Energy Sector in the Balkans Climate and Energy Outlook

PRIMES MODEL
E3MLAB – NTUA
PROF. P. CAPROS

JUNE 2010

Major Climate Action Policies in the EU

- The EU Climate Action and Energy Policy, adopted in 2008, is now under implementation:
  - ETS Directive: significant limitations of carbon allowances until 2030 with full auctioning from 2013 onwards
  - Non ETS Directive: specific emission reduction targets per country until 2020
  - RES Directive: specific ambitious targets for renewables per country until 2020
  - Supporting Directives and Regulations: Eco-Design, Buildings (recast), Cars, IPPC, LCD, etc.

Use of PRIMES for the European Commission

- Impact Assessment of the EU Climate Action and Energy Policy Package of 2008
- Update 2010 – projections up to 2030
  - Baseline scenario (incl. only ETS)
  - Reference scenario (full implementation of the package)
- Communication of the Commission (May 2010) for possible increase of emission reduction target to 30%
- Roadmap towards high decarbonisation by 2050
  - on going
  - Previously Eurelectric's Power Choices project

South East Europe and the EU Climate Policies

- The current EU climate action (and RES) policies are ambitious and have strong implications on
  - Energy investment (RES, nuclear, CCS, energy efficiency)
  - Costs and prices (higher electricity prices because of costs and ETS auctioning payments)
- What would be the impacts on the South East European area of raising ETS carbon prices and promoting the RES, similarly to the EU
  - 25 €/tCO2 by 2020 and 47 €/tCO2 by 2030
  - 48 €/MWh shadow subsidy for Renewables

CO2 Baseline Projection

CO2 Emissions (Mt of CO2 - sec approach)						index 1990 = 100	
	1990	2000	2010	2020	2030	2020	2030
Albania	5.5	3.2	6.1	8.2	9.4	147.5	161.6
Bosnia	23.7	12.8	19.5	16.8	14.6	70.7	67.5
Bulgaria	72.4	42.1	48.9	34.3	22.2	47.3	34.7
Croatia	20.5	16.9	21.8	21.9	23.5	106.9	111.3
Greece	71.2	89.2	98.8	102.0	99.0	143.2	142.4
FYROM	9.1	8.5	9.8	7.8	6.8	85.6	84.9
Romania	166.7	83.6	92.1	91.6	79.0	54.9	51.9
Serbia&Montenegro	59.9	46.5	65.6	59.1	56.9	98.6	102.5
Balkans excl. Turkey	429.1	302.8	362.6	341.6	311.4	79.6	76.9
Turkey	126.4	198.6	270.2	331.1	384.4	261.8	288.6
All SEE	555.6	501.4	632.8	672.6	695.8	121.1	125.1
EU27	4030.6	3810.6	3728.4	3692.0	3151.8	91.6	86.5
SEE as % of EU27+SEE	13.0	12.2	15.4	16.3	19.1		

Source: PRIMES model

- Big differences among the SEE countries in CO2 trends
- Total Balkans excl. Turkey displays a declining trend, but Turkey's emissions are projected to boom
- Total CEE displays a divergent trend compared to the EU27

Decomposition of Baseline CO2 Projection

Avg. % change per year	GDP growth		Energy Intensity growth		Carbon Intensity growth		Growth of CO2 Emissions	
	90-'10	10-'30	90-'10	10-'30	90-'10	10-'30	90-'10	10-'30
Albania	*2.4*	*4.7*	*-1.3*	*-3.0*	*-0.6*	*0.7*	*0.5*	*2.3*
Bosnia	*11.2*	*3.3*	*-10.8*	*-3.9*	*-0.2*	*-0.7*	*0.2*	*-1.3*
Bulgaria	*1.5*	*2.8*	*-3.1*	*-3.9*	*-0.3*	*-2.7*	*-1.9*	*-3.8*
Croatia	*1.4*	*1.8*	*-1.1*	*-1.5*	*0.0*	*0.1*	*0.3*	*0.4*
Greece	*2.9*	*2.1*	*-0.8*	*-1.7*	*-0.4*	*-0.4*	*1.7*	*0.0*
FYROM	*1.3*	*3.7*	*-0.5*	*-4.5*	*-0.4*	*-0.8*	*0.4*	*-1.6*
Romania	*1.7*	*2.4*	*-3.6*	*-2.8*	*-1.0*	*-0.3*	*-2.9*	*-0.7*
Serbia&Montenegro	*3.2*	*4.8*	*-2.5*	*-5.0*	*-0.1*	*-0.3*	*0.5*	*-0.5*
Balkans excl. Turkey	*2.4*	*2.5*	*-2.8*	*-2.7*	*-0.3*	*-0.5*	*-0.8*	*-0.7*
Turkey	*3.9*	*3.8*	*-0.4*	*-1.9*	*0.4*	*-0.1*	*3.9*	*1.9*
All SEE	*3.0*	*3.1*	*-2.2*	*-2.3*	*-0.2*	*-0.3*	*0.7*	*0.6*
EU27	*1.7*	*2.0*	*-1.4*	*-1.8*	*-0.7*	*-1.0*	*-0.4*	*-0.8*

