140	1125	1110	1107	1104	1092	1080
Large hydro	3320	3320	3320	3320	3320	3320	3320	3320	3320
	1270	1270	1270	1270	1270	1270	1270	1270	1270
Small hydro	5000	5000	5000	5000	5000	5000	5000	5000	5000
	1270	1270	1270	1270	1270	1270	1270	1270	1270
Solar PV	1200	1127	868	614	361	338	316	287	259
	1000	869	669	474	278	261	243	222	200

Table: Capital costs for different technologies in SEE – Highs and lows, in EUR/kW

The conclusion that can be drawn from the report is that although capital costs of construction of new thermal power plants and hydro power plants will remain constant until 2050 due to the fact that these are mature technologies, solar PV costs will reduce significantly based on experience of the past few years and upward trend in the deployment. These costs do not include any calculation of externalities which would greatly impact the cost of fossil fuel based solutions and is a factor which will be modeled in future versions of this work.

DEMAND SIDE OF THE MODEL

Buildings

As a result of inputs and suggestions we received during the Call for Evidence, we have made several revisions to the assumptions in the SEE energy models. Amendments to the energy models in the buildings sectors are listed below:

Renovation rates and performance of renovated and new homes[10]

Several stakeholders suggested that the energy models are too ambitious in Levels 3 and 4 in terms of reductions in space heating demand that can be expected over a 40-year period.

Other stakeholders considered the initially assumed uptake and depth of insulation measures too low; suggesting that insulation measures provide the best economic payback and that more ambitious performance and rates of renovation are needed as early as possible in order to be accomplished preferably even before 2050[11]. For newly built homes, they emphasized that the European Union has already mandated the "nearly zero-energy" building as standard for all new buildings by 2021[12].

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10 Home or household

11 BPIE modeling, published in 2013, illustrates tha "the depth of typical building renovation needs to shift from the majority currently being at a "shallow" level (i.e. up to 30% energy saving) to either "deep" (i.e. 60–90% saving) or increasingly "nZEB" (i.e. nearly zero-energy buildings, saving 90% or more) for the period 2020–2050." http://www.bpie.eu/documents/BPIE/Developing_Building_Renovation_Strategies.pdf

12 "Nearly zero-energy" buildings are mandatory according to EPBD (European Performance Building Directive) for all new buildings as of 2021. EPBD Directive 2010/31/EU: "By December 31, 2018, new buildings occupied and owned by public authorities must be nearly zero-energy buildings. By December 31, 2020, all new buildings must be nearly zero-energy buildings".

In order to provide full range of options that are technically possible for performance of new and insulated homes, we have made changes to the SEE energy models and the number of households receiving "deep"[13] insulation measures as well as the number of new "nearly zero-energy" buildings has been increased in Levels 3 and 4. We believe that the SEE energy models now better represent the full range of possible futures, allowing users to make pathway choices which are less ambitious (Level 1) but also those which are very ambitious (Level 4) when it comes to performance of new and insulated homes.

Home renovation rates

Following the interventions to the energy models, it is now anticipated that almost entire pre-2010 building stock will be renovated by 2050 in most ambitious trajectory (Level 4). This requires a sharp increase in renovation rates, from currently lower than 1% per annum towards 2.5% or 3% per annum[14] as of 2020.

	Assumptions for renovation rates
Level 1	≤ 1.5 % p.a. starting from 2020
Level 2	Intermediary
Level 3	Intermediary
Level 4	≤3% p.a. starting from 2020

Table: Summary of levels for renovation rates

13 Same as 8

14 Even though described as overly ambitious, they are in line with the renovation rate target set by the European Union of 3% each year for central government buildings from 2014 onwards, as well as ongoing research and initiatives which suggest that in order to achieve 90% CO_2 savings by 2050 "the renovation rates need to ramp up from the prevailing rate of around 1% of total floor area renovated annually, to between 2.5% and 3% p.a. from 2020 onwards." http://www.bpie.eu/documents/BPIE/Developing_Building_Renovation_Strategies.pdf

Performance of renovated and new homes

Changes to our assumptions on the performance of renovated and new homes in Levels 3 and 4 have been driven by policies and initiatives that are already or are being set in place in the EU to encourage a shift from "shallow" towards "deep" and "nearly zero-energy" renovations as well as the EU legislation mandating the "nearly zero-energy" building as standard for all new buildings by 2021. Different ambition levels therefore reflect different possible pathways when it comes to depth and speed of harmonization of legislation in the region with that of the EU as well as its implementation (Croatia, already the EU MS, is an exception).

	Assumptions for existing stock
Level 1	Application of low cost and easy to implement measures with minor and gradual improvements resulting in the decrease of heat demand of renovated homes down to ~45 kWh/m² from 2040
Level 2	Gradual tightening of building codes and renovation effort resulting in the decrease of heat demand of renovated homes down to ~30 kWh/m² from 2030
Level 3	Homes will be renovated to "nearly zero-energy" level (90–95% savings), starting from 2030. Developments prior 2030 will help raise awareness and allow various financing schemes and implementation models to mature.
Level 4	Homes will be renovated to "nearly zero-energy" level (90–95% savings) from 2025

Table: Summary of assumptions used to generate performance of renovated homes

	Assumptions for new stock
Level 1	Demand of each new home will decrease to "low energy house" standard of 30 kWh/m^2 from 2025 without additional improvements by 2050
Level 2	Demand of each new home will decrease to "low energy house" standard of 30 kWh/m^2 from 2025 and further to the level of "nearly zero-energy" building between 2030 and 2035
Level 3	Demand of each new home will decrease to the level of "nearly zero-energy" buildings from 2025
Level 4	Demand of each new home will decrease to the level of "nearly zero-energy" building from 2020, as mandated by the EU legislation % of home space heated

Table: Summary of assumptions used to generate levels of performance of new homes

Percentage of home space heated

The latest Energy Community report[15] on energy efficiency highlights that "it is estimated that in all of the Contracting Parties at least 50% of the population spends more than 10% of their net income on energy – thus falling under the standard definition of fuel poverty".

While recognizing that this is a complex issue and evolution of which is difficult to predict, none of the stakeholders has challenged the assumption that this is going to change by 2050 and that the ambition level which should allow people of the region to heat entire or almost entire space area by 2050 is possible. We therefore assume, and this is now aligned in all the SEE energy models, that around 85% of space will be heated in homes across the region with demand equivalent to heating 15% or 20% of surface area to be offset by improved space heating management (control and metering systems).

15 https://www.energy-community.org/portal/page/portal/ENC_HOME/DOCS/3750146/EnC_EE_Publication.pdf

The assumption of percentage of home space heated, whilst varying over time (gradual growth from current percentage towards 85% in 2050) is not a parameter which the user of the model can change.

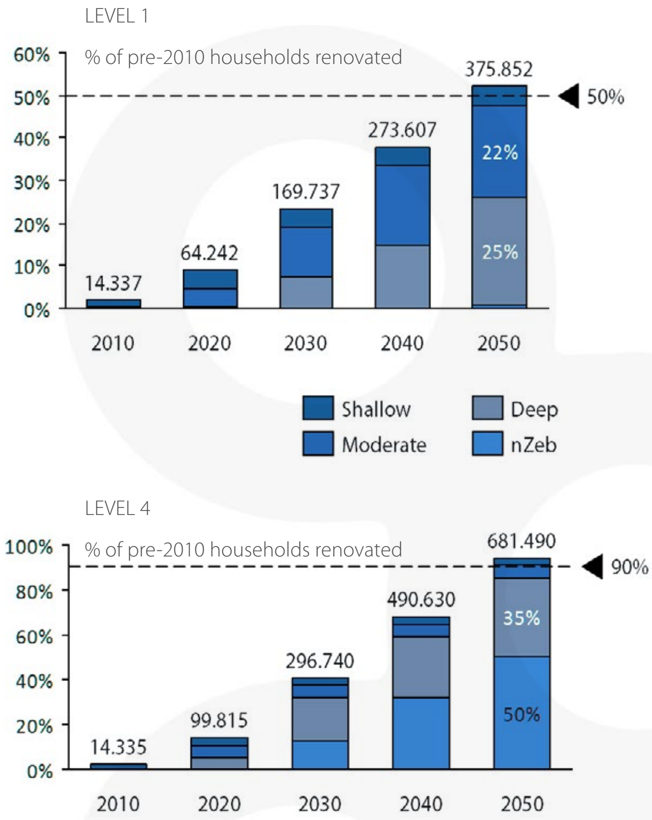
Heat loss per household

Revised thermal performance trajectories, described above, have been combined with assumptions on internal temperature demand, internal gains from heat emitting appliances and mean outside temperatures to derive an average annual space heating demand, which can be met by a number of different heating systems.

