



Study on 2030 overall targets (energy efficiency, renewable energies, GHG emissions reduction) for the Energy Community

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Introduction

General approach & key aspects

- The core objective of this project was to **develop a methodology and to conduct a quantitative assessment to show pathways for achieving calculated 2030 energy efficiency (EE), renewable energies (RE) and greenhouse gas emissions (GHG) reduction targets** that can be expected under aligned framework conditions in the Energy Community Contracting Parties.
- For doing so, we aimed for **aligning our methodologies to the approaches used for energy and climate target setting at EU Member State level**, and we made use of specialised energy system models for assessing certain impacts related to that.

- Step 1 – Methodology for 2030 target setting
 - Including Methodology for EE, RE and GHG targets
- Step 2 – 2030 Target Calculation
 - Including data collection, actual target calculation, and overview on targets
- Step 3 – Evaluation of the impact of target fulfilment

Energy modelling

The impacts arising from the uptake of renewable energies and of a possible future carbon pricing for the electricity sector are explored using two models with complementary strengths and focal points:

- Electricity Market Model - EEMM (REKK)
- Green-X model (TU Wien)
- Both models have been applied in combination within the SEERMAP project to undertake a detailed assessment of electricity futures for South Eastern Europe.

Renewable Energy Targets

GHG Emission Reduction Targets

Energy Efficiency Targets

2020

Top-down approach:

- Flat rate / GDP based approach

Top-down approach:

- Split between ETS (EU bubble) and Non-ETS (national targets)
- Allocation of national targets reflects difference in economic welfare

Mix of top-down and bottom up allocation:

- EE Directive prescribes strong measures to be implemented
- National allocation plans reflect country-specifics / preferences

2030

- Only EU target set by now, bottom-up approach proposed

- Same approach as used for 2020

- Only EU targets set by now (but same approach is likely to be followed)

- A closer look at economic welfare:

GDP per capita in the European Union and the Energy Community

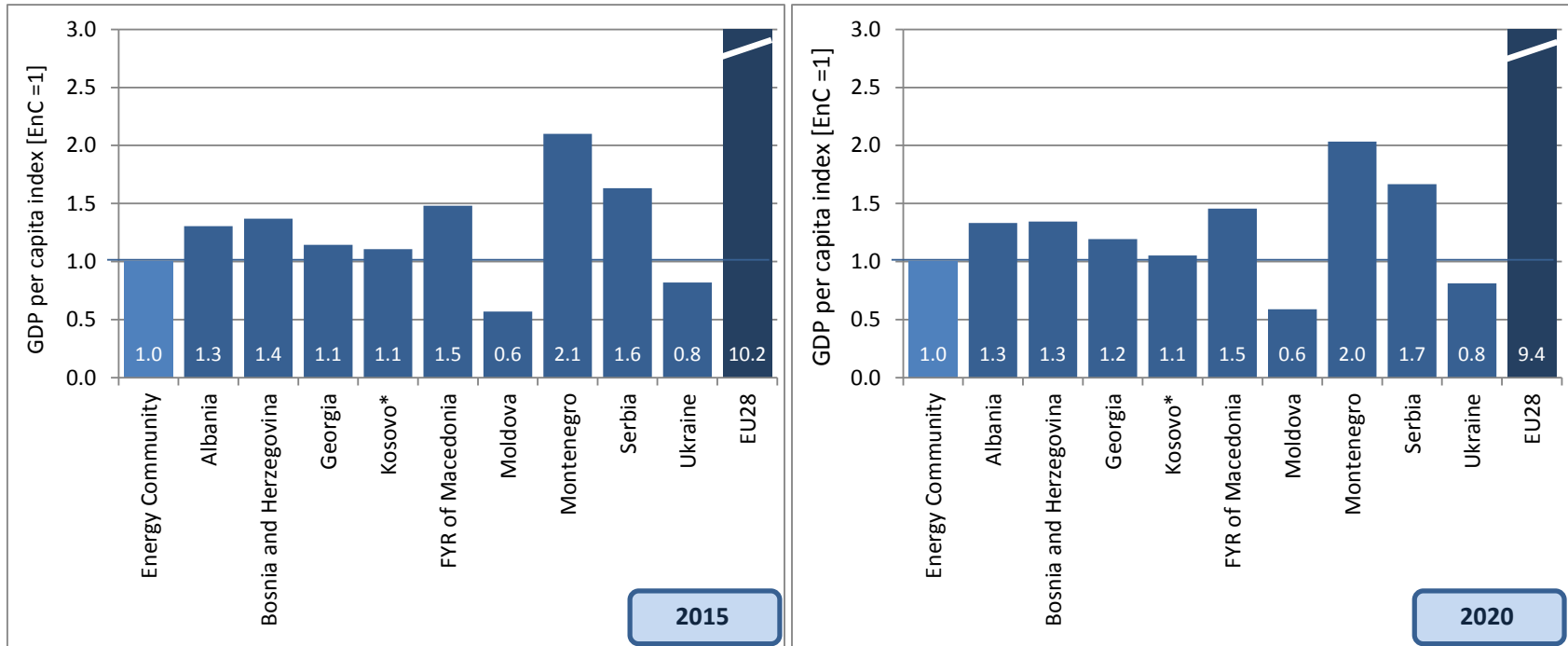


Figure: GDP per capita for the year 2015 (left) and 2020 (right).

- The GDP per capita for the years 2015 and projections for 2020 in relative terms compared to the Energy Community average (Energy Community = 1)

(Source: EUROSTAT, 2018; IMF, 2018)

A closer look at economic welfare: GDP per capita in the European Union and the Energy Community

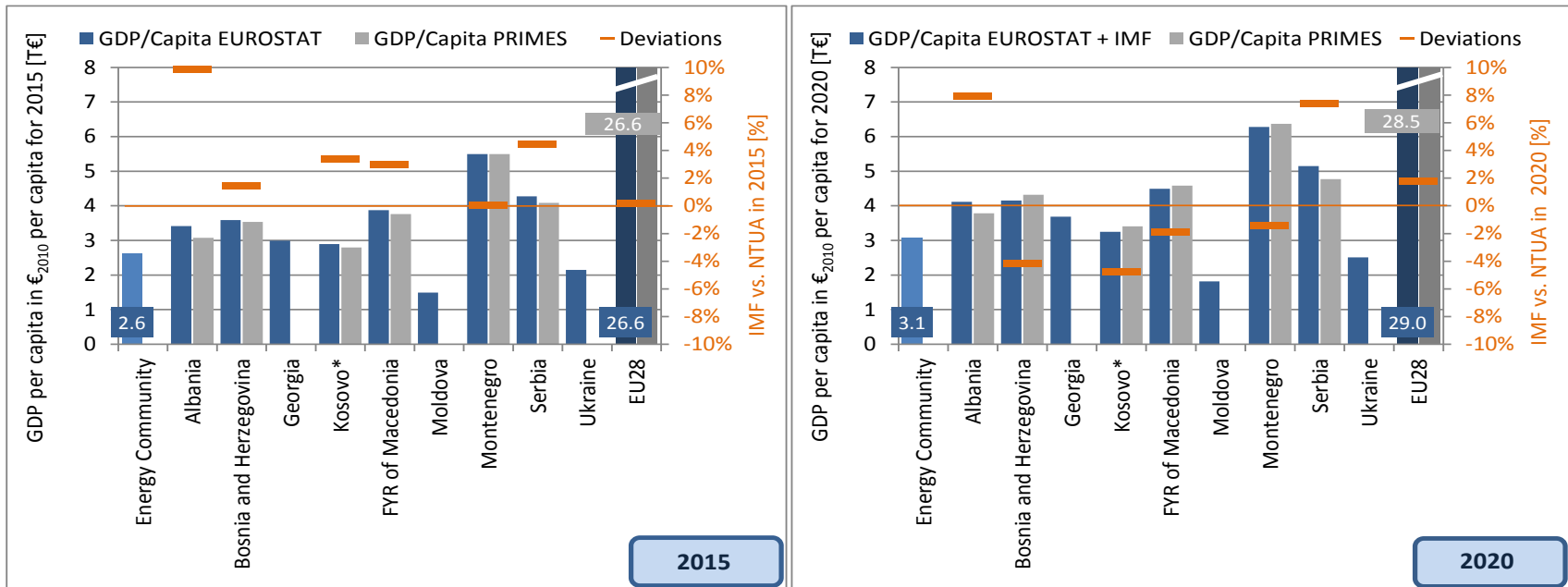


Figure: GDP per capita 2015 and 2020: a comparison of actual data (EUROSTAT) and data used in modelling (PRIMES) for 2015 (left) and implications on 2020 projections (right)

