Study on 2030 overall targets

(energy efficiency, renewable energies, GHG emissions reduction)

for the Energy Community

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Structure of this presentation

- Introduction - **General approach & key aspects**
- Approach for 2030 **Energy Efficiency** target setting
- Approach for 2030 **Renewable Energies** target setting
- **Assessing the impacts** – exemplified for Serbia
  - Energy efficiency
  - Renewable Energies
  - GHG emission reduction

Introduction

General approach & key aspects

Core objective

- The core objective of this project is to further develop the methodology and to conduct a quantitative assessment of pathways **for achieving calculated 2030 energy efficiency, RES and GHG emissions reduction targets** that can be expected under **aligned framework conditions** in the Energy Community Contracting Parties.
- For doing so, we **align** our methodologies to the approaches and aim for **achieving a comparable level of effort** as used for energy and climate target setting at EU Member State level.
- Furthermore, we **make use of specialised energy system models for assessing certain impacts related** to that.
- As key outcome besides reporting an **MS Excel Tool is in development** to inform on data used and on indicators and results derived at CP as well as at EnC level.

2020 and 2030 Target Setting at EU level

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	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

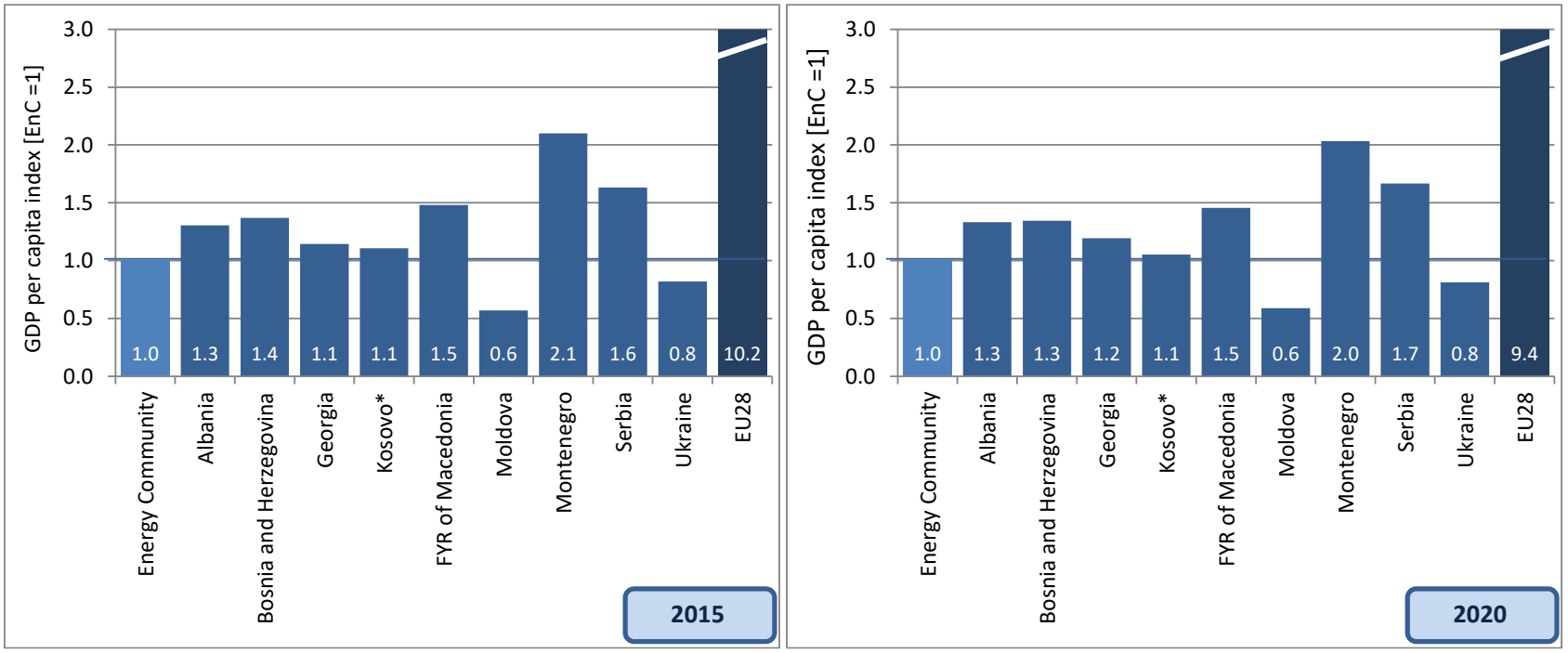


***Figure: GDP per capita for the year 2015** (left) **and 2020** (right).*

- *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)

Part 1:

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

A closer look at the target setting approaches

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.

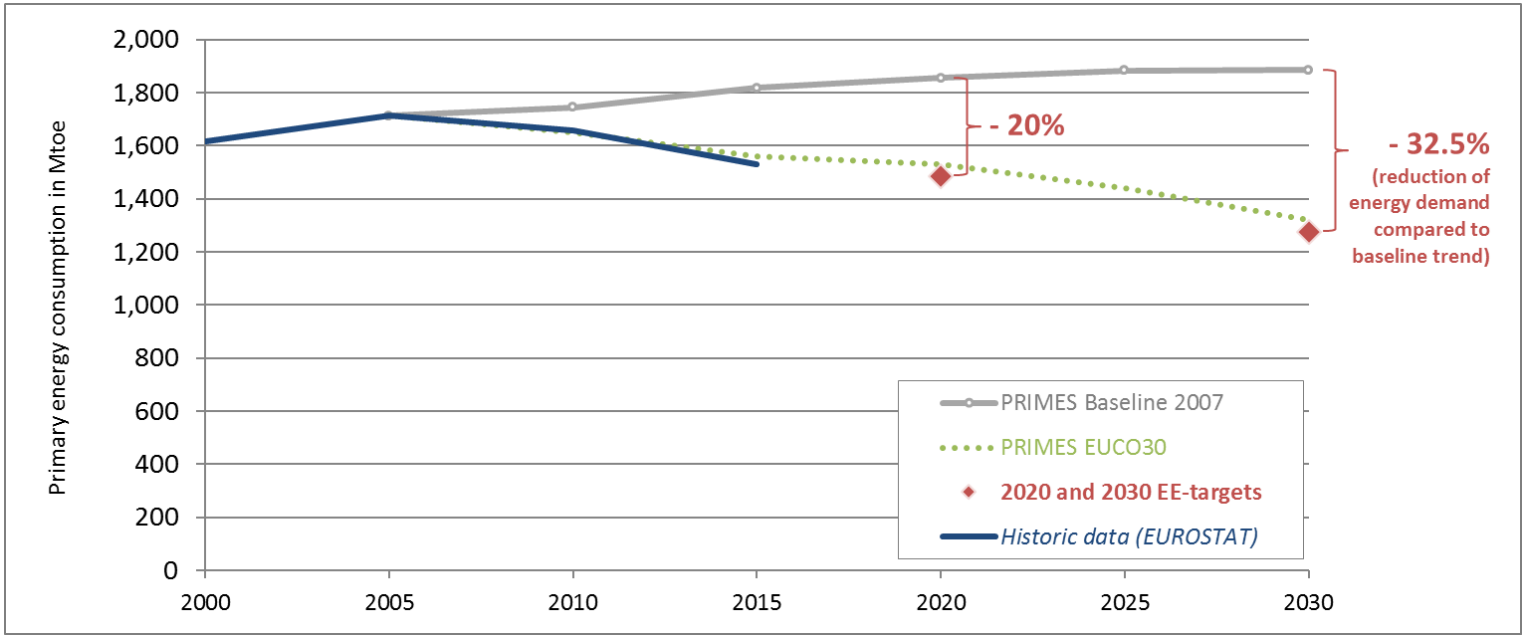


Figure: EE Targets EU targets for energy efficiency in 2020 and in 2030.

(Source: E3MLAb and IIASA, 2007; EUROSTAT, 2017b; EC, 2006; EU, 2008; EC, 2016c)

A closer look at the target setting approaches

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

EnC level

It is important to consider both **economic performance and energy consumption** at the same time. The combined indicator appears then also useful for defining energy efficiency targets of comparable effort among different countries.

Another aspect concerns the **dynamic trend**: If the development of these indicators is related to a specific year, in this analysis 2005, via normalization (to the starting point) it is also possible to compare and analyse the historical and future development between MS and CPs that have a different starting point.

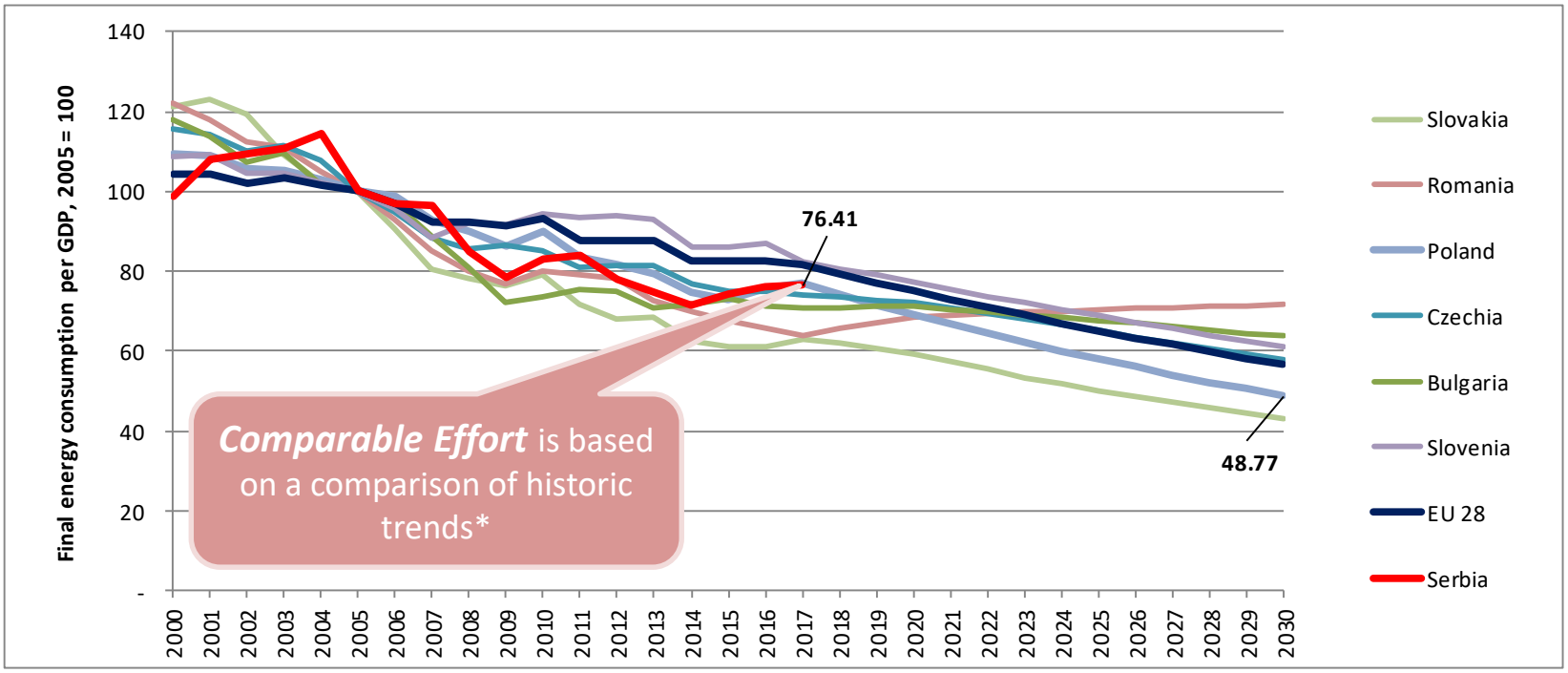
On the basis of previous analyses, in Resch et al (2018), as well as on the basis of national calculations done by the individual CP (in this case the Serbian authorities), we introduce and compare **three different approaches to setting an EE target** for Serbia.

