# PHOTOVOLTAIC POWER SYSTEMS PROGRAMME





# IEA-PVPS Self-Consumption Policies 2016

**Tables and Figures** 

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Figure 3. Comparison of production and consumption profiles



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Figure 4. Self-consumption and self-sufficiency (source: IEA)



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	u ∎	Right to self- consume	<ul> <li>Self-consumption is legally permitted</li> </ul>
	Onsite Sel Consumpti	Revenues for self- consumed PV electricity	<ul> <li>Savings on the variable price of electrici</li> </ul>
		Charges to finance T&D costs	<ul> <li>Additional costs associated to self-cons</li> </ul>
	۲۶. ۲۶	Value of excess electricity	<ul> <li>Net metering: energetic compensation (</li> <li>Net billing: monetary compensation (cre</li> </ul>
	Excess Electric	Maximum timeframe for compensation	<ul> <li>Self-consumption: real time (e.g 15 minute)</li> <li>Net metering and net billing: time frame exceptions (from credits that can be roll-quarterly compensation)</li> </ul>

N N

Table 1. Self-consumption's main characteristics



#### ity from the grid

sumption such as fees or taxes may exist

- credit in kWh)
- edit in monetary unit)
- utes)
- is typically one year although there are some ed over to the following billing cycle to



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	1	Right to self-consume
PV Self-	2	Revenues from self-consu
consumption	3	Charges to finance T&D
	4	Revenues from excess ele
Evenes DV electricity	E	Maximum timeframe for
Excess PV electricity	3	compensation
	6	Geographical compensat
	7	Regulatory scheme durat
	8	Third party ownership ac
	•	Grid codes and additiona
Other system	9	taxes/fees
characteristics	10	Other enablers of self-cor
	11	PV System Size Limitatio
	12	<b>Electricity System Limitat</b>
	13	Additional features

Table 2. Main parameters defining a self-consumption scheme



# umed PV ectricity ion tion cepted nsumption ns tions

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	-	
	1	Right to self-consume
PV Self-	2	Revenues from self-consumed PV
consumption	3	Charges to finance T&D
	4	Revenues from excess electricity
Excess PV electricity	5	Maximum timeframe for compensation
	6	Geographical compensation
	7	Regulatory scheme duration
	8	Third party ownership accepted
Other system	9	Grid codes and additional taxes/fees
characteristics	10	Other enablers of self-consumption
	11	PV System Size Limitations
	12	Electricity System Limitations
	13	Additional features

Table 4. Belgium's self-consumption schemes



#### Australia

Yes

Savings on the electricity bill

Tariff structure changes in some

states

Feed-in Tariff

**30 Minutes** 

On site only Unlimited but FiT are revised annually. Yes (e.g. Solar Leasing)

Yes (Injection control / ramp-rate control / no DC-injection)

None

None

None (except additional grid codes) None

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			DIaz
DV C - If	1	Right to self-consume	Yes
PV Self-	2	Revenues from self-consumed PV	Savings on the e
consumption	3	Charges to finance T&D	Non
	4	Revenues from excess electricity	Retail Electric
Excess PV electricit	y 5	Maximum timeframe for compensation	3 Yea
	6	Geographical compensation	On site and virtua
	7	Regulatory scheme duration	Unlimi
	8	Third party ownership accepted	Yes
Other system	9	Grid codes and additional taxes/fees	Non
characteristics	10	Other enablers of self-consumption	ToU Ta
	11	PV System Size Limitations	1 M\
	12	Electricity System Limitations	Non
	13	Additional features	Non

Table 5. Brazil's self-consumption schemes

Brazil	
Yes	
vings on the electricity bill	
None	
Retail Electricity Prices	
3 Years	
ite and virtual net-metering	
Unlimited	
Yes	
None	