- Energy efficiency progress is the main factor mitigating the effects from GDP growth, some decarbonisation is expected in only few countries

Baseline RES Projection

RES in Gross Final Energy Consumption								Target
%	2000	2005	2010	2015	2020	2025	2030	2020
Albania	38.9	32.6	26.7	24.2	22.9	21.5	20.7	?
Bosnia	24.9	18.8	17.1	16.9	16.2	15.9	16.5	?
Bulgaria	8.2	11.1	10.1	11.0	11.3	13.6	16.1	16%
Croatia	15.7	13.6	12.0	11.8	13.4	13.6	13.5	?
Greece	7.6	7.6	9.0	9.7	10.7	11.8	12.4	20%
FYROM	18.8	15.7	15.4	16.8	17.0	15.5	15.0	?
Romania	17.3	18.9	18.9	19.3	19.0	19.0	20.8	24%
Serbia&Montenegro	23.1	18.9	16.7	16.1	15.2	14.1	13.7	?
Balkans excl. Turkey	14.9	14.9	14.5	14.9	14.9	15.2	15.9	
Turkey	17.6	15.5	12.9	10.5	9.6	9.1	9.2	?
All SEE	16.2	15.2	13.9	13.2	12.9	12.8	13.2	
EU27	7.6	8.6	10.9	12.8	14.8	16.7	18.4	20%

- RES deploy considerably under current trends, but less than required by targets
- RES decline in some countries with high potential, thus more intense RES policies are required
- Turkey's RES performance lags behind rest of SEE

Carbon Price Case

With 25 in 2020 and 48 €/tCO2 carbon prices within an ETS market, emissions almost stabilize in the SEE region

Countries using coal/lignite have more flexibility in reducing emissions, than others

Turkey's inflexibility is noticed

CO2 Emissions from energy (Mt)		Carbon Price Case	
% change from Baseline	2005	2020	2030
Albania	4.6	-5.5	-13.3
Bosnia	16.0	-18.6	-26.5
Bulgaria	45.1	-23.1	-23.6
Croatia	19.9	-8.7	-13.6
Greece	96.2	-22.0	-34.1
FYROM	8.2	-25.3	-39.3
Romania	89.7	-12.2	-31.6
Serbia&Montenegro	58.7	-18.0	-22.7
Balkans excl. Turkey	338.4	-17.4	-28.2
Turkey	218.2	-9.6	-13.7
All SEE	556.6	-13.6	-20.2
Index for SEE (2005=100)	***100***		
Baseline		***120.8***	***124.8***
Carbon Price Case		***104.4***	***102.1***