- Harmonized Reduction (Baseline III – 32.5%)
- Comparable Effort (Historic Trend)
- National Perspective

A closer look at the target setting approaches

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

EnC level



Development of FEC/GDP in Serbia compared to the EU 28 and selected MS (2005=100) – **Comparable Effort Scenario**

Source: Eurostat, 2019; IMF, 2018; NTUA, 2007, 2012.

A closer look at the target setting approaches

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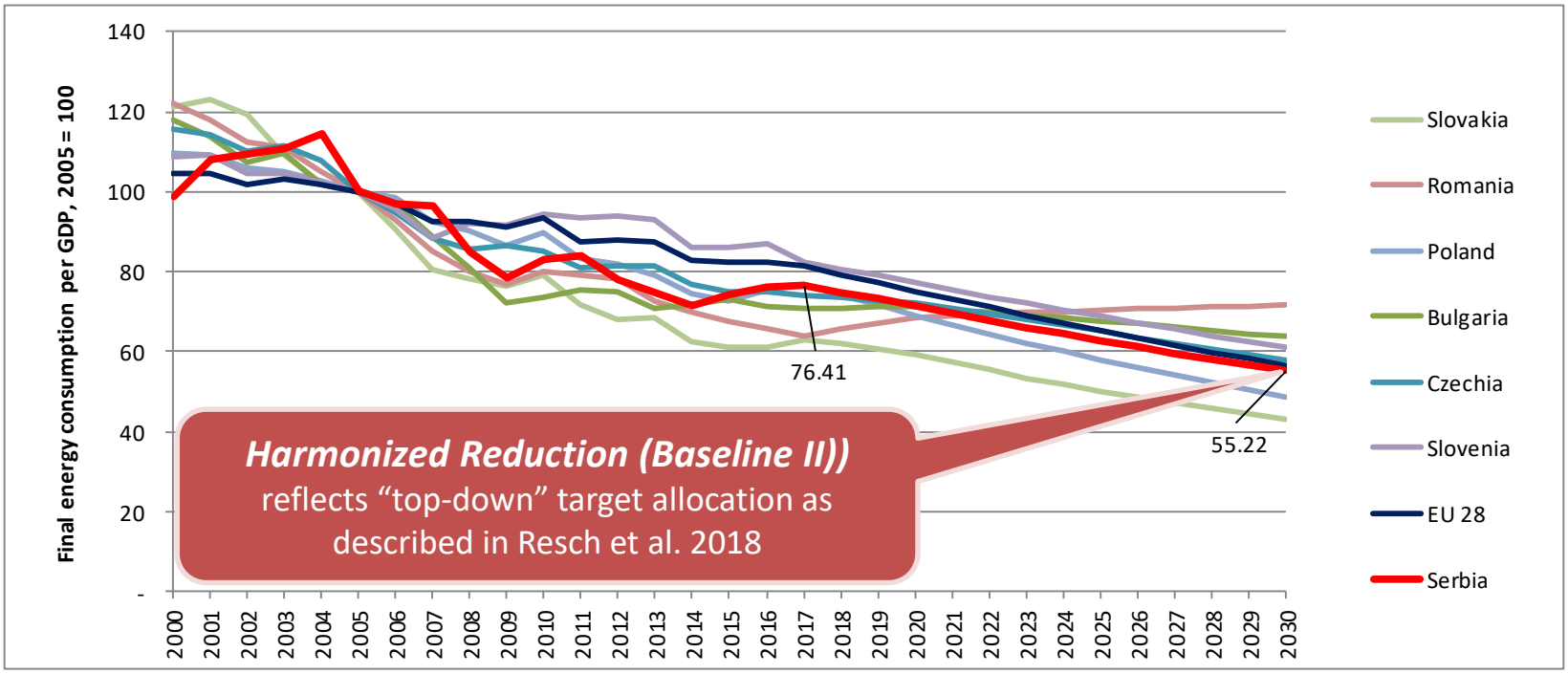
Approach for **2030 EE target setting** within the Energy Community

EnC level



Development of FEC/GDP in Serbia compared to the EU 28 and selected MS (2005=100) – **Harmonized Reduction Scenario**

Source: Eurostat, 2019; IMF, 2018; NTUA, 2007, 2012.

A closer look at the target setting approaches

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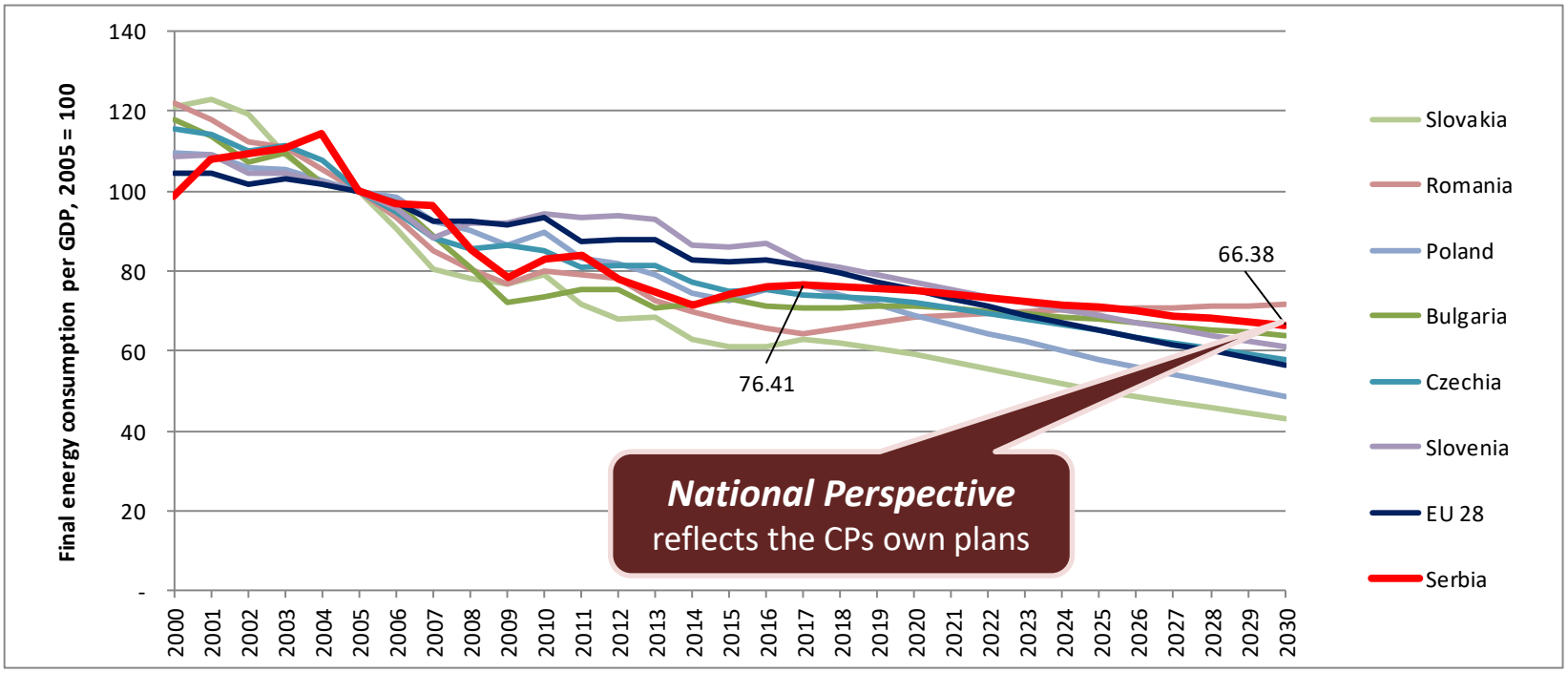
Approach for **2030 EE target setting** within the Energy Community

EnC level



Development of FEC/GDP in Serbia compared to the EU 28 and selected MS (2005=100) – **National Perspective Scenario**

Source: Eurostat, 2019; IMF, 2018; NTUA, 2007, 2012.

