SEERMAP

South-East Europe Electricity Roadmap

RES in Bosnia and Herzegovina Status and Development

NREAP

of Bosnia and Herzegovina

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INSPIRED BY THE FUTURE

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- B&H was obliged to prepare the NREAP in 2006 when the decision to establish the Energy Community was enacted
- B&H defined/confirmed NREAP targets in acc. w/ Directive 2009/28/EC, in March 2016 by decision of Ministerial Council of B&H
- The NREAP defines mandatory targets for RES and its share in energy consumption in 2020
- The target for B&H is set at 40% of RES participation
- The baseline year is 2009, the share of RES in final consumption was already 34%
- Expected total adjusted energy consumption in 2020: 4.852 (ktoe)
- Expected amount of RES energy corresponding to 2020 target: 1.940 (ktoe)
- Three main sectors are:
  - heating and cooling,
  - electricity,
  - transport
- In 2016 the total share of RES should be 36,7% which is in acc. w/ estimated trajectory = no available data about real situation
- Currently no official targets beyond 2020

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	Baseline	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
RES - H&C	43.3 %	44.4 %	45.7 %	47.5 %	48.6%	51.4%	51.7%	51.7%	52.0%	51.2%	52.7%	52.4 %
RES-E	50.3 %	60.5 %	40.7%	42.8%	46.4 %	45.7 %	48.0 %	50.0 %	51.5 %	54.6 %	54.5 %	56.9 %
RES-T	0.9%	0.8%	0.7%	0.7%	0.7%	0.6%	1.0 %	3.3 %	5.4 %	7.4 %	8.5 %	10.1 %
Total RES share	34.0 %	36.4 %	31.7 %	32.9%	34.1%	35.0%	35.8%	36.7%	37.5%	38.4%	39.2%	40.0 %

Overall for 2020 and estimated trajectory for RES in total

	Baseline	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
RES - H&C	792	835.4	867.2	910.1	941.8	1005.0	1023.2	1032.7	1047.6	1041.5	1081.7	1085.2
RES-E	495.2	627.2	436.7	463.8	502.2	509.0	546.4	585.1	619.4	674.8	691.7	741.4
RES-T	5.9	7.1	4.8	5.0	5.4	5.3	15.6	38.5	61.2	83.8	99.5	113.9
Total RES share	1306.9	1469.6	1308.7	1378.9	1449.4	1519.3	1585.2	1656.3	1728.2	1800.0	1872.9	1940.5

Table for calculating the share of RES for each sector in total energy consumption (ktoe)

	2011-2012	2013-2014	2015-2016	2017-2018	2020
	$C_{bazno}+20\%(C_{2020}-C_{bazno})$	$C_{bazno}+30\%(C_{2020}-C_{bazno})$	$C_{bazno}+40\%(C_{2020}-C_{bazno})$	$C_{bazno}+55\%(C_{2020}-C_{bazno})$	C_{2020}
RES minimum trajectory (%)	35.2	35.8	36.4	37.3	40
RES minimum trajectory (ktoe)	1433.6	1497.0	1560.3	1655.4	1940.5

Estimated trajectory

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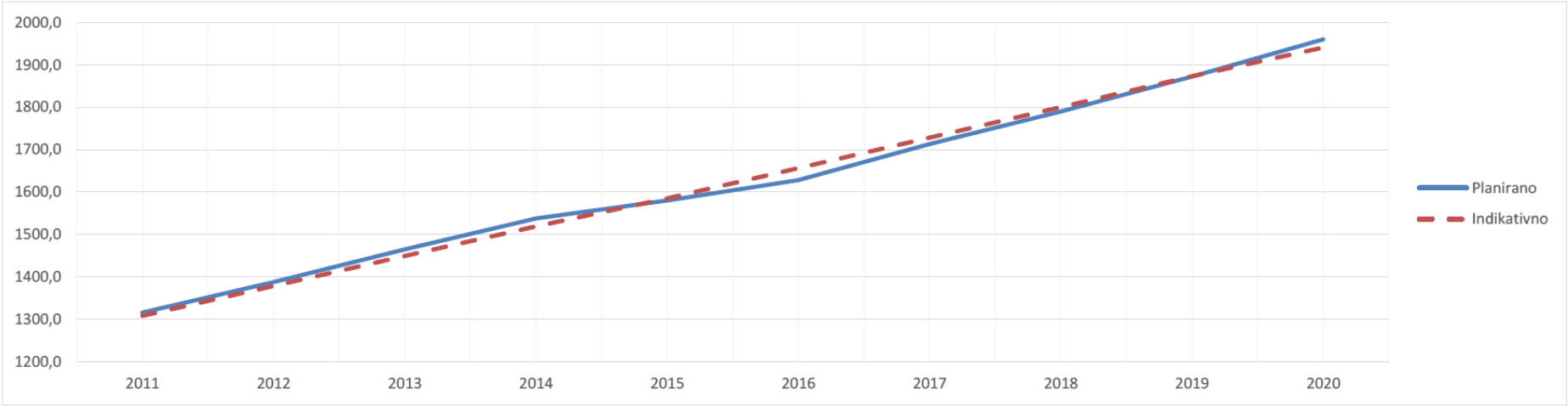