Macro-economic projections

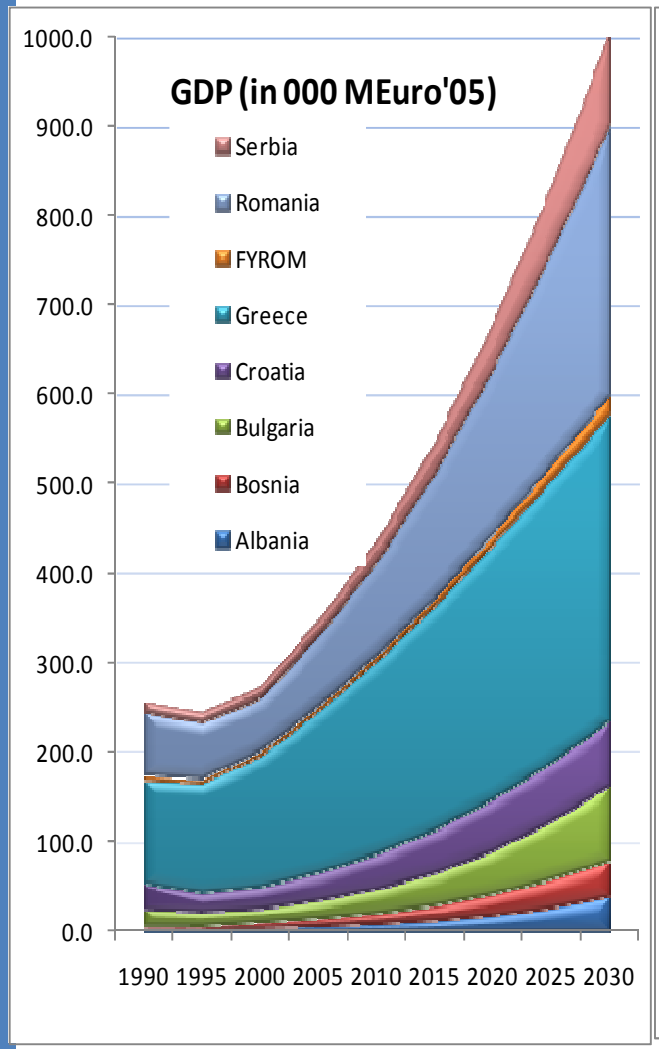
Scenario for the European Commission before the Crisis

- Sustained growth of Balkans: 4-5% per year

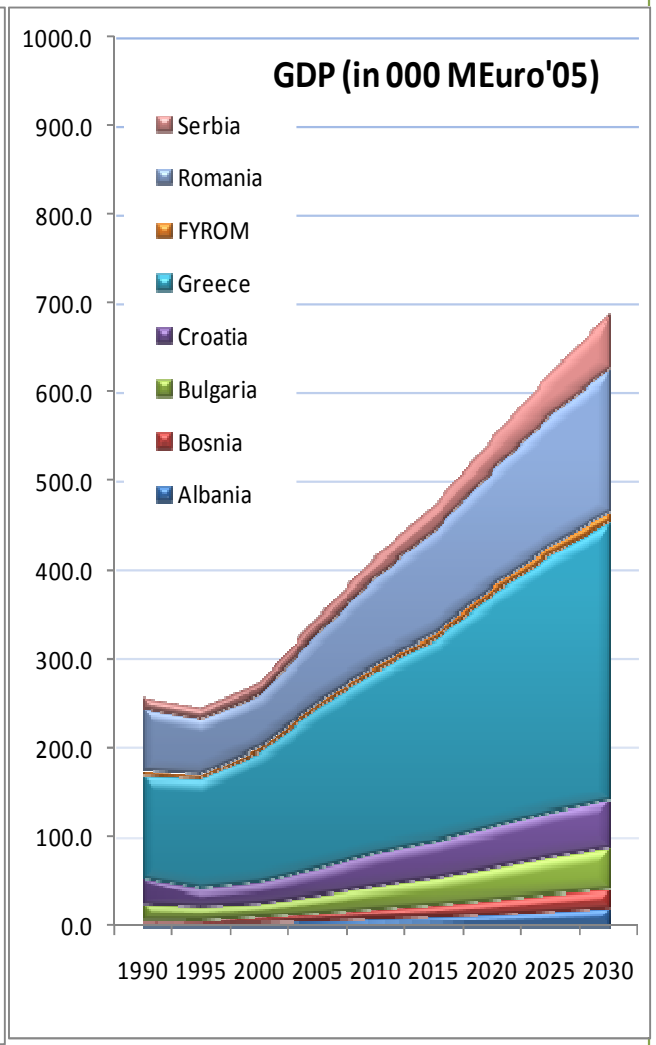
Scenario post Crisis, taking into account new projections by ECFIN

- Lower growth of the Balkans: recession 2009-2010, then growth less than 3% per year