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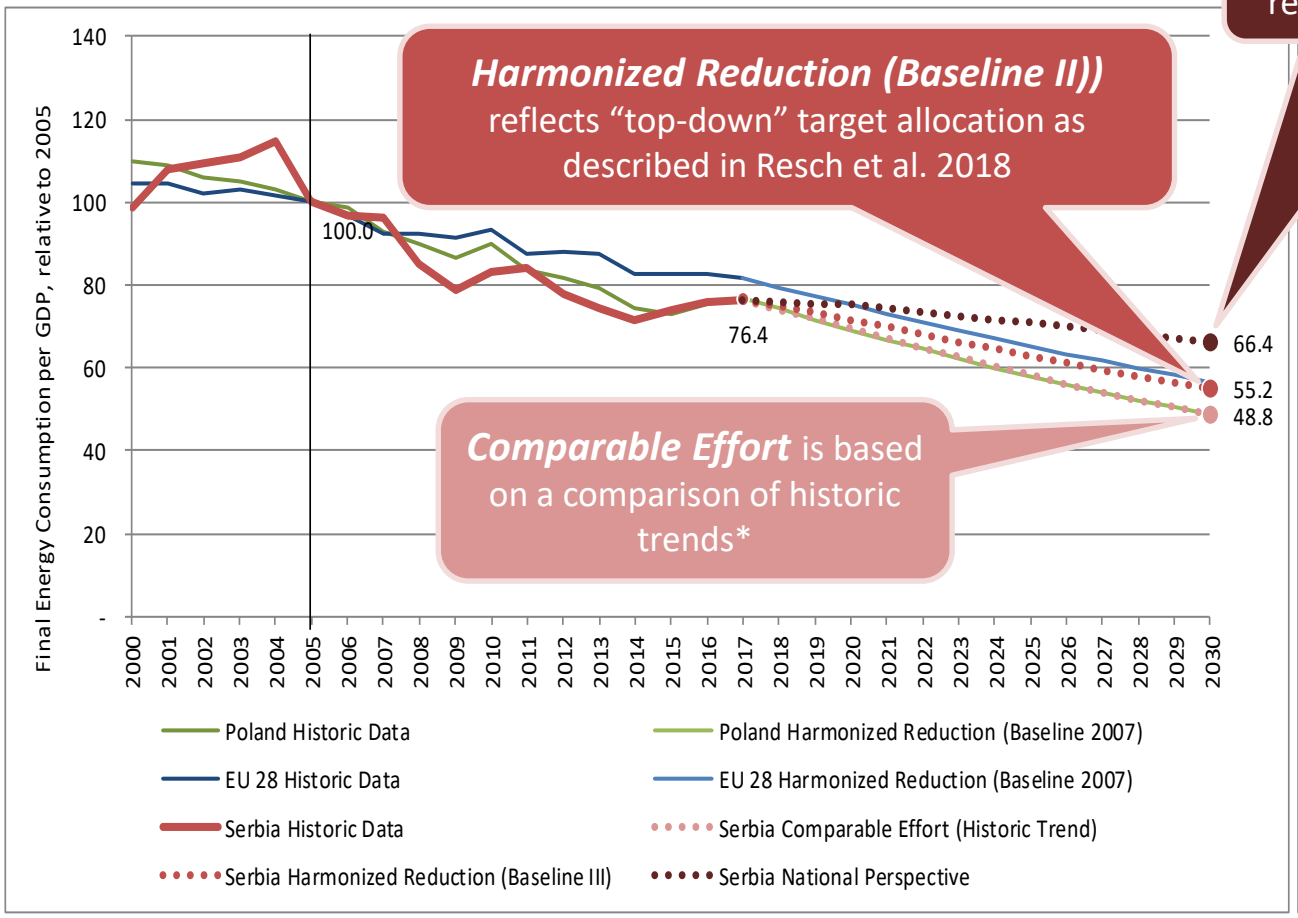
Energy efficiency: Assessing the impacts – exemplified for **Serbia**

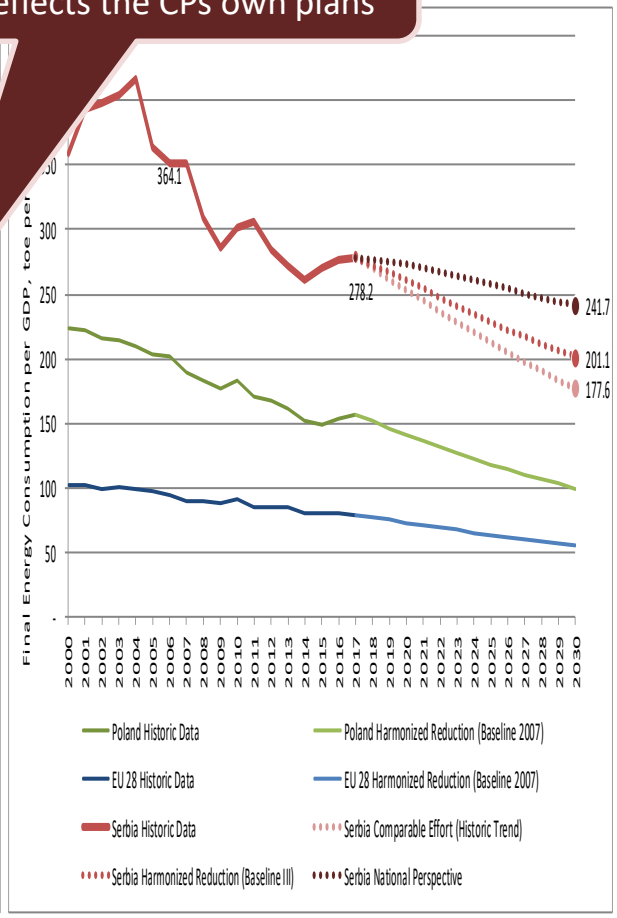
Serbia

National Perspective reflects the CPs own plans

Harmonized Reduction (Baseline II)) reflects "top-down" target allocation as described in Resch et al. 2018

Comparable Effort is based on a comparison of historic trends*





*I.e. the fit in historic development of FEC per GDP between 2005 and 2017

A closer look at the target setting approaches

Baseline advanced scenario and corresponding EE Targets at CP Level

EnC level

EE targets for Serbia in terms of final energy consumption	Unit	Historic data	Comparable Effort (Historic Trend)	Harmonized Reduction (Baseline III)	National Perspective
EE target for 2030 in terms of final energy consumption	**ktoe**		**8,139**	**9,215**	**11,078**
EE target relative to final energy consumption in 2005	**ktoe/%**	9,503	**-14.4%**	**-3.0%**	**16.6%**
EE target relative to **final energy consumption in 2017**	**ktoe/%**	8,831	**-7.8%**	**4.4%**	**25.4%**
EE target relative to **final energy consumption in 2030** by Baseline III scenario	**ktoe/%**	13,652	**-40.4%**	**-32.5%**	**-18.9%**

Comparison of energy efficiency scenarios for final energy with various benchmark values

Source: Eurostat, 2019; IMF, 2018; NTUA, 2007, 2012.

A closer look at the target setting approaches

Baseline advanced scenario and corresponding EE Targets at CP Level

EnC level

EE targets for Serbia in terms of primary energy consumption	Unit	Historic data	Comparable Effort (Historic Trend)	Harmonized Reduction (Baseline III)	National Perspective
EE target for 2030 in terms of **primary energy consumption**	**ktoe**		**13,727**	**15,542**	**17,629**
EE target relative to **primary energy consumption in 2005**	**ktoe/%**	15,660	**-12.3%**	**-0.8%**	**12.6%**
EE target relative to **primary energy consumption in 2017**	**ktoe/%**	14,893	**-7.8%**	**4.4%**	**18.4%**
EE target relative to **primary energy consumption in 2030** by Baseline III scenario	**ktoe/%**	23,025	**-40.4%**	**-32.5%**	**-23.4%**

Comparison of energy efficiency scenarios for primary energy with various benchmark values

Source: Eurostat, 2019; IMF, 2018; NTUA, 2007, 2012.

Next Steps to put possible EE targets into perspective

EnC level

- To develop an dynamic energy intensity of GDP vs GDP per capita indicator to check calculated targets for an adequate ambition level with EU 28 MS
- To develop an dynamic energy consumption per capita vs GDP per capita to check calculated targets for an adequate ambition level with EU 28 MS
- This will be based on the most recent available economic and energy related data
- The historic perspective and 2030 EE targets will be compared
- Providing an analysis on a CP basis that will allow to qualify the target in an “equivalent effort” perspective

Part 2:

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

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

EnC level

- 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.
- 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, 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}");

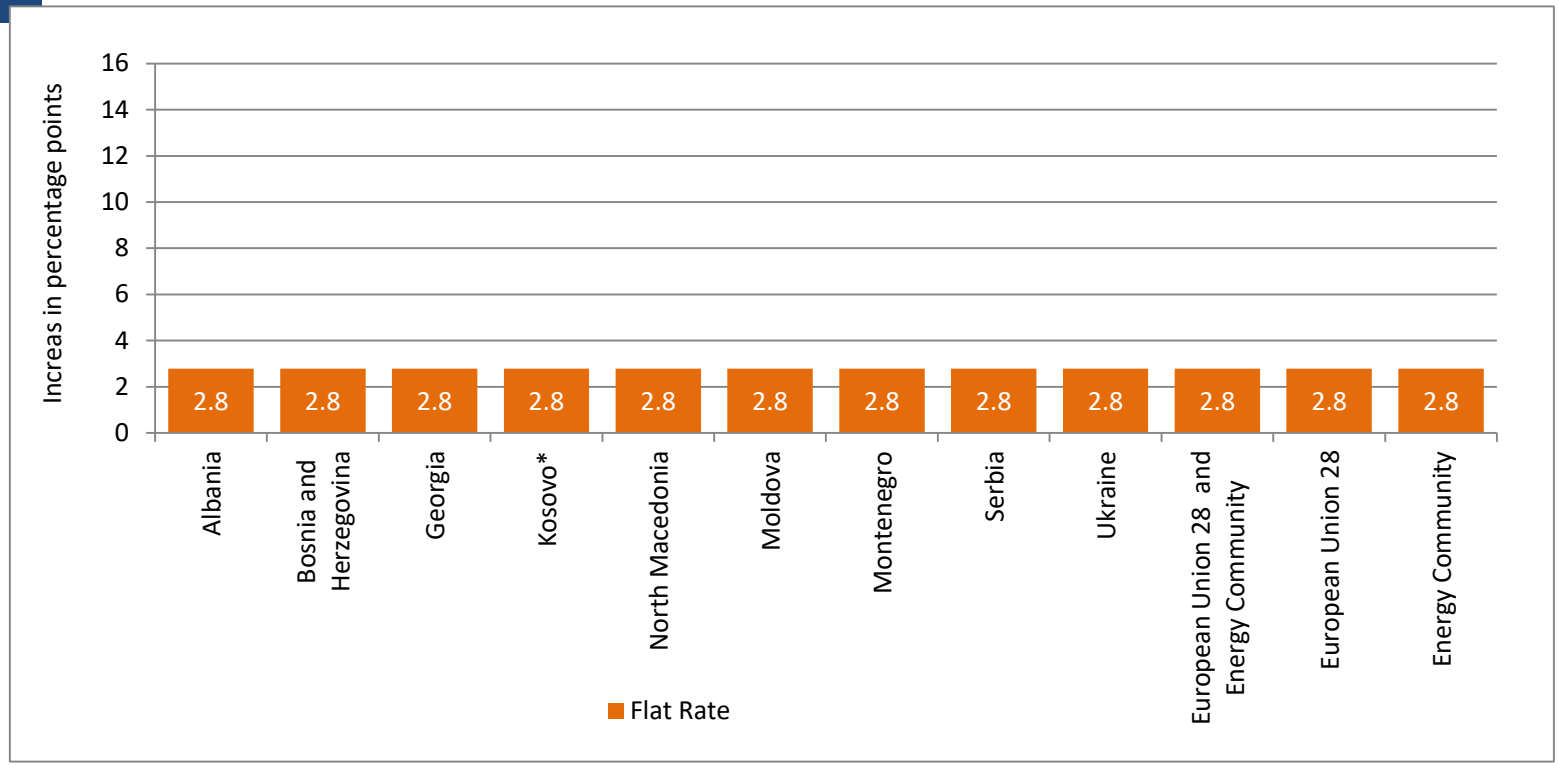
(c) a **GDP-per-capita based contribution** ("C_{GDP}");