As an example, under the most ambitious trajectory (Level 4), users can now see a picture of the SEE region in which:

- People lower their thermostats –to lower but safe level of warmth[16]
- 80%–85% of space heated in homes across the region coupled with improved management of area heating (control and metering systems)
- Renovations evolve towards "deep" and "nearly zero-energy" and all possible efficiency improvements to existing homes are made (e.g. solid wall insulation, cavity wall insulation, floor insulation, super-glazing, loft insulation, etc.). These measures address between 90% and 96% of 2010 stock potential
- The demolition rate for existing stock (of 0.1% per annum), which is higher than the current rate
- New home standards are assumed to be equivalent to "nearly zero-energy" buildings as of 2020, which is a thermal efficiency standard developed in Europe and representing close to the limit of what is physically possible in terms of energy demand reduction for heating

16 Comfort level in most countries – based on existing building codes – is currently defined as 20°C (±2°C)



Graph: Renovation depths[17] and rates, Level 1 and Level 4 Trajectories, Albanian buildings stock example

Graphs show a difference between Level 1 and Level 4 on the example of the building stock in Albania in terms of % of total pre-2010 households that will be renovated

- Level 1 ~50%
- Level 4 ~90%

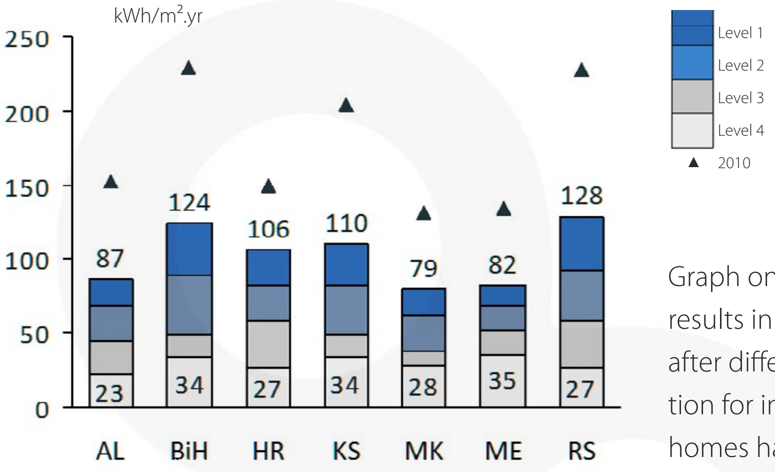
as well as renovation depths

- Level 1 ~50% of all renovations are "deep"
- Level 4 ~55% of all renovations are "nearly-zero"

(Figures rounded for simplicity purposes)

Even though minor variations have been assumed in renovation rates targets across the SEE countries, graphs for Albania are illustrative for other countries as well.

17 Renovation ambitions and renovation strategies in EU countries have been taken into account; applied methodology similar to that used in the study Renovating Romania, 2014, BPIE http://bpie.eu/uploads/lib/document/attachment/39/Renovating_Romania_EN_Final.pdf



Graph: Results on average performance of homes in 2050 across the region, based on different ambition levels for renovations (rates and depths) and new buildings

Graph on the left presents results in the SEE countries after different levels of ambition for insulated and new homes have been applied:

- Level 1 ≤ 130 kWh/m^2.yr
- Level 2 intermediary
- Level 3 intermediary
- Level 4 ≤ 35 kWh/m^2.yr

Space heating technologies

Several stakeholders suggested that the model was too ambitious in proposing the pathway with high level – up to 90% – of heating electrification.

In a nutshell, the way the energy model works is that it includes 16 different heating technology pathways for 2050. Each of the 16 pathways represents a possible mix of electric and non-electric heating solutions and assumes different level of electrification (high, balanced, low, or very low). Since the heating technologies available over the coming years are very variable and all could be significantly scaled up within the 2050 timeframe, the approach of 16 different heating technology packages, rather than the usual Level 1 to 4 approach, seems more appropriate as it allows the users of the energy models to explore the impact on energy demand, supply and emissions of 16 (rather than just 4) different technology packages for the SEE countries in 2050.

These different technology pathways also recognize the role of CHP and other technologies alongside the heat pumps and the fact that they will likely co-exist in the future. Preferable combination of electric and non-electric heating solutions will be dependent on location and site specifics and will require wider discussions that take into account different environmental and practical considerations (e.g. heat pumps may be difficult in more dense urban areas or high electrification makes very little sense without deep efficiency retrofits).

Based on additional consultations and literature reviewed, we recognize that current challenges are being addressed[18] and that innovation will likely occur[19] in the sector of heat pumps to speed the roll out of this technology at lower cost to the consumers. Suggested balancing challenges posed by electrification of heating in the medium term may be gone by 2050 as the demand reductions take hold.

We therefore think that, until further evidence is available, all pathways set out in the energy models, including those with high level of electrification, are sufficiently credible from a technical perspective and should stay in the models to allow users to explore full scope of possible options.

Hot water demand per household

Several stakeholders asked for clarification about existing differences in hot water demand per household in 2050 across the region, but did not follow up with suggestions for changes to the models.

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18 http://www.sciencedirect.com/science/article/pii/S0301421515002347

19 www.ehpa.org

Currently in the models, our assumptions on comfort levels[20] and efficiency improvements by 2050 are aligned across the region. Current hot water consumption patterns as well as projected changes in number of members per household[21] by 2050 do influence regional variations in hot water demand per household in 2050.

Home lighting and appliances

We are thankful for the submission indicating an error in the data for appliances in the Serbian energy model. That has been now corrected.

The lighting and appliances sector covers diverse areas such as consumer electronics and home computing, cold and wet appliances, and lighting. Several stakeholders mentioned that greater savings will likely happen[22] even in the least ambitious trajectory (Level 1) and that the increase in energy demand for appliances may not be very credible pathway as it assumes stagnation in innovation and EU policy.

While we agree with the assumption that technology advancement and product innovation is to be driven by the EU policy, ambition levels currently in the models also reflect range of possible futures when it comes to replacement and penetration rates around the region in this sector.

Therefore, in order to maintain satisfactorily wide range between Level 1 and Level 4, we have not made additional changes to the models, apart from the assumption that the transition towards more efficient lighting will be completed by 2030.

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20 Each person in a household takes one shower every day plus an allowance for personal hygiene, dishwashing, laundry needs, etc. The standard hot water temperature is ~40° C

21 There are on average 6 members in a Kosovo household (~5.1 projected by 2050), while there are fewer than average – for the region – members in a Montenegro household projected by 2050.

22 Our estimates for 2050 considered the best performing appliances currently available on the EU market, for which we have sourced the data from the Top Ten website, http://www.topten.eu/

	Assumptions for lighting
Level 1	All homes replace their light bulbs with CFL and/or LED (higher % of CFL and lower % of LED) by 2030, number of light bulbs increases significantly
Level 2	Intermediary
Level 3	All homes replace their light bulbs with CFL and/or LED (lower % of CFL and higher % of LED) by 2030, number of light bulbs moderately increases
Level 4	All homes replace their light bulbs with LED as of 2030, number of light bulbs stays the same or slightly increases

Table: Summary of assumptions used to generate levels of demand for lightening in homes

Energy intensity in services sector

Changes made in the service sector to the energy model respond to the suggestions we received during the Call for Evidence that there is neither evidence nor reason to believe that services energy intensity will differ significantly across countries of the region by 2050. Different levels of effort will likely be required though due to baseline differences.

The indicator used in the models – Energy Consumption per unit of Gross Value Added (GVA) of Services – seeks to highlight the progress that can be made in reducing the energy consumption[23] per unit of activity (measured in terms of value added) in the service sector.[24]

23 The energy consumption in the service sector consists mainly of energy consumption in buildings.

24 Energy consumption in the services sector is also strongly linked to the number of employees, especially in office buildings as energy is mainly consumed for lighting, office and IT equipment, and air conditioning. One more indicator commonly used for Services in EU is energy consumption per

Since the service sector in the models is very diverse and has been broadly defined to include; catering & hotels, health & education services, wholesale & retail trade, offices and public administration, baseline differences in energy intensity of service sector between countries of the region can be theoretically explained as a result of different relative importance of various factors (composition of services, labour productivity or value added created per employee, energy efficiency improvements and energy demand for different services e.g. cooling, appliances, etc.).

For 2050, changes made to the models assume that countries of the region will be more aligned when it comes to service sector energy intensity. Ambition levels have therefore been modified and they follow the trends observed in EU countries of decoupling between the energy consumption and economic activity as well as EU targets on renovation and building standards (similar as in residential sector)[25].

It is important to note that due to data scarcity and data limitations in this sector the scope and depth of possible analysis has been constrained, and all future refinements in the model will reflect future improvements in data availability and accessibility.

employee, which highlights the progress made in reducing the energy consumption per employee in the service sector and/or increasing the labour productivity.

25 A potential boost to energy efficiency investment is the launch of a major study by the World Green Building Council (World GBC) on the health and productivity benefits associated with green buildings. Previous studies have shown that simple measures such as improved ventilation can increase productivity by up to 11%, while improved lighting design in an office can increase productivity by up to 23%. Establishing the link between green building technologies and productivity helps to provide more transparency on the business case for investments in energy efficiency. http://www.worldgbc.org/files/1513/6608/0674/Business_Case_For_Green_Building_Report_WEB_2013–04–11.pdf

Industry

At this stage, detailed modelling has been performed only for aluminium, cement and steel sectors because of the disproportionately high energy and emissions intensity compared to other industries. The only area where changes to the models have been made is fuel switching and share of "alternative fuels".