View 2 years ago



Current View



Implications

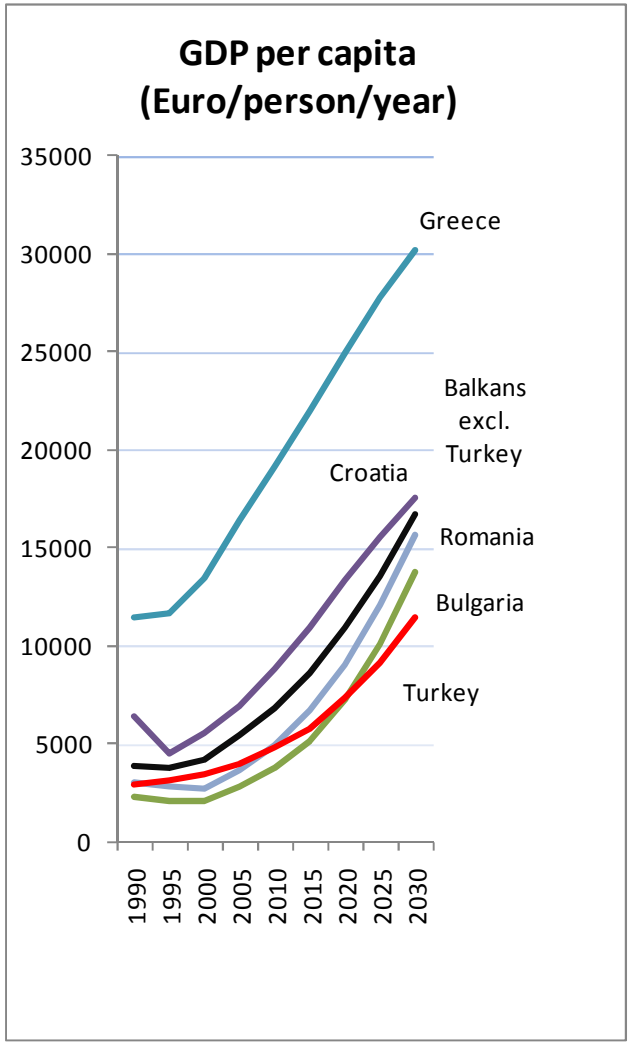
Significantly less real income per capita, than expected two years ago

Downwards revised prospects for investment and energy intensive industry

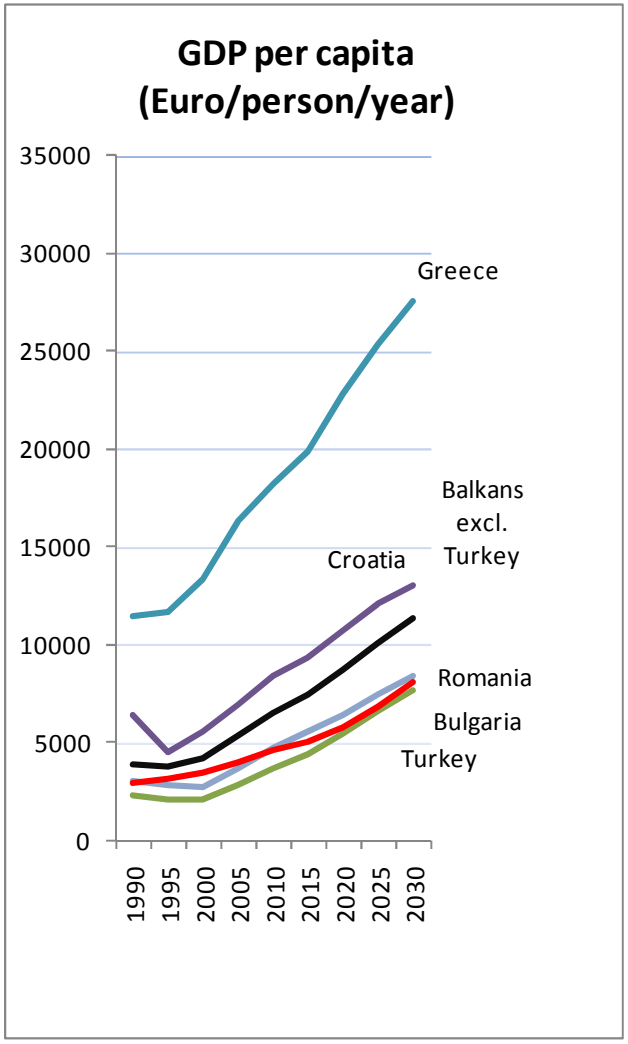
Lower growth of transport activity

Hence less energy consumption

View 2 years ago



Current View



Carbon and RES policy

With 48 €/MWh shadow subsidy for RES, the SEE develops considerable amounts of renewables; the carbon prices are an additional incentive

