



Okrugli stol:

Nacrt pravilnika o korištenju obnovljivih izvora energije i visokoučinkovite kogeneracije – prostor za bioplin
HGK, 1.9.2016.

Primjeri dobre prakse iz 7 zemalja projekta BiogasAction



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Energetski institut Hrvoje Požar
Zagreb



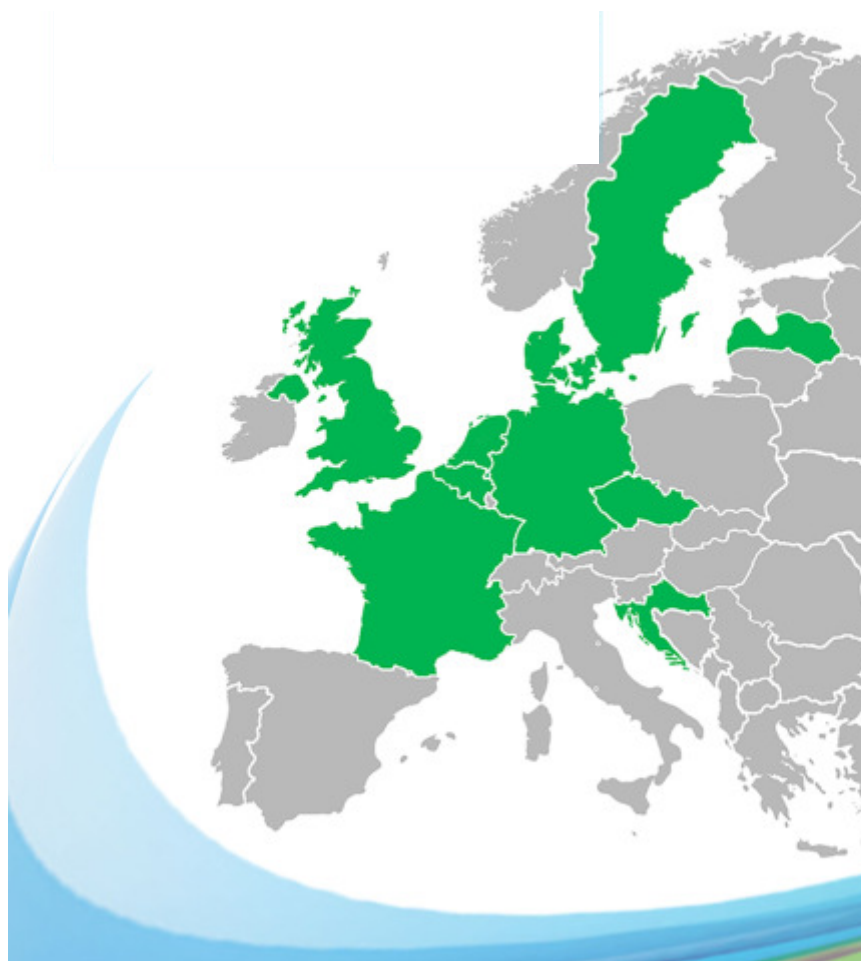
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 6917552

Biogas Action

- o www.BiogasAction.eu
- o 1.1.2016.-31.12.2018.
- o BiogasAction nastoji biti pokretač razvoja europskog tržišta bioplina te povećati proizvodnju bioplina i biometana u EU usmjeravajući se na otklanjanje ne-tehničkih prepreka i izgradnju boljeg okruženja za proizvodnju bioplina i biometana, u skladu s ciljevima za 2020 godinu.
- o Projekt zagovara razvoj tržišta (malih) bioplinskih postrojenja koja ne koriste energetske usjeve u osam ciljanih zemalja i pomaže razvoju tržišta u odnosu na zatečeno stanje.
- o Budžet: 1,99 M€



Konzorcij



Project Coordinator

EC Network

ECNet - EC Network Denmark



AILE - Local Energy Agency of Western France



Ekodoma Latvia



Czech Biogas Association Czech Republic



ESS - Energy Agency for Southeast Sweden



CCS Energy advice - Cornelissen Consulting Services | Netherlands



Fedarene Belgium



DFFB - Danish Technology Centre for Biogas | Denmark



IBBC - The International Biogas and Bioenergy Centre of Competence | Germany



EBA - European Biogas Association | Belgium



RAEE - Rhônalpénergie-Environnement | France



EIHP - Energy Institute Hrvoje Požar | Croatia



SWEA - Severn Wye Energy Agency | United Kingdom



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Neki od zadataka za RH:

- o Pomoći u uspostavljanju povoljnijeg zakonodavnog okvira
- o Jačanje kapaciteta dionika tržišta
- o Uspostava platforme za bioplin www.Obioplínu.com
- o Procjena socio-ekonomskih utjecaja na društvo od proizvodnje bioplina
- o Treninzi, radionice
- o Projektno područje:
 - Koprivničko-križevačka županija i
 - Bjelovarsko-bilogorska županija
- o





Pisma podrške projektu:



- o Hrvatska savjetodavna služba
- o Hrvatska udruga mladih poljoprivrednika
- o Hrvatska mljekarska udruga
- o Hrvatska gospodarska komora, Zajednica za OIE – Grupacija za bioplin

te partneri s projektnog područja:

- o Koprivničko-križevačka županija
- o Bjelovarsko-bilogorska županija
- o Grad Bjelovar
- o Tehnološki park Bjelovar
- o Općina Ivanska
- o Općina Sv. Ivan Žabno
- o Razvojna agencija Podravine i Prigorja - PORA

