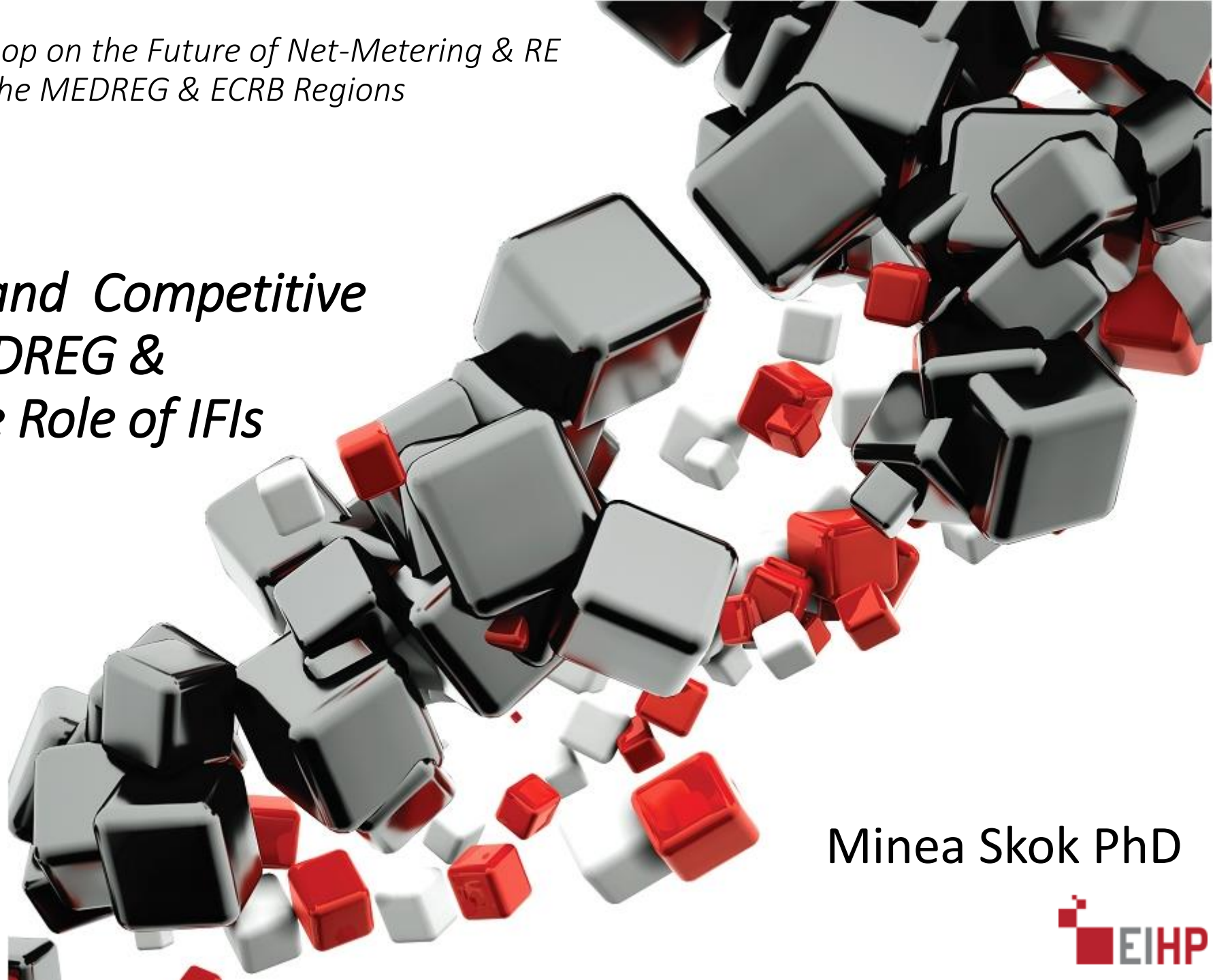
MEDREG and ECRB Joint Workshop on the Future of Net-Metering & RE Support Auction Mechanism in the MEDREG & ECRB Regions

Discussion panel

Net-Metering: Cost and Competitive Indicators in the MEDREG & ECRB Region and the Role of IFIs