(Source: EUROSTAT, 2018a; IMF, 2018; NTUA, 2012)

- A closer look at economic welfare:
GDP growth rates in the European Union and the Energy
Community**

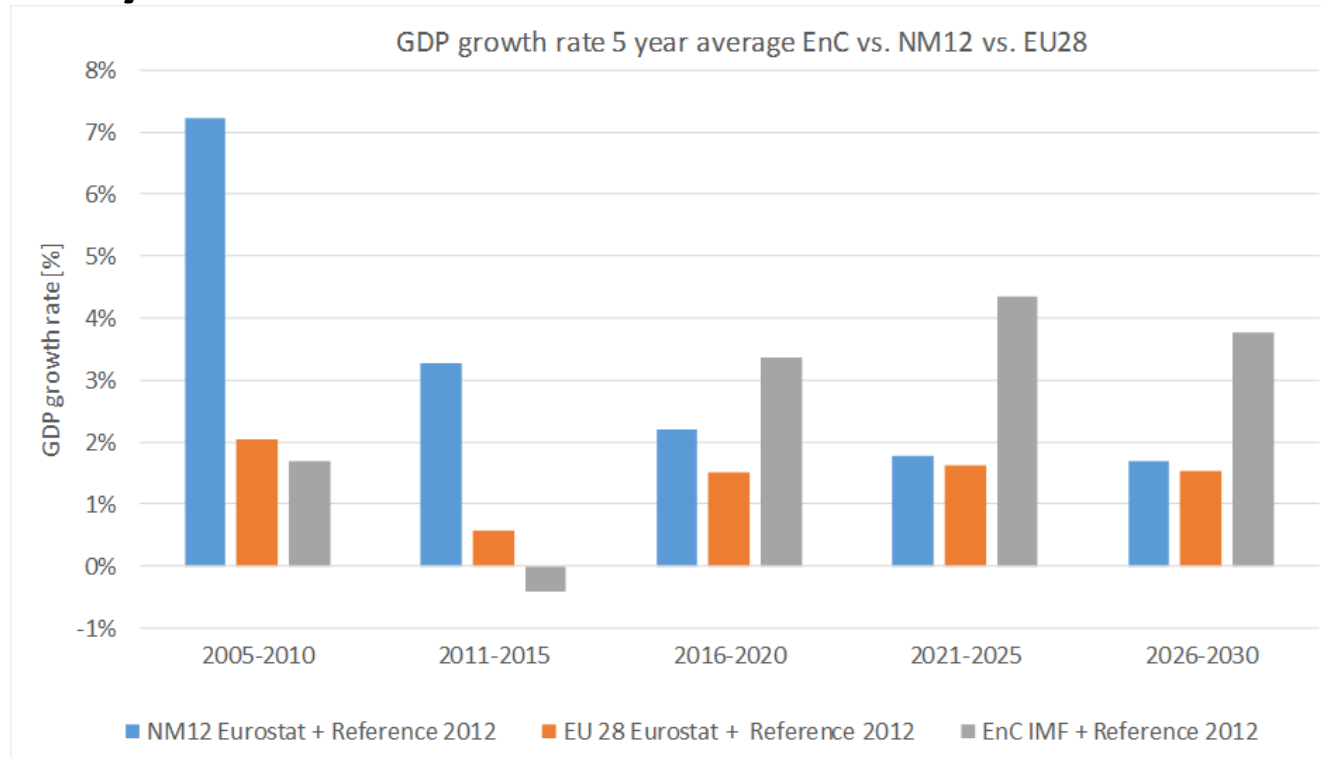


Figure: 5 year average GDP growth rates until 2030

(Source: EUROSTAT, 2018a; IMF, 2018; NTUA, 2012)

Part 1:

Approach for **2030 EE target setting**
within the Energy Community

Approach for 2030 EE target setting within the Energy Community

EU level

In November 2016, the EC proposed an update to the Energy Efficiency Directive, including a new EU energy efficiency target for 2030, and measures to update the Directive to assure target achievement in the 2030 timeframe. A binding energy efficiency target at EU level of 32.5% is proposed for 2030. However, there are no binding targets established so far at the level of individual Member States.

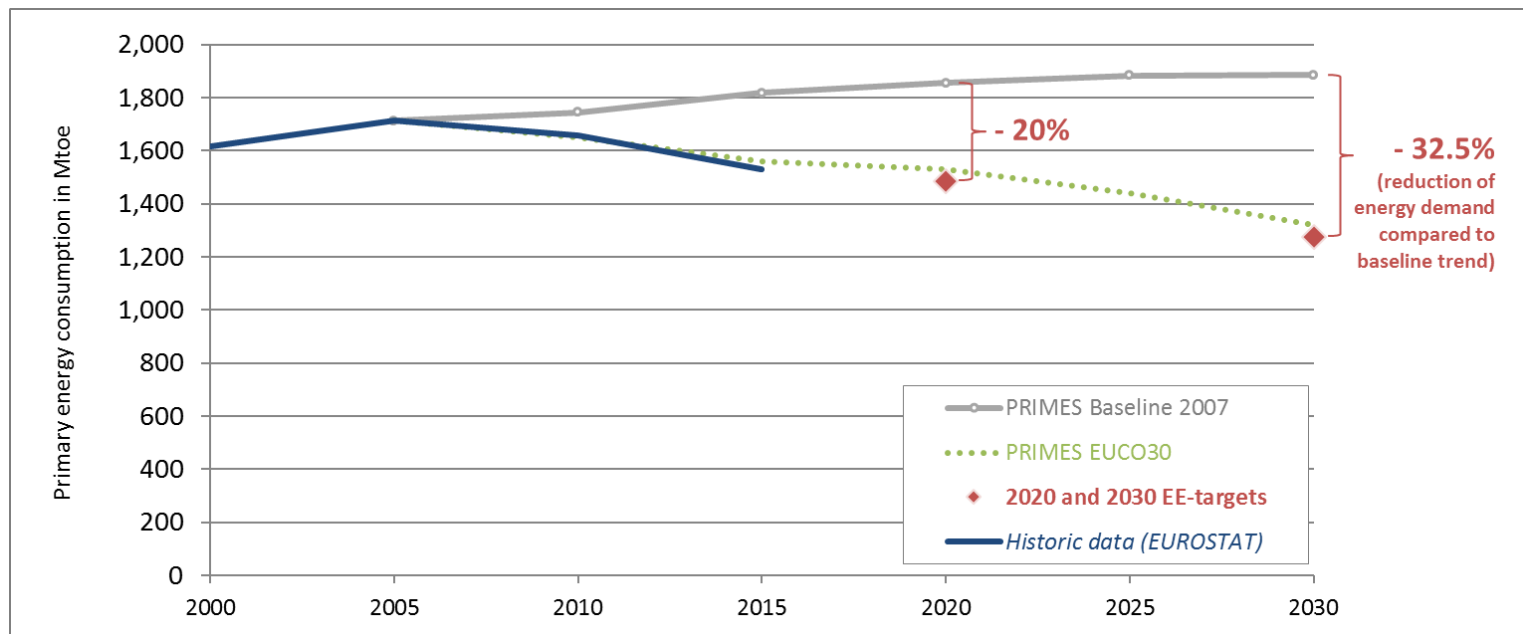


Figure: EE Targets EU targets for energy efficiency in 2020 and in 2030.