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

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

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

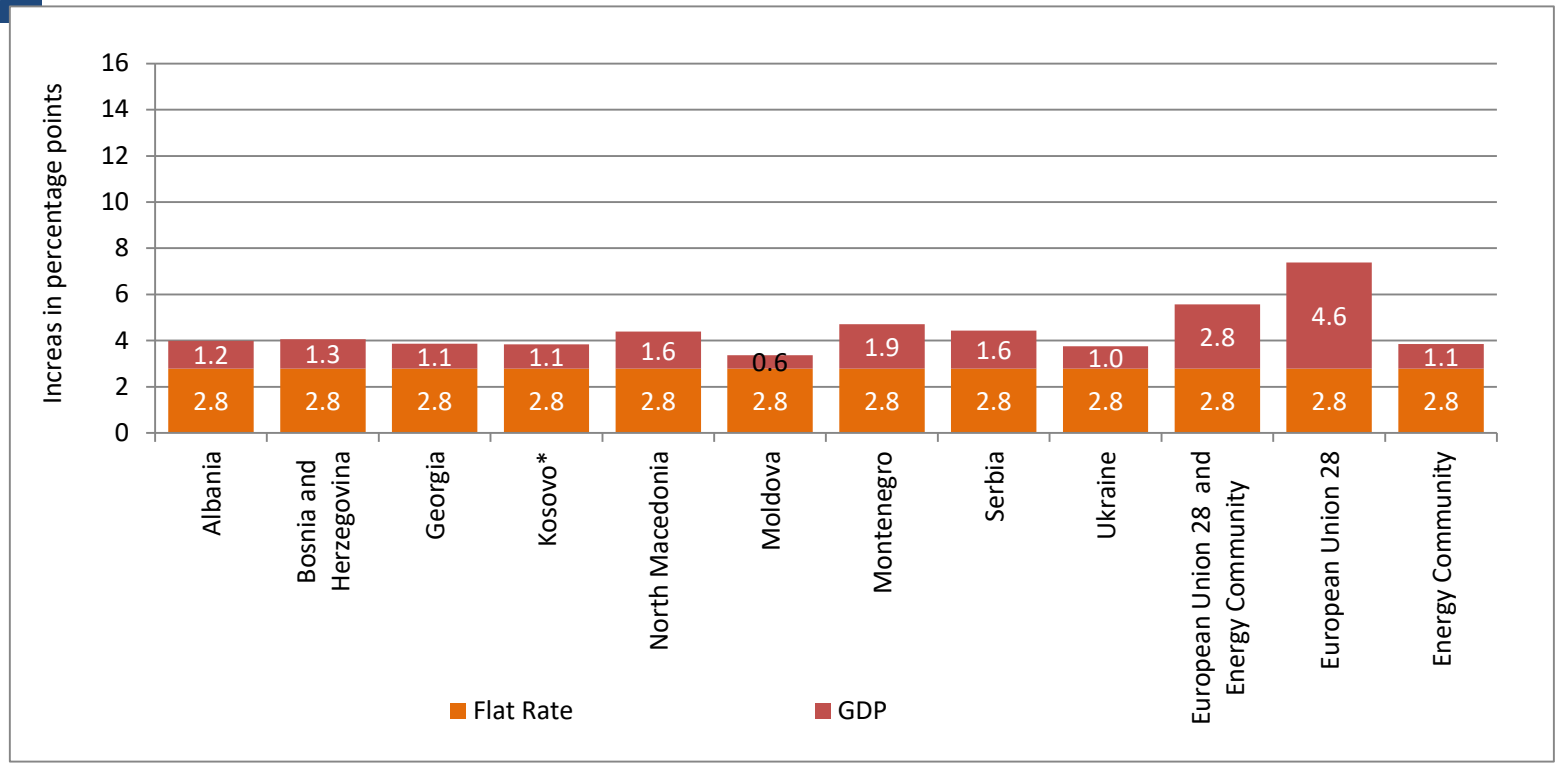
EnC level



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.

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

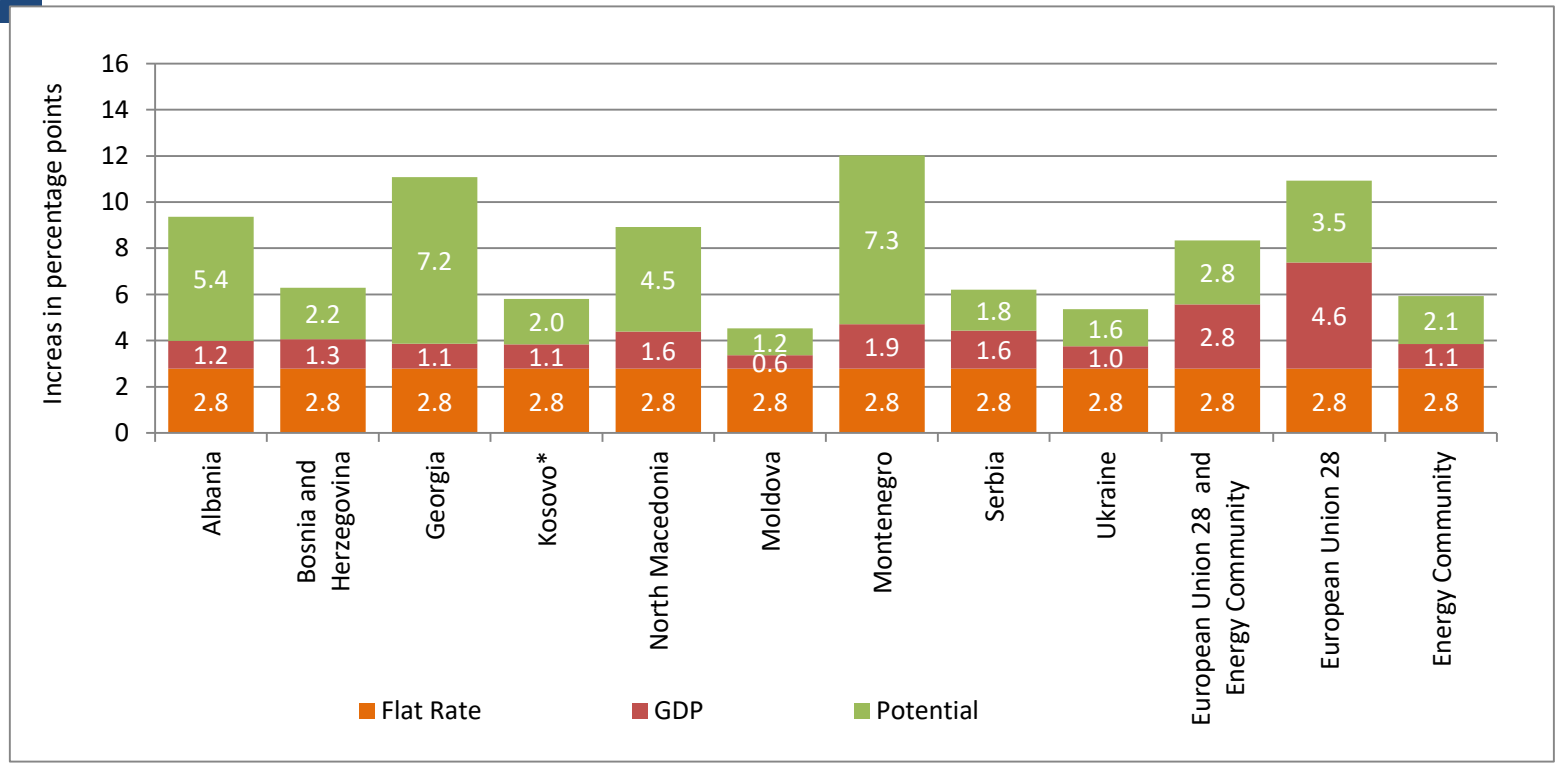
EnC level



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.

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

EnC level



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)

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

EnC level

→ The component $C_{Potential}$ shall take into account the CPs cost effective potential for RE sources

The approach used within this study: **Green-X modelling (instead of PRIMES) for deriving a least-cost allocation of the RE potentials across the EnC**

The selection of RE technologies in the period post 2020 follows a least-cost approach, meaning that all additionally required future RE technology options are ranked in a merit-order, and it is left to the economic viability which options are chosen for meeting the presumed 2030 RE target.

*In other words, a **least-cost approach** is used to determine investments in RE technologies post 2020 across the Energy Community. This allows for a full reflection of competition **across technologies and countries** (incorporating well also differences in financing conditions etc.) from a European perspective.*

Support levels and related expenditures follow then the marginal pricing concept where the marginal technology option determines the support level (like in the ETS or in a quota/certificate trading regime, or similar to the concept of liberalised electricity markets).

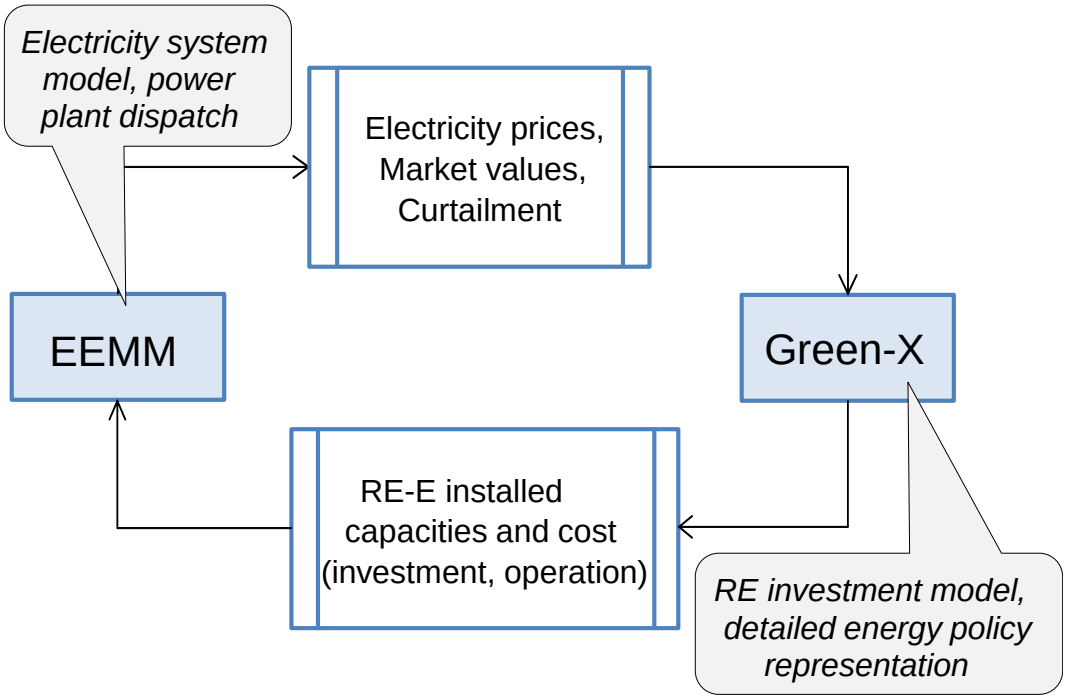
Approach for **2030 RE target setting** within the Energy Community