Comparative presentation of indicative trajectories of increase in consumption of final RES energy and planning of RES energy production for BiH in the period 2010-2020 (ktoe)

NREAP in Bosnia-Herzegovina

- RES electricity support scheme on entity level
- FIT support for RES development for projects up to 10 MW
- For different RES projects and different project sizes there are different FIT values
- In order to get FIT the project needs to enter the quotas
- Qutoas different for different RES projects
- Guaranteed price consists of:
  - Reference price (to be estimated each year)
  - Tariff coefficient or premium (depends on type and size of RES)

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Tip postrojenja prema vrsti primarnog izvora energije	Snaga	Sati rada	Jedinična vrijednost investicije (T_{INV})	Troškovi rada i održavanja ($T_{R\&O}$)	Troškovi goriva (T_{goriva})	Faktor nadoknade uloženog kapitala ($F_{n.k}$)	Troškovi proizvodnje po jedinici električne energije (TP_e)	Referentna cijena (R_C)	Tarifni koeficijent (C)	Garantovana cijena (G_C)
	kW	h/god	KM/kW	KM/kW	KM/kWh	%	KM/kWh	KM/kWh		KM/kWh
	1	2	3	4	5	6	7=5+4/2 +(3*6)/2	8	9=7/8	10=8*9
Hidroelektrana										
a) mikro	23	4.100	3.500	705	0	13,90	0,29036	0,105696	2,7471	0,29036
b) mini	150	4.100	3.500	260	0	13,90	0,18192	0,105696	1,7211	0,18192
c) mala	1.000	4.100	3.100	134	0	13,90	0,13751	0,105696	1,3010	0,13751
d) srednja	10.000	4.100	2.900	105	0	13,90	0,12373	0,105696	1,1706	0,12373
e) velika	-	-	-	-	-	-	-	-	-	-
Vjetroelektrana										
a) mikro	23	2.500	3.100	498	0	13,90	0,37124	0,105696	3,5123	0,37124
b) mini	150	2.500	3.100	124	0	13,90	0,22140	0,105696	2,0947	0,22140
c) mala	1.000	2.500	2.900	71	0	13,90	0,18917	0,105696	1,7898	0,18917
d) srednja	10.000	2.500	2.550	47	0	13,90	0,16033	0,105696	1,5169	0,16033
e) velika	15.000	2.500	2.350	43	0	13,90	0,14766	0,105696	1,3971	0,14766
Solarna elektrana										
a) mikro	23	1.500	3.900	386	0	13,90	0,61814	0,105696	5,8483	0,61814
b) mini	150	1.500	3.900	169	0	13,90	0,47335	0,105696	4,4784	0,47335
c) mala	1.000	1.500	3.520	102	0	13,90	0,39326	0,105696	3,7206	0,39326
d) srednja	-	-	-	-	-	-	-	-	-	-
e) velika	-	-	-	-	-	-	-	-	-	-

Excerpt from FIT in the Federation of B&H

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Excerpt from FIT in Republika Srpska