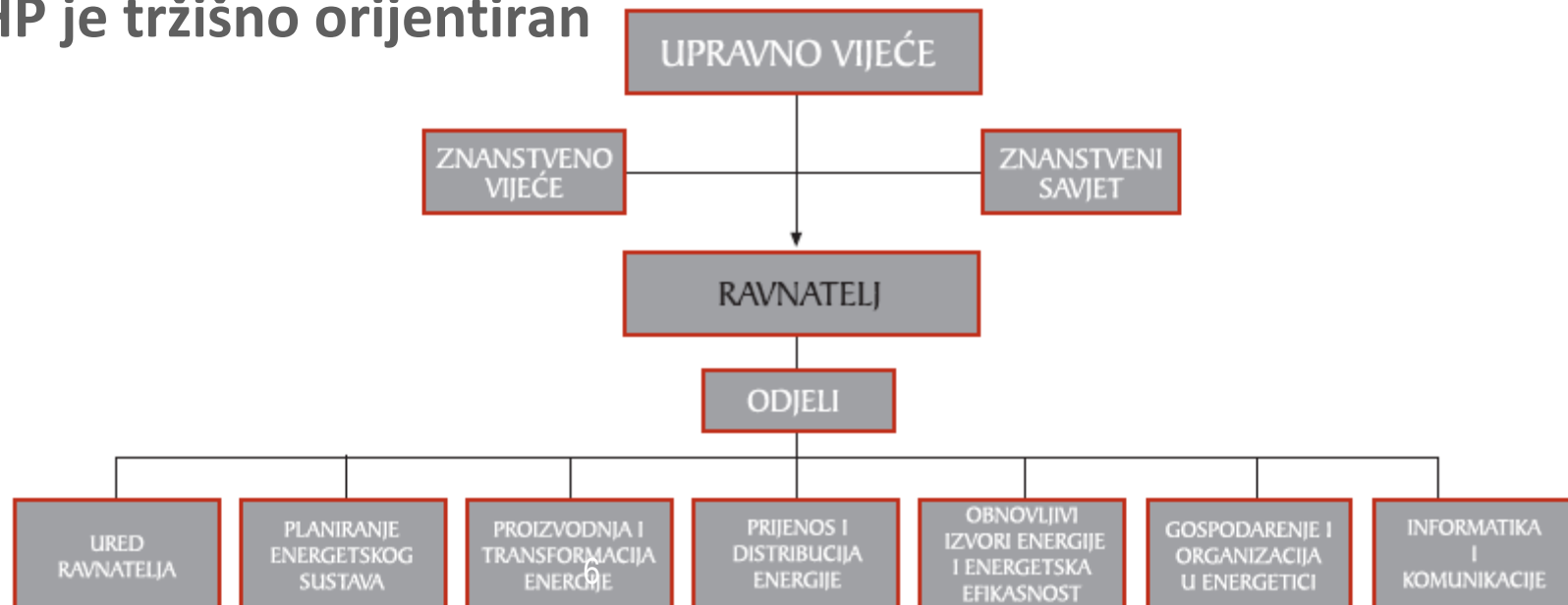


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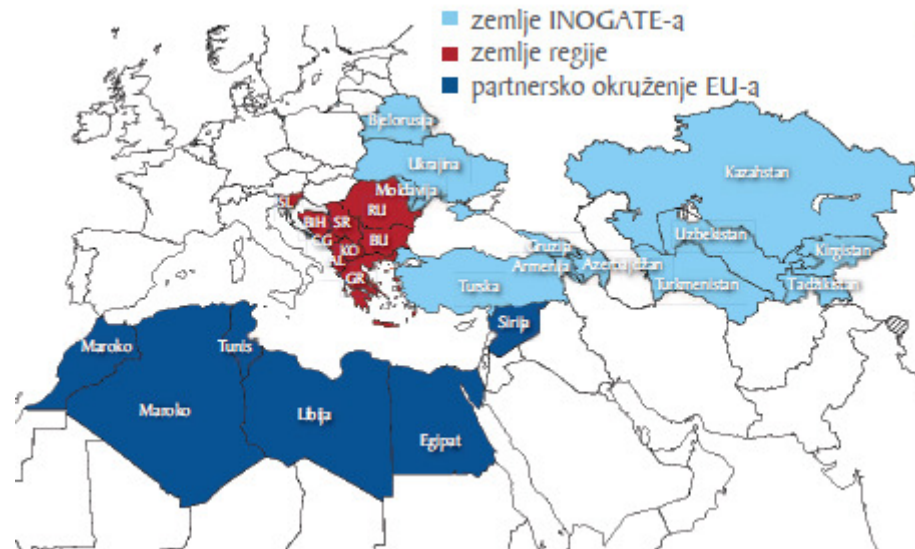
- o Energetski institut osnovan od strane Vlade RH
- o Misija: razvoj modernih i održivih energetske tržišta kroz integraciju OIE i EE, novih tehnologija i razmjenom iskustava
- o ~85 😊😊 (80% visokoobrazovanih)
- o 6+1 Odjela:
 - Odjel za OIE i EE (22 😊): multidisciplinarni tim (7 različitih profesija i profila)