(Source: E3MLab and IIASA, 2007; EUROSTAT, 2017b; EC, 2006; EU, 2008; EC, 2016c)

Approach for **2030 EE target setting** within the Energy Community

EnC level

We propose to establish an energy efficiency target at EnC level in-line with the EU target for 2030:

- For **2030** an agreement has been taken on the overall ambition level – i.e. a 32.5% reduction of energy demand compared to (2007) baseline conditions shall be achieved by 2030 at EU level.
- This corresponds to a net increase of the EE effort by **12.5 percentage points** at EU level.
- Consequently, if the **same ambition** would be followed at EnC level, **an increase at EnC level from 20% by 2020 (i.e. the expected EE target at EnC level) to also 32.5% by 2030.**
- This would imply that **all CPs have to commit themselves to various measures.** These measures were already formulated in the Energy Efficiency Directive 2012/27/EU as well as in the 4th edition of the Energy Communities Legal Framework (EnC, 2017) for the energy efficiency target for the year 2020, and for 2030 proposed updates are foreseen as published by the European Commission in the proposed recast of the EE Directive as part of the EC's winter package.
- We further **propose benchmarks for an increase of energy efficiency for all CPs**, which is in-line with the EnC target for 2030. This means that each CP is subject to the same benchmark, *regardless of its economic welfare* – i.e. for example, **a 12.5% net increase in EE target from 2020 to 2030** also requires each CP to increase its EE benchmark by 12.5 percentage points.

Approach for 2030 EE target setting within the Energy Community

EnC level

→ The challenge is to find a **suitable baseline scenario** and an **EE target level** which can be achieved with **“comparable effort”** as at EU level. Furthermore, the efforts among the individual CPs should also be roughly comparable.

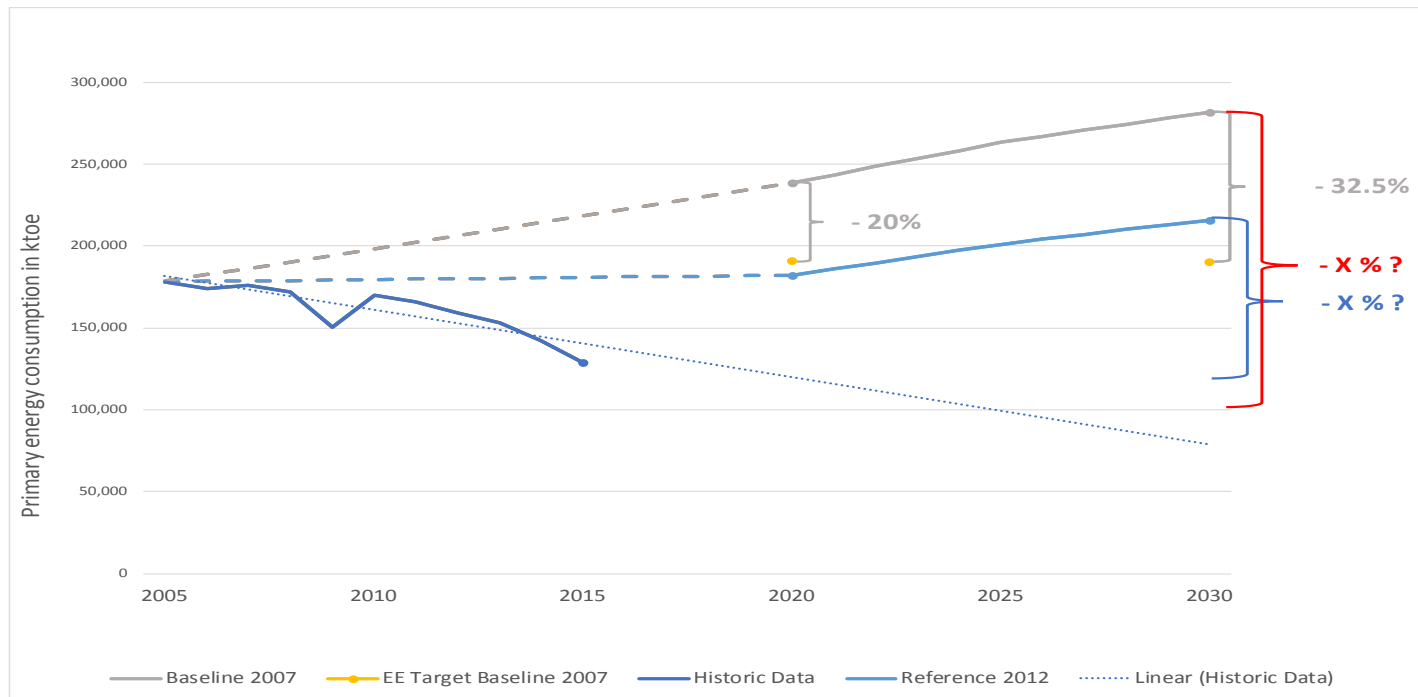


Figure: Comparison of different EnC primary energy consumption scenarios between 2020 and 2030, historic development and possible EE targets in 2030.

(Source: Energy Strategy, 2012; EUROSTAT, 2018; IEA, 2018; IMF, 2018; NEEAP, 2017; NEEAP, 2018; NTUA, 2012; own calculations)

Evolution of Baseline Scenarios

EnC level

- **Reference 2012:** Primes Reference 2012 was used for WB6, national baseline scenarios were taken from NEEAP'S and national energy strategies (Georgia, Moldova, Ukraine).
- **Baseline (Baseline 2007):** Primes Baseline 2007 and the targets for 2020 were extended to include Georgia and the growth rates of Primes Reference 2012 as well as national calculated growth rate scenarios up to 2030 were used.
- **Baseline intermediate (Baseline II):** Primes Baseline 2007 and the 2020 targets were extended to Georgia and the same methodology as used to calculate the 2020 targets was applied to 2030.
- **Baseline advanced (Baseline III):** Based on the Baseline II methodology, the 2020 targets of Albania were revised downwards and the Old BAU Scenario of the NEEAP was used for Ukraine.

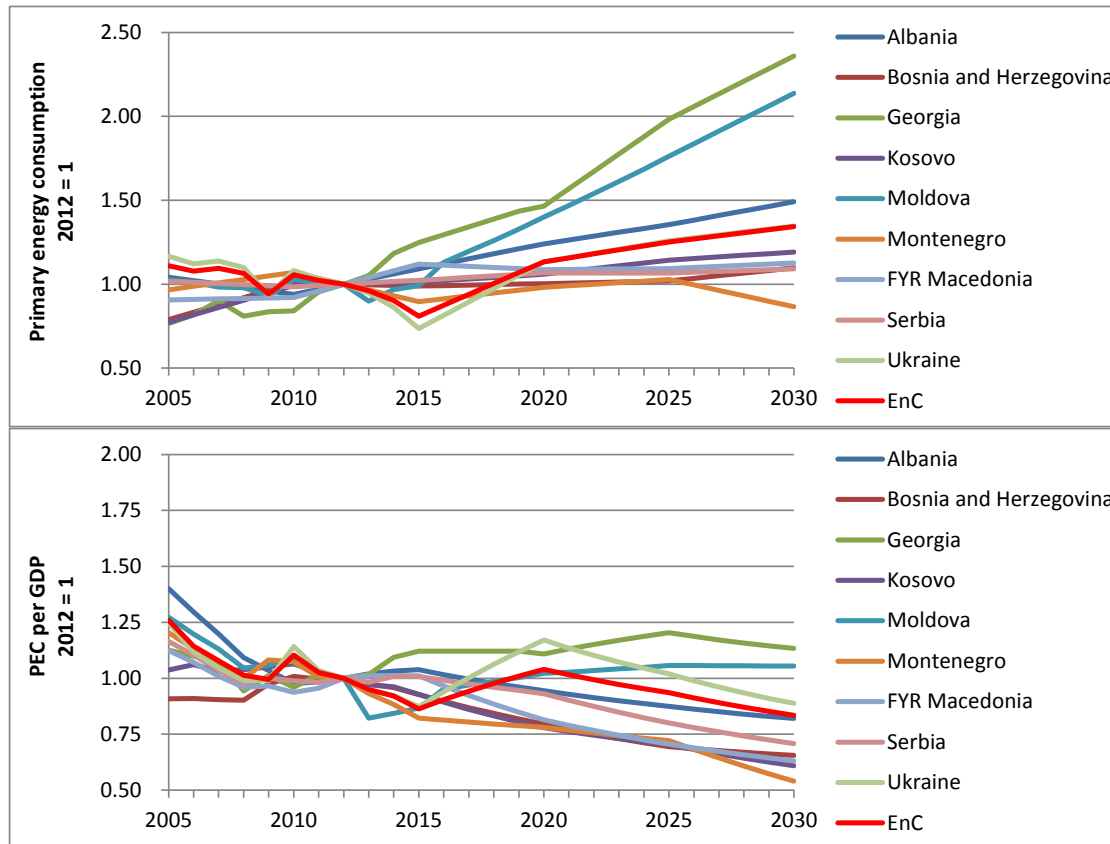
A closer look at the target setting approaches

Study on 2030 overall targets

Evolution of Baseline Scenarios

EnC level

Reference 2012 Scenario



→ Problem: Not aligned to EU approach (i.e. inconsistency through the use of a reference trend)

Figure: Primary energy consumption (PEC) (top) and PEC per GDP (bottom)

- according to the historical development extrapolated by the modelled PRIMES Reference Scenario for the WB6

- according to BAU scenarios included in the NEEAPs of Georgia, Moldova and Ukraine.