Тип електране према врсти извора енергије и инсталисаној снази	Продаја у обавезном откупу по гарантованим откупним цијенама			Продаја на тржишту и потрошња за властите потребе	
	Гарант. откупна цијена KM/kWh	Референтна цијена KM/kWh	Премија (у гарантованој цијени) KM/kWh	Референтна цијена KM/kWh	Премија KM/kWh
Хидроелектране:					
• до укључиво 1 MW	0,1541	0,0541	0,1000	0,0776	0,0765
• преко 1 MW до укључиво 5 MW	0,1327	0,0541	0,0786	0,0776	0,0551
• преко 5 MW до укључиво 10 MW	0,1245	0,0541	0,0704	0,0776	0,0469
Вјетроелектране *(гарантована откупна цијена за постројења до укључиво 10 MW, а премија без ограничења)*	0,1652	0,0541	0,1111	0,0776	0,0876
Електране на чврсту биомасу					
• до укључиво 1 MW	0,2413	0,0541	0,1872	0,0776	0,1637
• преко 1 MW до укључиво 10 MW	0,2261	0,0541	0,1720	0,0776	0,1485
Електране на пољопривредни биогас до укључиво 1 MW	0,2402	0,0541	0,1861	0,0776	0,1626
Конвенционални извори енергије у ефикасном когенеративном постројењу *(гарантована откупна цијена за постројења инсталисане снаге до укључиво 10 MW, а премија за продају на тржишту и потрошњу за властите потребе за постројења инсталисане снаге до укључиво 30 MW)*					
• Нова когенеративна постројења на **гас** до укључиво 1 MW	0,1731	0,0541	0,1190	0,0776	0,0955
• Нова когенеративна постројења на **гас** од 1 MW до укључиво 10 MW	0,1478	0,0541	0,0937	0,0776	0,0702
• Нова когенеративна постројења на **лигнит** до укључиво 1 MW	0,1197	0,0541	0,0656	0,0776	0,0421
• Нова когенеративна постројења на **лигнит** од 1 MW до укључиво 10 MW	0,0882	0,0541	0,0341	0,0776	0,0106

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Overview of RES support scheme for B&H

Power Plant Type	Federation of BiH	Republika Srpska
Hydro Power Plants	▪ Micro, up to 23 kW ▪ Mini, 23-150 kW ▪ Small, 150-1000 kW ▪ Medium, 1-10 MW	▪ < 1 MW ▪ 1 – 5 MW ▪ 5 – 10 MW
Wind Farms	▪ Micro, up to 23 kW ▪ Mini, 23-150 kW ▪ Small, 150-1000 kW ▪ Medium, 1-10 MW ▪ Large, 10-15 MW	▪ < 10 MW, guaranteed tariff ▪ ≥ 10 MW, premium tariff
Photovoltaic Power Stations (Solar Parks)	▪ Micro, up to 23 kW ▪ Mini, 23-150 kW ▪ Small, 150-1000 kW	▪ Roof, up to 50 kW ▪ Roof, 50 - 250 kW ▪ Roof, 250 - 1000 kW ▪ Ground, up to 250 kW
Biomass Power Plants	▪ Micro, up to 23 kW ▪ Mini, 23-150 kW ▪ Small, 150-1000 kW ▪ Medium, 1-10 MW	▪ < 1 MW ▪ 1 – 10 MW
Biogas Power Plants	▪ Micro, up to 23 kW ▪ Mini, 23-150 kW ▪ Small, 150-1000 kW ▪ Medium, 1-10 MW	▪ Biogas from agricultural waste, up to 1 MW ▪ Landfill gas in efficient cogeneration, up to 1 MW ▪ Landfill gas in efficient cogeneration, 1 - 10 MW
Efficient Cogeneration	▪ Medium, up to 5 MW	
Efficient Cogeneration – non-conventional energy sources		▪ New gas cogeneration, up to 1 MW ▪ New gas cogeneration, 1 - 10 MW ▪ New lignite cogeneration, up to 1 MW ▪ New lignite cogeneration, 1 - 10 MW

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- RES integration issues
  - Network regulation in acc. w/ connection rules, the network costs mostly to be carried by project developer, in some cases impact on project feasibility
  - Balancing requirements currently only in RS = how to manage for run/off/river SHPP