- o **EIHP je tržišno orijentiran**

ORGANIZACIJSKA SHEMA



Reference

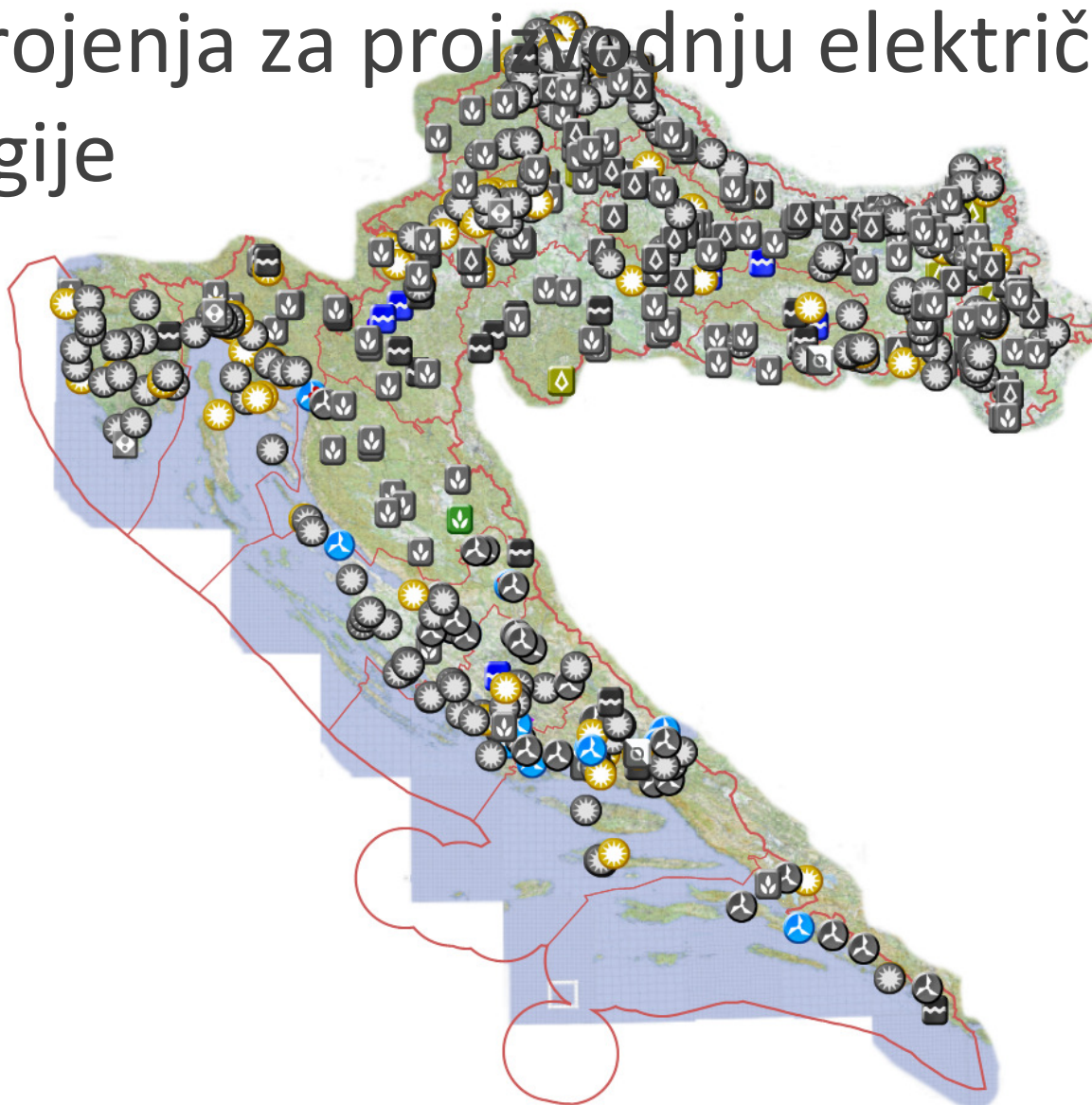


Sadržaj

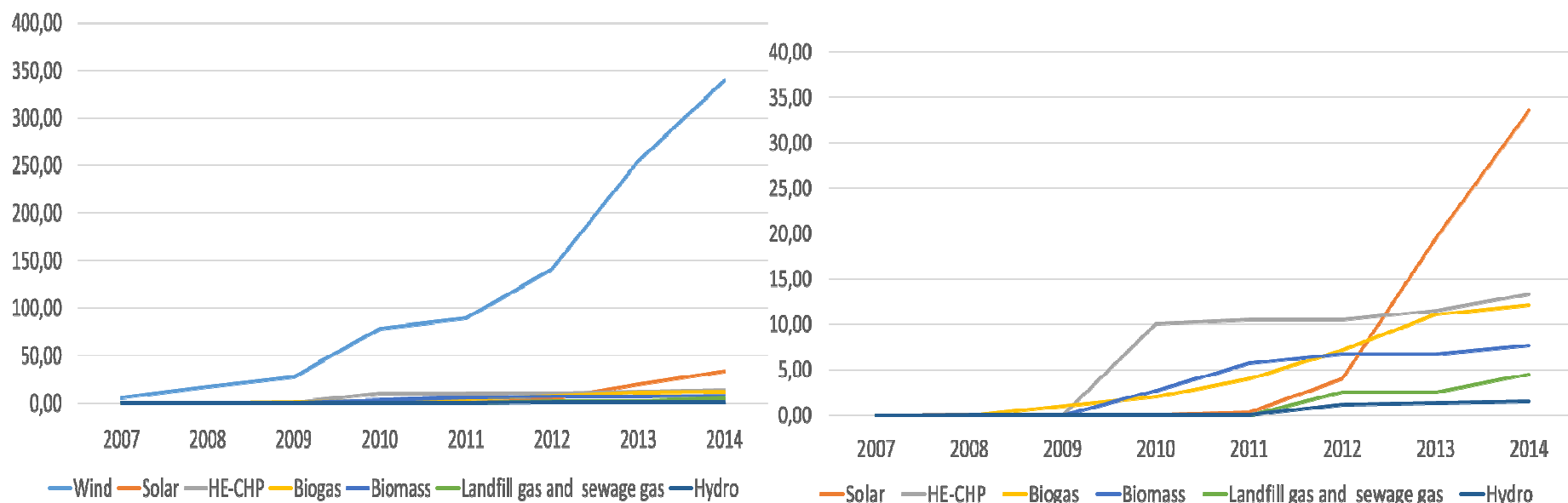
- **Gdje se nalazi sektor bioplina u energetsom sustavu RH**
- **Moguće uloge bioplina u energetsom sektoru RH**
- **Primjeri iz 7 zemalja Biogas Action projekta**
- **Diskusija**



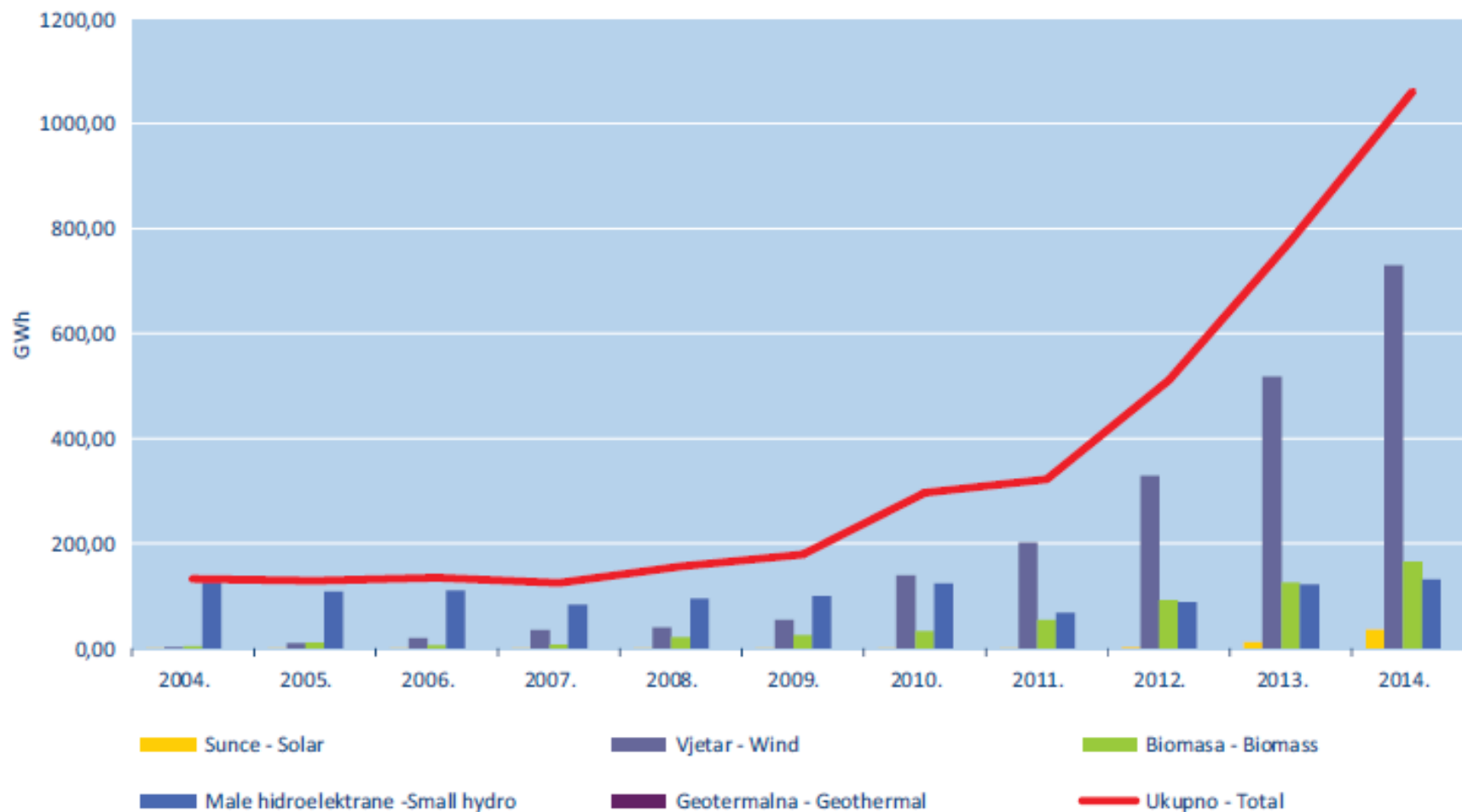
OIE projekti u RH = ukupno 1280
postrojenja za proizvodnju električne
energije



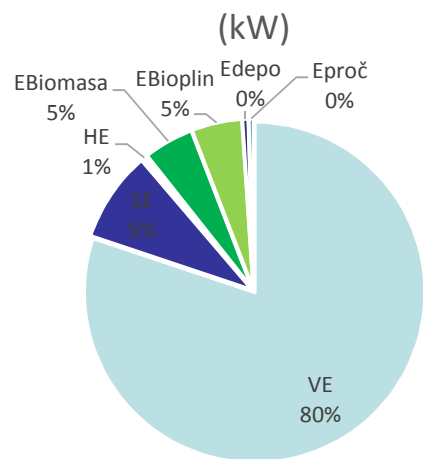
Instalirani kapaciteti za električnu energiju iz OIE (MW) do 2014.: 434 MWe



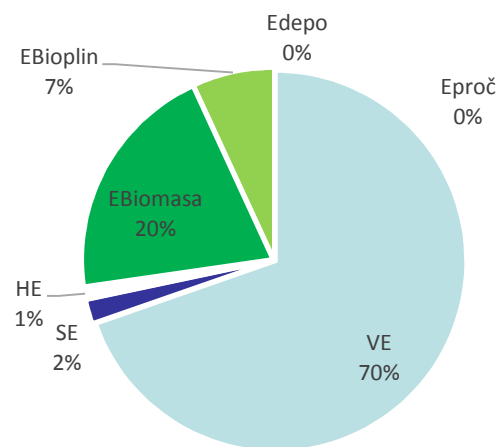
Proizvodnja električne energije u 2014.: 1061,5 GWh ili 7.8% (bez velikih hidroelektrana)



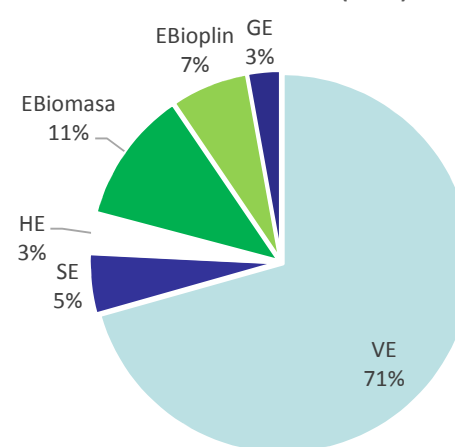
Povlašteni proizvođači 2016. (kW)