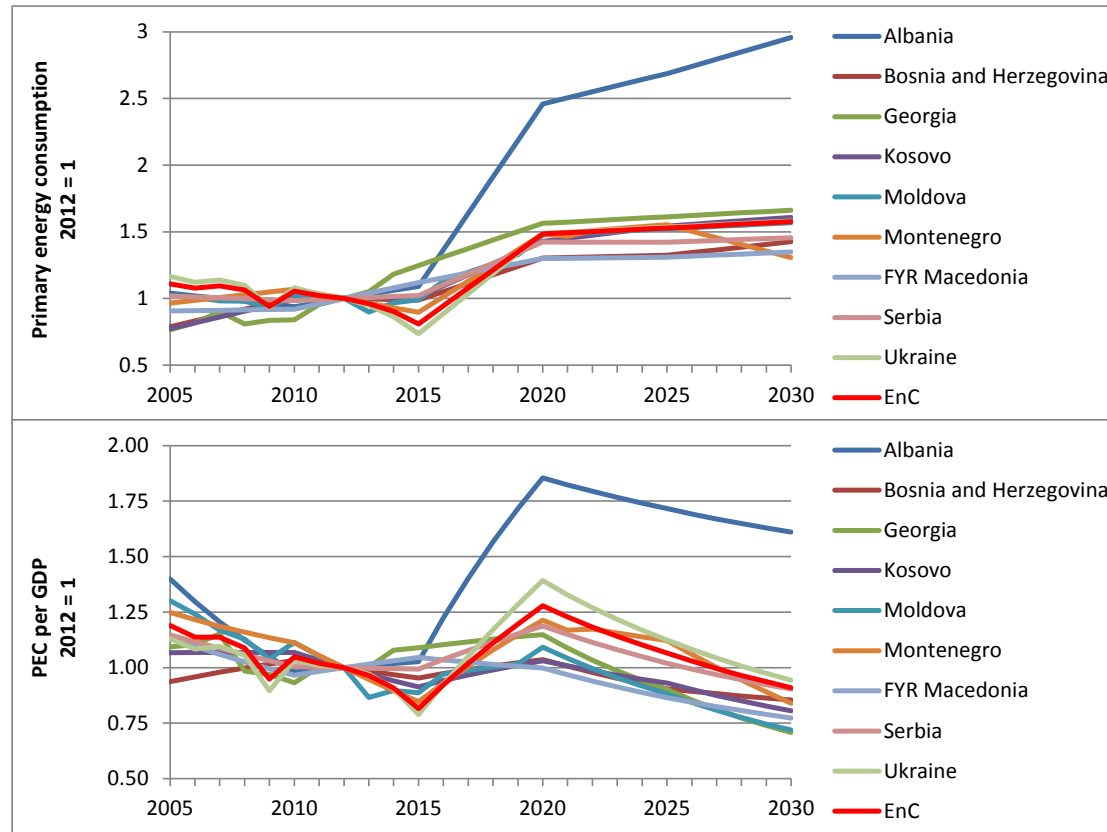
All data is normalized to the year 2012.

(Source: Eurostat, 2018; NTUA, 2012; NEEAPs)

Evolution of Baseline Scenarios

EnC level

■ Baseline (Baseline 2007)



→ Problem: "Strange" trends for some CPs

Figure: Primary energy consumption (PEC) (top) and PEC per GDP (bottom) according to - the historical development extrapolated by the modelled PRIMES Baseline Scenario (2012 to 2020) and PRIMES Reference Scenario (growth rates from 2020 to 2030) for the WB6 - according to BAU scenarios included in the NEEAPs of Georgia, Moldova and Ukraine. All data is normalized to the year 2012.

(Source: Eurostat, 2018; NTUA, 2007, 2012; NEEAPs)

A closer look at the target setting approaches

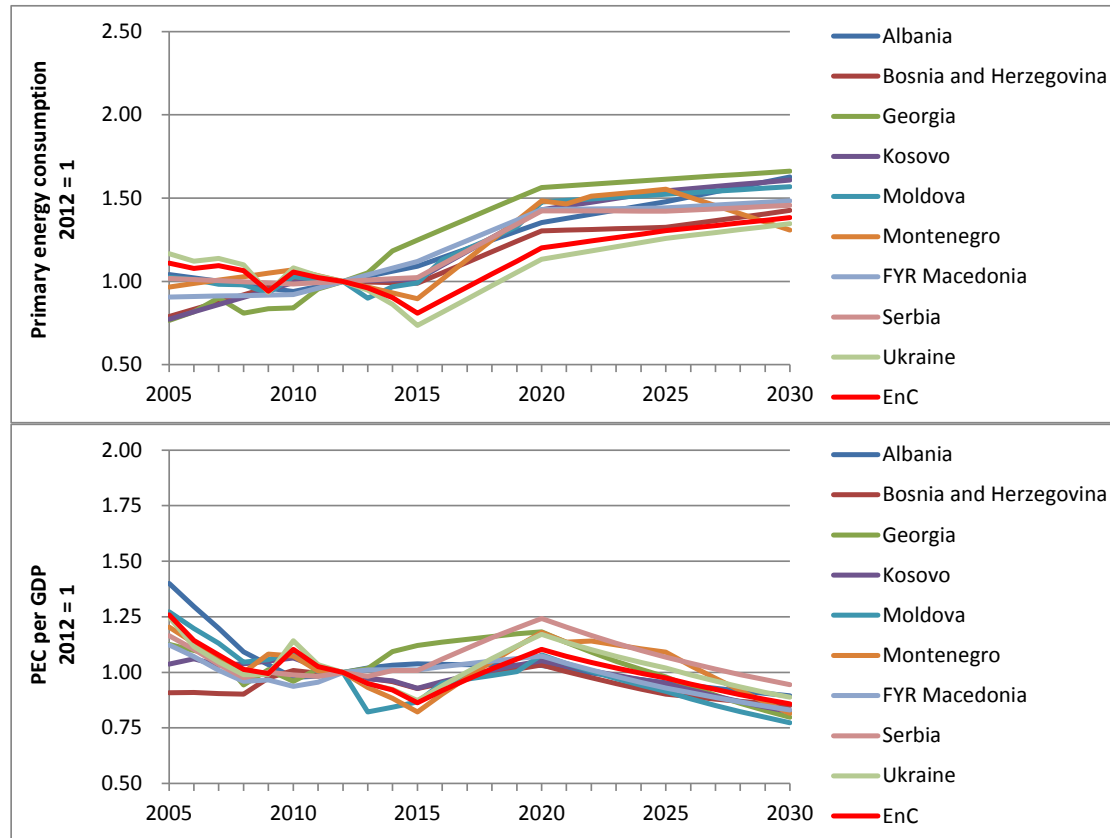
Study on 2030 overall targets

Evolution of Baseline Scenarios

EnC level

■ Baseline advanced (Baseline III)

(*with modifications)



→ Suitable baseline demand trends were derived, aligned across the EnC

Figure: Primary energy consumption (PEC) (top) and PEC per GDP (bottom) according to - the historical development extrapolated by the modelled PRIMES Baseline Scenario (2012 to 2020) and PRIMES Reference scenario (growth rates from 2020 to 2030) for the WB6* - complemented by energy scenarios for Georgia, Moldova and Ukraine using the same approach as for the 2020 target calculation and modified for Albania and Ukraine. All data is normalized to the year 2012. (Source: Eurostat, 2018; NTUA, 2007, 2012; NEEAPs)