Net metering from the DSO perspective

Minea Skok PhD

EIHP

Long term economic sustainability of the system operation

EIHP
www.eihp.hr

- DSO business rely heavily on revenues from the **distribution use of system charges** (distribution tariffs)
- vast majority of **distribution system costs are capacity driven** (constructing, maintaining, upgrading and replacing the existing physical infrastructure) → fixed irrespective of the volume of distributed electricity (minority of costs are variable → grid losses)
- **ensure that prosumers "pay their fair share of network and system costs"** → net-metered customers use grid as a backup system for their excess production
- self generation (prosumers) should have both rights & obligations → **costs and benefits of self-generation & net-metering shall be fairly shared**

- **Self-generation** → use of power generated on-site in order to reduce (at least in part) the purchase of electricity from the grid ← **prosumers**
- **Net-metering** → regulatory framework under which the excess electricity injected into the grid can be used at a later time to offset consumption during times when their on-site renewable generation is absent or not sufficient (consumers use grid as a backup system for their excess power production)
- **Net-billing** → invoice is based on the value of withdrawn energy decreased by the value of injected energy

CROATIA

self-generation is related to the renewable generation & high-efficiency cogeneration

for SG<500 kW RE Law obliges the prosumers supplier to purchase excess electricity injected to the grid at the 90% supply tariff (**net-billing**)

gen. rated capacity ≤ contracted power

CROATIA (in force since January 2019)

net-metering/billing is limited to **households** with self-generation provided that the **annual injected electricity** is lower than electricity **absorbed** from the grid supplier purchase excess electricity injected to the grid at the 80% supply tariff

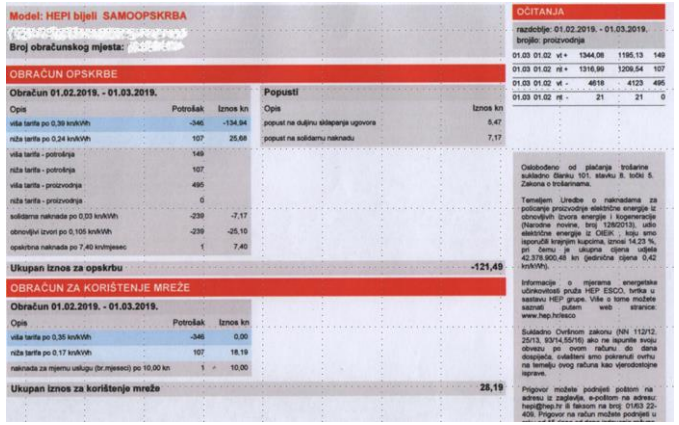
Monthly bill example: Croatian household-prosumer (net-metering)

www.eihp.hr

Component	HT [HRK/kWh]	LT [HRK/kWh]	Fixed monthly charges [HRK]
Supply (energy)	0,49	0,24	7,4
Distribution network charge	0,24	0,12	10
Network charge (total)	0,35	0,17	10
RES charge	0,105	0,105	-
Solidarity charge	0,03	0,03	-
Total for absorption (supply)	**0,975**	**0,545**	**17,4**
Purchase (of surplus)	**0,39**	**0,19**	-

=0,8*0,49

=0,8*0,24



Monthly metered data [kWh]			Total
Absorption	HT	149	256
	LT	107	
Injection	HT	495	495
	LT	0	
NET	HT	-346	-239
	LT	107	

SUPPLIER		Absorbtion/Injection	Unit price [HRK/kWh]	Cost [HRK]
Energy	HT	-346	0,39	-134,94
	LT	107	0,24	25,68
Solidarity charge	HT+LT	-239	0,03	-7,17
RES charge	HT+LT	-239	0,105	-25,10
Supply costs	Fixed monthly value	1	7,4	7,40
Total				**- 134,13**

DSO		Absorbtion/Injection	Unit price [HRK/kWh]	Cost [HRK]
Energy	HT	-346	0,24	0
	LT	107	0,12	12,84
Metering point administration	Fixed monthly value	1	10	10,00
Total				**22,84**

TSO		Absorbtion/Injection	Unit price [HRK/kWh]	Cost [HRK]
Energy	HT	-346	0,11	0
	LT	107	0,05	5,35
Total				**5,35**