RES facilitation policies are also assumed

SEE may overshoot targets – exporters of RES

Performance by country depends on RES potential

RES in Gross Final Energy Consumption						Target
%	2005	2020	% diff	2030	%diff	2020
Albania	32.6	25.7	2.8	26.0	5.3	?
Bosnia	18.8	20.9	4.7	24.4	7.9	?
Bulgaria	11.1	23.5	12.2	34.3	18.1	16%
Croatia	13.6	16.3	2.9	18.7	5.2	?
Greece	7.6	17.8	7.1	22.5	10.1	20%
FYROM	15.7	22.8	5.8	25.6	10.6	?
Romania	18.9	25.8	6.8	29.0	8.2	24%
Serbia&Montenegro	18.9	19.5	4.3	18.7	5.1	?
Balkans excl. Turkey	14.9	21.4	6.5	24.8	8.9	
Turkey	15.5	13.3	3.7	14.6	5.4	?
All SEE	15.2	17.0	5.6	19.0	7.5	
EU27	8.6	20.0	5.2	22.2	3.8	20%

Decomposition of CO2 reduction from Baseline

% Contribution to emission reduction of:	Gains in Energy Intensity		Nuclear energy		Renewables		Less Carbon intensity of fossils	
	2020	2030	2020	2030	2020	2030	2020	2030
Albania	*19.4*	*37.3*	*0.0*	*0.0*	*59.4*	*52.2*	*21.2*	*10.4*
Bosnia	*49.1*	*39.6*	*0.0*	*0.0*	*31.9*	*38.0*	*19.0*	*22.4*
Bulgaria	*17.0*	*23.3*	*3.1*	*-10.5*	*62.2*	*68.2*	*17.6*	*19.0*
Croatia	*36.8*	*37.3*	*0.0*	*0.0*	*37.8*	*41.7*	*25.4*	*20.9*
Greece	*41.1*	*34.5*	*0.0*	*0.0*	*42.1*	*42.0*	*16.8*	*23.5*
FYROM	*42.4*	*36.2*	*0.0*	*0.0*	*33.5*	*38.7*	*24.1*	*25.1*
Romania	*26.2*	*26.0*	*5.3*	*33.5*	*52.4*	*19.0*	*16.1*	*21.4*
Serbia&Montenegro	*44.0*	*37.4*	*0.0*	*0.0*	*26.3*	*22.9*	*29.8*	*39.7*
Balkans excl. Turkey	*33.7*	*22.3*	*5.4*	*22.3*	*39.8*	*30.6*	*21.1*	*24.8*
Turkey	*37.6*	*24.4*	*0.0*	*2.6*	*36.9*	*35.4*	*25.5*	*37.6*
All SEE	*35.6*	*23.8*	*4.3*	*17.6*	*37.2*	*29.0*	*23.0*	*29.6*

- Energy Intensity gains, renewables and shift to nat. gas have almost equal contribution to emission reduction, while nuclear has a small role.