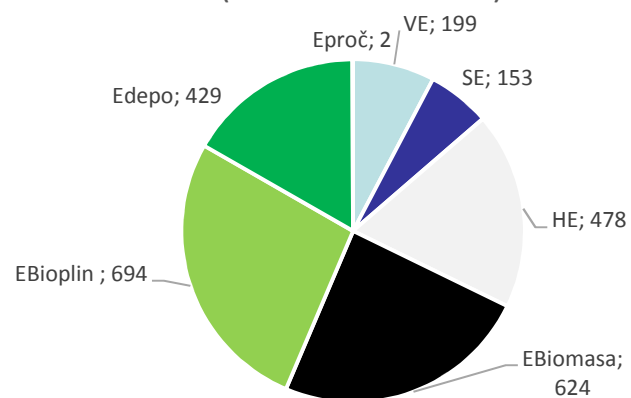
Nositelji projekata 2016. (kW)



Kvota 2020. (kW)



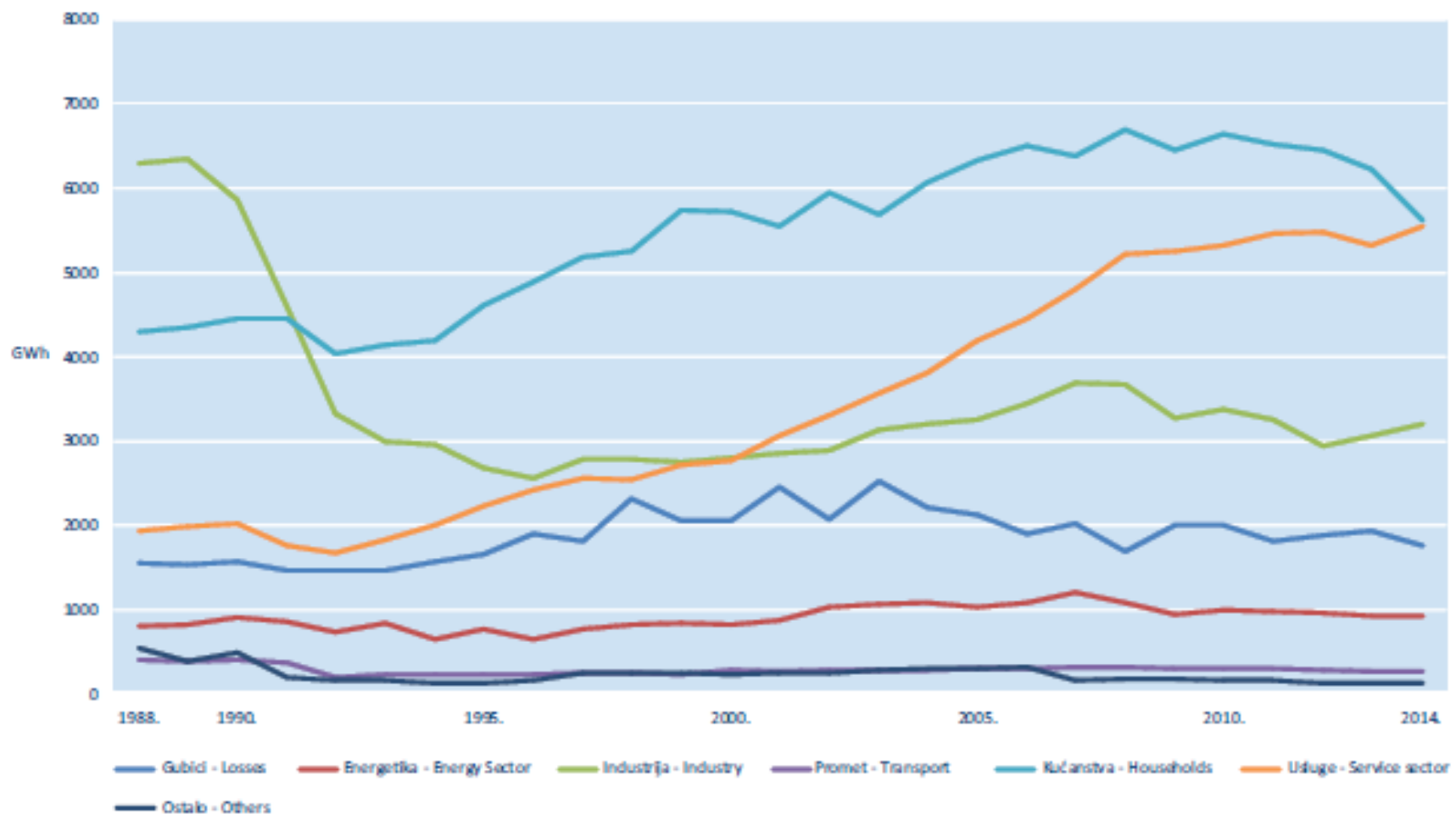
Radni sati po tehnologiji - lipanj 2016. (Maksimum 730 h)



Tehnologija	Proizvodnja (kWh)
VE	66%
EBiomasa	12%
EBioplin	14%
HE	1%
SE	6%
Edepo	1%
Eproč	0%
Ukupno	126.336.979



Potrošnja električne energije po sektorima



20:20:20 ciljevi za RH: udio OIE u bruto finalnoj potrošnji energije = 27% u 2014.!

	2011	2012	2013	2014	2020 target
Total RES	25.4	26.8	28.1	27.9	20.0
RES-E	37.6	38.8	42.2	45.3	39.0*
RES-H/C	33.7	36.5	37.2	36.2	19.6*
RES-T	0.4	0.4	2.2	2.1	10.0*

- Promjena u metodologiji u 2011.:
 - 72% hrvatskih kućanstava koristi krutu biomasu za grijanje (71% čini ogrjevno drvo) u 2012.
 - U ukupnoj finalnoj energetske potrošnji kućanstava, biomasa čini 53%, ali je svega 0,56% pripisano modernoj biomasi
- Da li je 20:20:20 cilj zaista ispunjen?



Tržište bioplina RH

- o 1998. BIOEN – procijenjen potencijal na ~2 PJ
- o 2007. “Doručak za bioplin” projekt IEE Big>East (EIHP)
- o 2009. 1. postrojenje za proizvodnju i korištenje bioplina (1MWe)
- o Nedovoljno pažnje ili planiranja od strane VRH prema potencijalima bioplina:
 - Bioplin je uključen u Nacionalnu energetska strategiju (2009) naknadno i to “cilj za 2020: 9 PJ iz bioplina”
 - Bez razmatranja koja bi vrsta korisne energije bila najpotrebnija
- o Neorganiziranost sudionika tržišta bioplina
- o Najčešća veličina bioplinskog postrojenja: 1 MWe
- o Visoka ovisnost o energetska usjevima