EnC level

→ The component $C_{Potential}$ shall take into account the CPs cost effective potential for RE sources

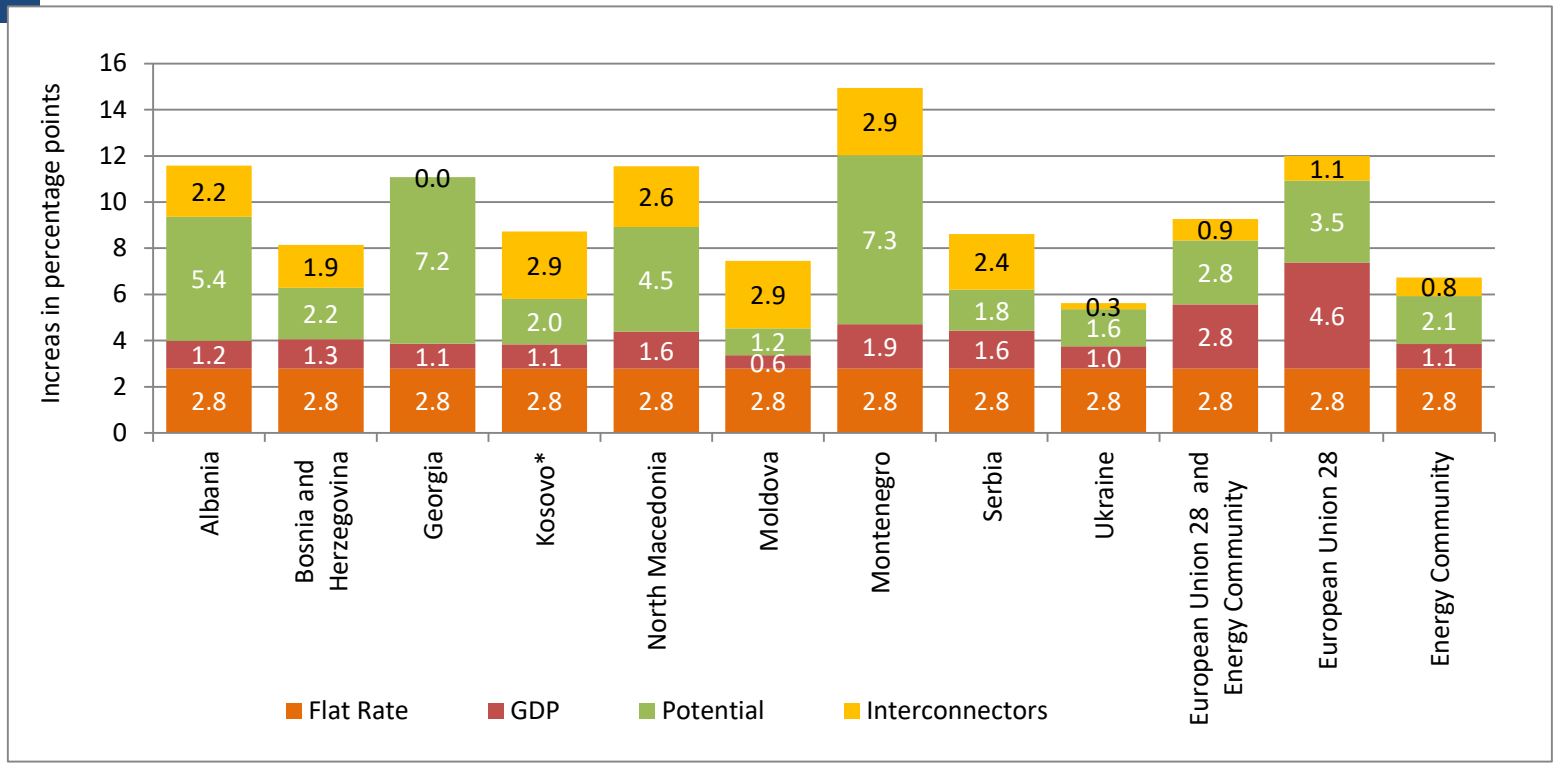
The approach used within this study: **Green-X modelling (instead of PRIMES) for deriving a least-cost allocation of the RE potentials across the EnC**

→ More precisely: TU Wien's Green-X model combined with REKK's EEMM power system model (as used e.g. in the SEERMAP study)



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

EnC level



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.

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

EnC level

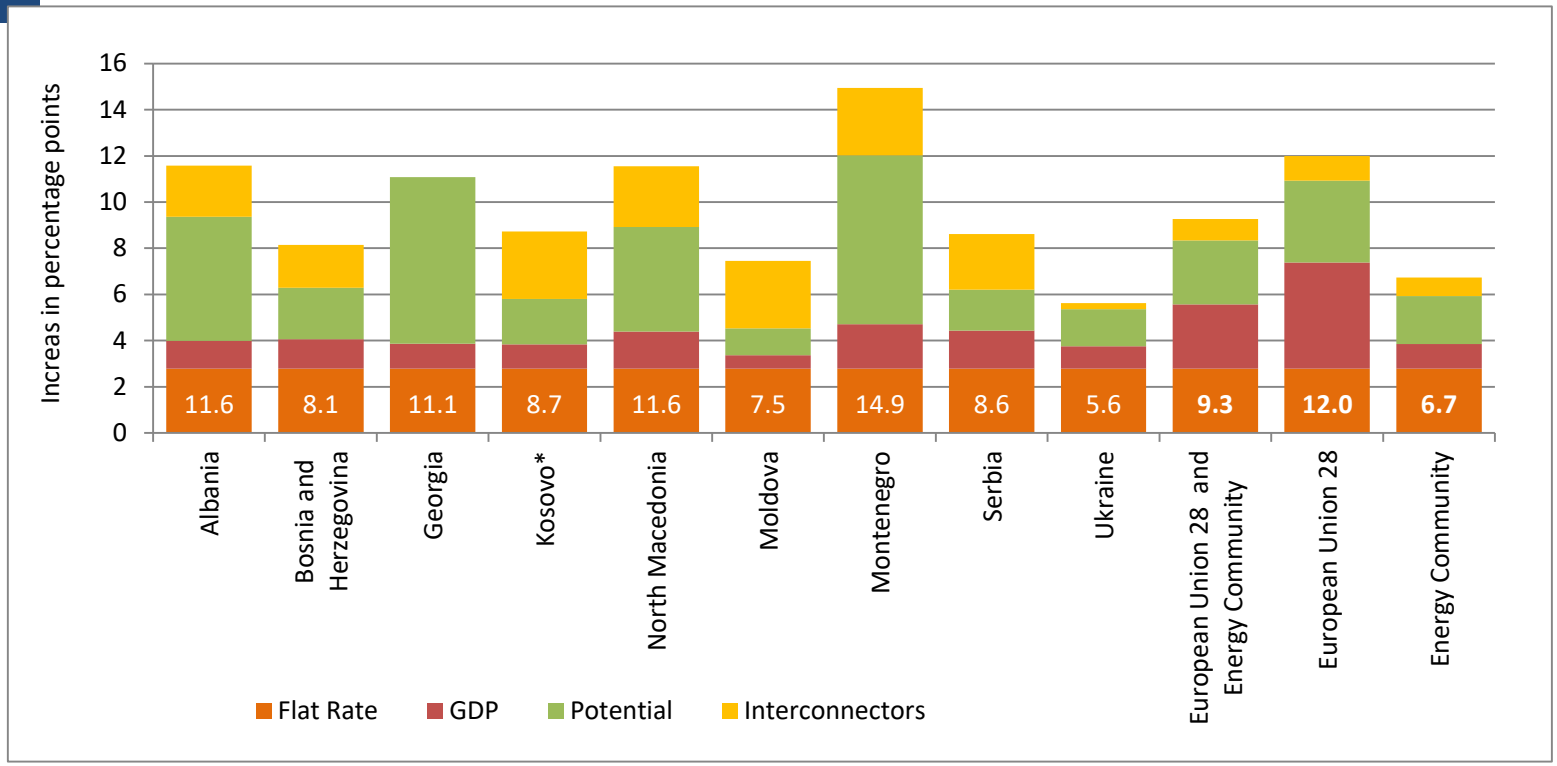


Figure: Resulting RE share net increase between 2020 and 2030 for all CPs and the EnC region according to the proposed target setting approach (i.e. a "four component" approach).