**ToU Tariffs** 

1 MW

None

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			Canada
	1	Right to self-consume	Yes
<b>PV Self-consumption</b>	2	Revenues from self-consumed PV	Savings on the electricity bill
	3	Charges to finance T&D	None
	4	Revenues from excess electricity	Ontario: retail price (net-metering) - other systems depending on the jurisdiction
Excess PV electricity	5	Maximum timeframe for compensation	Ontario: 1 year - other systems depending on the jurisdiction
	6	Geographical compensation	On site only
	7	Regulatory scheme duration	Unlimited
	8	Third party ownership accepted	Yes
Other	9	Grid codes and additional taxes/fees	Yes
other system	10	Other enablers of self-consumption	ToU Tariffs
citaracteristics	11	PV System Size Limitations	Vary from jurisdiction to jurisdiction
	12	Electricity System Limitations	None
	13	Additional features	In Ontario, choice between FIT and Self- Consumption

Table 6. Canada's self-consumption schemes



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DV Calf	1	Right to self-consume	
PV Self-	2	Revenues from self-consumed PV	Sav
consumption	3	Charges to finance T&D	
	4	Revenues from excess electricity	Lower
Excess PV electricity		Maximum timeframe for compensation	
	6	Geographical compensation	
	7	Regulatory scheme duration	
	8	Third party ownership accepted	
Other system	9	Grid codes and additional taxes/fees	
characteristics	10	Other enablers of self-consumption	
	11	PV System Size Limitations	
	12	Electricity System Limitations	
	13	Additional features	

Table 7. Chile's self-consumption schemes

1	

Chile
Yes
Savings on the electricity bill
None
wer value than the retail price of
electricity
1 year
On site only
Unlimited
Yes
None
None
100 kW
None
None

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	1	Right to self-consume	2
PV Self- consumption	2	Revenues from self-consumed PV	Saving
	3	Charges to finance T&D	(
	4	Revenues from excess electricity	
Excess PV electricity	5	Maximum timeframe for compensation	
	6	Geographical compensation	
	7	Regulatory scheme duration	
	8	Third party ownership accepted	
	9	Grid codes and additional taxes/fees	
Other system characteristics	10	Other enablers of self-consumption	
	11	<b>PV System Size Limitations</b>	
	12	Electricity System Limitations	7 GW
	13	Additional features	1

Table 8. China's self-consumption schemes



# China

Yes

s on the electricity bill + bonus

None

Market price + bonus

**Real-time** 

On site only

20 years

None

None

None

20 MW - 35kV

for distributed PV installations

in 2015

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DV Colf	1	Right to self-consume	
PV Sell-	2	Revenues from self-consumed PV	Sav
consumption	3	Charges to finance T&D	
Evenes DV alastricity	4	Revenues from excess electricity	Retail and ab the
Excess PV electricity	5	Maximum timeframe for compensation	
	6	Geographical compensation	
	7	Regulatory scheme duration	
	8	Third party ownership accepted	
Other system	9	Grid codes and additional taxes/fees	Yes
characteristics	10	Other enablers of self-consumption	
	11	PV System Size Limitations	6k
	12	Electricity System Limitations	
	13	Additional features	

Table 9. Denmark's self-consumption schemes



#### Denmark

Yes

ings on the electricity bill

None

price (1 hour net-metering) ove 1 hour: Lower value than e retail price of electricity

1 Hour

On site only

20 years

Yes

(grid codes requirements)

**ToU Tariffs** 

W(AC) for the high tariff

800 MW (high tariff)

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PV Self-	1	Right to self-consume	
	2	Revenues from self-consumed PV	
consumption	3	Charges to finance T&D	
	4	Revenues from excess electricity	Retail
Excess PV electricity	5	Maximum timeframe for compensation	Real-time
	6	Geographical compensation	
	7	Regulatory scheme duration	
	8	Third party ownership accepted	
	9	Grid codes and additional taxes/fees	
Other system characteristics	10	Other enablers of self-consumption	
	11	PV System Size Limitations	When S<
	12	Electricity System Limitations	
	13	Additional features	

Table 10. Finland's self-consumption schemes



#### Finland

Yes

Savings on the electricity bill

None

electricity price (typically Finnish SPOT electricity price)

e, hourly net-metering is under discussion

On site only Unlimited

Yes

Grid code for PV plant

#### No

100 kVA or Ea< 800 kWh/a, exemption of electricity tax No

No

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	14		
DV Solf	1	Right to self-consume	
concumption	2	Revenues from self-consumed PV	
consumption	3	Charges to finance T&D	
	4	Revenues from excess electricity	
Excess PV electricity	5	Maximum timeframe for compensation	
	6	Geographical compensation	
	7	Regulatory scheme duration	
	8	Third party ownership accepted	
	9	Grid codes and additional taxes/fees	P
Other system characteristics	10	Other enablers of self-consumption	
	11	<b>PV System Size Limitations</b>	
	12	Electricity System Limitations	
	13	Additional features	Pro

Table 11. France's self-consumption schemes

5-

### France

Yes

Savings on the electricity bill

None

FiT (see detail)

Real-time

On site only

20 years (FiT)

None

ossible move towards a higher

share of fixed grid costs.