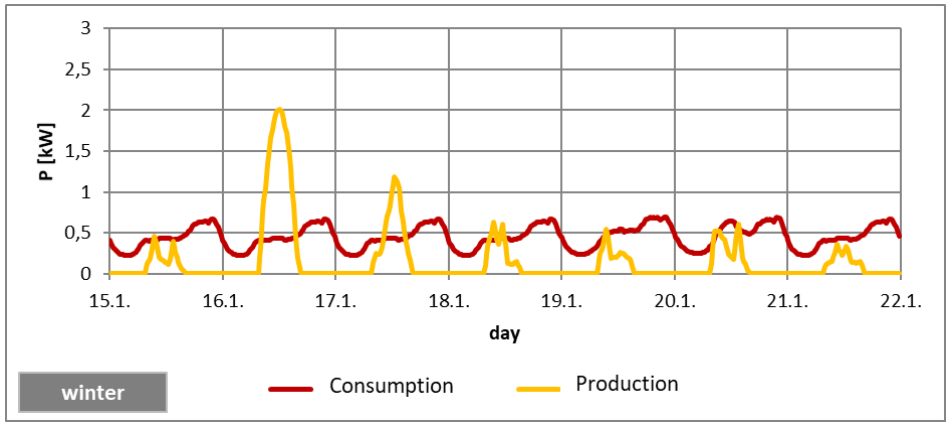
	[HRK]	[€]
Supplier	- 134,13	-18,0
DSO	22,84	3,1
TSO	5,35	0,7

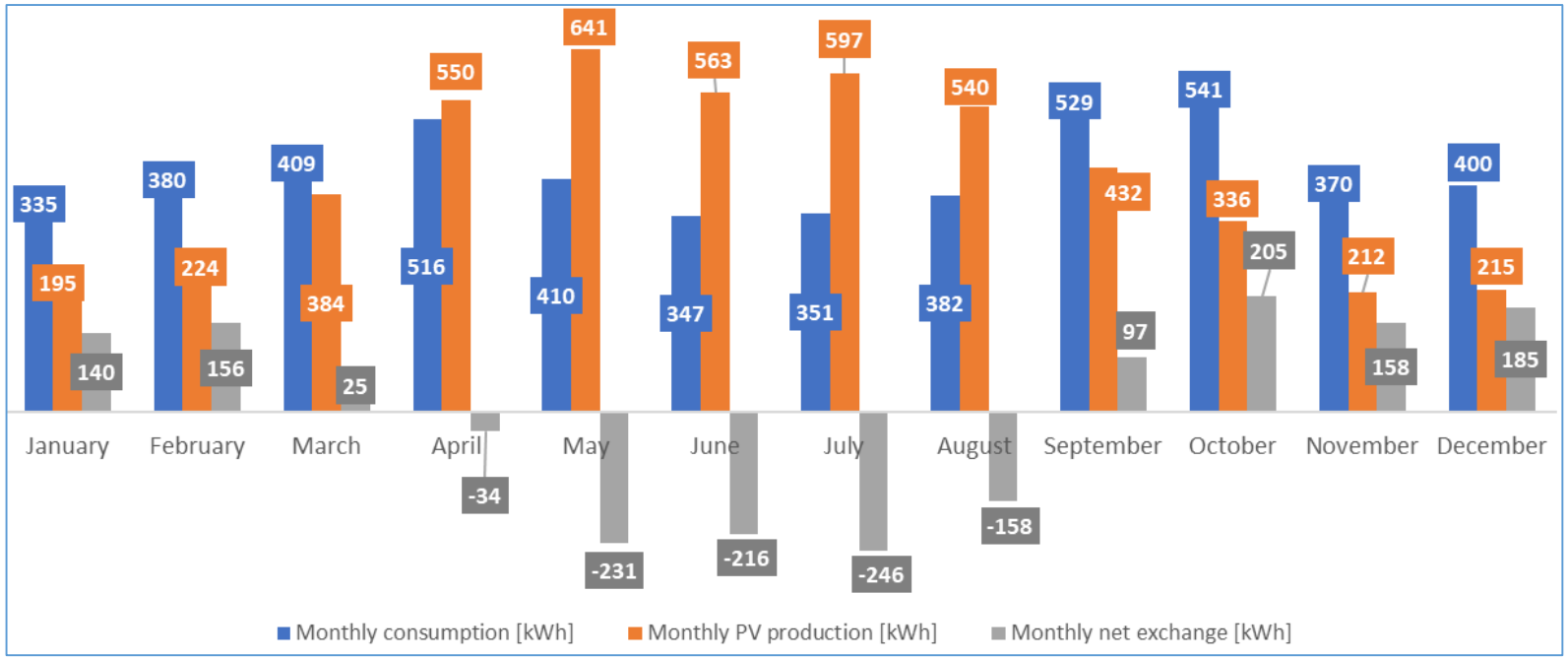
remaining surplus is credited in monetary units for the next billing period