Share of "alternative fuels" in the cement industry

Originally in the energy models, the "alternative fuels" in Industry included both biomass and waste (including RDF). Following the comments we received during the Call for Evidence, it has been concluded that in case of the SEE energy models, since the waste has not been modelled, it could not be represented in the "alternative fuels" category except as imports which was considered inadequate.

We acknowledge that during the sectoral consultations (2013/2014) we collected a lot of interest in higher waste utilization from stakeholders. Since unfortunately this is not currently reflected in the model, we plan to refine it in the future.

Changes to the assumptions in ambition levels therefore now only relate to the uses of biomass in the cement industry and reflect conclusions that had been reached through the literature review and stakeholder engagement process

	Assumptions for share of biomass
Level 1	Stays the same as in 2010
Level 2	Intermediary
Level 3	Intermediary
Level 4	Maximum share of biomass ~10%

Table: Summary of levels for share of biomass in cement industry

Transport

Comments and amendments to the energy models in transport sector relate to assumptions behind trajectories for penetration of electric vehicles and those surrounding the modal shift by 2050, especially share of rail p-km.

Modal split and share of rail p-km

Several stakeholders argued that the assumed share of rail p-km by 2050 is too low, especially in Levels 3 and 4; they suggested that the assumptions need to better correspond with the key objectives of the EU[26] transport policy in order to be considered sufficiently ambitious and credible.

In its Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system, the European Commission adopted a roadmap of 40 concrete initiatives for the next decade to build a competitive transport system. At the same time, the proposals aim to dramatically reduce Europe's dependence on imported oil and cut carbon emissions in transport by 60% by 2050. Contributing to a 60% cut in transport emissions by the middle of the century, key goals include:

- No more conventionally-fuelled cars in cities
- A 50% shift of medium distance intercity passenger and freight journeys from road to rail and waterborne transport
- 40% use of sustainable low carbon fuels in aviation; at least 40% cut in shipping emissions

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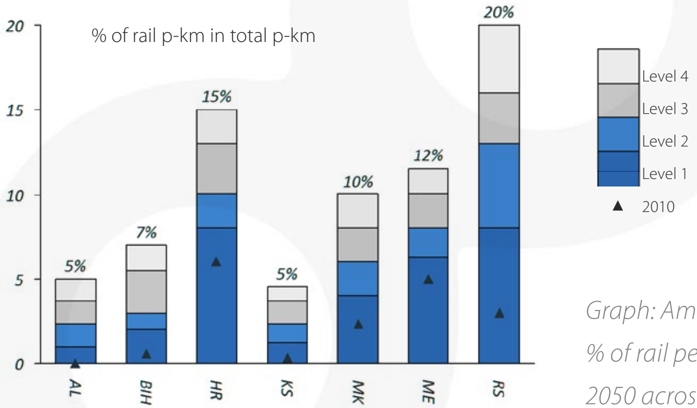
26 White Paper on the Common Transport Policy (CTP) "European Transport Policy for 2010: Time to Decide" highlights the importance of modal shift: "Shifts to more environmentally friendly modes must be achieved where appropriate, especially on long distance, in urban areas and on congested corridors. At the same time each transport mode must be optimized." http://ec.europa.eu/transport/themes/strategies/doc/2001_white_paper/lb_com_2001_0370_en.pdf

Likewise, it is anticipated that the railway network of the region will be repaired and rehabilitated and that it will facilitate the creation of a single European rail space. Improved performance and increased railway traffic coupled with reduced share of cars also responds to a need to sooner or later meet the EU noise and outdoor air pollution standards and greenhouse gasses emission reduction targets in the region that currently suffers from high rates of motorized pollution, congestion and noise.

Based on the comments we received during the Call for Evidence, the share of rail p-km has been increased in ambition Levels 3 and 4 in order to better reflect expected alignment with the EU transport policy goals and to provide satisfactory wide range of possibilities between Level 1 and Level 4.

Feasibility of increased ambition levels has been additionally tested against the rail traffic data recorded in the past[27] in the region[28]. Performance indicators of several EU mid-size railway networks have been taken into account[29] as well.



Graph: Ambition levels for % of rail per km in total by 2050 across the region

27 Railway Reform in the Western Balkans, World Bank, 2005

28 Railway Reform in South East Europe and Turkey on the Right Track?, World Bank, 2011

29 Performance Analysis of Railway Infrastructure and Operations HANSEN, Ingo; WIGGENRAAD, Paul; WOLFF, Jeroen, 2013

Evolving towards less car-oriented mobility may seem as a difficult goal, logistically and financially. Modelling results however show that the modal shift can have a significant impact on capital costs of transport sector by 2050. Pathways with lower share of cars and higher shares of rail, buses and non-motorized transport have lower capital costs and higher fuel savings.

Electric vehicles (EV)

Different, even conflicting comments received during the Call for Evidence seem to reflect uncertainty surrounding the trajectory and ultimate scale of adoption of EVs in Europe, and consequently also in the region.

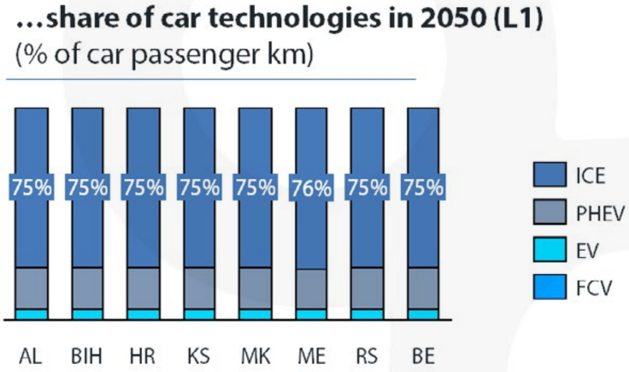
As prospective EU member states with an extremely large proportion of our current car stock coming from EU sources we envisage that the SEE countries will follow the EU electrification trends with perhaps some lag in the early years but steadily increasing as the region is absorbed into the EU.

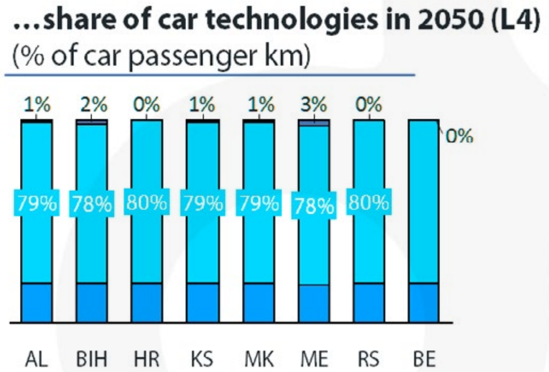
The developments to date and some indicators looking forward seem to suggest significant potential. On the regulatory side, the European Commission has shown its support for the further adoption of electric mobility through the Directive on the deployment of alternative fuels infrastructure. At a more granular level, many governments in Europe have set EV adoption targets in the past few years to accomplish the goals of emissions reduction, energy independence, and technology ownership. These targets, though aspirational and possibly difficult to achieve, do signal strong commitment and support for large-scale EV adoption.[30]

Since the possible trajectories for EV adoption over the coming years are very variable and all could be considered sufficiently credible within the 2050 timeframe, we have

30 EVolution, Electric vehicles in Europe: gearing up for a new phase? Published by Amsterdam roundtables in collaboration with McKinsey & Company, 2014

made changes to the models by increasing the ambition for EV adoption in the SEE in Levels 3 and 4. The models now allow the users of the energy models to explore the full range of possible futures and their respective impact on energy demand, supply and emissions for the SEE countries in 2050.





Graph: Assumptions regarding the share of car technologies[31] by 2050 across the region in Level 1 and Level 4

31 ICE (Internal combustion), FCV (Fuel cell vehicles)

Efficiency assumption of passenger cars

Few experts pointed to the advantages of having greater flexibility in the model for the user to be able to vary these efficiency improvements of passenger cars.

While the efficiency assumptions of new passenger cars follow from the EU policy, we agree that this would be a helpful addition to the models to also reflect a range of possible vehicle replacement rates in the SEE region.

The transport worksheet of the energy models however already has a large number of variables: Km travelled per person, Mode of transport (modal split), Mix of vehicle technology types, Efficiency of the vehicle and type of fuel used, Occupancy of the vehicle, etc. Therefore, the suggestion to transform the efficiency improvements of passenger cars into a variable that the user of the model can change has not been addressed at this stage in the energy models, but this could be refined at the later stage.