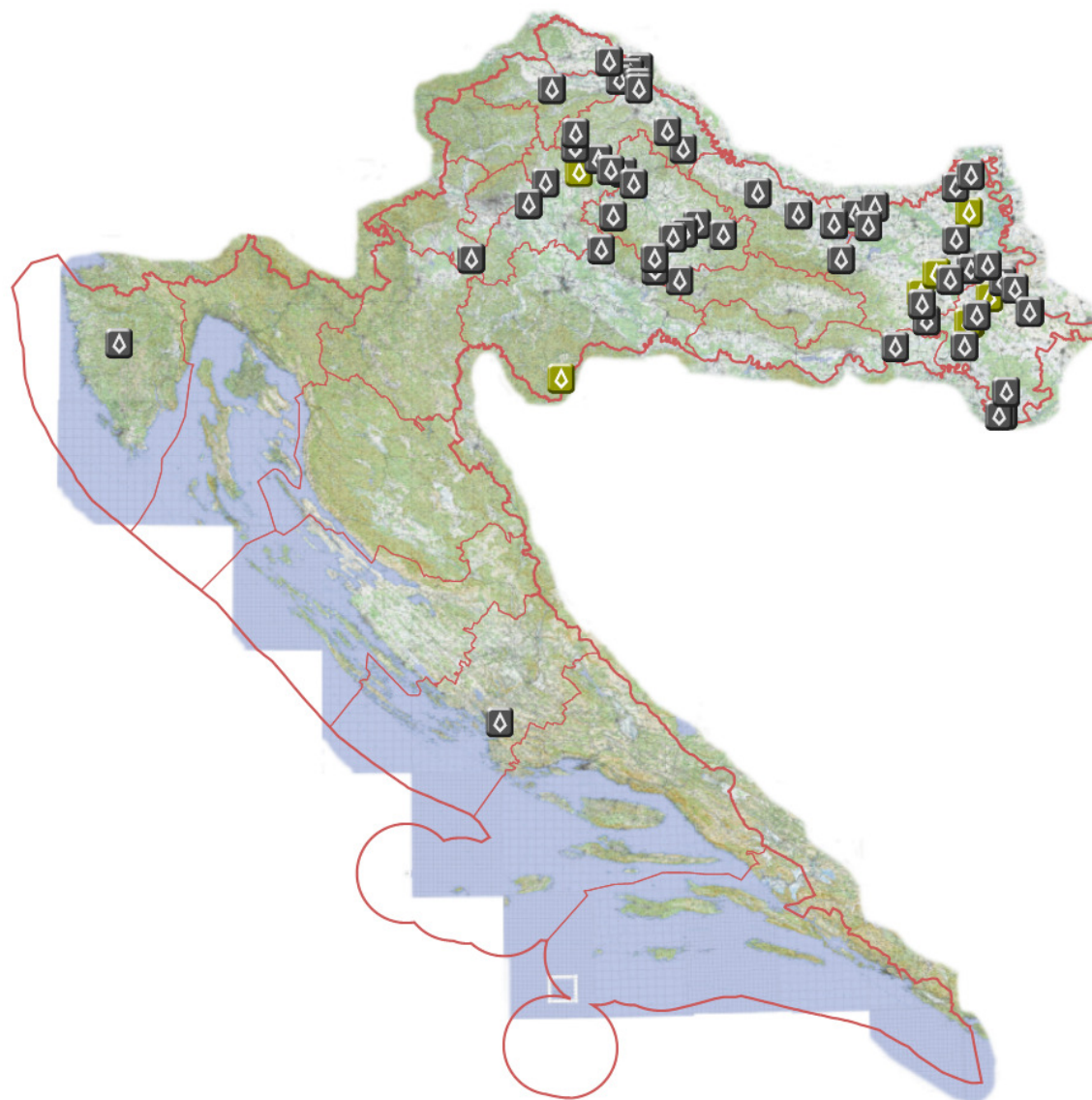


Tržište bioplina RH

- o Većina razvoja tržišta bioplina je došlo kroz projekte financirane od strane IEE programa, a sada kroz H2020:
 1. BiG>East (2007-2010),
 2. BiogasIN (2010-2012),
 3. Geronimo II-Biogas (2011-2013),
 4. GreenGasGrids (2011-2014);
 5. BioMethaneRegions (2011-2014),
 6. UrbanBiogas (2011-2014) and
 7. BiogasHeat (2012-2015)
 8. Bin2Grid (H2020: 2015-2018)
 9. BiogasAction (H2020: 2016-2019)
- o Projekti su omogućili osnovne edukacijske aktivnosti i razmjenu informacija (Priručnik za bioplin, Korištenje toplinske energije iz bioplina, treninzi, seminari...)
- o EIHP je koordinirao i/ili sudjelovao u 7/9 projekata vezanih za bioplin u Hrvatskoj



HR tržište bioplina 2016.



Perspektive tržišta bioplina u HR

- o <2016.:
 - Najčešća veličina: 1 MW_{el}
 - ~5 glavnih igrača
 - Većina proizvodnje se oslanja na energetske usjeve
- o >2016.:
 - ~8 MW_{el} preostalo do 2020.
 - Postrojenja od $<30 \text{ kW}_{el}$ prihvatljiva za FiT, ali visoke barijere za ulazak na tržište
 - HR farme su među najmanjima u EU i nestaju



Neslužbena procjena tehničkog potencijala biometana u RH

- o Poljoprivreda: ~ 2,48 (ali i 26,7 PJ)
- o Otpad: > 1,09 PJ
- o Pročistači otpadnih voda: > 0,23 PJ
- o Deponiji: > 0,43 PJ
- o Industrija; ? PJ +

IEE Urban Biogas: ~4,23 PJ/god.

IEE Green Gas Grids: ~ 3,37 PJ/god.

EKONOMSKI POTENCIJAL BIOMETANA/BIOPLINA: 0-11,61 PJ

Kako?



DK vs DE pristup procjeni potencijala bioplina u HR (uz angažman 226.563 ha za energetske usjeve)

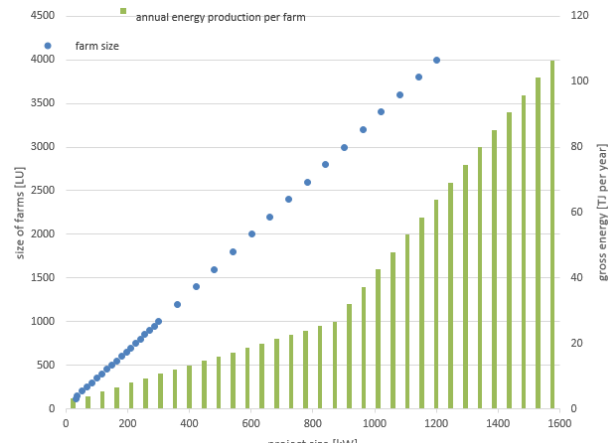
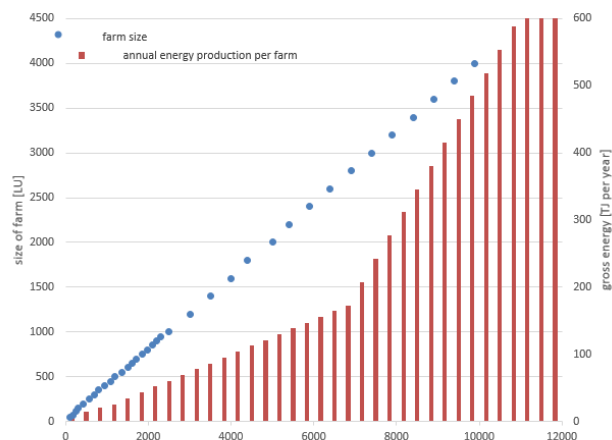


Table 5 – Economic potential of on-farm biogas plants for Croatia: energy produced and used (2012) – scenario high.

ROI ≥ %	Gross energy per ROI group [PJ]	Cumulative [PJ]	Electricity generated per ROI group [PJ]	Cumulative [PJ]
20	6.82	6.82	2.60	2.60
15	6.92	13.74	2.64	5.25
13	3.44	17.18	1.21	6.45

Table 6 – Economic potential of on-farm biogas plants for Croatia: energy produced and used (2012) – scenario low.

ROI ≥ %	Gross energy per ROI group	Cumulative [PJ]	Electricity generated per ROI group [PJ]	Cumulative [PJ]
30	4.20	4.20	1.60	1.60
25	5.42	9.62	2.07	3.67
20	5.50	15.12	2.10	5.77
15	5.49	20.61	2.05	7.83
13	6.10	26.71	2.03	9.86

Izvor: Kulisic et al.: Calculation of on-farm biogas potential: A Croatian case study, Biomass&Bioenergy 74(2015):66–78



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Bilanca prirodnog plina 2009.- 2014.