A closer look at the target setting approaches

Study on 2030 overall targets

Comparison of Baseline Scenarios and corresponding EE Targets at EnC Level

EnC level

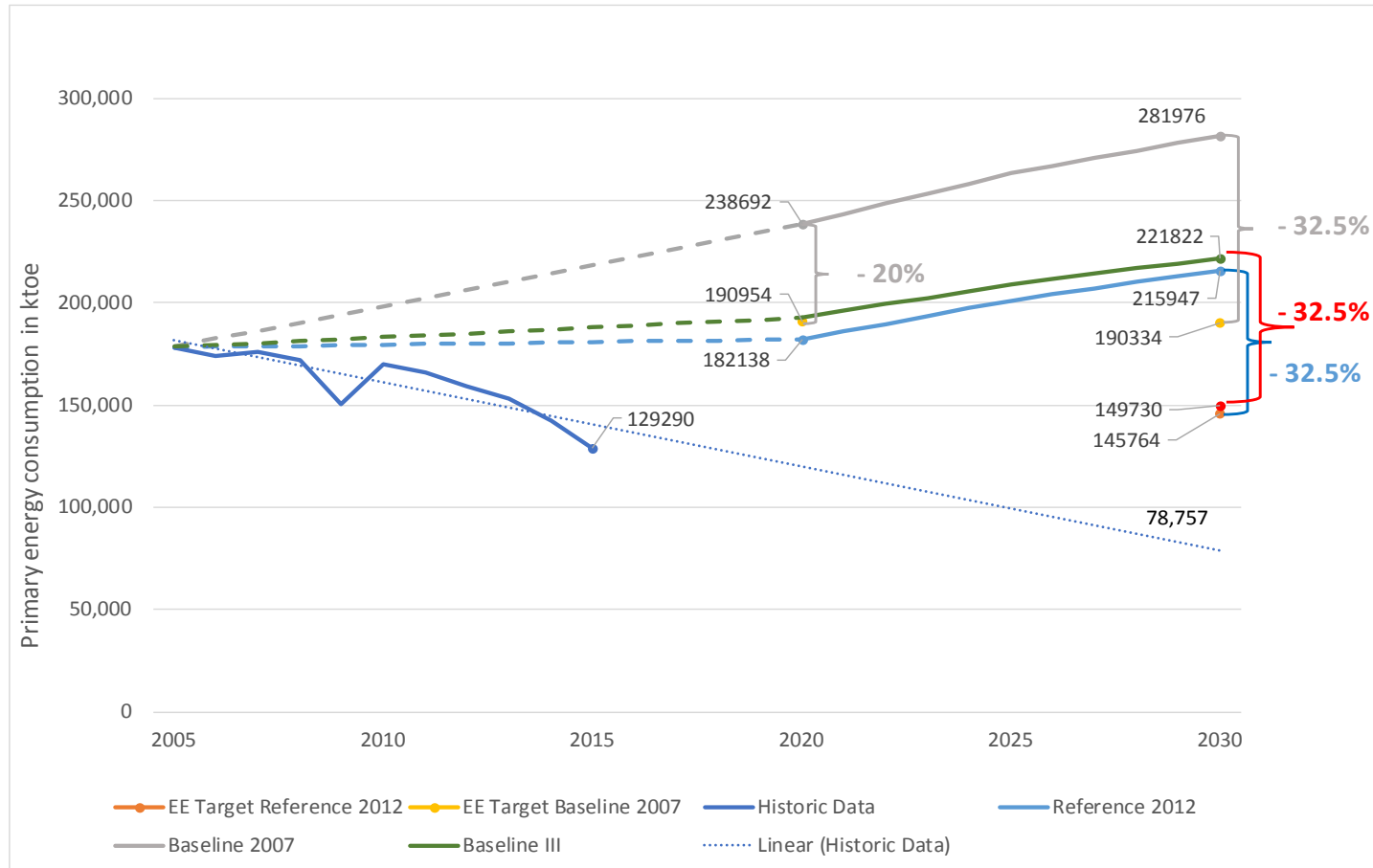


Figure: Comparison of different EnC baseline scenarios, historic development and EE targets for 2030 (primary energy consumption)

Baseline advanced scenario and corresponding EE Target at EnC level

EnC level

- Historical data was used to correct existing energy scenarios until 2015. From 2015 to 2030 growth rates from existing scenarios were used.
- The **Baseline advanced** Scenario (Baseline III) and the corresponding 2030 EE targets serve as basis for the impact assessment on RE and GHG.

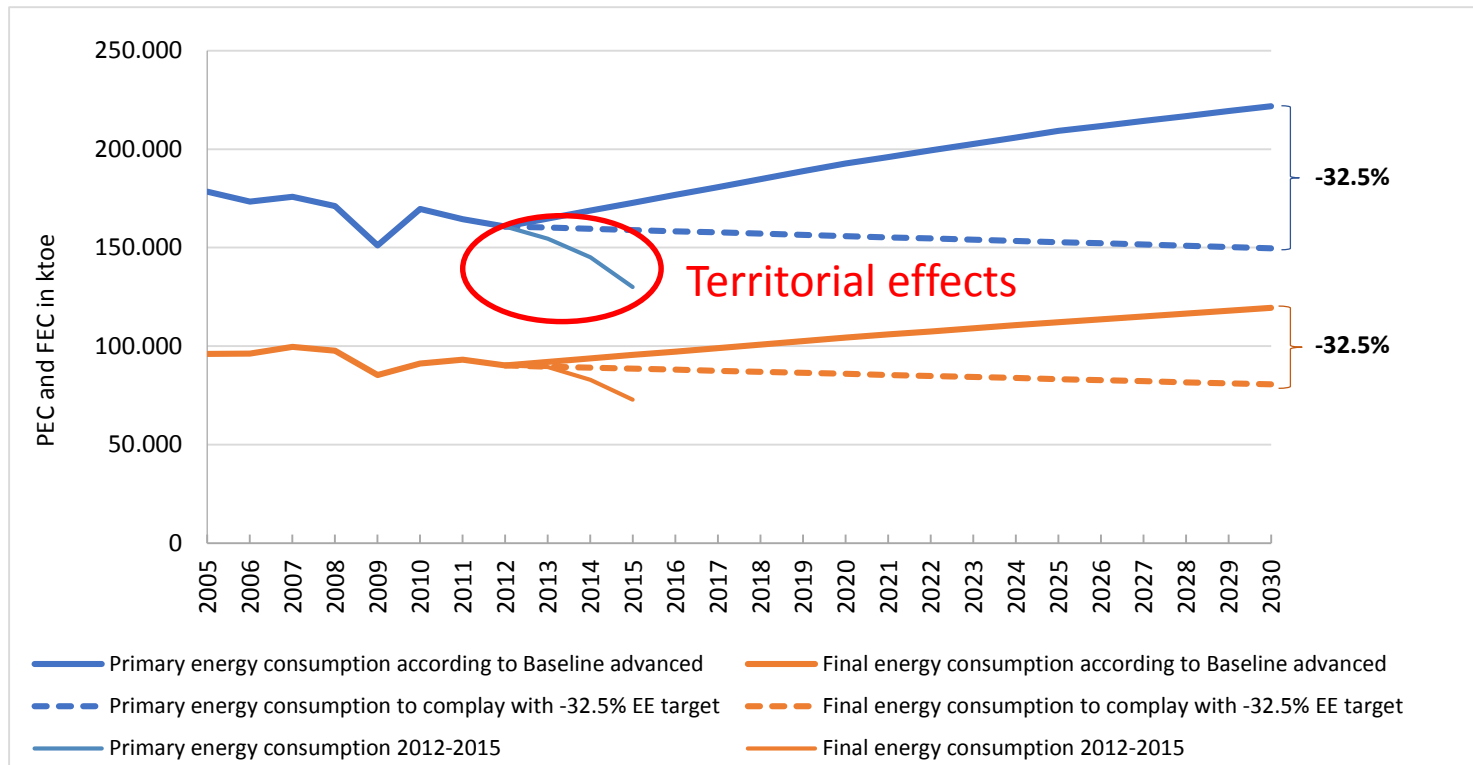


Figure: Indicators of Baseline advanced scenarios as a basis for the impact assessment (Source: Energy Strategy, 2012; EUROSTAT, 2018; IEA, 2018; IMF, 2018; NEEAP, 2017; NEEAP, 2018; NTUA, 2012; own calculations)

Baseline advanced scenario and corresponding EE Targets at CP Level

EnC level

- The **Baseline advanced** approach and scenario is the most homogeneous one among all demand scenarios under consideration.
- Compared to other scenarios, there are considerably fewer outliers upwards, but also fewer outliers downwards with respect to the PEC/GDP and FEC/GDP indicators across CPs.