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

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

EnC level

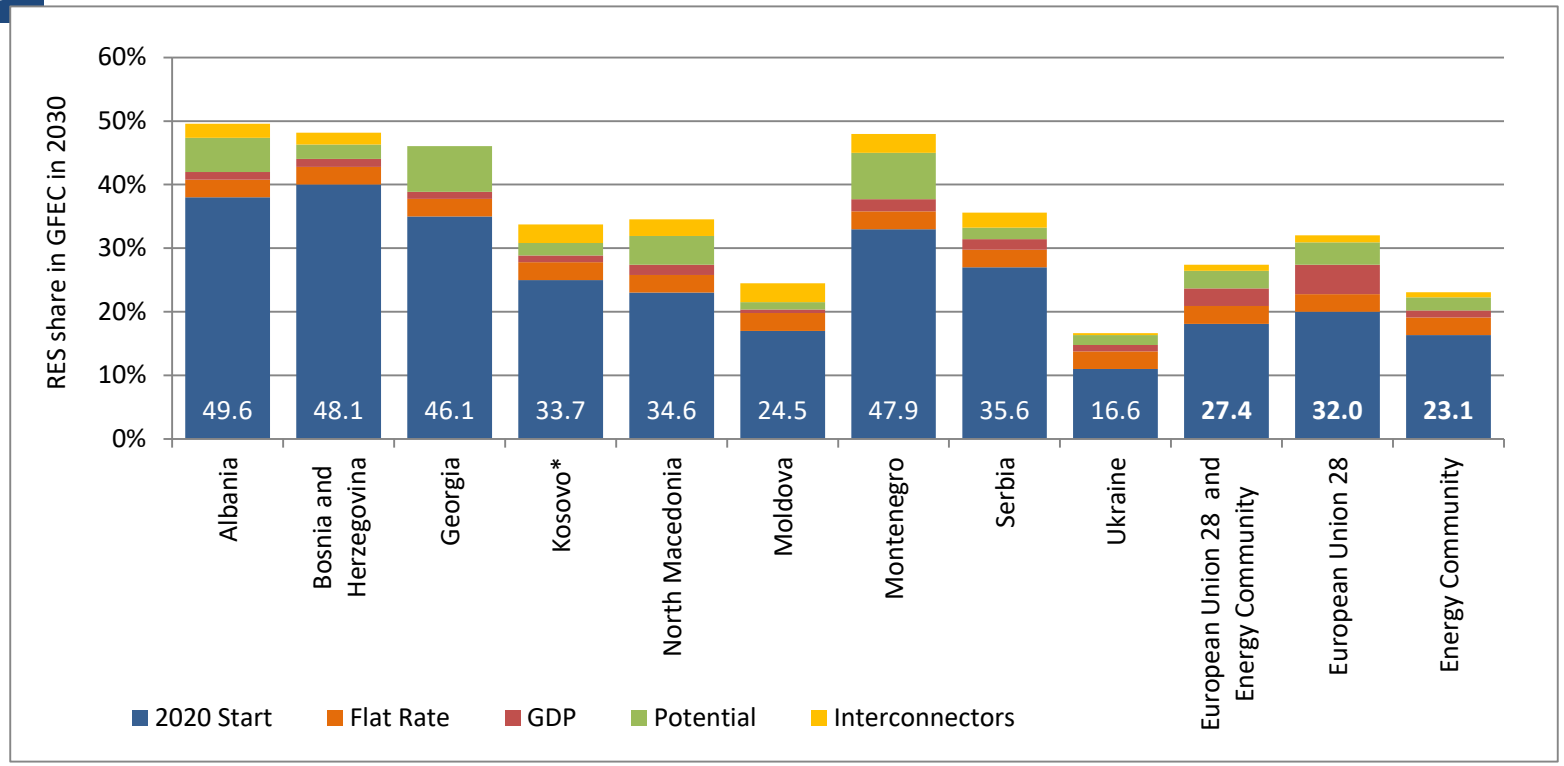

Figure: 2030 RE Targets for all CPs and the EnC region according to the proposed target setting approach (i.e. a "four component" approach).

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

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

EnC level

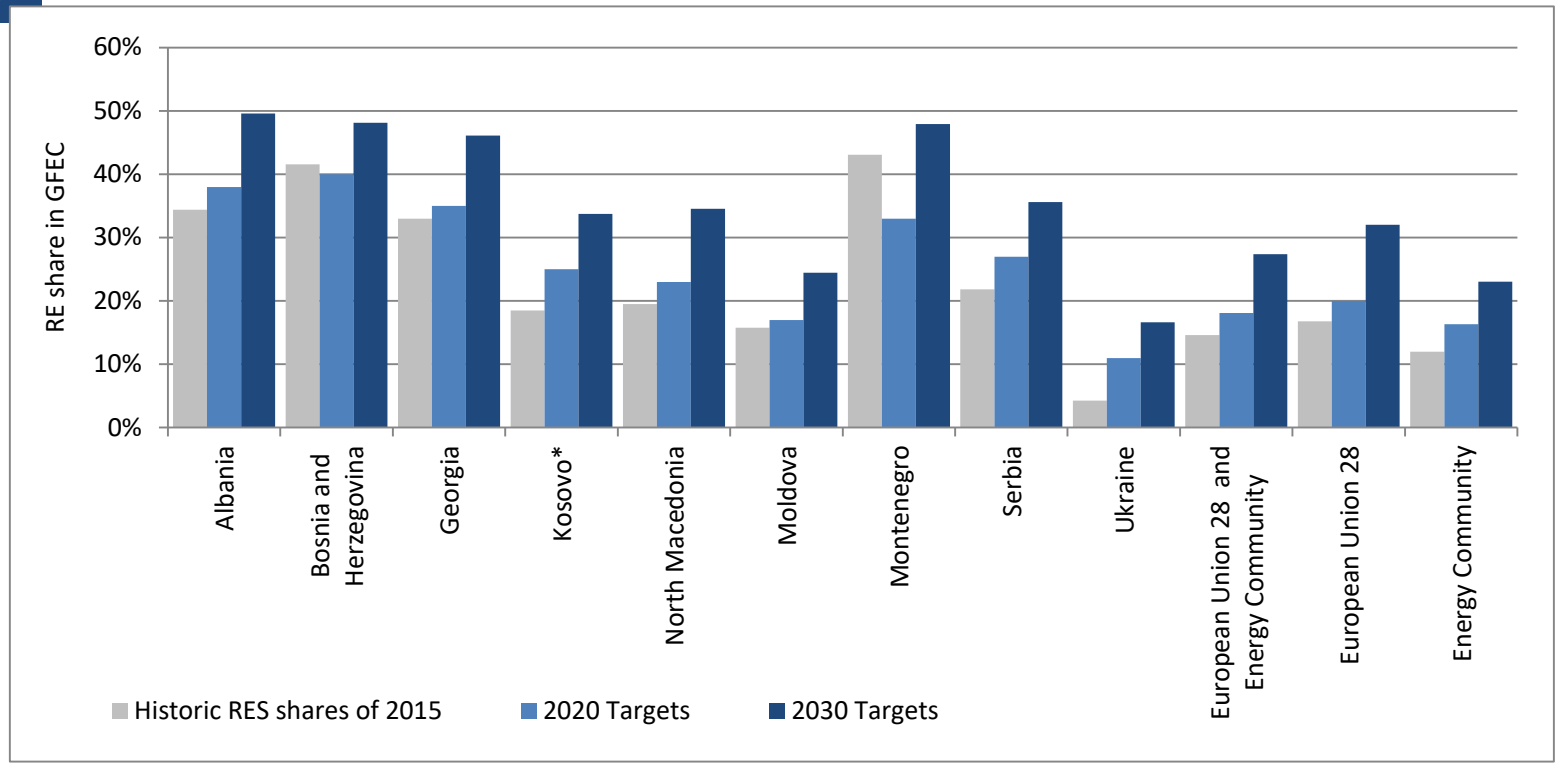

Figure: Comparison RE shares per region an Contracting Party. The historic RE share for the year 2015 (grey) in gross final energy consumption (GFEC) is compared to the 2020 target (light blue) and 2030 target (dark blue).

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

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 as of RED	2030 Targets according the 4 componets approch					
				Flat rate contribution	GDP per capita based contribution	Potential-based contribution	Interconnection level based contribution	Total needed increas	Overall targets for 2030
	2015	2016	2020	2020 vs. 2030	2020 vs. 2030	2020 vs. 2030	2020 vs. 2030	2020 vs. 2030	2030
Contracting Party	[%]	[%]	[%]	[pp]	[pp]	[pp]	[pp]	[pp]	[%]
Albania	34.4%	37.1%	38.0%	2.8%	1.2%	5.4%	2.2%	11.6%	49.6%
Bosnia and Herzegovina	26.7%	25.3%	40.0%	2.8%	1.3%	2.2%	1.9%	8.1%	48.1%
Georgia	33.0%[1]	33.4%[1]	35.0%	2.8%	1.1%	7.2%	0.0%	11.1%	46.1%
Kosovo*	18.5%	24.4%	23.0%	2.8%	1.1%	2.0%	2.9%	8.7%	33.7%
Moldova	26.2%	26.9%	17.0%	2.8%	0.6%	1.2%	2.9%	7.5%	24.5%
Montenegro	43.1%	41.5%	33.0%	2.8%	1.9%	7.3%	2.9%	14.9%	47.9%
North Macedonia	19.5%	18.0%	23.0%	2.8%	1.6%	4.5%	2.6%	11.6%	34.6%
Serbia	21.9%	21.0%	27.0%	2.8%	1.6%	1.8%	2.4%	8.6%	35.6%
Ukraine	4.9%	5.8%	11.0%	2.8%	1.0%	1.6%	0.3%	5.6%	16.6%
Energy Community	*12.1%*	*11.5%*	*16.3%*	*2.8%*	*1.1%*	*2.1%*	*0.8%*	*6.7%*	*23.1%*

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)

Assessing the impacts – exemplified for **Serbia**

Part 1: Energy efficiency

Derived **options for setting 2030 Energy Efficiency Targets**:

EE targets for Serbia by 2030	Final Energy Consumption [ktoe]	Comparison to default (Harmonised Reduction=100%) [%]
National Perspective	11,078	120.2%
Harmonised Reduction (Baseline III)	9,215	100.0%
Comparable Efforts (Historic Trend)	8,139	88.3%

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Serbia

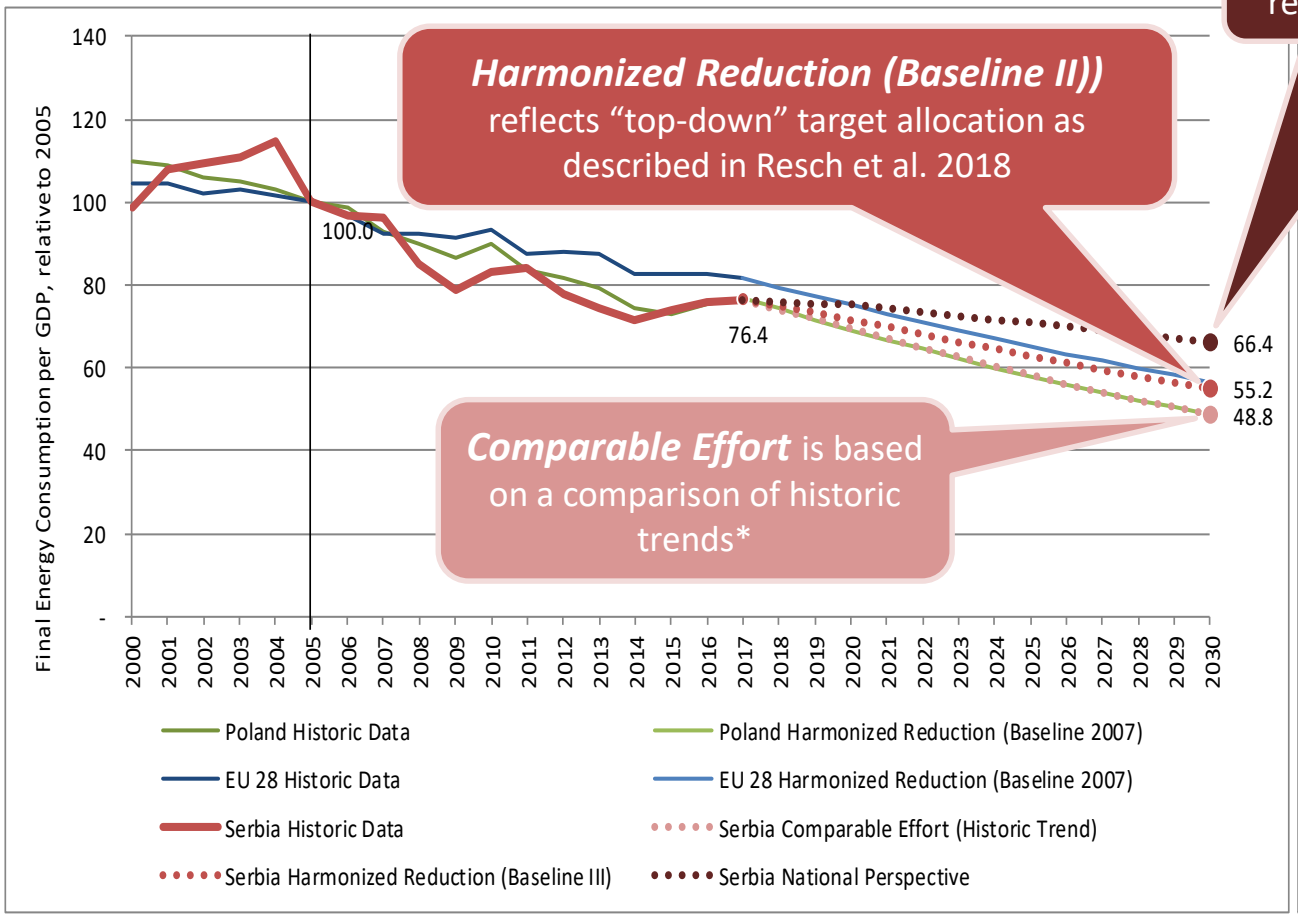
Assessing the impacts – exemplified for **Serbia**