ANNEX 1

Call for Evidence Web Based and Face to Face Consultations

List of Participants: JODI Workshop, March 23 2015, Energy Community Secretariat, Vienna

1. **Al Zayer Fuad,** Saudi Arabia – IEF
2. **Andonov Viktor,** Macedonia – Ministry of Economy
3. **Andreikenas Arvydas,** Lithuania – Statistics Lithuania
4. **Arfat Mohamed,** GECF
5. **Bekiri Uljusi,** Kosovo – Directorate of Compulsory Reserves of Oil and Oil Derivatives
6. **Blackburn Alex,** UNSD
7. **Bojku Bekim,** Kosovo – Agency of Statistics
8. **Bozhko Svitlana,** Ukraine – State Statistics Committee of Ukraine
9. **Bundo Alfred,** Albania – Ministry of Energy and Industry
10. **Cegir Karolina,** Austria – Energy Community Secretariat
11. **Christodoulides Pantelis,** Austria – OPEC
12. **Fetie Cristian,** Luxembourg – EUROSTAT
13. **Fryzorenko Anatoliy,** Ukraine – State Statistics Service of Ukraine
14. **Galdava Irakli,** Georgia, Georgian Energy and Water Supply Regulatory Commission (GNERC)
15. **Gervais Steve,** France – IEA
16. **Gojčaj Suzana,** Montenegro – Statistical Office of Montenegro – MONSTAT
17. **Gridneva Natalia,** Moldova – National Bureau of Statistics
18. **Hassani Hossein,** Austria – OPEC
19. **Jasimi Adrian,** Austria – Energy Community Secretariat
20. **Jomiru Serghei,** Moldova – Ministry of Economy of Republic of Moldova
21. **Kos Grabar Vlatka,** Croatia – Energetski institut Hrvoje Požar
22. **Krteva Snezana**
23. **Kulakowska Hanna,** Poland – Ministry of Economy

24. **Leskoviku Artan,** Albania – National Agency of Natural Resources (AKBN)
25. **Ljucović Anton,** Montenegro – Ministry of economy
26. **Maneva Stojna,** Macedonia – State Statistical Office of the Republic of Macedonia
27. **Martins Jose-Luis,** Austria – European Union Delegation to the International Organisations in Vienna
28. **Miloshevska Gjurgjica,** Macedonia – State Statistical Office of the Republic of Macedonia
29. **Mujčinagić Alija,** Bosnia and Herzegovina
30. **Mumović Milka,** Austria – Energy Community Secretariat
31. **Papaz Milan,** Bosnia and Herzegovina – Minister of Foreign Trade and Economic Relations of Bosnia and Herzegovina
32. **Parvanova Antonia,** Bulgaria – National Statistical Institute of Bulgaria
33. **Sahiti Ismajl,** Kosovo – Agency of Statistics
34. **Shejzan Abdullaj,** Macedonia
35. **Štambuk Damir,** Croatia – Ministry of Economy
36. **Stelter Jan,** France – IEA
37. **Suzdalenko Vera,** Latvia – Central Statistical Bureau of Latvia
38. **Svetlana Bulgac,** Moldova – National Bureau of Statistics
39. **Tarnawska Paulina,** Poland – Ministry of Economy
40. **Naida Taso,** Bosnia and Herzegovina – SEE Change Net
41. **Todradze Gogita,** Georgia – National Statistics Office of Georgia – GEOSTAT
42. **Torikata Yuichiro,** IEF
43. **Trhulj Jasmina,** Austria – Energy Community Secretariat
44. **Urbonaitė Milda,** Austria – Permanent Mission of the Republic of Lithuania to the International Organizations in Vienna
45. **Badihi Majid,** GECF

List of Participants: Call for Evidence meeting in Tirana, Albania, April 15 2015

1. **Robert Nygard,** Embassy of Sweden
2. **Emirjeta Adhami,** INCA (Institute of Nature Conservation in Albania)
3. **Teuta Malshi,** Insitute of Environment Policies
4. **Francesco Guerzoni,** Italian Development Cooperation
5. **Adriano De Vito,** Italian Development Cooperation
6. **Bilal Sulo,** National Agency of Natural Resources
7. **Alma Saraci,** National Agency of Natural Resources
8. **Christina Argiropoulou,** Embassy of Greece
9. **Redion Biba,** Co-Plan
10. **Ismail Beka,** GIZ
11. **Gjergji Simaku,** Ministry of Energy and Industry
12. **Elton Qendro,** OSCE
13. **Marinela Spahiu,** URI
14. **Danut Bokur,** Embassy of Romania
15. **Antoine Avignon,** EU Delegation to Albania
16. **Aspri Kapo,** National Agency of Environment
17. **Roman Kristofik,** Embassy of Slovakia

List of Participants: Call for Evidence meeting in Sarajevo, Bosnia and Herzegovina, April 16 2015

1. **Ivan Grle,** Aluminij Mostar
2. **Ante Rezić,** Aluminij Mostar
3. **Mirsa Tuce,** ArcelorMittal Zenica
4. **Miroslav Nikolić,** Elektroprivreda HZ HB
5. **Semir Hadžimuratović,** NOS BiH (Nezavisni operator sistema u BiH / Independent Operator of System in BiH)
6. **Emir Šabić,** UK Embassy
7. **Indira Buljubašić,** University of Tuzla
8. **Sandra Eljšan,** University of Tuzla
9. **Aleksandar Jegdić,** Regulatory Commission for Energy of Republic of Srpska
10. **Edward Ferguson,** British Ambassador to Bosnia and Herzegovina

List of Participants: Call for Evidence meeting in Zagreb, Croatia, April 20 2015

1. **Mario Stazić,** Žmergo
2. **Biserka Žerjan,** Protor
3. **Roberto Rosandić,** Oaza
4. **Lara Šiljeg,** Divina Natura
5. **Ana Postrimovski,** Divina Natura
6. **Marko Pavić,** Slap
7. **Irena Brnada,** REC Croatia
8. **Tomislav Tomašević,** HBS
9. **Pippa Gallop,** CEE Bankwatch Network
10. **Domagoj Račić,** Dupinov san
11. **Toni Vidan,** Friends of the Earth Croatia
12. **Petra Remeta,** WWF Adria
13. **Vedran Horvat,** HBS
16. **Vladimir Potočnik,** HED/DOOR

List of Participants: Call for Evidence meeting in Prishtina, Kosovo, April 15 2015

1. **Midin Bojaxhiu,** KPMM (Komisioni i Pavarur per Miniera dhe Minerale – Independent Commission for Mines and Minerals)
2. **Fatmir Azemi,** MMPH (Ministria e Mjedisit dhe Planifikimit Hapsinor – Ministry of Environment and Spacial Planning)
3. **Arben Ajazi,** MMPH (Ministria e Mjedisit dhe Planifikimit Hapsinor – Ministry of Environment and Spacial Planning, Department of Spatial Planning, Construction and Housing (DPHNB))
4. **Xhavit Drenori,** NGO Ispalumni

List of Participants: Call for Evidence meeting in Skopje, Macedonia, March 23 2015

1. **Trajce Andreevski,** UNDP
2. **Kosana Nikolikj-Mazneva,** ELEM
3. **Marjan Dodovski,** ELEM
4. **Zoran Grkov,** energy expert and consultant
5. **Natasha Radovanovic,** KfW
6. **Vlasto Stoimenovski,** Skopski leguri
7. **Solza Grceva,** Assembly of The Republic of Macedonia, Commission for European Affairs
8. **Julijana Dimoska-Isajlovska,** Energy Regulatory Commission of The Republic of Macedonia
9. **Goran Nikolovski,** Ministry of Economy
10. **Suat Sulejmani,** Ministry of Economy
11. **Christine Winterburn,** Deputy Ambassador of UK
12. **Joana Babusku,** UK Embassy Representative

List of Participants: Call for Evidence meeting in Podgorica, Montenegro, April 16 2015

1. **Edin Koljenović,** Građanska alijansa
2. **Jasna Sekulović,** GIZ
3. **Eleonora Albijanić,** Elektroprivreda Crne Gore
4. **Momir Škopelja,** Regulativna agencija za energetiku
5. **Irena Tadić,** Agencija za zaštitu životne sredine
6. **Ljubica Vulović,** Zavod za hidrometeorologiju i seizmologiju
7. **Slavica Micev,** ZHMS
8. **Tonka Popović,** ZHMS
9. **Vanja Rajović,** ZHMS
10. **Dušan Vuksanović,** Faculty of Architecture
11. **Sreten Škuletić,** ETF
12. **Rajko Šebek,** Elektroprivreda Crne Gore
13. **Božidar Pavlović,** Ministry of Economy
14. **Ivan Vukčević,** British Embassy
15. **Ian Robert Whitting,** British Ambassador to Montenegro
16. **Lyndon Radnedge,** Deputy of the British Ambassador to Montenegro

Call for Evidence announcement in Belgrade, Serbia, April 20 2015

The Call for Evidence in Serbia was announced during the public hearing "Climate Change as a reality in Serbia and EU – challenges, responsibilities, possibilities" ("Klimatske promene kao realnost u Srbiji i EU – izazovi, odgovornosti, mogućnosti"), held in the National Parliament of the Republic of Serbia, where the SEE SEP Serbian CSO partner CEKOR presented the model and invited all present to take part in the Call for Evidence consultations. More info is available on this link.