Energy demand scenarios used for this impact assessment	PEC Historical 2015	PEC Baseline advanced 2030	PEC -32.5% Energy Efficiency Target	FEC Historical 2015	FEC Baseline advanced 2030	FEC -32.5% Energy Efficiency Target
Contracting Party	[ktoe]	[ktoe]	[ktoe]	[ktoe]	[ktoe]	[ktoe]
Albania	2,190	3,444	2,325	2,030	3,070	2,072
Bosnia and Herzegovina	8,030	9,126	6,160	4,370	5,578	3,765
Georgia	4,630	6,167	4,162	4,100	5,070	3,422
Kosovo*	2,520	4,066	2,745	1,380	2,335	1,576
FYR of Macedonia	2,680	4,239	2,862	1,920	2,957	1,996
Moldova	3,380	5,355	3,615	2,330	3,692	2,492
Montenegro	1,010	1,471	993	690	1,318	890
Serbia	14,760	23,025	15,542	8,490	13,652	9,215
Ukraine	90,090	164,929	111,327	50,830	81,713	55,156
Energy Community	129,290	221,822	149,730	76,140	119,385	80,585

Energy Efficiency:

The selection of a **suitable baseline scenario appears crucial** for an EE target defined in relative terms – i.e. as percentage reduction in comparison to that baseline trend.

Sound statistics on energy supply and use, and a consistent modelling framework for the whole EnC are other crucial elements in this context. But such data or methods are partly lacking for some of the CPs.

By **applying the same methodology as for the target calculation of the 2020 energy efficiency targets** and **by making corrections**, especially for Albania, where the 2020 target was already set significantly too high, and for Ukraine, where the Old BAU scenario from the NEEAP was finally used, a reasonable baseline scenario was derived with **Baseline advanced** (Baseline III).

If a 32.5% reduction is applied to this Baseline **all CPs would face comparatively similar efforts** to meet their 2030 energy efficiency targets.

Thanks for your attention!

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Part 2:

Approach for **2030 RE target setting**
within the Energy Community

Approach for **2030 RE target setting** within the Energy Community

EU level

- On 30 November 2016 the European Commission published a package of proposals for legislative measures for the time horizon from 2020 to 2030 called “Clean Energy for all Europeans” commonly referred to as the winter package. It aims at further promoting the clean energy transition while developing the internal market for electricity and thus fostering the Energy Union.
- An ambitious political agreement on increasing renewable energy use in the EU has been taken recently: In a Statement of the European Commission (STATEMENT/18/4155) it was declared that the new regulatory framework includes a **binding renewable energy target for the EU for 2030 of 32%** with an upwards revision clause by 2023.
- At this point (6 September 2018), **no agreement has been taken on the exact approach to be used for an effort sharing**, nor on the binding character of MS pledges.
→ The lack of binding national targets was however also addressed by the European Parliament. Amendments adopted by the European Parliament on 17 January 2018 on the proposal for a recast of the RED include a newly designed formula (see Amendment 111 - Proposal for a Directive ... Article 3 – paragraph 2).

Approach for **2030 RE target setting** within the Energy Community

EnC level

- In brief, we propose to increase the RE share at CP level according the **formula set out in Annex Ia** of the Amendments adopted by the European Parliament on 17 January 2018 on the proposal for a directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources, treating the CPs of the EnC similar to EU MSs.
- Thus, this approach follows **an integrated concept that takes into account:**
 - ❑ **the differences in economic development,**
 - ❑ **the potential for cost-effective RE deployment, and**
 - ❑ **the interconnection level in the European Network of Transmission System Operators for Electricity (ENTSO-E) across the EU and the EnC.**
- This approach strictly follows the formula set out in Annex Ia (P8_TA-PROV(2018)0009), and **distributes the efforts across all CPs** (and EU Member States) **while maintaining the RE ambition level as presumed at EU level** (i.e. to aim for (at least) **32% RE** as share in gross final energy demand)

Approach for 2030 RE target setting within the Energy Community

EnC level

The details of the calculation...

Amendment 270, Proposal for a directive Annex Ia (new) - Text proposed by the Commission

1. A Member State's targets for 2030 shall be the sum of the following components, each expressed in percentage points:

(a) the **Member State's national binding target for 2020** as set out in Annex I of the Directive COM(2016) 767 final/2 and Decision D/2012/04/MC-EnC, Article 4 for the Energy Community.

(b) a **flat rate contribution** (" C_{Flat} ");

(c) a **GDP-per-capita based contribution** (" C_{GDP} ");

(d) a **potential-based contribution** (" $C_{Potential}$ ");

(e) a **contribution reflecting the interconnection level** of the Member State (" $C_{Interco}$ ").

2. C_{Flat} shall be the same for each Member State. All Member States' C_{Flat} shall together **contribute 30 %** of the difference between the Union's targets for 2030 and 2020.

3. C_{GDP} shall be allocated between Member States based on a GDP per capita index to the Union average, where for each Member State individually the index is **capped at 150 % of the Union average**. All Member States' C_{GDP} shall together **contribute 30 %** of the difference between the Union targets for 2030 and 2020.

4. $C_{Potential}$ shall be allocated between Member States based on the difference between a Member State's RES share in 2030 as shown in PRIMES EUCO.... scenario and its national binding target for 2020. All Member States' $C_{Potential}$ shall together **contribute 30 %** of the difference between the Union targets for 2030 and 2020. (→ [Least cost allocation](#))

5. $C_{Interco}$ shall be allocated between Member States based on an electricity interconnection share index to EU average, where for each Member State individually the interconnection share index is **capped at 150% of the EU average**. All Member States' $C_{Interco}$ shall together **contribute 10%** of the difference between the EU targets for 2030 and 2020.

A closer look at the target setting approaches

Study on 2030 overall targets

Approach for 2030 RE target setting within the Energy Community

EnC level

RE share in gross final energy consumption	RE share as of EUROSTAT Shares tool		2020 Targets according to the RD2020 approach	2030 Targets according the 4 componets approach	Needed increas in percentage points (2020 vs 2030)
	2014	2015	2020	2030	2020 vs. 2030
<i>Contracting Party</i>	[%]	[%]	[%]	[%]	[pp]
Albania	32.0%	34.9%	38.0%	49.6%	11.6%
Bosnia and Herzegovina	41.1%	41.5%	40.0%	48.1%	8.1%
Georgia	32.3% ¹	33.0% ¹	35.0%	46.1%	11.1%
Kosovo*	19.5%	18.5%	25.0%	33.7%	8.7%
Moldova	12.4%	15.8%	17.0%	24.4%	7.4%
Montenegro	37.2%	37.7%	33.0%	48.0%	15.0%
FYR of Macedonia	19.6%	19.9%	28.0%	38.0%	10.0%
Serbia	22.7%	21.8%	27.0%	35.6%	8.6%
Ukraine	3.3%	4.3%	11.0%	16.6%	5.6%
<i>Energy Community</i>	10.1%	12.0%	16.4%	23.1%	6.7%

Remark:

¹ The RE share for Georgia for the years 2014 and 2015 is an approximate value, as the available data is not as detailed as needed to calculate the exact RE share.