ToU Tariffs

None

None

ects to increase the fixed part of grid costs

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	1	Right to self-consume	8
PV Self-	2	Revenues from self-consumed PV	
consumption	3	Charges to finance T&D	
	4	Revenues from excess electricity	
Excess PV electricity	5	Maximum timeframe for compensation	
	6	Geographical compensation	
	7	Regulatory scheme duration	
	8	Third party ownership accepted	
	9	Grid codes and additional taxes/fees	Gr
Other system characteristics	10	Other enablers of self-consumption	
	11	PV System Size Limitations	Mir
	12	Electricity System Limitations	
	13	Additional features	EE

Table 12. Germany's self-consumption schemes

1 de	ALL.	
1 SEP	EE.	
F	TT I	
	2	

Ge	rn	na	nv
 <b>1</b>			

Yes

Savings on the electricity bill

None

FiT or FiP

**Real time** 

On site only

20 years (FiT)

# All

id codes compliance and partial EEG-surcharge

Battery storage incentives

nimum 10% of self-consumption

52 GW of PV installations

G levy must be paid anyway by the prosumer (above 10kW)

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DV C-IC	1	Right to self-consume	
PV Self-	2	Revenues from self-consumed PV	
consumption	3	Charges to finance T&D	
	4	Revenues from excess electricity	R
Excess PV electricity	5	Maximum timeframe for compensation	
	6	Geographical compensation	Cr cor
	7	Regulatory scheme duration	
	8	Third party ownership accepted	
	9	Grid codes and additional taxes/fees	Syst
Other system characteristics	10	Other enablers of self-consumption	
	11	PV System Size Limitations	
	12	Electricity System Limitations	No
	13	Additional features	

Table 13. Israel's self-consumption schemes



Israel

Yes

Savings on the electricity bill

None

Retail Electricity Prices (full netmetering)

2 years

edits can be transfered to other nsumers (but without T&D costs)

Unlimited

Yes

tem costs (see detail) - grid, backup and balancing costs

None

5 MW

o, but system costs are linked to PV penetration.

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# PHOTOVOLTAIC POWER SYSTEMS PROGRAMME

	1	Right to self-consume	
PV Self-consumption	2	Revenues from self-consumed PV	
	3	Charges to finance T&D	
	4	Revenues from excess electricity	5
Excess PV electricity	5	Maximum timeframe for compensation	
	6	Geographical compensation	
	7	Regulatory scheme duration	
	8	Third party ownership accepted	
	9	Grid codes and additional taxes/fees	
Other System	10	Other enablers of self-consumption	
chara cteristics	11	PV System Size Limitations	
	12	Electricity System Limitations	
	13	Additional features	

Table 14. Italy's self-consumption schemes



#### Italy

Yes

Savings on the electricity bill

Yes, above 20 kW

SP, net-billing based on energy and services; market price for selling

Self consumption, real time; SSP, advance payment

twice per year

On site (meter aggregation is allowed for some

specific SSP cases)

Unlimited

Yes, with conditions for SSP

None

None

Self-consumption, none (below 20 MW for SEU); SSP, up to 500 kW

None

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DV/ Colf	1	Right to self-consume
rv sell-	2	Revenues from self-consumed PV
consumption	3	Charges to finance T&D
	4	Revenues from excess electricity
Excess PV electricity	5	Maximum timeframe for compensation
	6	Geographical compensation
	7	Regulatory scheme duration
	8	Third party ownership accepted
Other system	9	Grid codes and additional taxes/fees
characteristics	10	Other enablers of self-consumption
	11	PV System Size Limitations
	12	Electricity System Limitations
	13	Additional features