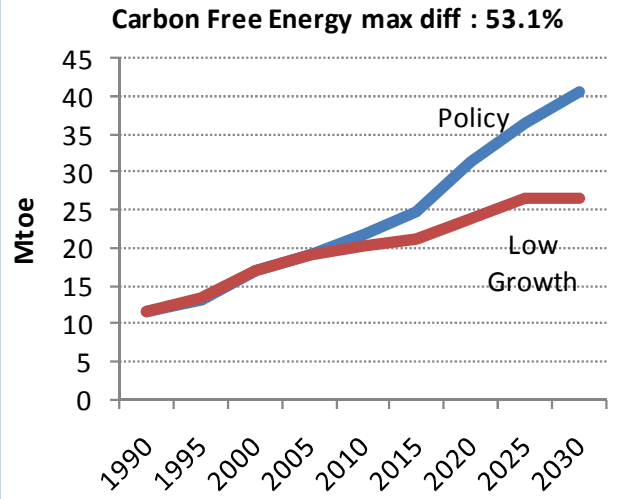
Climate Action and RES policy

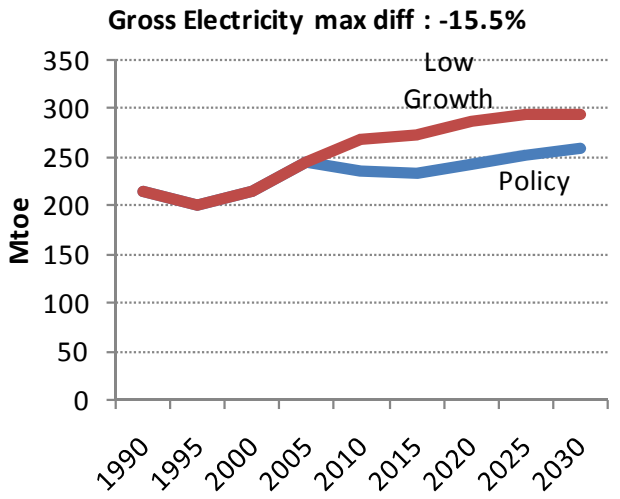
ETS prices combined with RES trading induce significant changes in energy system structure of the Balkans

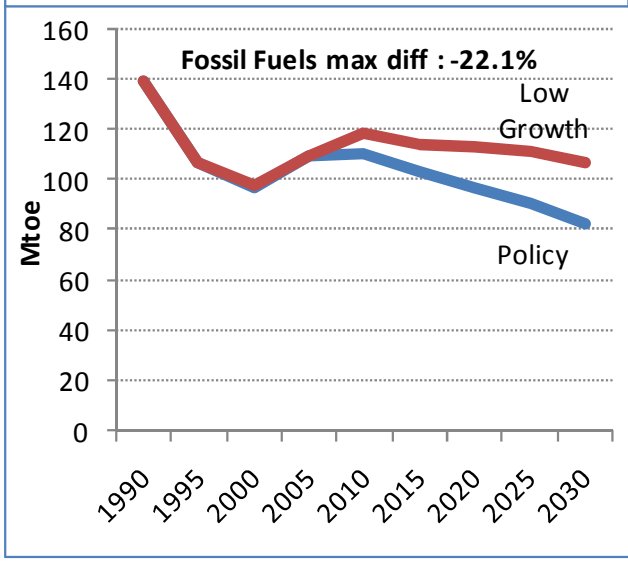
The changes include considerable increase in carbon free energy and reduction in fossil fuel requirements

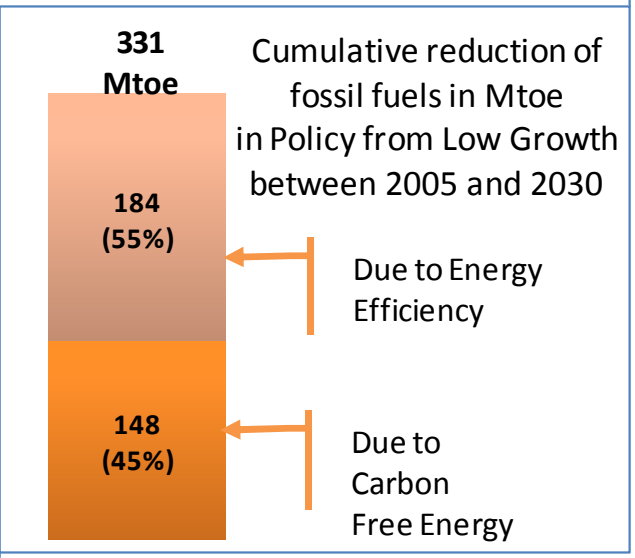
Energy efficiency and higher electricity prices (due to auctioning) imply lower demand for electricity