Table: RE Targets and historic shares
(Source: EUROSTAT, 2018; IEA, 2018; NTUA, 2012; own calculations)

A closer look at the target setting approaches

Study on 2030 overall targets

Approach for 2030 RE target setting within the Energy Community

EnC level

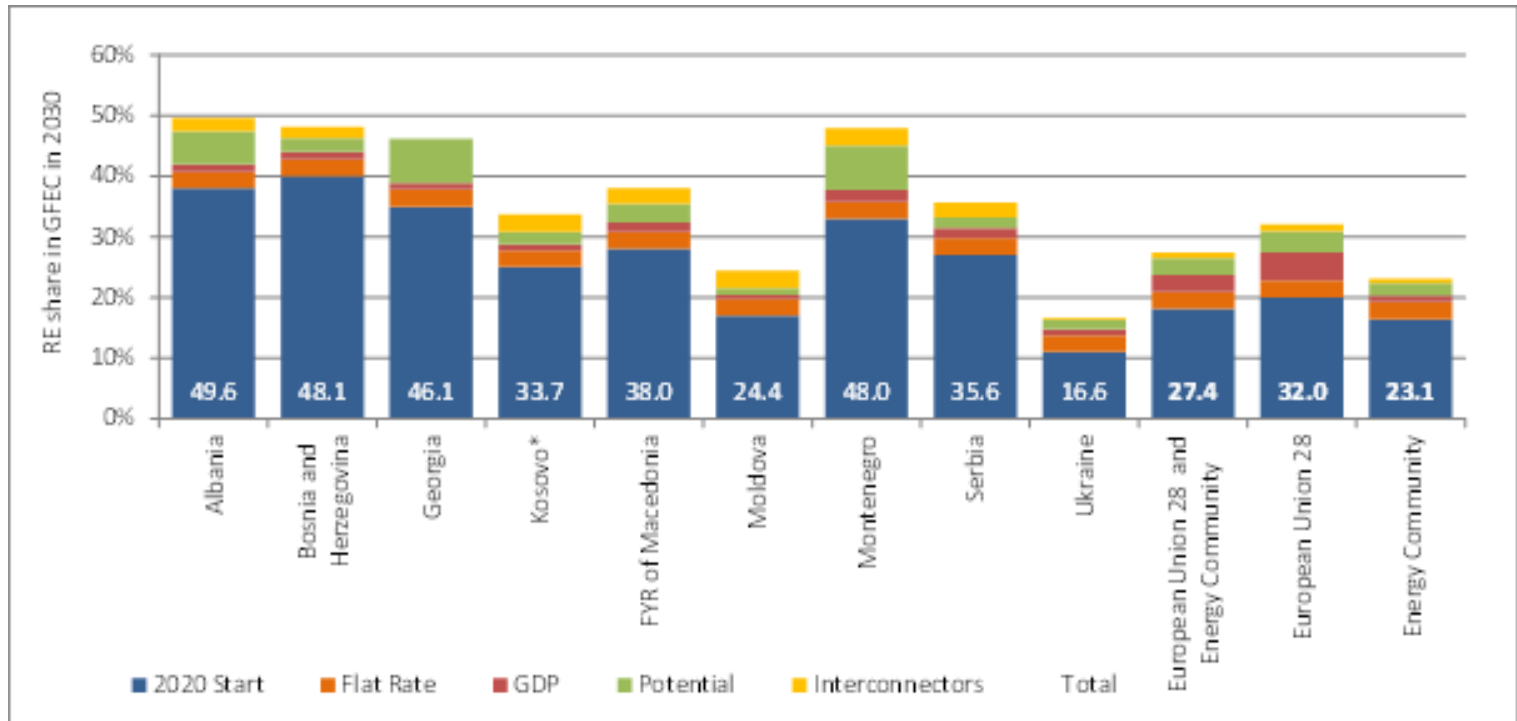


Figure: 2030 RE Targets for all CPs and the EnC region according to the proposed target setting approach (i.e. a “four component” approach).

(Source: EUROSTAT, 2018; IEA, 2018; IMF, 2018; NTUA, 2012; own calculations)