		2009.	2010.	2011.	2012.	2013.	2014.	2014/13.	2009-14.
		milijuna m ³			Million cubic meters			%	
Proizvodnja	Production	2704,8	2727,2	2471,4	2013,1	1856,1	1747,0	-5,9	-8,4
Uvoz	Import	1044,2	1069,6	876,1	1357,7	1270,4	1132,6	-10,8	1,6
Izvoz	Export	804,9	484,1	258,6	256,8	376,1	433,9	15,4	-11,6
Saldo skladišta	Stock change	15,3	-71,2	76,1	-142,3	59,5	-2,1		
Ukupna potrošnja	Energy supplied	2959,4	3241,5	3165,0	2971,7	2809,9	2443,6	-13,0	-3,8

70 MWe = ~ 235 Mm³ prirodnog plina ili

10% ukupne potrošnje ili

13% ukupne proizvodnje ili

21% ukupnog uvoza

~ 4% ukupnih termoelektrana u RH (u sustavu HEPa)

~ 3% ukupnih hidroelektrana u RH (u sustavu HEPa)



	Electricity prices						Gas prices					
	Households (*)			Industry (*)			Households (*)			Industry (*)		
	2012	2013	2014	2012	2013	2014	2012	2013	2014	2012	2013	2014
EU-28	0.195	0.202	0.208	0.116	0.118	0.120	0.070	0.071	0.072	0.038	0.040	0.037
Euro area (EA-17) (5)	0.205	0.215	0.221	0.122	0.126	0.128	0.077	0.079	0.079	0.039	0.041	0.038
Belgium	0.222	0.222	0.204	0.111	0.110	0.109	0.073	0.067	0.065	0.035	0.034	0.029
Bulgaria	0.096	0.088	0.090	0.078	0.073	0.084	0.056	0.052	0.047	0.040	0.035	0.034
Czech Republic	0.150	0.149	0.127	0.103	0.099	0.082	0.066	0.058	0.056	0.034	0.033	0.030
Denmark	0.297	0.294	0.304	0.099	0.100	0.088	0.096	0.098	0.088	0.042	0.044	0.036
Germany	0.268	0.292	0.297	0.130	0.144	0.152	0.065	0.069	0.068	0.038	0.048	0.040
Estonia	0.112	0.137	0.133	0.082	0.097	0.093	0.052	0.048	0.049	0.036	0.035	0.037
Ireland	0.229	0.241	0.254	0.140	0.137	0.131	0.067	0.072	0.075	0.042	0.047	0.042
Greece	0.142	0.170	0.179	0.122	0.124	0.130	0.102	0.089	0.080	0.058	0.051	0.047
Spain	0.228	0.227	0.237	0.120	0.120	0.117	0.086	0.089	0.096	0.038	0.038	0.037
France	0.145	0.159	0.175	0.079	0.085	0.091	0.068	0.073	0.076	0.040	0.039	0.038
Croatia	0.138	0.135	0.132	0.094	0.094	0.092	0.047	0.047	0.048	0.046	0.043	0.040
Italy	0.230	0.232	0.234	0.178	0.172	0.174	0.097	0.095	0.095	0.040	0.038	0.035
Cyprus	0.291	0.248	0.236	0.234	0.201	0.190	-	-	-	-	-	-
Latvia	0.137	0.136	0.130	0.111	0.115	0.118	0.056	0.050	0.049	0.040	0.037	0.036
Lithuania	0.127	0.139	0.132	0.114	0.123	0.117	0.061	0.061	0.050	0.046	0.041	0.037
Luxembourg	0.171	0.165	0.174	0.101	0.100	0.099	0.059	0.057	0.051	0.051	0.045	0.039
Hungary	0.162	0.133	0.115	0.100	0.098	0.090	0.052	0.042	0.035	0.047	0.048	0.039
Malta	0.168	0.169	0.125	0.186	0.186	0.186	-	-	-	-	-	-
Netherlands	0.190	0.192	0.173	0.097	0.094	0.089	0.084	0.085	0.082	0.037	0.036	0.033
Austria	0.202	0.202	0.199	0.112	0.111	0.106	0.076	0.075	0.073	0.043	0.043	0.040
Poland	0.153	0.144	0.141	0.096	0.088	0.083	0.058	0.051	0.050	0.038	0.036	0.036
Portugal	0.206	0.213	0.223	0.115	0.114	0.119	0.085	0.093	0.104	0.042	0.042	0.047
Romania	0.108	0.128	0.125	0.076	0.082	0.081	0.027	0.031	0.032	0.026	0.029	0.031
Slovenia	0.154	0.166	0.163	0.094	0.095	0.085	0.073	0.071	0.063	0.055	0.048	0.044
Slovakia	0.172	0.168	0.152	0.127	0.127	0.117	0.051	0.052	0.052	0.041	0.039	0.038
Finland	0.156	0.156	0.151	0.071	0.075	0.072	-	-	-	0.040	0.047	0.056
Sweden	0.208	0.205	0.187	0.078	0.075	0.067	0.127	0.122	0.114	0.055	0.055	0.044
United Kingdom	0.179	0.180	0.201	0.119	0.120	0.134	0.058	0.059	0.065	0.034	0.036	0.035
Iceland	0.116	0.107	0.116	:	:	:	-	-	-	-	-	-
Liechtenstein	:	:	0.155	:	:	0.140	:	:	0.086	:	:	0.056
Norway	0.178	0.178	0.166	0.086	0.087	0.081	:	:	:	:	:	:
Montenegro	0.095	0.099	0.099	0.072	0.075	0.075	-	-	-	-	-	-
FYR of Macedonia	0.079	0.078	0.082	:	0.075	0.078	:	:	:	0.050	0.039	0.042
Albania	0.117	0.115	0.116	:	:	:	-	-	-	-	-	-
Serbia	:	0.061	0.060	:	0.066	0.067	:	0.044	0.045	:	0.038	0.038
Turkey	0.147	0.131	0.131	0.096	0.081	0.081	0.041	0.037	0.037	0.030	0.027	0.027
Bosnia and Herzegovina	0.080	0.080	0.081	0.066	0.066	0.062	0.056	0.051	0.051	0.057	0.053	0.053
Kosovo	:	0.056	0.059	:	0.073	0.079	-	-	-	-	-	-

(*) Annual consumption: 2 500 kWh < consumption < 5 000 kWh.

(*) Annual consumption: 500 MWh < consumption < 2 000 MWh; excluding VAT

(*) Annual consumption: 20 GJ < consumption < 200 GJ.

(*) Annual consumption: 10 000 GJ < consumption < 100 000 GJ; excluding VAT.

(*) 2014: EA-18.

Source: Eurostat (online data codes: nrg_pc_204, nrg_pc_205, nrg_pc_202 and nrg_pc_203)

U raskoraku:

- o Najavljena je nova Energetska strategija
- o Prostor bioplina u sustavu tržišnih premija
 - Prva verzija odbijena u siječnju 2016.
 - Nacrt Pravilnika o korištenju OIE i VUK do 9.9.2016.
- o Zbog visokih operativnih troškova, proizvodnja bioplina je vrlo zahtjevna u sustavu tržišnih premija.
- o Biometan? Obveza za OIE u prijevozu od 9 PJ?
- o Uloga bioplina u energiji uravnoteženja?
- o Olakotne okolnosti za bioplin zbog usluga ekosustava (zaštita vodotokova, podzemnih voda, povećanje kvalitete života na selu...)?