Balkans excl. Turkey









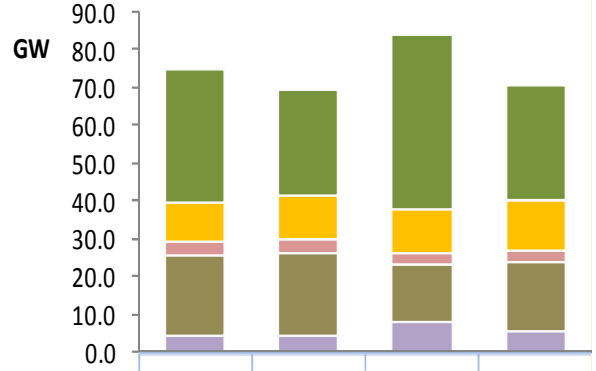
Power sector changes

Investment in power generation is affected giving priority to Renewables and Nuclear (2800 MW more are built post 2020)

Use of solid fuels is reduced considerably, as the scenario assumes a rather pessimistic view on CCS

Gas requirements are lower than without the policy, because of RES and higher efficiency

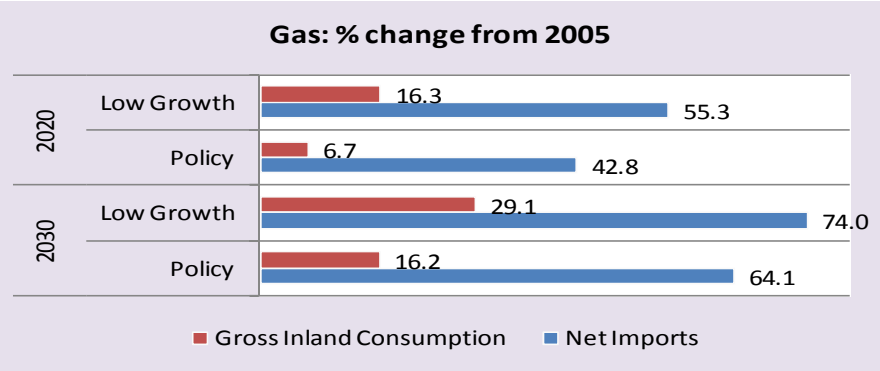
Incremental power from RES is delivered mainly by Wind and Biomass and less by PV



	2020		2030	
	Policy	Low Growth	Policy	Low Growth
RES	35.2	28.1	46.2	30.5
Gas	10.3	11.5	11.1	13.0
Oil	3.3	3.7	3.4	3.1
Solids	21.5	22.2	15.0	18.7
Nuclear	4.4	4.4	8.3	5.5

Balkans excl. Turkey

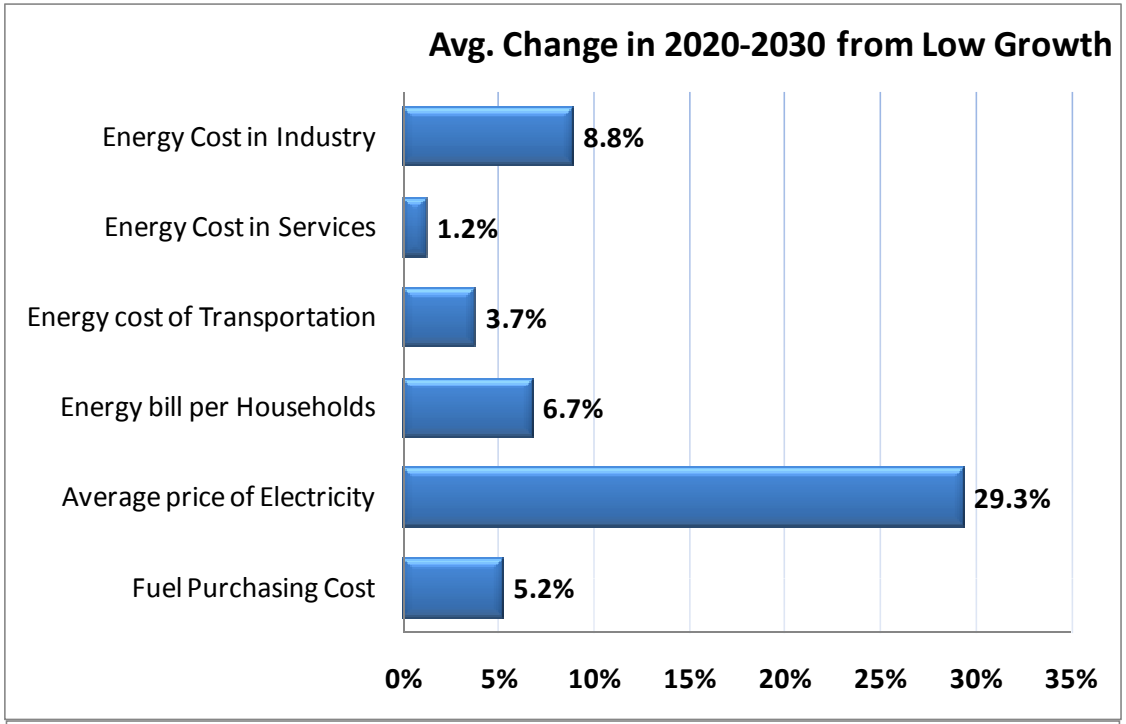
Policy: Net Power Capacity (GW)					Diff. from Low Growth	
	2005	2015	2020	2030	2020	2030
Total RES	22.7	28.7	35.2	46.2	7.1	15.8
Hydro	21.9	23.6	24.3	24.8	0.5	0.5
Wind	0.6	3.9	6.1	12.3	2.8	8.0
- onshore	0.6	3.9	6.0	11.4	2.7	7.1
- offshore	0.0	0.0	0.1	0.9	0.1	0.9
Solar	0.0	0.4	2.4	4.5	1.6	3.3
Geothermal, etc.	0.0	0.0	0.0	0.1	0.0	0.0
Biomass	0.2	0.7	2.4	4.5	2.1	3.9