A closer look at the target setting approaches

Study on 2030 overall targets

Approach for 2030 RE target setting within the Energy Community

EnC level

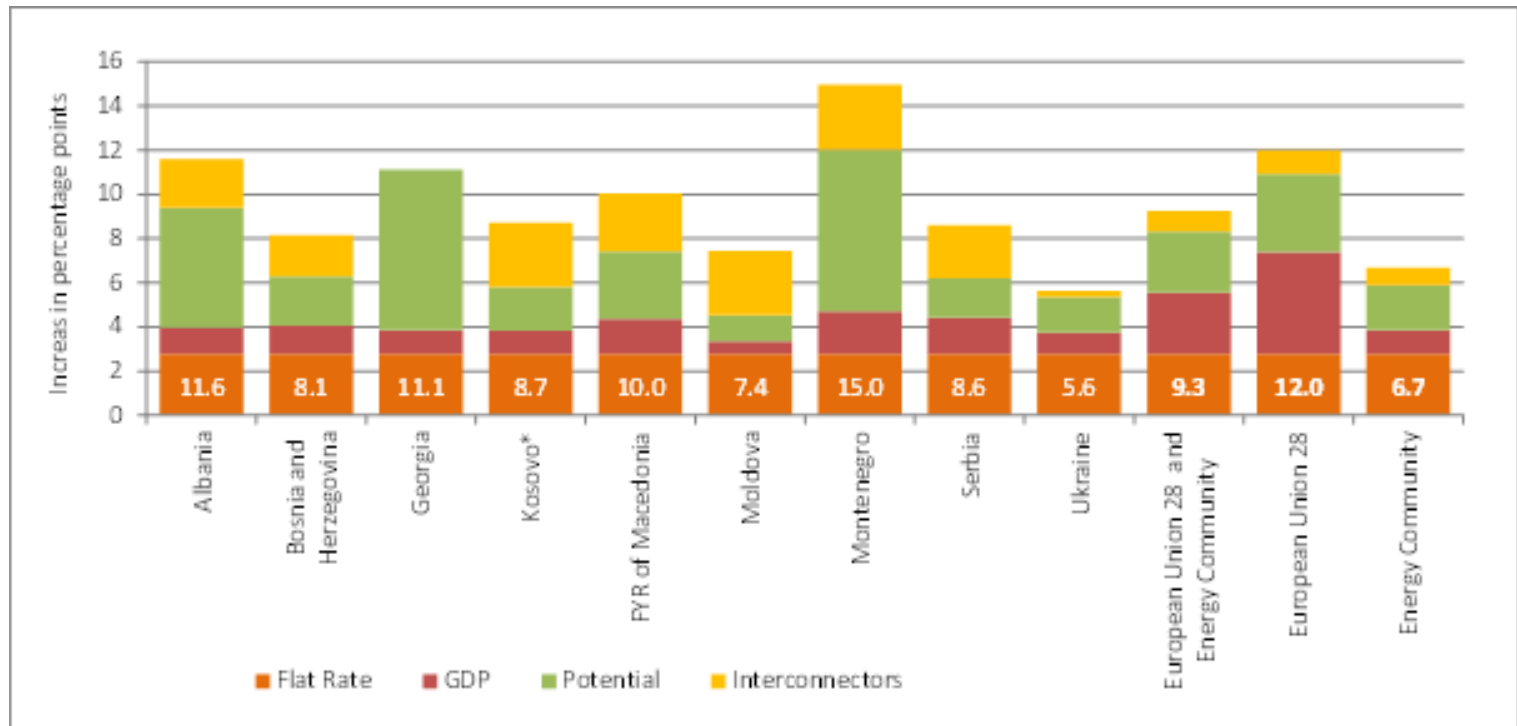


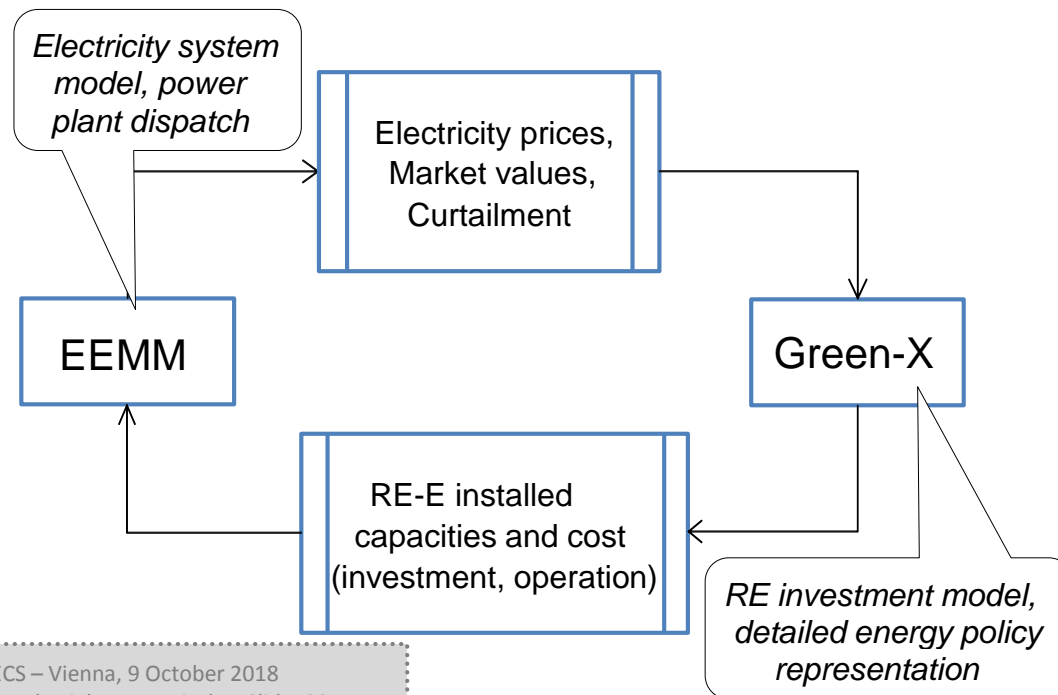
Figure: Resulting RE share net increase between 2020 and 2030 for all CPs and the EnC region according to the proposed target setting approach (i.e. a “four component” approach).

(Source: EUROSTAT, 2018; IEA, 2018; IMF, 2018; NTUA, 2012; own calculations)

2030 RE targets ... brief assessment of related impacts

This analysis builds on modelling works undertaken by the use of TU Wien's Green-X model. More precisely, the outcomes of a quantitative RE policy analysis of distinct scenarios on future RE deployment within the EnC are used to indicate impacts of achieving proposed 2030 RE targets, including:

- **Feasibility of RE target achievement**, indicating the necessary RE deployment and its sectorial decomposition;
- **Assessment of direct economic impacts**, estimating the necessary investments and the required support dedicated to renewable energies.



EnC level

For specific purposes, e.g. for assessing the interplay between RES and future electricity market design that involves an analysis of the merit order effect and related market values of the produced electricity for variable and dispatchable renewables, Green-X was complemented by its regional power-system companion – i.e. the EEMM model developed and applied by REKK.

A closer look at the target setting approaches

Study on 2030 overall targets

2030 RE targets ... brief assessment of related impacts

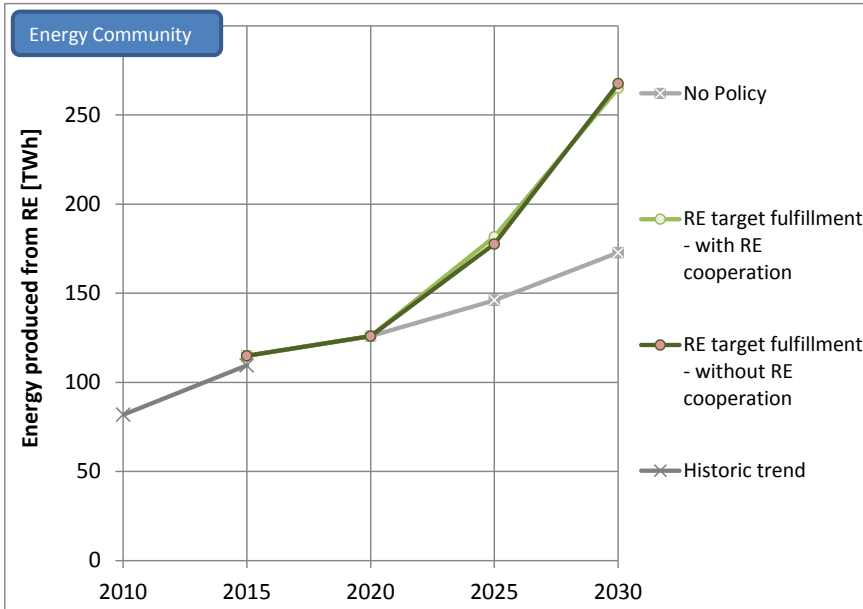
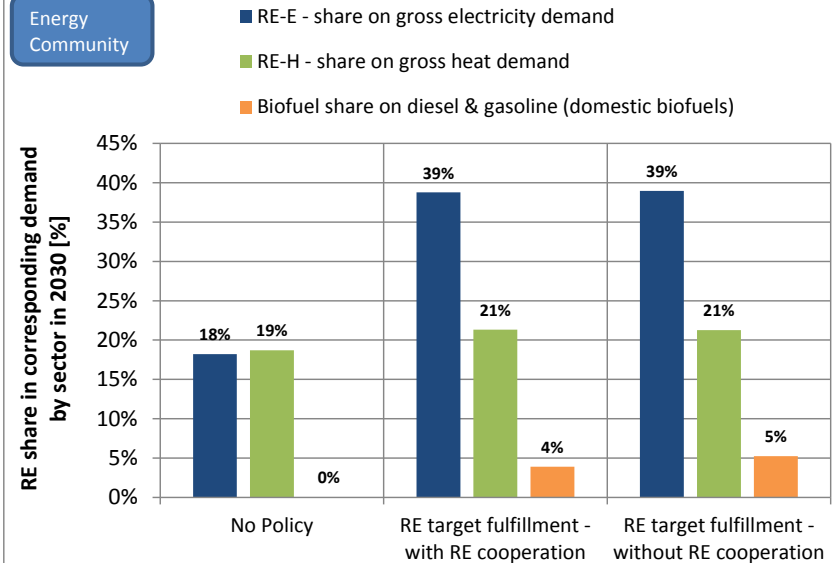


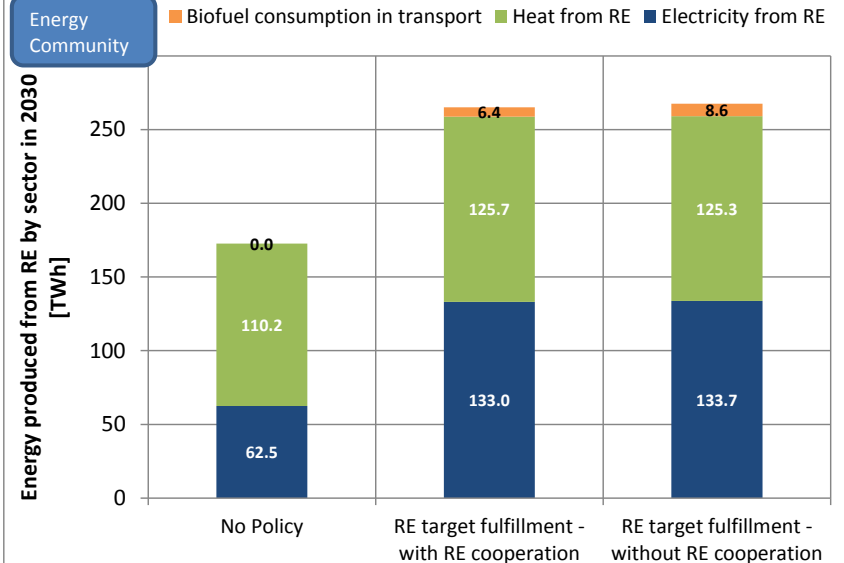
Figure: Past and expected future RE deployment in the Energy Community in absolute terms according to statistics and assessed RE scenarios

Figure: Sectorial breakdown of 2030 RE deployment in the Energy Community according to the assessed RE scenarios in relative and absolute terms according to statistics and assessed RE scenarios

Energy Community



Energy Community



Renewable Energies:

- A different approach compared to Energy Efficiency is proposed for establishing 2030 targets for **Renewable Energies**.
- In brief, we propose to increase the RE share at CP level according the formula originally proposed by the European Parliament for the recast of the RED, treating the CPs of the EnC similar to EU MSs.
- This **approach follows an integrated concept** that takes into account
 - the **differences in economic development**,
 - the **potential for cost-effective RE deployment** and
 - the **interconnection level in the European Network of Transmission System Operators for Electricity (ENTSO-E)** across the EU and the EnC.
- This approach strictly follows the given formula and distributes the efforts across all CPs (and EU Member States) while maintaining the RE ambition level as presumed at EU level (i.e. currently assumed to aim for (at least) **32% RE** as share in gross final energy demand).

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