Iskustva Biogas Action:

- o Razlika tretmana BP prema supstratu
- o BE: „dodatak” na investiciju ako je ona veća zbog poboljšanja stanja okoliša
- o FR: razlike po regijama, ali većinom „olakotne” okolnosti za BP do 500 kW, kombinacija TP i FiT prema raznim okolnostima
- o CZ: BP nema poseban tretman. Nema investicija u BP od 2014. kada je uveden sustav tržišnih premija (do 360 MW).
- o NL: uravnoteženje mreže, izuzeće od poreza...
- o DE: uravnoteženje mreže, <75 kW i 80% gnoja na FiT od 25€/kWh
- o DK: uravnoteženje mreže, bonus za
- o SK: biometan u prijevozu, poticaj dolazi od lokalnih vlasti
- o GB: biometan, poticaj dolazi od privatnih osoba

Prema interesu, možemo pitati partnere da nam detaljno obrazlože svoje sustave.





Njemačko udruženje za bioplin (Fachverband Biogas)



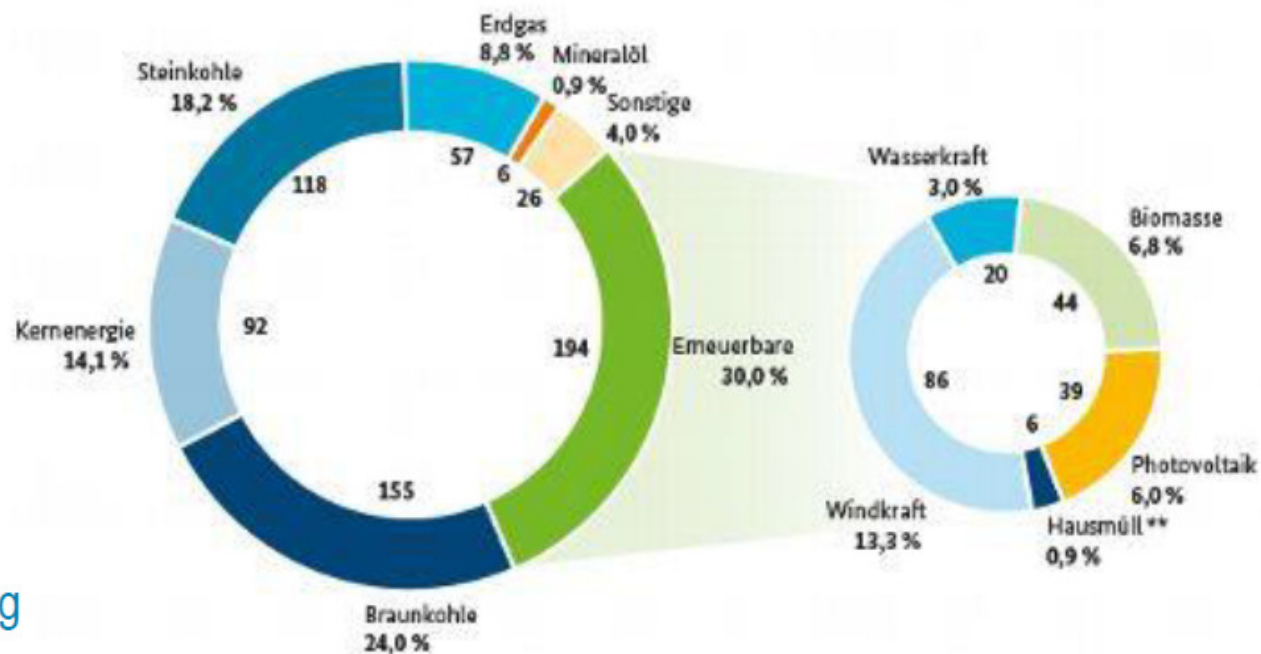
Sebastian Stolpp, voditelj međunarodnih aktivnosti

Structure of the German electricity production from renewable energy sources (2014)

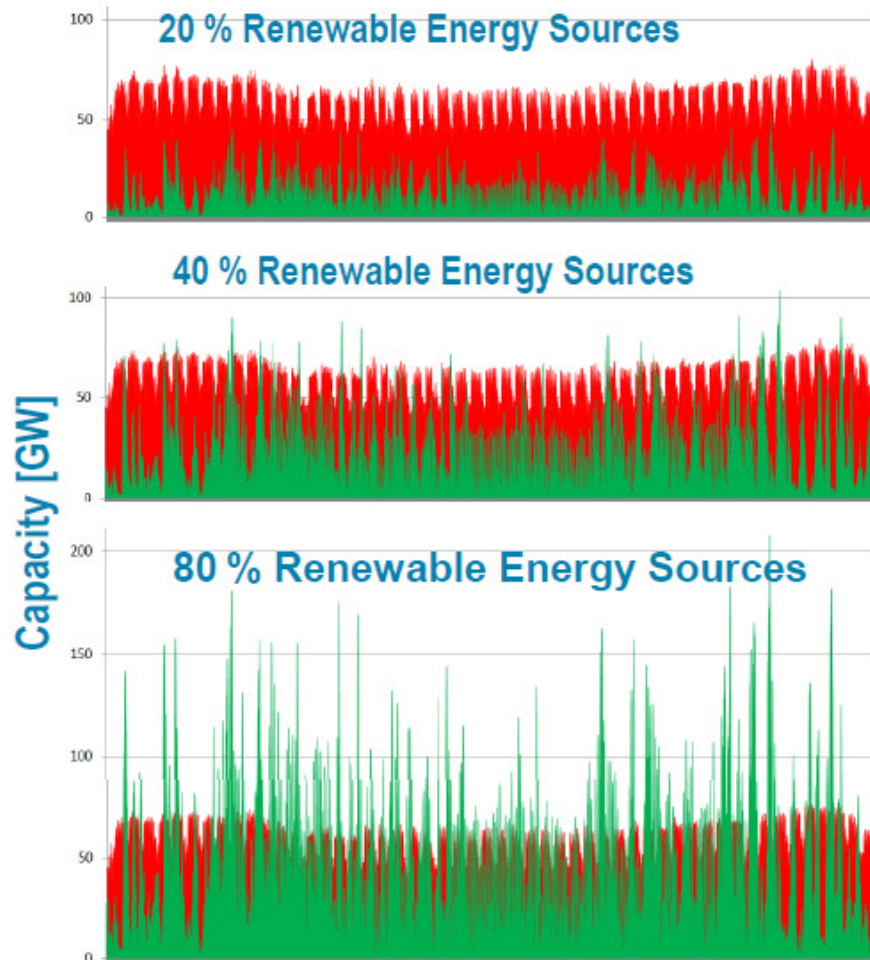


30% of electricity production from RES

More than 50% of the RES are fluctuating



The new role of biogas in electricity production: Flexibility instead of base load



With increasing share of RES, baseload loses importance

Flexible systems fill the valleys of the wind and sun

→ CHP with bioenergy & natural gas

→ New role of biogas

red Demand (2010)
green Wind and solar generation

Direct Marketing



- The basic condition of direct marketing is that the electricity is not supplied to the grid operator but sold to an electricity trader.

Three different forms of direct marketing

The plant operator does not change the way the plant operates

The electricity trader can control the plant remotely

The plant operator and the electricity trader agree on a fixed schedule.