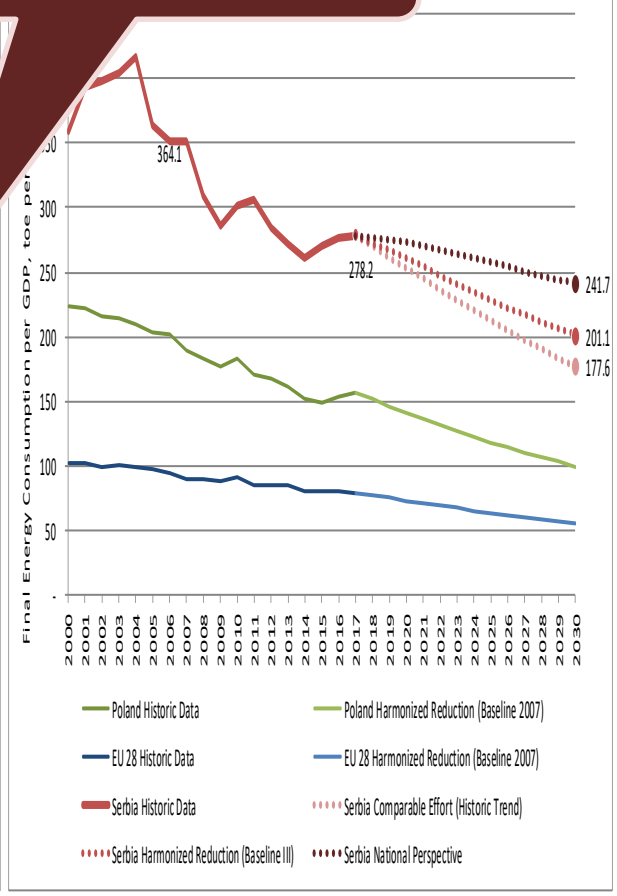
Part 1: Energy efficiency

National Perspective reflects the CPs own plans

Harmonized Reduction (Baseline II)) reflects "top-down" target allocation as described in Resch et al. 2018

Comparable Effort is based on a comparison of historic trends*





*I.e. the fit in historic development of FEC per GDP between 2005 and 2017

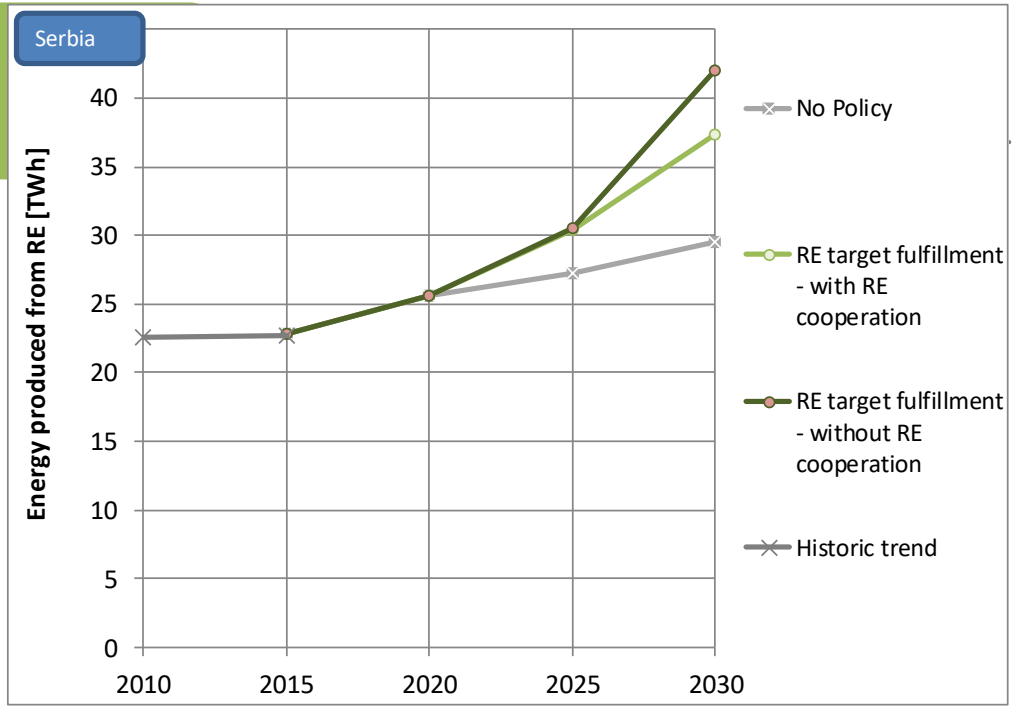
Assessing the impacts – exemplified for **Serbia**

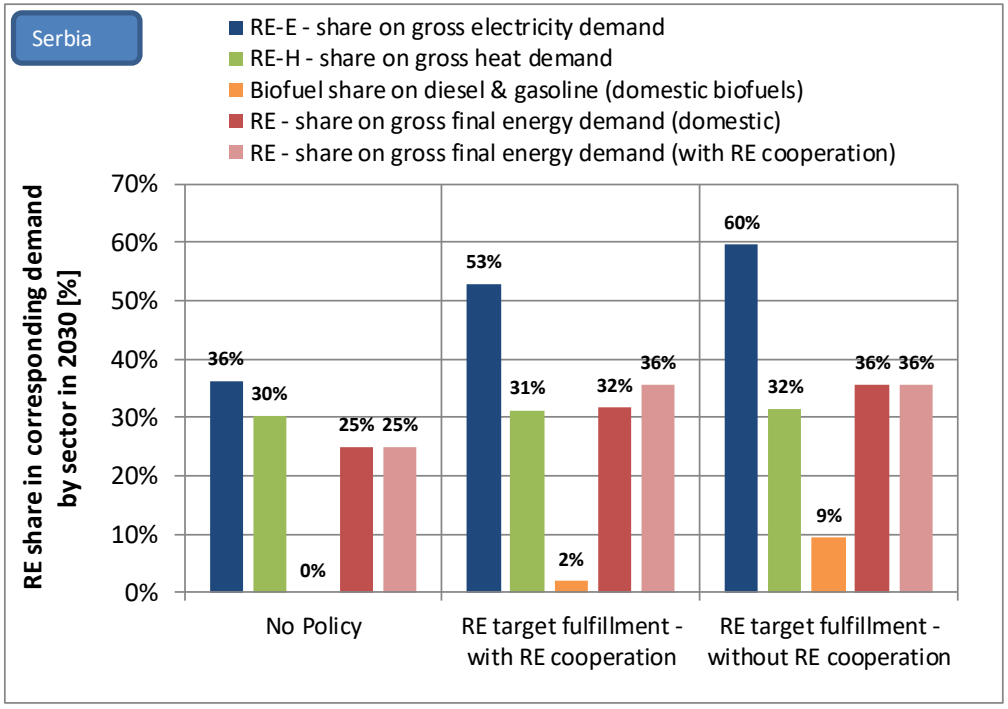
Part 2: Renewable Energies

A "No Policy" scenario to showcase no policy action.

Two "RE target" scenarios to assess the feasibility and impacts of 2030 RE target achievement:

- **"RE target fulfilment – without RE cooperation"** … pure domestic RE target fulfilment with no (or only limited) cooperation
- **"RE target fulfilment – with RE cooperation"** … "Community perspective" is taken with efficient and effective RE target achievement at EnC level