Announcement and Invitation to Call for Evidence made at the ECRAN-TAIEX multi-beneficiary Workshop on contributions to the Global Climate, Tirana, Albania, March 18 2015

1. **Ndricim Bytyci,** Ministry of Agriculture, Rural Development and Water Management, Albania
2. **Laureta Dibra,** Ministry of Environment, Albania
3. **Ilia Gjermani,** Ministry of Energy and Industry, Albania
4. **Jonila Haxhillari,** Ministry of Environment, Albania
5. **Vasil Premci,** Ministry of Transport and Infrastructure, Albania
6. **Lilika Radovicka,** Ministry of Transport and Infrastructure, Albania
7. **Enkeleda Shkurta,** National Environmental Agency, Albania
8. **Gjergji Simaku,** Ministry of Energy and Industry, Albania
9. **Bakir Krajinović Federal Hydrometeorological Institute,** BIH
10. **Senad Oprasic,** BiH Ministry of Foreign Trade and Economic Relations Environmental protection, BIH
11. **Mirlinda Bllata-Dibrani,** MESP, Kosovo
12. **Rizah Hajdari,** Ministry of Environment and Spatial Planning; Kosovo Environmental Protection Agency, Kosovo
13. **Violeta Lajqi- Makolli,** MESP, Kosovo
14. **Adem Tusha,** MESP, Kosovo
15. **Olivera Kujundžić,** Ministry of Sustainable Development and Tourism, Montenegro
16. **Milena Spicanovic,** Ministry of Sustainable Development and Tourism, Montenegro
17. **Sandra Andovska,** DPMEA, Macedonia
18. **Nataša Markovska,** Macedonian Academy of Sciences and Arts, Macedonia
19. **Teodora Obradović Grncarovska,** Ministry of Environment and Physical Planning, Macedonia
20. **Ljubica Teofilovska,** Ministry of Environment and Physical Planning, Macedonia
21. **Pelin Haberal Ministry of Energy and Natural Resources,** Turkey
22. **Selen Kilincarslan,** Ministry of Environment and Urbanization, Turkey
23. **Ergün Koc,** Ministry of Energy and Natural Resources, Turkey
24. **Betül Konakli,** Science, Industry and Technology Ministry, Turkey

25. **Daniela Carrington,** UNDP regional office
26. **Eleni Georgopoulou,** National Observatory of Athens, Greece
27. **Sevastianos Moirasgentis,** National Observatory of Athens, Greece
28. **Dimitrios Papadopoulos,** E3M-LAB NTUA, Greece
29. **Imre Csikos ECRAN**
30. **Jozsef Feiler,** ECRAN
31. **Agnes Kelemen ECRAN**
32. **Lira Hakani,** SEESEP Network, EDEN center , Albania
33. **Ana Ranković,** SEESEP Network, Fractal, Serbia

Call for Evidence Website Registrations to view Call for Evidence data, from March 23 to April 30 2015

1. **Zemri Sulemani,** Center for sustainable community development – PROCIVIC, Tetovo, Macedonia
2. **Svetlana Bozhko,** State Statistics Service of Ukraine, Ukraine
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43. **Milivoj Maksić,** Optel Inženjering, Sombor, Serbia
44. **Radislav Momirov,** Ministry of Agriculture and Environmental Protection, Belgrade, Serbia

45. **Spiro Thodhorjani,** Polytechnic University of Tirana, Tirana, Albania
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48. **Admir Mešić,** Emisoft AS, Norway
49. **Sanela Cigić,** FERK – Regulatory Commission for Energy in Federation of Bosnia and Herzegovina, Mostar, Bosnia and Herzegovina
50. **Dalibor Aleksić,** Ministry of Internal Affairs, Belgrade, Serbia
51. **Neven Duić,** University of Zagreb – Faculty of Mechanical Engineering and Naval Architecture, Zagreb, Croatia
52. **Laura Aylett,** DECC, London, United Kingdom
53. **Nenad Radović,** Elektroprivreda Republike Srpske BiH, Trebinje, BiH
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58. **Faris Kreso,** Alfa Energy Group, United Kingdom
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65. **Osman Lindov,** Faculty of Traffic and Communications, University of Sarajevo, Sarajevo, Bosnia and Herzegovina
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67. **Mirsa Tuce,** ArcelorMittal Zenica, Zenica, Bosnia and Herzegovina
68. **Vladimir Jelavić,** EKONERG, Zagreb, Croatia
69. **Iva Švedek,** EKONERG, Zagreb, Croatia

70. **Aleksandar Marković,** Serbia Energy News, Serbia
71. **Stjepan Kumrić,** Cement Factory Lukavac, Lukavac, Bosnia and Herzegovina
72. **Valentina Delija,** EKONERG, Zagreb, Croatia
73. **Martin Tais,** UNDP BiH, Sarajevo, BiH
74. **Marjana Kaluđerović,** The Aluminium Plant Podgorica KAP, Podgorica, Montenegro
75. **Sabina Sijarić,** Ministry of environment and tourism of Federation BiH, Sarajevo, Bosnia and Herzegovina
76. **Radomir Mutabdžija,** Agency for Statistics of BiH, Sarajevo, Bosnia and Herzegovina
77. **Guy Turner,** Trove Research, London, United Kingdom
78. **Nadia Ameli,** OECD, France
79. **Milica Kankarash,** Montenegro

SEE SEP Workshop on Energy Model

The SEE SEP Workshop on energy model's scenario building was organized in Tirana, Albania, on 24th and 25th March 2015.

Participants of the workshop were energy modelers and senior advisors from the project as well as regional and international energy experts.

1. **Garret Tankosić-Kelly,** SEE Change Net, BiH
2. **Masha Durkalić,** SEE Change Net, BiH
3. **Naida Taso,** SEE Change Net, BiH (See biography in Annex 2: SEE 2050 Energy Model – Biographies of Team)
4. **Đorđija Blagojević,** SEE Change Net, BiH
5. **Ermelinda Mahmutaj,** EDEN, Albania
6. **Lira Hakani,** EDEN, Albania (See biography in Annex 2: SEE 2050 Energy Model – Biographies of Team)
7. **Xhemal Mato,** Ekolevizja, Albania
8. **Zoran Ivančić,** CPI, BiH
9. **Irma Filipović,** CPI, BiH (See biography in Annex 2: SEE 2050 Energy Model – Biographies of Team)
10. **Tanja Jokić,** CPI, BiH (See biography in Annex 2: SEE 2050 Energy Model – Biographies of Team)
11. **Arlene Birt,** Designer of Energy Model Report – Segment on Advocacy, Belgium
12. **Maja Božičević-Vrhovčak,** DOOR, Croatia
13. **Ivana Rogulj,** DOOR, Croatia (See biography in Annex 2: SEE 2050 Energy Model – Biographies of Team)

14. **Daniel Kammen,** Energy expert, USA (See biography in Annex 2: SEE 2050 Energy Model – Biographies of Team)
15. **Kushtrim Kaloshi,** ATRC, Kosovo
16. **Anyla Beqa,** ATRC, Kosovo (See biography in Annex 2: SEE 2050 Energy Model – Biographies of Team)
17. **Sonja Zuber,** Analytica, Macedonia (See biography in Annex 2: SEE 2050 Energy Model – Biographies of Team)
18. **Ana Stojilovska,** Analytica, Macedonia (See biography in Annex 2: SEE 2050 Energy Model – Biographies of Team)
19. **Sanja Orlandić,** Green Home, Montenegro (See biography in Annex 2: SEE 2050 Energy Model – Biographies of Team)
20. **Dragana Mileusnić,** CAN Europe, Belgium
21. **Zvezdan Kalmar,** CEKOR, Serbia (See biography in Annex 2: SEE 2050 Energy Model – Biographies of Team)
22. **Ana Ranković,** Fractal, Serbia (See biography in Annex 2: SEE 2050 Energy Model – Biographies of Team)
23. **Noah Kittner,** Energy expert, USA (See biography in Annex 2: SEE 2050 Energy Model – Biographies of Team)
24. **Nataša Kovačević,** Green Home, Montenegro
25. **Lidija Kesar,** Fractal, Serbia
26. **Rita Strakosha,** Ekolevizja, Albania
27. **Pippa Gallop,** CEE Bankwatch, Czech Republic/Croatia
28. **Peter Vajda,** Energy Community, Hungary/Austria
29. **Petra Remeta,** WWF Adria, Croatia
30. **Michel Cornet,** Climact, Belgium Fractal, Serbia (See biography in Annex 2: SEE 2050 Energy Model – Biographies of Team)
31. **Tomislav Puškec,** Regional independent energy expert, Croatia (See biography in Annex 2: SEE 2050 Energy Model – Biographies of Team)
32. **Aleksandar Dedinec,** Regional independent energy expert, Macedonia (See biography in Annex 2: SEE 2050 Energy Model – Biographies of Team)
33. **Vida Ogorelec,** Facilitator and expert, Slovenia

EU Sustainable Energy Week 2015 – Fair, Clean and Efficient Energy System in South East Europe and the Neighbourhood – Policy Session "Launch of the 2050 Energy Model for South East Europe (and beyond?)", June 17 2015, Brussels, Belgium

List of registered attendees:

1. **Zvezdan Kalmar i Krnajski Jović,** CEKOR
2. **Feiler Jozsef,** 400 ppm
3. **Gabriel Joachim,** By – Invest GmbH
4. **Traum Dario,** Bloomberg
5. **Durkalić Masha,** SEE Change Net
6. **Martin Ben,** ONIEB
7. **Wisniwski Sylvia,** Finance in Motion
8. **Asmelash Elisa ,** EIR global
9. **Nunez Ferrer Jorge,** Centre for European Policy Studies
10. **Hanđiska Trendafilova Maja,** Mission of the Republic of Macedonia to the EU
11. **Tetu Florian**
12. **Simonsson Johanna,** Swedish Association of Local Authorities and Regions (SALAR)
13. **Magureanu Razvan,** University Politehnica Bucharest
14. **Vermeulen Pascal,** Climact
15. **Henning Laurel,** MLex
16. **Kukan Eduard,** European Parliament
17. **Charlaftis Aggelos,** Epaphos Advisors Teamwork
18. **Brites Marta,** European Commission
19. **Cadeddu Roberto,** HELIOS ESCo Srl
20. **Djukic Kristina,** South – East European Federation of Cities and Regions for the Environment
21. **Johnston Mark,** European Policy Centre
22. **Dvorakova Karolina,** Gemeente Amsterdam
23. **Vreede Kirste,** Eurovent
24. **Georgiev Ivailo,** National Palace of Culture – Congress Centre Sofia
25. **Cornet d'Elzius Michel,** Climact
26. **Cosic Boris,** Adria Section of the Combustion Institute
27. **Baumgarten Dominik,** Representation of Lower Saxony at the European Union
28. **Bergasse Emmanuel,** Bergasse Conseils
29. **Lippold Marcus,** SPOL
30. **Vrancken Bart,** Alcatel-Lucent
31. **Kubečková Darja,** VŠB – Technical University Ostrava, Faculty of Civil Engineering
32. **Szomolanyiova Jana,** SEVEn, The Energy Efficiency Center

33. **Čeperković Bratislav,** Government of Serbia
34. **Raičević Borko,** Energy Community
35. **Safiulins Timurs,** Riga Energy Agency
36. **Filipović-Karadža Irma,** CPI
37. **Rogulj Ivana,** Society for sustainable development and design – DOOR
38. **Tankosić-Kelly Garret,** SEE Change Net
39. **Mileusnic Dragana,** CAN Europe
40. **Taso Naida,** SEE Change Net
41. **Blagojević Đorđija,** SEE Change Net
42. **Stojanović Bojan,** WWF
43. **Kammen Daniel,** University of California, Berkeley
44. **Hakani Lira,** Environmental Center for Development, Education and Networking (EDEN center)
45. **Wysoczynska Marta,** European Commission/DG RTD
46. **Cowgill Andrew,** British Management Data Foundation
47. **Wettmark Jan,** Arvika Kommun
48. **Counsell Thomas,** UK Department of Energy & Climate Change
49. **Kittner Noah,** UC Berkeley
50. **Orlandic Sanja,** Green Home
51. **Beqa Anyla,** Advocacy Training and Resource Center (ATRC)
52. **Zuber Sonja,** Analytica Think Tank
53. **Kalaba Igor,** Center for Environment
54. **van Steenberghe Vincent,** Belgian Federal Ministry Environment
55. **Zahirović Melisa,** SEE Change Net
56. **Bitvai Krisztina,** Eurideas Linguistic Services
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62. **Nozic Mirjana,** NIS j.s.c.
64. **Trzaskowski Piotr,** European Climate Foundation
64. **Beuchod Elena Eugenia,** Cassa depositi e prestiti
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69. **Ranković Ana,** NGO Fractal

70. **Cesàro Paolo,** Meet In Brussels
71. **Dedi Elona,** Mission of Albania to EU
72. **Janina Suela,** Mission of Albania to EU
73. **Čengić Nina,** SEE Change Net
74. **Iulia Platona,** Pivex Smart Grid
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77. **Vassallo Josianne,** Building Regulation Office
78. **Eriksson Aleksandra,** Journalist
79. **Wasser Udo,** E.V.V.E.
80. **Hoffmann Heike,** Germany Trade and Invest
81. **Vidan Toni,** Zelena akcija
82. **Peolidis Christos,** EU Commission
83. **Lee Felicia,** UC Berkeley – RAEL
84. **Stathis Vassilios,** Independent Consultant
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88. **Staudt Elisabeth,** German Environmental Action
89. **Đorđević Maša,** Open Society Foundations
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93. **Whitington Brian,** Tighean Innse Gall
94. **Birt Arlene,** Background Stories
95. **Korb Andra,** IFOAM EU
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97. **Despradel Cynthia,** REHVA
98. **Romano Sara,** Regione Lombardia
99. **Matković Puljić Vlatka,** HEAL
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102. **Baka Joanna ,** European Academy for Taxes, Economics & Law
103. **Kouloutmpanis Athanasios,** Com&Com
104. **Villar Joaquin,** Andalusian Energy Agency
105. **Singh Smita,** Delegation of the EU to India
106. **Diamandieva Maria,** International Academy of Architecture
107. **Charalampous George,** BEUC
108. **Derveaux Karel,** ECOPOWER
109. **Taleva Katerina,** Ifoam-EU
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114. **De Leut Nijaz,** O3 Makes free Consultants

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123. **Sokolov Olexandr,** City Council Chernihiv

124. **Pydochenko Oleksii,** MERP

125. **Mandatova Pavla,** EURELECTRIC

126. **Carstei Mihaela,** Energy Policy Group

127. **Kimmett Chris,** Open Energi

128. **Azais Nelly,** Independent

129. **Gunduzyeli Elif,** Climate Action Network Europe

130. **Sroda Szymon,** Polish National Contact Point for EU Programmes

131. **Svaren Vigdis,** Norsk Teknologi

132. **Secretariat Eusew,** ESN

133. **Kunc Davor,** European Commission

134. **Czako Veronika,** European Commission EASME

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137. **Mardashkin Yury,** Ministry of Energy of the Republic of Belarus

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142. **Dzmitrovich Iryna,** Ministry of Energy of the Republic of Belarus

143. **Malashanka Mikhail,** Ministry of Energy of the Republic of Belarus

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145. **Janssen Rod,** Energy consultant

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165. **Ulivieri Veronica,** La Stampa
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168. **Zografakis Nikolaos,** Regional Energy Agency of Crete
169. **Brussig Berndt,** BSC BerlinSolarCulture
170. **Singh Jas,** The World Bank
171. **Primova Radostina,** Hinicio
172. **Kalpakchiev Teodor,** European Commission
173. **Verbics Krisztina,** State Secretariat for European Union Affairs, Prime Minister's Office
174. **Lunacek Ulrike,** European Parliament
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202. **Simjanović Jelena,** Global CCS Institute
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204. **Jollands Nigel,** EBRD
205. **Glancy,** Ryan, Aether Ltd
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207. **Cendrowicz Nicholas ,** European Commission
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209. **Matolcsy Karoly,** ÉMI Nonprofit Kft.
210. **Dravecka Pavlina,** GOPAcom
211. **O'Kane Hannah,** European Parliament
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215. **Dimitrovski Dimitar,** International Finance Corporation
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218. **Cano Jose Carlos,** IusVentures
219. **Jezic von Gesseneck Josip,** Chamber.be
220. **van Aardenne John,** European Environment Agency
221. **Somer Alev,** EUROCITIES
222. **Ettorre Francesca,** Turboden
223. **Matheys Julien,** Flemish Dept. Environment, Nature and Energy
224. **Joebstl Roland,** EEB
225. **Perisinakis Athanasios,** Sinergasia SA

226. **Uzdavinyte Jovita,** Europe External Policy Advisors
227. **Paraschiv Camelia,** European Commission
228. **Costa Carrapiço Ines,** Universidad Politécnica de Madrid
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230. **Lilliu Stefano,** Comune di Quartu Sant'Elena
231. **Szalkowska Urszula,** MyEarth
232. **Baton Marie,** CLASP
233. **Court Benjamin,** Global CCS Institute
234. **Tusvik Sunniva,** Mid-Norway European Office
235. **Wenzler Ivo,** Accenture
236. **Larrabide Ibai,** Zabala IC
237. **Grazhdan Alla,** USAID Municipal Energy Reform Project in Ukraine
238. **Taraj Borana,** European Commission
239. **Ricketts Gabriella,** European Bank for Reconstruction and Development
240. **Horvath Jiri,** thermaflex isolatie b.v
241. **Suu Lauri,** SA KredEx
242. **Leuwers Claire,** Lille II
243. **Cazes Bertrand,** Glass for Europe
244. **Salo Mikko,** Lappeenranta University of Technology
245. **Tagliapietra Simone,** Bruegel

ANNEX 2

Biographies of Team members

Scenario Authors

Dr. Daniel M. Kammen

Director of UC Berkeley's Renewable and Appropriate Energy Lab

Dr. Kammen is the Class of 1935 Distinguished Professor of Energy at the University of California, Berkeley, with parallel appointments in the Energy and Resources Group, the Goldman School of Public Policy, and the department of Nuclear Engineering. He was appointed the first Environment and Climate Partnership for the Americas (ECPA) Fellow by Secretary of State Hillary R. Clinton in April 2010.