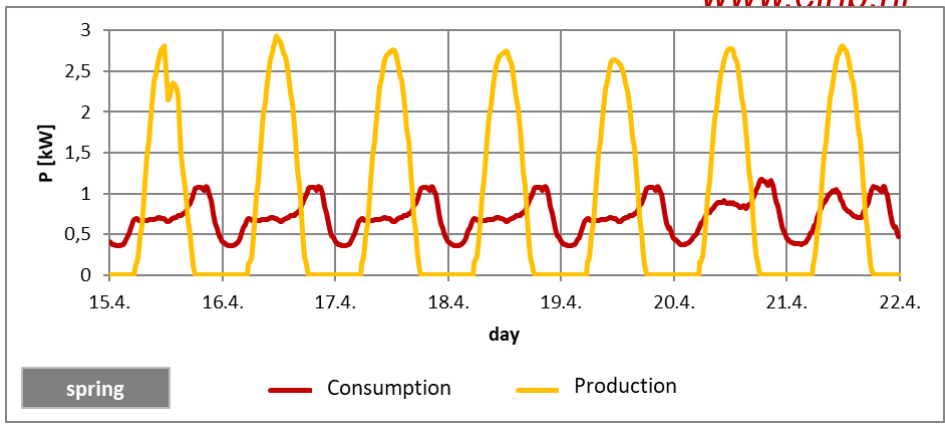
Example - one Croatian household in Istria

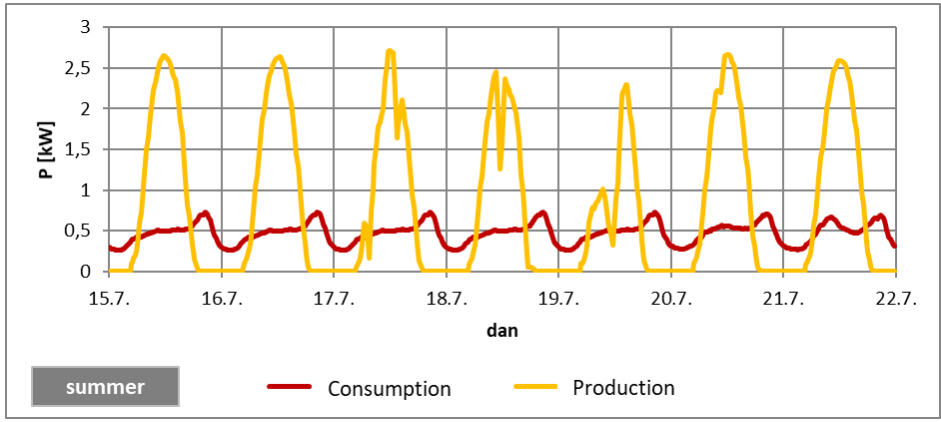
EIHP
www.eihp.hr

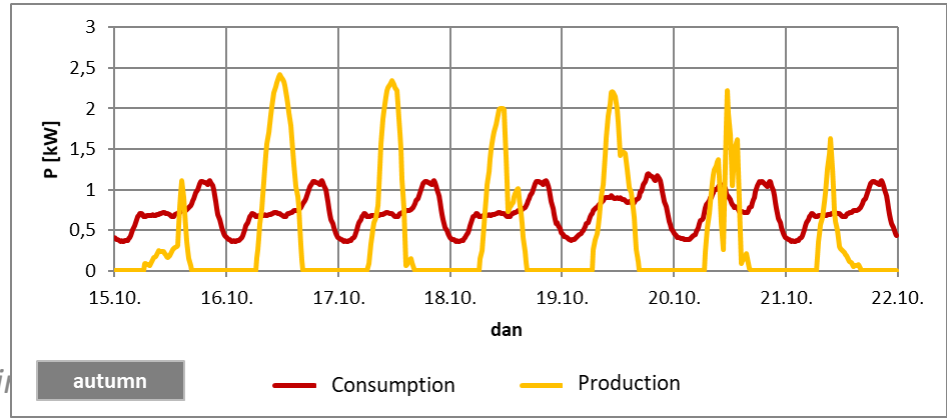
- Yearly: consumption 4.970 kWh > production 4.890 kWh (neto 81 kWh)
- PV (single phase): 3 kWac (3,6 kWdc)