Assessing the impacts – exemplified for **Serbia**

Part 2: Renewable Energies

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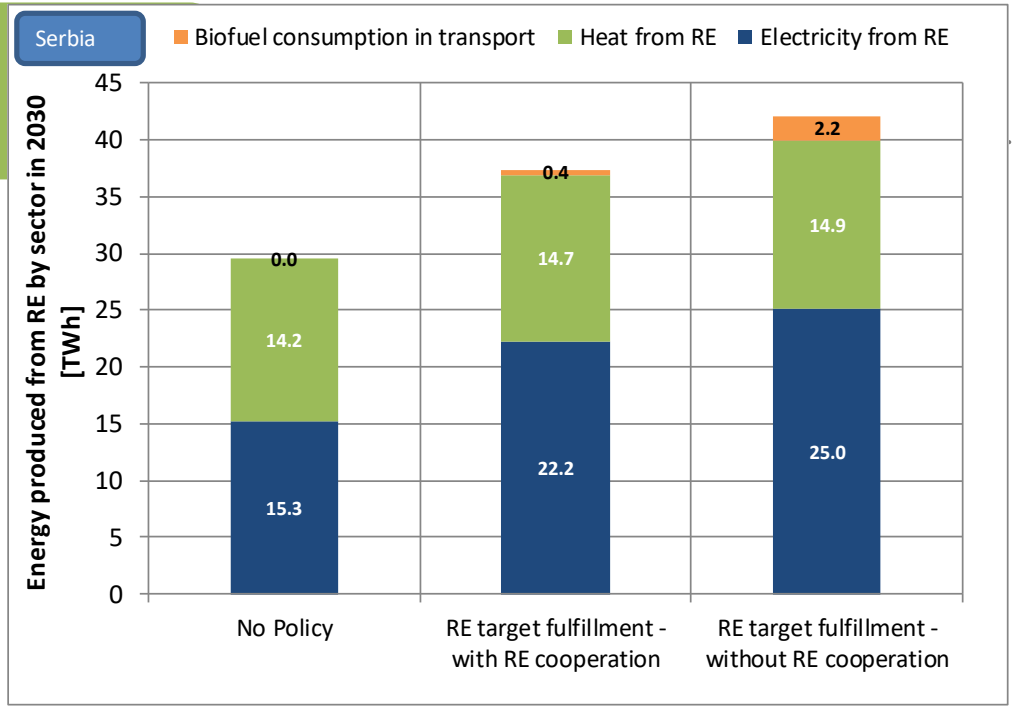
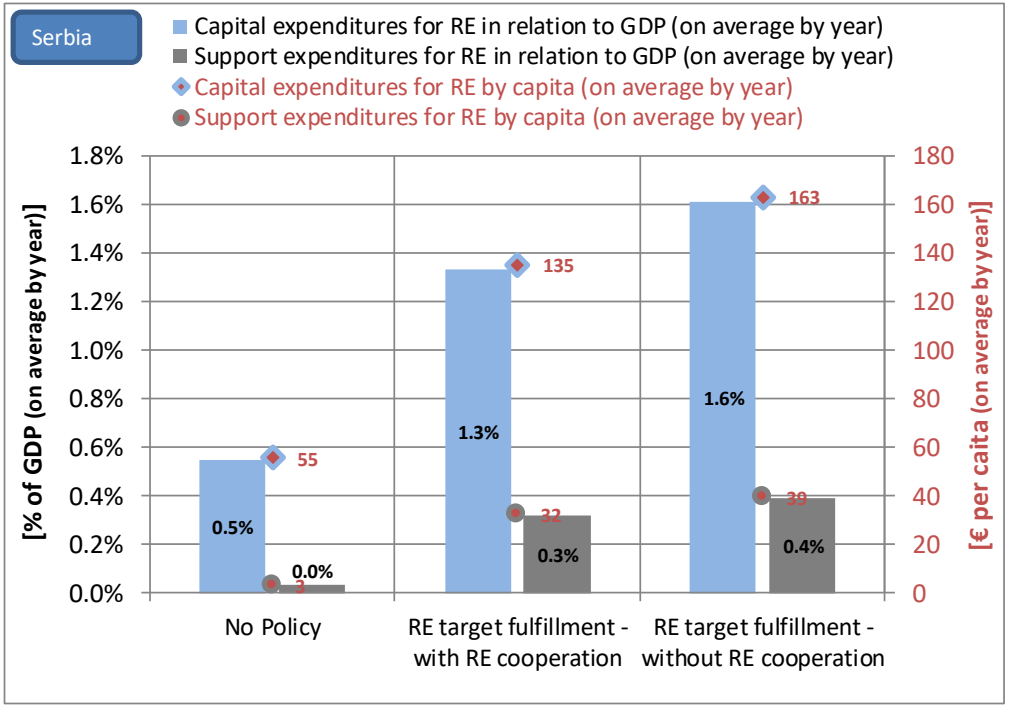




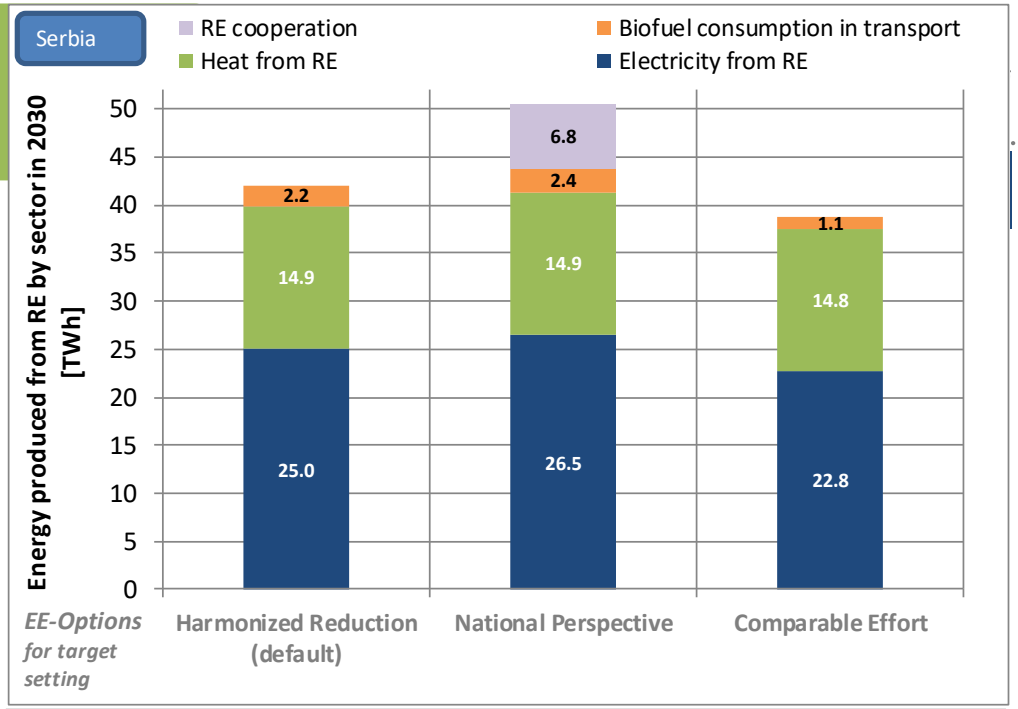
Assessing the impacts – exemplified for **Serbia**

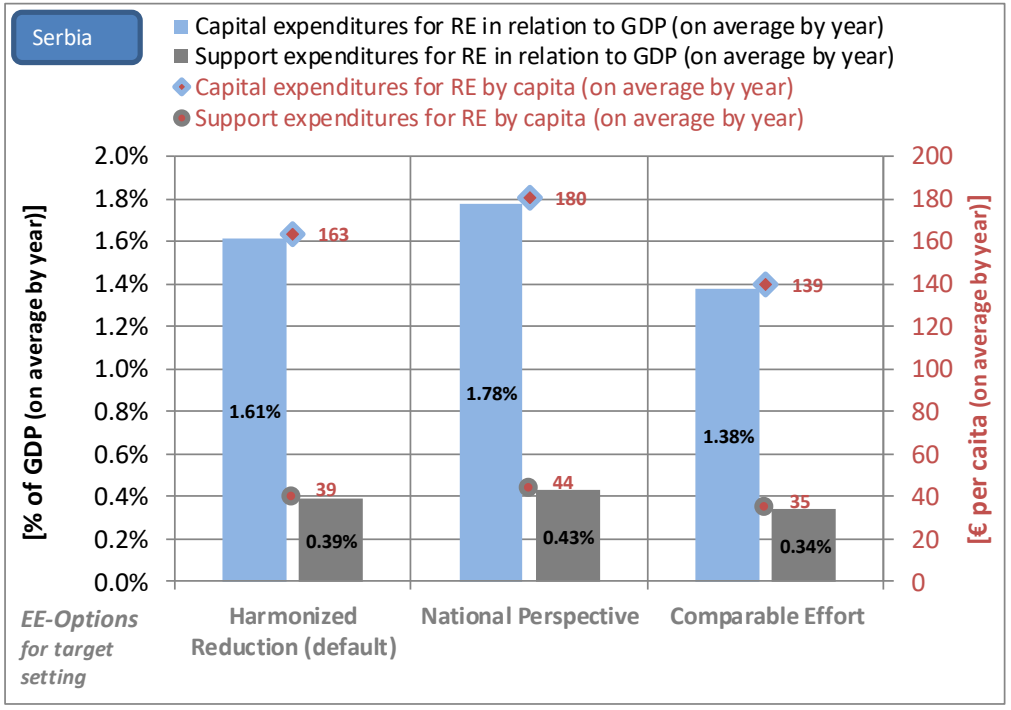
Part 2: Renewable Energies

Analysing the impact of EE target setting options, exemplified for the "national perspective":

- **Harmonized Reduction** (default options … as discussed previously)
- **National Perspective** (high demand growth)
- **Comparable Effort** (derived from historic trend analysis, low demand growth)

→ *Modelling indicates that high demand in "National Perspective" requires RE cooperation for achieving the Serbian 2030 RE target (due to perceived domestic limits for a cost effective deployment)*





Assessing the impacts – exemplified for **Serbia**

Part 3: GHG emission reduction

Illustrating the impact of changes in EE and in RE deployment on **GHG emissions in Serbia** (rough indication)

No Policy	RE target fulfillment - with RE cooperation	RE target fulfillment - without RE cooperation	RE target fulfillment - EE-Option: National Perspective	RE target fulfillment - EE-Option: Comparable Effort
72%	**61%**	**56%**	**74%**	**48%**

… compared to 2005 levels

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Serbia

Assessing the impacts – exemplified for **Serbia**

Part 3: GHG emission reduction

Illustrating the impact of changes in EE and in RE deployment on **GHG emissions in Serbia** (rough indication)

		No Policy	RE target fulfillment - with RE cooperation	RE target fulfillment - without RE cooperation	RE target fulfillment - EE-Option: National Perspective	RE target fulfillment - EE-Option: Comparable Effort
Approximation of fossil generation			Comparison: 2030			
Electricity	GWh	26,748	19,783	16,957	23,982	14,285
Heat	GWh	32,899	32,426	32,286	41,809	26,863
Transport fuels (road transport)	GWh	22,882	22,458	20,714	25,124	19,056
Residual fuels (i.e. mainly other transport modes)	GWh	6,120	6,120	6,120	7,356	5,404
Total	**GWh**	**88,650**	**80,787**	**76,077**	**98,271**	**65,608**
Approximation of GHG emissions (fossil fuel use)			Comparison: 2030			
Electricity	kt CO2	19,438	14,376	12,323	17,428	10,381
Heat	kt CO2	8,685	8,560	8,523	11,038	7,092
Transport fuels (road transport)	kt CO2	5,878	5,769	5,321	6,454	4,895
Residual fuels (i.e. mainly other transport modes)	kt CO2	1,572	1,572	1,572	1,890	1,388
Total	**kt CO2**	**35,574**	**30,278**	**27,740**	**36,809**	**23,756**
Total non-ETS (rough indication)	kt CO2	**16,136**	**15,902**	**15,417**	**19,381**	**13,375**

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Concluding remarks

- The proposed **approach for RE target setting within the EnC follows the principles laid out at EU level**, specifically how benchmarks are introduced that indicate a fair contribution of individual MSs to the EU target
- This approach builds on 4 components **(i.e. flat rate, GDP/capita, least-cost allocation and the interconnectivity of the electricity grid)** that sum up the required increase at country level
- The **ambition level for renewables is influenced by the target set for Energy Efficiency** – here distinct options are analysed:
  - Harmonized Reduction (default options … as discussed previously)
  - National Perspective (high demand growth)
  - Comparable Effort (derived from historic trend analysis, low demand growth)
- The **EE target has a strong impact on the feasibility of target achievement in RE and in GHG mitigation** → an unambitious EE target challenges the achievement of RE targets and endangers the feasibility of GHG limits