Kammen is the founding director of the Renewable and Appropriate Energy Laboratory (RAEL), Co-Director of the Berkeley Institute of the Environment, and Director of the Transportation Sustainability Research Center. He has founded or is on the board of over 10 companies, and has served the State of California and US federal government in expert and advisory capacities.

Dr. Kammen was educated in physics at Cornell and Harvard, and held postdoctoral positions at the California Institute of Technology and Harvard. He was Assistant Professor and Chair of the Science, Technology and Environmental Policy Program at the Woodrow Wilson School at Princeton University before moving to the University of California, Berkeley. Dr. Kammen has served as a contributing or coordinating lead author on various reports of the

Intergovernmental Panel on Climate Change since 1999. The IPCC shared the 2007 Nobel Peace Prize. He serves on the Advisory Committee for Energy & Environment for the X-Prize Foundation.

During 2010–2011 Kammen served as the World Bank Group's Chief Technical Specialist for Renewable Energy and Energy Efficiency. He was appointed to this newly created position in October 2010, in which he provided strategic leadership on policy, technical and operational fronts. The aim is to enhance the operational impact of the Bank's renewable energy and energy efficiency activities while expanding the institution's role as an enabler of global dialogue on moving energy development to a cleaner and more sustainable pathway.

He has authored or co-authored 12 books, written more than 300 peer-reviewed journal publications, testified more than 40 times to U.S. state and federal congressional briefings, and has provided various governments with more than 50 technical reports. Dr. Kammen also served for many years on the Technical Review Board of the Global Environment Facility. He is a frequent contributor to or commentator in international news media, including *Newsweek, Time, The New York Times, The Guardian* and *The Financial Times*. Kammen has appeared on *60 Minutes* (twice), Nova, Frontline, and hosted the six-part Discovery Channel series *Ecopolis*. Dr. Kammen is a Permanent Fellow of the African Academy of Sciences, a fellow of the American Physical Society.

Noah Kittner

Researcher at UC Berkeley's Renewable and Appropriate Energy Laboratory

Noah Kittner is a PhD student in the Energy and Resources Group at UC Berkeley and researcher in the Renewable and Appropriate Energy Laboratory. After graduating with a BS in Environmental Science from UNC-Chapel Hill (highest honors), Noah was a Fulbright Fellow at the Joint Graduate School for Energy and Environment in Bangkok, Thailand researching technical and policy aspects of solar electricity and sustainability assessment. Recently, he co-authored a Thai Solar PV Roadmap with colleagues at Chulalongkorn University.

He has worked on renewable energy issues in a variety of contexts, including measuring land use change and biomass fuel uses in western Uganda, installing solar panels in Mexico, and electricity grid modeling in Kosovo. He is supported through the Berkeley Center for Green Chemistry as a SAGE-IGERT fellow, National Science Foundation as a Graduate Research Fellow, USAID, and has won an award from the National Go Solar Foundation for his work on solar photovoltaics.

Barney Jeffries

Writer and Editor

Barney Jeffries is an experienced writer and editor specializing in environmental issues. He writes extensively for WWF, and worked on a number of high-profile publications, including:

Living Planet Report (2014, lead author)
Making Better Production Everybody's Business (2014, lead author)
Living Forests Report (2012, editorial consultant)
The Energy Report (2011, lead author, part I)

In addition to working on *The Energy Report*, Barney has produced communications materials for the WWF Global Climate and Energy Initiative, written web copy and blogs on renewable energy for WWF-UK, and authored a report on bioenergy for the New Generation Plantations platform.

Energy Experts

Dr. Eng. Besim Islami

Energy and Climate Change Consultant

Dr. Besim Islami has 25 years of professional experience in a number of energy sector related areas, including: carry out energy planning, preparing GHG inventory (knowing very well IPCC methodology and common reporting format), GHG mitigation scenarios (using LEAP and GACMO models), climate change adaptation scenarios, different studies related to the development of RES and EE policies and strategies, considering at all times GHG emission reduction; preparation of feasibility studies including technical, financial, and environmental impact of energy projects including big, medium and small hydro power plants, wind power plants, biomass energy, solar energy, geothermal energy; green house gas inventory; mitigation of green house gases scenarios through RES and EE penetration scenario using the LEAP, GACMO, RETScreen® and MARKAL software; and lecturing at university level EE, RES, environmental impact from energy source utilization chain, and cost-benefit analysis of EE and RES projects.

Dr. Islami has 22 years of working experience as a key expert for preparation of energy policies and energy strategies for Albania and Kosovo and participating as a team expert for the development of energy policy and energy sector development scenarios for almost all countries of the Western Balkans. Dr. Islami is the founder of first energy balances according to EUROSTAT format, forecasting of energy demand in general and electricity in particular for Albania (since 1996) and Kosovo (since 2003) and renewable energy sources (RES) data base. Dr. Islami worked for the Government of Albania as the Chairman of the National Agency for Energy for 10 years and since 2005 he is working regularly on different projects in Kosovo as well. He has gathered great experience working in Albania, Kosovo, Serbia, Montenegro, Macedonia, Croatia, Bulgaria, Rumania, Turkey, Russia, Ukraine, Georgia, Bolivia and Ecuador. He has also worked with a number of bilateral donors and multilateral financial institutions including the European Commission (IPA, CARDS and EAR), KfW, the World Bank, the European Bank for Reconstruction and Development (EBRD), GTZ, USAID, USTDA and UNDP.

M. Sc. Tomislav Pukšec

Research Assistant at the Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb

Tomislav Pukšec graduated from the Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb, in 2008, and he is employed there since 2009, at the Department of Power Engineering, Energy and Environment as a research assistant and PhD student. He is working on various projects dealing with energy efficiency and renewable energy sources (EU projects: IEE, FP7, IPA, MED, Horizon and national projects: Croatian Science Foundation, industry, local government, etc.).

He is the author of 32 scientific papers, of which 13 were published in scientific journals. He has been awarded two scientific scholarships: Croatian Science Foundation (Aalborg University) and Erasmus Mundus for PhD students (American University of Beirut). He is a recipient of an award given by The Society of University Teachers, Scholars and other Scientists of Zagreb University for best young scientists and artists in the year 2012, in the technical field category.

M. Sc. Aleksandar Dedinec

Research Assistant at the Research Center for Energy and Sustainable Development of the Macedonian Academy of Sciences and Arts (ICEIM-MANU)

Aleksandar is an expert modeller and analyst, specialized in the energy and climate change sectors. At present he is a research assistant at the Research Center for Energy and Sustainable Development of the Macedonian Academy of Sciences and Arts (ICEIM-MANU) and a PhD candidate at the Faculty of Electrical Engineering and Information Technologies. He holds a Master of Science in Electrical Engineering and Information Technologies. He is one of the leading people on the MARKAL energy strategy modelling in Macedonia.

He has been participating in more than 13 projects related to energy strategies, energy efficiency and renewable energy sources, as well as climate change, including: GHG inventories, climate change mitigation in various sectors, energy efficiency and GHG emissions indicators, and strategic energy planning. He is author and co-author of 5 scientific papers published in journals with impact factor and 14 papers published in proceedings.

Aleksandar Dedinec has also worked as a local consultant for TETRA TECH and WINROCK on projects financed by USAID, Energy Agency of the Republic of Macedonia, E4TECH, Regional Environmental Center (REC)... He is a member of the Association of Energy Engineers (AEE) and International Centre for Sustainable Development of Energy Water and Environment Systems (SDEWES). He is also experienced in computer science, robotics, and automation.

Michel Cornet

Energy and Climate Change Manager at Climact

Michel Cornet is the Energy and Climate Change Manager at Climact since 2009, and supports companies, NGO's and governments on energy and climate change.

He currently supports several countries in Western Europe, Eastern Europe and North Africa to set pathways towards a low-carbon society. He also leads the manufacturing analysis of the Global Calculator project that will be intensively used during the 2015 Paris COP.

Earlier, while at A.T. Kearney, he focused on strategy (corporate and functional) and on operations (complexity management). Prior to that, he worked in microfinance both on the field and serving the United Nations.

Michel is trained as a computer science engineer with a focus on entrepreneurship. He also provides various university lectures on energy and climate change.

Guy Turner

Founder and CEO of Trove Research Ltd

Guy Turner is an experienced economist with an environmental conscience, entrepreneurial flair and passion for delivering growth. He is the founder and CEO of Trove Research Ltd, a start up to help companies make better use of published research. He is also the non-executive director at Rezatec Ltd to guide product strategy, and a visiting Research Associate at Oxford University's Smith School of Enterprise and the Environment working on their Stranded Assets Programme.