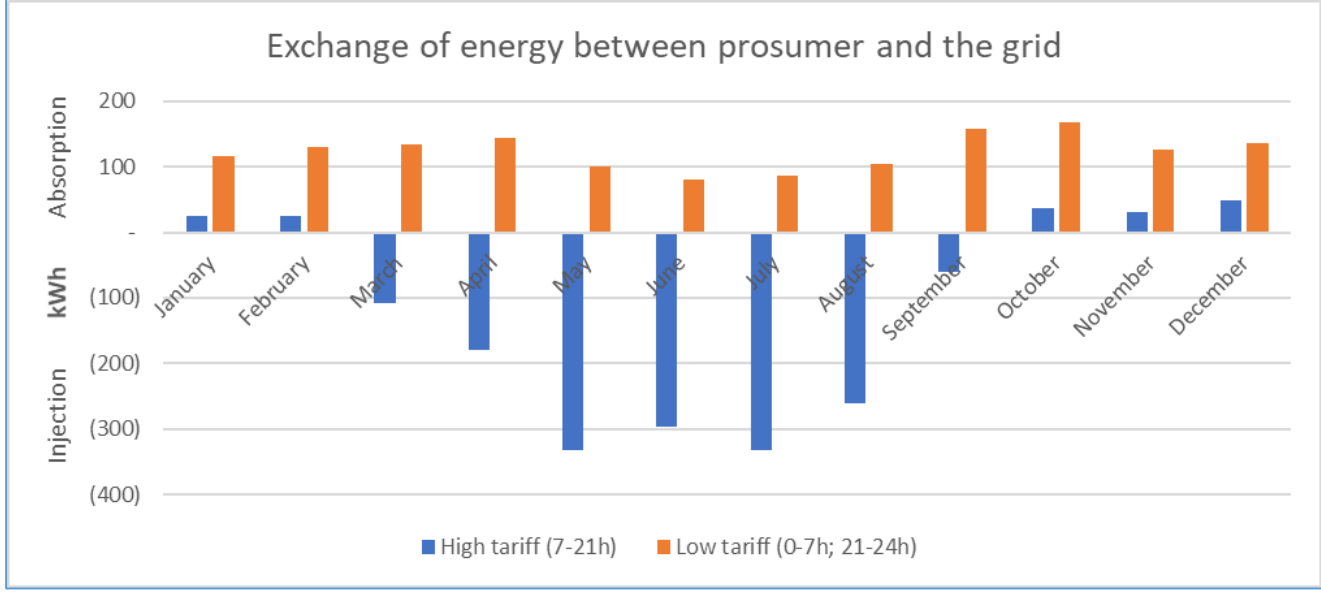






Example - one Croatian household in Istria

- Annual:
  consumption 4.970 kWh > production 4.890 kWh
  (net 81 kWh)
- PV (single phase): 3 kWac (3,6 kWdc)
- Pay off period: 7-8 yrs



[HRK]	Customer			Prosumer			Total		Reduction			
Month	Supplier	DSO	TSO	Supplier	DSO	TSO	Customer	Prosumer	Total	Supplier	DSO	TSO
January	187,91	76,55	29,92	66,05	29,75	8,48	294,38	104,28	65%	65%	61%	72%
February	212,15	85,48	33,94	72,26	31,77	9,32	331,57	113,34	66%	66%	63%	73%
March	228,08	91,39	36,60	0,33	26,11	6,71	356,07	33,15	91%	100%	71%	82%
April	289,07	114,24	46,96	-32,63	27,35	7,23	450,27	1,95	100%	111%	76%	85%
May	230,87	92,66	37,23	-129,63	22,14	5,06	360,76	-102,43	128%	156%	**76%**	86%
June	196,42	79,91	31,49	-118,86	19,61	4,01	307,82	-95,24	131%	161%	75%	**87%**
July	198,37	80,61	31,79	-135,38	20,37	4,32	310,77	-110,69	**136%**	**168%**	75%	86%
August	215,38	86,91	34,64	-91,75	22,43	5,18	336,93	-64,13	119%	143%	74%	85%
September	295,79	116,69	48,05	34,42	28,94	7,89	460,53	71,24	85%	88%	75%	84%
October	302,18	119,03	49,11	93,63	39,08	12,49	470,31	145,19	69%	69%	67%	75%
November	206,85	83,53	33,07	74,20	32,61	9,73	323,45	116,54	64%	64%	61%	71%
December	223,19	89,58	35,79	88,61	37,90	12,10	348,55	138,61	**60%**	**60%**	**58%**	**66%**
SUM [HRK]	**2.786**	**1.117**	**449**	**-** **79**	**338**	**93**	**4.351**	351,82	**92%**	**103%**	**70%**	**79%**
SUM [€]	**374**	***150***	***60***	**-** **11**	***45***	***12***	***584***	***47***	***537***	***385***	***104***	***48***
	64%	26%	10%								***152***	