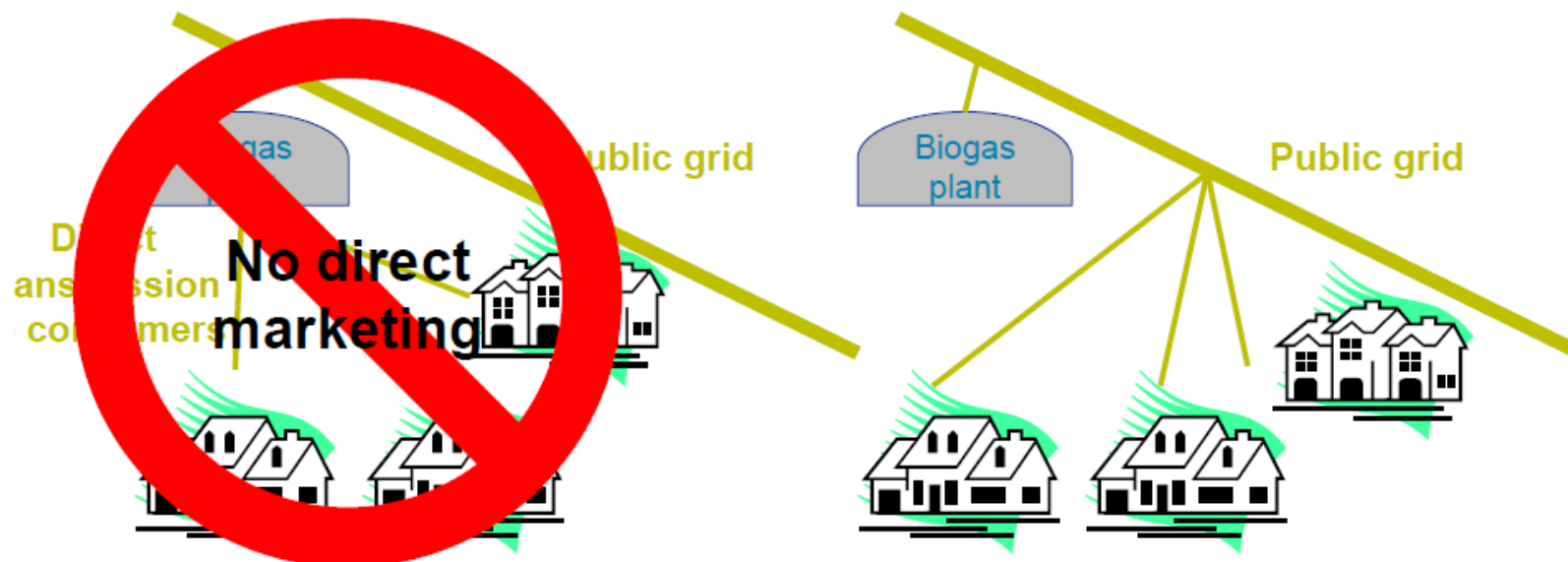


How does direct marketing and FiT of the EEG combine?



- By channeling the generated electricity through a public grid

► Market premium, flexibility premium



Market premium

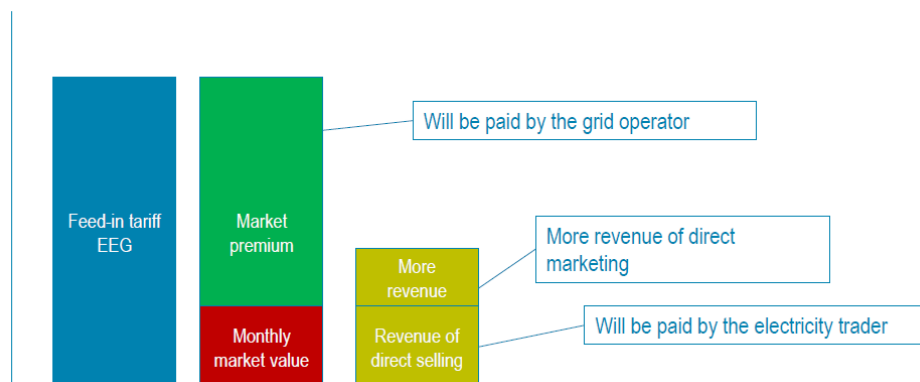


- The biogas plant operator can combine direct marketing with the Feed-in Tariff of the EEG = Market Premium
 - The biogas plant adheres to the requirements of the EEG and will also be reimbursed according to the statutes of the EEG but the electricity will be sold to an electricity trader.
- **In the future, the biogas plant has two sources of income:**
- Market premium: payed by the grid operator
 - Revenue of direct marketing: payed by the electricity trader



Premija za fleksibilnost

- Market premium = Feed-in tariff – monthly market value on the electricity exchange
- The plant operator has to get the monthly market value from his electricity trader

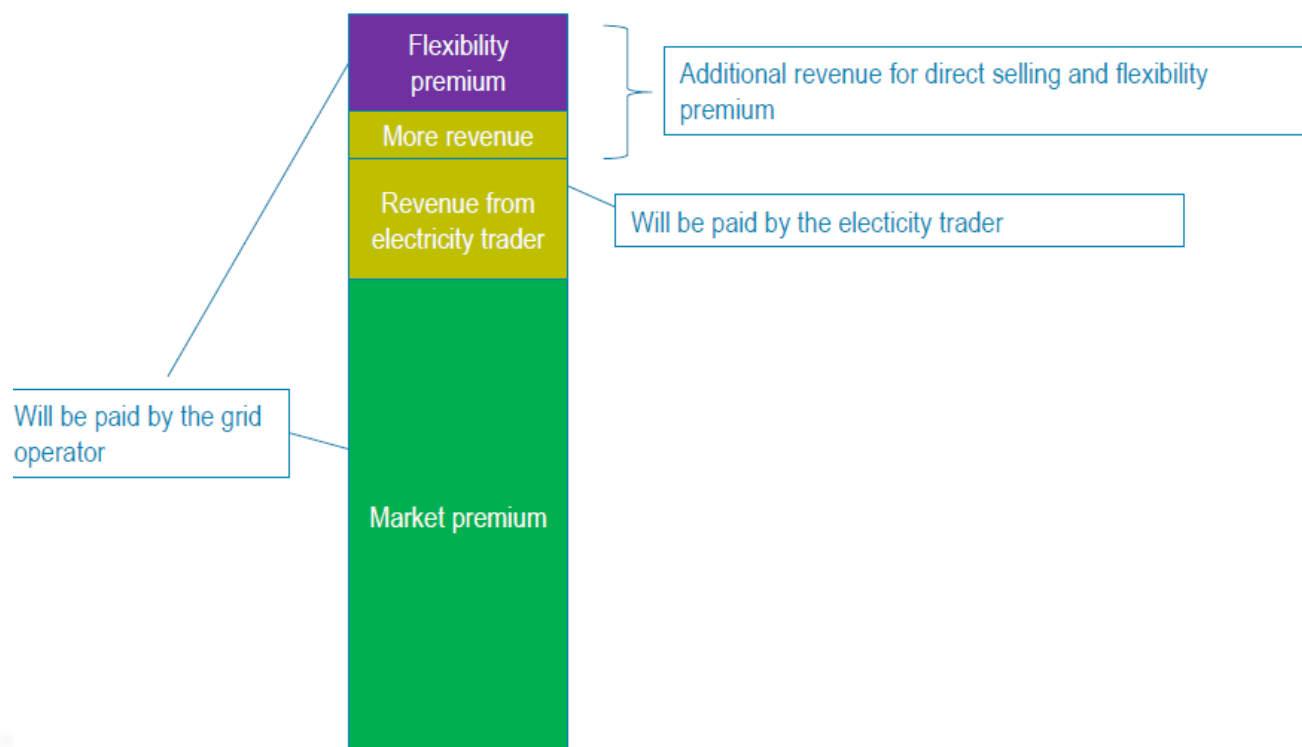


Ukoliko bioplinsko postrojenje može uskladištiti bioplin i omogućiti dodatni kapacitet za proizvodnju električne energije, to se postrojenje može natjecati za „premiju za fleksibilnost” povrh tržišne premije.

- o Premija za fleksibilnost će biti plaćena za dodatni kapacitet
 - Npr. Bioplinsko postrojenje kapaciteta od 100 kW ima instalirano 200 kW i pripadajuće skladište za bioplin tako da postrojenje može prihodovati od premije budući da može proizvoditi više električne energije kada je to potrebno
- o Premija za fleksibilnost je dodatna premija na tržišnu premiju
- o Izravno trgovanje i tržišna premija se mogu primijeniti i na ostale OIE
- o **Premija za fleksibilnost je samo za bioplinska postrojenja!**

I na kraju:

Market premium and flexibility premium



Diskusija



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Starija istraživačica za biomasu

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