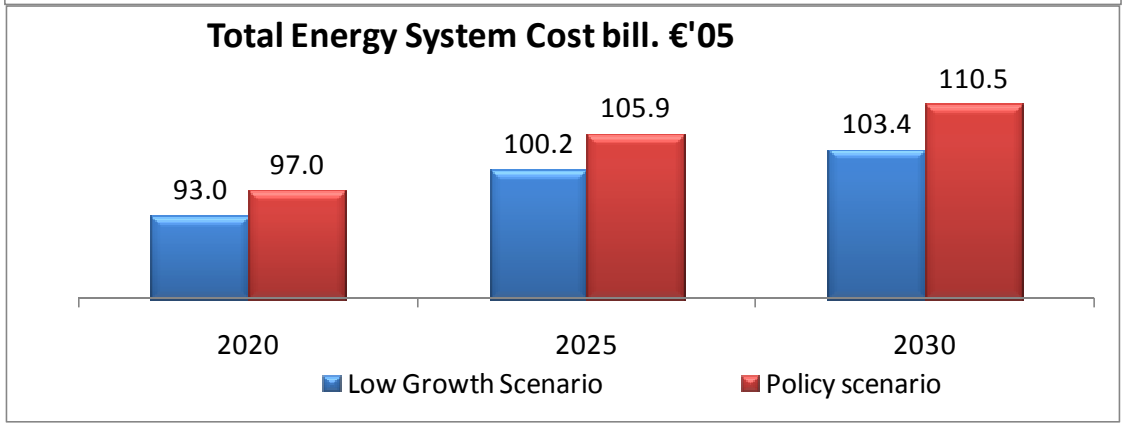


Costs and Prices

Electricity prices are affected because of higher costs for restructuring and the auctioning of ETS allowances

Total energy system costs are higher, between 5.5 and 9 billion Euros, every year from 2020 onwards. This includes costs for consumers to purchase energy and to invest in energy efficiency.





Conclusions

- Economic growth scenarios for the Balkans after the financial crisis imply rather low growth of energy demand. The projections for Turkey differ than the rest of the SEE.
- Gasification trends and renewables deployment is a dominant trend; however future gas needs are found lower than expected in the recent past.
- The current trends in the SEE show a less climate-friendly evolution than in the EU27, both regarding emissions and the RES. Security of supply is among the issues for concern.
- Applying the EU Climate Action and RES policy package in the entire SEE region, induces significant changes: high energy savings, impressively more RES (wind and biomass) and some more nuclear close to 2030. Gas substitutes fossil fuels but total gas needs reduce slightly from baseline.
- However, such a policy implies higher electricity prices but a modest increase in overall energy system costs

Thank you