78% energy part

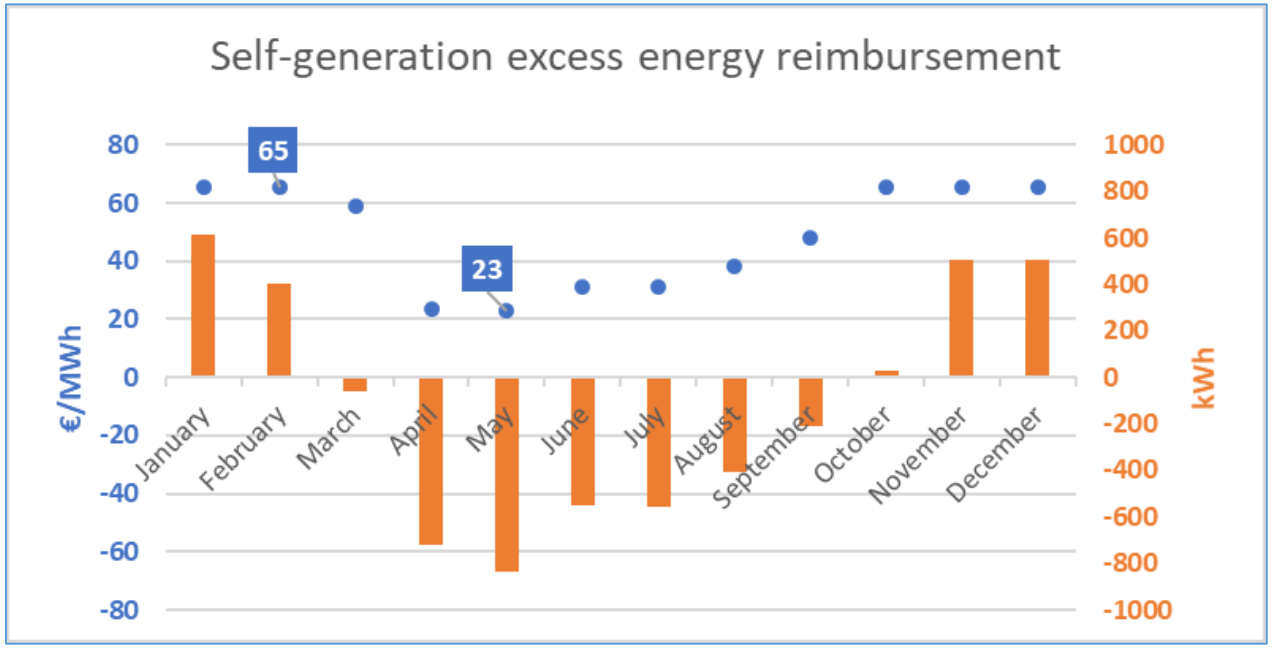
Example -
one Croatian commercial customer (<20kW) self-generation in Istria

www.eihp.hr

- Annual: consumption 15.000 kWh > production 16.949 kWh (net -1.949 kWh)
- PV (3f): 12 kWac (10 kWdc)