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- The regulation defines the FIT consisting of:
  - Reference price (to be paid by stated owned energy utilities)
  - Tariff coefficient or premium (in acc. w/ Decision on remuneration by all energy consumers)
- Currently in the Federation B&H the remuneration amounts to 0,1 pf/kWh or 0,05 Eurocent/kWh = some 4 mil. Euro in the pot
- In RS the current remuneration is 0,25 pf/kWh or 0,13 Eurocent/kWh = some 10 mil. Euro in the pot
- In the Federation B&H there is a System Operator managing the RES system
- In RS the state owned energy utility plays the role of the System Operator
- In order to achieve NREAP targets (which are partly included in the quotas) the remuneration will need to be increased

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			2010		2011		2012		2013		2014	
			MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh
Hydropower			1.10	4.50	6.55	29.00	43.63	188.72	49.08	213.25	55.98	247.61
< 1 MW			0.00	0.00	0.45	2.03	9.63	43.43	10.08	45.46	11.37	47.82
1 - 10 MW			1.10	4.50	6.10	27.00	34.00	145.29	39.00	167.79	44.61	199.79
Geothermal			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Solar			0.00	0.00	0.21	0.25	2.11	2.86	2.32	3.11	6.90	9.45
Photovoltaic			0.00	0.00	0.21	0.25	2.11	2.86	2.32	3.11	6.90	9.45
concentrated			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tide and Waves Energy			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wind Energy			0.00	0.00	5.00	10.00	20.00	40.00	25.00	50.00	30.00	60.00
inland			0.00	0.00	5.00	10.00	20.00	40.00	25.00	50.00	30.00	60.00
on the sea			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Biomass			0.00	0.00	0.83	2.23	3.30	8.91	4.13	11.14	5.87	19.37
hard			0.00	0.00	0.83	2.23	2.00	5.91	2.50	7.39	3.92	14.87
biogas			0.00	0.00	0.00	0.00	1.30	3.00	1.63	3.75	1.95	4.50
bioliquids			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL			1.10	4.50	12.59	41.48	69.03	240.49	80.52	277.50	98.75	336.43
	2015		2016		2017		2018		2019		2020	
	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh
Hydropower	66.72	293.09	79.14	348.04	97.30	426.99	110.89	486.24	135.05	593.76	162.36	712.12
< 1 MW	13.32	56.66	15.88	67.86	20.58	88.20	23.66	101.78	26.97	116.70	32.88	70.00
1 - 10 MW	53.39	236.43	63.27	280.18	76.72	338.79	87.24	384.46	108.08	477.06	129.48	570.12
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Solar	8.48	11.75	10.90	14.80	14.50	19.73	16.33	22.33	17.17	23.92	20.00	27.52
Photovoltaic	8.48	11.75	10.90	14.80	14.00	19.14	15.33	21.14	15.67	21.64	18.00	25.14
concentrated	0.00	0.00	0.00	0.00	0.50	0.59	1.00	1.19	1.50	1.78	2.00	2.38
Tide and Waves Energy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wind Energy	35.00	70.00	45.00	90.00	79.00	170.00	95.00	205.00	123.00	265.00	142.80	307.00
inland	35.00	70.00	45.00	90.00	79.00	170.00	95.00	205.00	123.00	265.00	142.80	307.00
on the sea	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Biomass	7.63	27.60	9.12	32.70	11.29	40.86	13.13	48.27	16.37	58.82	19.45	70.04
hard	5.35	22.35	3.19	25.95	7.71	32.61	9.23	39.27	11.49	47.58	13.61	56.56
biogas	2.28	5.25	2.93	6.75	3.58	8.25	3.90	9.00	4.88	11.24	5.84	13.48
bioliquids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	117.82	402.44	143.08	485.08	199.79	655.88	233.19	760.83	289.65	941.50	342.48	1116.68

Overview of production from RES supported by FIT until 2020

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- Key barriers
  - Quota regulation
  - Feed in tariff budget cap
  - Network connection
  - Administration
- Regulatory changes in recent years
  - Introduction of quotas
  - Establishing RES system operator in FB&H
  - Introduction of balancing obligation for RES in RS
  - Provision of bank guarantee for tender bids in RS