He was previously Head of Economics and Commodity Research at Bloomberg New Energy Finance, responsible for managing research products in the power, gas and carbon markets, and long term economic forecasting. He joined the New Energy Finance (NEF) in the start-up phase in 2006 to set up New Carbon Finance (NCF) – the business dedicated to analyzing the world's carbon markets – now the leading provider of this analysis worldwide. NCF absorbed into NEF which was successfully sold to Bloomberg in December 2009. He is the member of Barclays Environmental Index Committee, and founder member of Carbon Markets & Investors Association.

Spiritual father of the My 2050 Calculator

Professor David J. C. MacKay

Regius Professor of Engineering in the Department of Engineering at the University of Cambridge

MacKay is the Regius Professor of Engineering in the Department of Engineering at the University of Cambridge and from 2009 to 2014 was Chief Scientific Adviser to the UK Department of Energy and Climate Change (DECC). Before being appointed to the DECC, MacKay was most well known as the author of the book Sustainable Energy – Without the Hot Air.

David represented Britain in the International Physics Olympiad in Yugoslavia in 1985, receiving the first prize for experimental work. He went up to Trinity College, Cambridge, and received a Bachelor of Arts in Natural Sciences (Experimental and theoretical physics) in 1988. He went to the California Institute of Technology (Caltech) as a Fulbright Scholar. His supervisor in the graduate program in Computation and Neural Systems was John Hopfield. He was awarded a PhD in 1992.

In January 1992 MacKay was made the Royal Society Smithson Research Fellow at Darwin College, Cambridge, continuing his cross-disciplinary research in the Cavendish Laboratory, the Department of Physics of the University of Cambridge. In 1995 he was made a University Lecturer in the Cavendish Laboratory. He was promoted in 1999 to a Readership, in 2003 to a Professorship in Natural Philosophy and in 2013 to the post of Regius Professorship of Engineering. He was elected a Fellow of the Royal Society in May 2009.

MacKay's contributions in machine learning and information theory include the development of Bayesian methods for neural networks, the rediscovery (with Radford M. Neal) of low-density parity-check codes, and the invention of *Dasher*, a software application for communication especially popular with those who cannot use a traditional keyboard. His book *Information Theory, Inference, and Learning Algorithms* was published in 2003.

Regional Energy Model Team

Ana Ranković

Ana Ranković from NGO Fractal (Serbia) supports collaboration within the SEE SEP team and alignment of national modeling efforts through ongoing facilitation, communication and data management assistance. Her contribution also includes research in buildings energy efficiency and low carbon transport solutions. She is a co-founder and member of NGO Fractal since 2001 where she has initiated and led a number of dialogue programs designed to improve communication, trust and cooperation in the Western Balkans region, including support for cross-border community partnerships for sustainable use of natural resources and pollution prevention. Her areas of work also include citizen participation, gender, conflict sensitivity and development.

M. Sc. Naida Taso

Naida Taso is an Energy Specialist at SEE Change Net since 2012, working on the South East Europe Sustainable Energy Policy (SEE SEP) Programme as support for national teams in energy modeling. She studied at the Faculty of Electrical Engineering at the University of Sarajevo. She has completed both her Bachelor's and Master's degree in Renewable Energy (Geothermal Energy and Small Hydro Power Plants).

Ivana Rogulj

Ivana Rogulj has a Master's Degree in Electrical Engineering (Energy Systems), and she is currently finishing her postgraduate specialization in Eco engineering. She has 8 years of experience in the field of sustainable energy, with 6 of them spent working as Project Manager, AD and Head of Marketing and Information Department in the energy service company ESCO.

She has numerous trainings and additional education in the area, including certificates for measurement and verification of energy efficiency projects and building performance.

She is currently working in the Croatian CSO Society for Sustainable Development Design (DOOR) as a Project Manager for sustainable and renewable energy, energy poverty and natural resources management related projects. She was also a member of the working group for transposition of EPBD directive and is working on projects related to the implementation of EU legislation, currently on project REACH (Reduce Energy and Change Habits), with the objective of creating energy poverty regulation in Croatia.

Irma Filipović

Irma Filipović gained her Master's degree at the Faculty of Electrical Engineering in Sarajevo, in September 2013. She started working in Public Interest Advocacy Center – CPI Foundation in June 2013 as Project Manager on the SEE SEP project.

She also contributed to the LCPD/IED report "Time to Phase Out Dirty Coal in South Eastern Europe" with the emphasis on health damage resulting from the use of coal.

Tanja Jokić

Tanja Jokić gained her Master of Science degree at the department of Electric Power Engineering at Faculty of Electrical Engineering in Sarajevo, Bosnia and Herzegovina.

She has been working at the Public Interest Advocacy Center – CPI Foundation in Sarajevo since June 2013, employed as Project Manager on the SEE SEP project. She also contributed to the LCPD/IED report "Time to Phase Out Dirty Coal in South Eastern Europe".

Sonja Zuber

Sonja Zuber is the research and management coordinator in Macedonian think thank Analytica since 2010. She has relevant work experience in proposing policy solutions for laws and strategies, and in lobbying on national and international level. Sonja is trained on relevant policymaking, qualitative and quantitative research as well as energy modeling. In Analytica think tank, she has extensively worked on many projects at national and regional level funded by the Government of Macedonia, the European Commission and other domestic and foreign donors.

She has written and co-written more than 20 policy reports and briefs such as: "Winners and Losers – Who benefits from high level corruption in the South East Europe energy sector?", "Energy Poverty in Macedonia: Analysis of the Law on changing and amending the Law on energy adopted in May 2013", and many more. Sonja Zuber holds a Bachelor of Arts in Political Science from the University "Cyril and Methodius" Faculty of Law, Justinianus Primus, Skopje, Macedonia and a Master of Arts in European Studies from the Hochschule Bremen, Germany.

Ana Stojilovska

Ana Stojilovska has been working as a Research Fellow on the Energy and Infrastructure Program at Analytica Think Tank in Macedonia since October 2010. She holds a Master's Degree in European Studies obtained at the Europa-Kolleg Hamburg, University of Hamburg, Germany.

Her areas of research include energy efficiency, renewable energy, energy security, the heat market, co-generation, gasification, energy poverty, energy modeling for the buildings sector, cooperation between government and civil society, good governance in the energy sector... She has authored and co-authored over 30 papers and commentaries on energy topics published by Analytica, Konrad Adenauer Foundation, University American College Skopje, World Bank, and Macedonian magazine Political Thought.

She has worked on over 20 local and regional projects including research projects and events in the capacity of researcher, project assistant or project manager. Ana Stojilovska was also engaged in preparing comments for energy relevant documents such as European Bank for Reconstruction and Development's country strategy for Macedonia, Macedonian Energy law, Renewable Energy Action Plan for Macedonia, Work program of the Macedonian Government, etc.

Sanja Orlandić

Sanja Orlandić graduated in Biology on the Faculty of Mathematics and Natural Sciences of the University of Montenegro in Podgorica. She has been employed as the energy program coordinator of CSO Green Home – Zeleni dom since 2008. Her areas of work in the frame of energy program include energy efficiency, renewable energy sources (with focus on solar and wind energy), providing opinions for strategic documents prepared by the Government of Montenegro (such as the National Energy Strategy), providing opinions on strategic environmental impact assessments for large energy projects (interconnection cable between Pljevlja and Lastva Grbaljska, hydropower plants on Komarnica river), and researches about implementation of legislation in the field of energy in Montenegro.

Anyla Beqa

Anyla Beqa is currently working as Energy Model Developer at the Advocacy Training and Resource Center (ATRC) in Kosovo. She has a Bachelor's Degree of Science in Applied Arts and Science, majoring in Economics and Statistics and Public Policy. Anyla has been working within SEE SEP project since September 2013. She also contributed to the report about corruption "Winners and Losers: Who benefits from high level corruption in the South East Europe energy sector?". Her previous engagement in the field of energy includes her fellowship at the Trasmission, System and Market Operator KOSTT in Kosovo.

Lira Hakani

Lira Hakani has a Master's Degree in Biology from the Faculty of Natural Sciences, University of Tirana, Albania. She has been a Program Officer for Public Information and Participation with the Environmental center for Development, Education and Networking (EDEN) in Tirana since September 2011. Her areas of work include public information, energy, industry, monitoring IFI investments, environmental projects and law implementation.

Zvezdan Kalmar

Zvezdan Kalmar studied at the Faculty of Philosophy, University of Belgrade, Serbia, and is engaged in the civil society movement of Serbia since 1997. He is working as the coordinator for Energy and Transport at CEKOR (Center for Ecology and Sustainable Development), and is also CEE Bankwatch's coordinator in Serbia since 2005. Zvezdan is a campaigner and activist and often represents Serbian environmental NGOs in international meetings and fora regarding energy, climate issues and transport, such as in NGO dialogue with European Commission, EBRD Annual meetings, Astana Ministerial Conference, Energy Community, etc.

He is working on legal and strategic issues such as LCPD, hydro, biomass, resettlement, state aid in energy, energy poverty, lignite pollution, climate and energy policies, climate adaptation as well as on monitoring of EU integration processes in Serbia and IPA programming. He also works with local communities that are endangered by large infrastructure projects on assisting them to realize and utilize their human and environmental rights.

South East Europe Sustainable Energy Policy

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