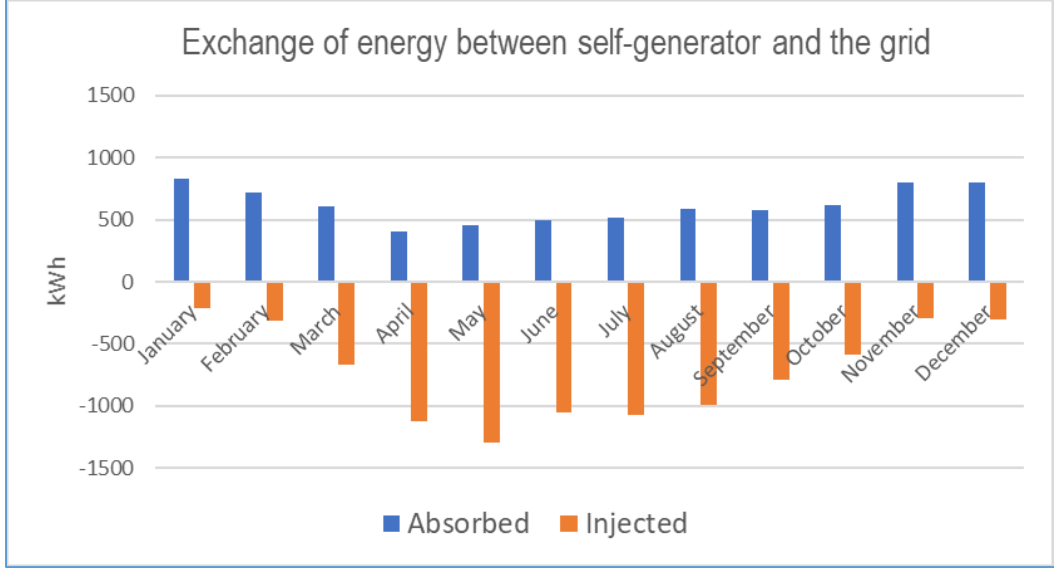
Component	*HT [HRK/kWh]*	*LT [HRK/kWh]*	*Fixed monthly charges [HRK]*
Supply (energy)	0,68	0,4	0
Distribution network charge	0,35	0,17	41,3
Network charge (total)	0,24	0,12	41,3
RES charge	0,105	0,105	/
Solidarity charge	0,03	0,03	/
Total for absorption (supply)	**1,165**	**0,705**	**41,3**
Purchase (of surplus)	***0,486***		

- net-billing scheme - invoice issued by supplier is based on the value of the widrawn energy decreased by the value of the injected energy
- excess energy is valuated at a level below the retail electricity price (90% or lower if injection exceeds absorption)
- network charge – only for the absorbed energy only (not decreased by the injected energy)



Example - one Croatian commercial customer (<20kW) self-generation in Istria

- annual: consumption 15.000 kWh > production 16.949 kWh (net: -1.949 kWh)
- PV (3f): 12 kWac (10 kWdc)



[HRK]	Customer			Self-generation			Total		Reduction			
Month	Supplier	DSO	TSO	Supplier	DSO	TSO	Customer	Self-generation	Total bill	Supplier	DSO	TSO
January	947,44	309,11	121,26	486,88	203,56	72,88	1.377,81	763,32	45%	49%	34%	40%
February	859,48	284,32	110,04	356,12	181,69	63,01	1.253,84	600,82	52%	59%	36%	43%
March	912,71	299,45	116,90	123,66	153,85	50,26	1.329,06	327,76	75%	86%	49%	57%
April	827,66	274,63	105,56	71,07	111,68	31,16	1.207,85	213,91	82%	91%	59%	70%
May	962,85	312,25	122,51	80,98	121,46	35,49	1.397,62	237,93	83%	92%	61%	71%
June	980,79	316,78	124,49	89,41	128,91	38,83	1.422,05	257,15	82%	91%	59%	69%
July	1.059,80	339,28	134,70	87,85	129,96	39,18	1.533,77	256,99	83%	92%	62%	71%
August	1.032,67	331,48	131,14	105,17	144,16	45,59	1.495,29	294,92	80%	90%	57%	65%
September	913,75	298,51	116,31	111,67	146,42	46,77	1.328,58	304,86	77%	88%	51%	60%
October	858,72	283,58	109,63	144,07	157,63	51,99	1.251,93	353,69	72%	83%	44%	53%
November	907,96	297,85	116,15	427,26	198,06	70,41	1.321,96	695,73	47%	53%	34%	39%
December	911,28	298,39	116,33	424,89	198,02	70,33	1.326,01	693,24	48%	53%	34%	40%
SUM [HRK]	**11.175**	**3.646**	**1.425**	**2.509**	**1.875**	**616**	**16.246**	**5.000**	**69%**	**78%**	**49%**	**57%**
SUM [€]	**1.500**	***489***	***191***	**337**	***252***	***83***	***2.181***	***671***	***1.509***	***1163***	***238***	***109***
	69%	22%	9%								***346***	