Table 15. Japan's self-consumption schemes



# Japan

# Yes

Savings on the electricity bill

# None

# FiT

Real-time (30 minutes)

On site only

10 years (FiT)

Yes

None

ToU tariffs / Storage and DSM

incentives

Below 10 kW

None

# PHOTOVOLTAIC POWER SYSTEMS PROGRAMME

DV C - HE	1	Right to self-consume
PV Self-	2	Revenues from self-consumed PV
consumption	3	Charges to finance T&D
	4	Revenues from excess electricity
Excess PV electricity	5	Maximum timeframe for compensation
	6	Geographical compensation
	7	Regulatory scheme duration
	8	Third party ownership accepted
Other system	9	Grid codes and additional taxes/fees
characteristics	10	Other enablers of self-consumption
	11	PV System Size Limitations
	12	Electricity System Limitations
	13	Additional features

*Table 16. Mexico's self-consumption schemes* 



# Mexico

#### Yes

# Savings on the electricity bill

#### None

# Retail Electricity Prices (full netmetering)

# 1 year

# Virtual net-metering allowed

# Unlimited

# Yes (leasing is possible)

# None

# None

# 500kW

### None

# Additional Incentives Exist

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			p. L. Moolau
			Below 100 KW
	1	Right to Self-Consume	Yes
PV Self- Consumption	2	Revenues from Self- Consumed PV	Savings on the electricity bill
	3	Charges to Finance T&D	Yes ("solar tax")
	4	Revenues from excess electricity	None
Excess PV Electricity	5	Maximum timeframe for compensation	Real-time
	6	Geographical compensation	None
	7	Regulatory scheme duration	Unlimited
	8	Third party ownership accepted	None
Other system	9	Grid codes and additional taxes/fees	Above 10 kW (*)
characteristics	10	Other enablers of self- consumption	None
	11	PV system size limitation	100 kW but below or equal to capacity contracted
	12	Electricity system limitations	Distributor's License
	13	Additional features	Taxes on batteries

(\*) except the Canary Islands, Baleares Islands, Ceuta and Melilla

Table 17. Spain's self-consumption schemes

#### Above 100 kW

Yes

Savings on the electricity bill

Yes ("solar tax")

Wholesale market price minus taxes

#### Real-time

None

Unlimited

Yes

Yes (\*)

None

Below or equal to the capacity contracted

Distributor's License

Taxes on batteries

Spain

P C C

# PHOTOVOLTAIC POWER SYSTEMS PROGRAMME

		2	Sweden	Sweden	
DV C-IC	1	Right to self-consume	Yes	Yes	
PV Selt-	2	Revenues from self-consumed PV	Savings on the electricity bill	Savings on the electricity bill	
consumption	3	Charges to finance T&D	None	None	
	4	Revenues from excess electricity	Various offers from utilities + 0,6 SEK/kWh + Green certificates	Wholesale electricity price	
Excess PV electricity	5	Maximum timeframe for compensation	1 year	Real-time	
	6	Geographical compensation	On site only	On site only	
	7	Regulatory scheme duration	Subject to annual revision	Unlimited	
	8	Third party ownership accepted	Yes	Yes	
	9	Grid codes and additional taxes/fees	Grid codes requirements and VAT registration	Grid codes requirements and VAT registration	
Other system characteristics	10	Other enablers of self-consumption	ToU Tariffs	ToU Tariffs	
	11	PV System Size Limitations	Below 100 Amp. Maximum 30MWh/year for the tax credit.	Above 100 Amp	
	12	Electricity System Limitations	None	None	
	13	Additional features	None	None	

Table 18. Sweden's self-consumption schemes



# PHOTOVOLTAIC POWER SYSTEMS PROGRAMME

	No. 1	
DV/ Self-	1	Right to self-consume
consumption	2	Revenues from self-consumed PV
consumption	3	Charges to finance T&D
	4	Revenues from excess electricity
Excess PV electricity	5	Maximum timeframe for compensation
	6	Geographical compensation
	7	Regulatory scheme duration
	8	Third party ownership accepted
	9	Grid codes and additional taxes/fees
Other system characteristics	10	Other enablers of self-consumption
	11	PV System Size Limitations
	12	Electricity System Limitations
	13	Additional features