Forecasted impact of household prosumers (net metering/billing) on DSO revenues – Croatian case

www.eihp.hr

			Consumption [GWh]			DSO charge [M HRK]		
Households	Tarif model	No.	HT	LT	Total	Metering point administration	Energy	SUM
	"White"	1.458.135	3.074	1.682	4.755	175	940	1.115
	"Blue"	733.176	/	/	1.485	88	327	415
	SUM	**2.191.311**	/	/	6.240	**263**	**1.266**	1.529

206 M€ from households;
430 M€ from all DSO customers

No. family houses *single family homes*	1.200.000	**Average annual consumption of family house [kWh] - estimation**	4.000	**Avrg. price [HRK/kWh]**	0,203	**Metering point administration fee [HRK/MP]**	10

jointly acting RE self-consumers (confined to same building) NOT observed

Reduction in the energy part of the DUoS charge: **78%**

Forecasted impact of household prosumers (net metering/billing) on DSO revenues – Croatian case

EIHP
www.eihp.hr

		Self-consumption share	10%	20%	30%	40%	50%	60%	70%
		No. of households -prosumers	120.000	240.000	360.000	480.000	600.000	720.000	840.000
		Consumption [GWh]	480	960	1.440	1.920	2.400	2.880	3.360
		Share in total households consumption [%]	8%	15%	23%	31%	38%	46%	54%
DSO use of system charge revenue	Customer	Metering point administration [M HRK]	14,4	28,8	43,2	57,6	72	86,4	100,8
		Energy component [M HRK]	97,39	194,79	292,18	389,58	486,97	584,36	681,76
		Total [M HRK]	**111,79**	**223,59**	**335,38**	**447,18**	**558,97**	**670,76**	**782,56**
	Prosumer	Metering point administration [M HRK]	14,4	28,8	43,2	57,6	72	86,4	100,8
		Energy component [M HRK]	21,31	42,62	63,93	85,24	106,55	127,86	149,17
		Total [M HRK]	35,71	71,42	107,13	142,84	178,55	214,26	249,97
		Revenue decrease [M HRK]	**76,08**	**152,17**	**228,25**	**304,34**	**380,42**	**456,5**	**532,59**
		Revenue decrease [M €]	**10,2**	**20,4**	**30,6**	**40,9**	**51,1**	**61,3**	**71,5**
		New DUoS revenue from households [%]	95%	90%	85%	80%	75%	70%	65%
		New DUoS revenue- all customers [%]	**98%**	**95%**	**93%**	**90%**	**88%**	**86%**	**83%**

Key messages - role of NRAs

www.eihp.hr

- **EU household** → average energy component is above 69% of the total (still not very far from purely volumetric tariffs)
- **EnC CPs** vast majority of DSOs having fixed & capacity components share under 35% → average share of fixed costs in the DSOs total regulatory approved revenues ~ 80%
- in countries with a higher share of energy component prosumers contribute less to the grid cost recovery because of self-consumed electricity
- when net metering scheme is applied this effect is even aggravated → generated electricity is exempted from paying volumetric grid tariffs
- cross subsidization is of particular concern if volumetric grid tariffs are used instead of the capacity-based tariffs → revisiting distribution tariff designs to ensure system fixed-cost recovery by preventing undesirable cross-subsidies among consumers

Key messages - role of NRAs

www.eihp.hr

- for investments in DSO&TSO peak load is decisive → to reduce (delay) grid expansion needs, **self-generation must coincide with local peak demand** → expansion of SG may push a change for tariffs that leverage the full potential of better matched load-generation profiles

- net-metering of SG undermines efforts to enhance **flexibility** and to develop **demand-side management** → prosumer is not stimulated to optimize its demand to increase the self-consumption rate as the time value of generated energy is completely lost and the storage capacity of the system as a whole is taken for free
- ACER/CEER strongly recommend not to allow net metering

Energy Institute Hrvoje Pozar

Savska cesta 163

Zagreb, Croatia

www.eihp.hr