Table 19. Switzerland's self-consumption schemes



<b>C</b>	ansaide Vi	14.00	1.100	
		7 Gr	ar	
- 1		4 - 1		

Yes

Savings on the electricity bill

None

FiT (energy cost for the DSO minus ~8%)

Real-time

Multi-family Housing

Unlimited

Yes

Specific grid codes

None

None

None

Direct subsidies up to 30kW and some specific rules (see detail)

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	10	
DV Solf	1	Right to self-consume
concumption	2	Revenues from self-consumed PV
consumption	3	Charges to finance T&D
	4	Revenues from excess electricity
Excess PV electricity	5	Maximum timeframe for compensation
	6	Geographical compensation
	7	Regulatory scheme duration
	8	Third party ownership accepted
Other system	9	Grid codes and additional taxes/fees
characteristics	10	Other enablers of self-consumption
	11	PV System Size Limitations
	12	Electricity System Limitations
	13	Additional features
Excess PV electricity Other system characteristics	5 6 7 8 9 10 11 12 13	compensation Geographical compensation Regulatory scheme duration Third party ownership accepted Grid codes and additional taxes/fees Other enablers of self-consumption PV System Size Limitations Electricity System Limitations Additional features

Table 20. The Netherlands' self-consumption schemes



# The Netherlands

Yes

Savings on the electricity bill

None

Retail Electricity Prices (full netmetering)

1 year

Multi-family Housing / or through private line Unlimited

Yes

None

Experimental ToU

15 kW

None

P C

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	1	Right to self-consume
PV Self- consumption		Revenues from self-consumed PV
	3	Charges to finance T&D
	4	Revenues from excess electricity
Excess PV electricity	5	Maximum timeframe for compensation
	6	Geographical compensation
	7	Regulatory scheme duration
	8	Third party ownership accepted
Other system	9	Grid codes and additional taxes/fees
characteristics	10	Other enablers of self-consumption
	11	PV System Size Limitations
	12	Electricity System Limitations
	13	Additional features

Table 21. The UK's self-consumption schemes

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# PHOTOVOLTAIC POWER SYSTEMS PROGRAMME

DV/ C-If	1	Right to self-consume	
PV Self-	2	Revenues from self-consumed PV	Saving
consumption	3	Charges to finance T&D	
	4	Revenues from excess electricity	Retail Electri
Excess PV electricity	5	Maximum timeframe for compensation	
	6	Compensation	
	7	Regulatory scheme duration	
	8	Third party ownership accepted	
Other system	9	Grid codes and additional taxes/fees	Vary by state calculated mont utilities have ac
characteristics	10	Other enablers of self-consumption	ToU
	11	PV System Size Limitations	Yes, but depend
	12	Electricity System Limitations	
	13	Additional features	Multiple other p

Table 22. The USA's self-consumption schemes

ALL AL	
AL SU	-
	1

US	A
1040	

Yes

s on the electricity bill

In specific states

city Prices (full net-metering)

Vary by state

**On-Site** 

Unlimited

Yes

e. E.g. In Mass, NEM energy is hly with a mínimum bill. Arizona implemented fixed charges to count for grid costs

Tariffs in some states

s on the state: from 10 kW to 10 MW (or no limit)

In some states

olicies depending on the state or at federal level

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			A	В	C	D	E
			Self-consumption with constraints	Self-consumption with a FiT	Net-billing	Net-metering	Self-consumption with premium
	1	Right to self-consume	Yes	Yes	Not compulsory	Yes	Yes
PV Self- consumption	2	Revenues from self- consumed PV	Savings on the electricity bill	Savings on the electricity bill	Production revenue minus consumption costs	Savings on the electricity bill	Savings on the electricity bill + premium
5	3	Charges to finance T&D	Yes	No	No	No	No
Francisco PA	4	Revenues from excess electricity	No remuneration	Feed-in Tariff	Feed-in tariff	Retail electricity prices	Feed-in Tariff
electricity	5	Maximum timeframe for compensation	Real-time	Real-time	Could be >1 year	Could be > 1 year	Real-time
	6	Geographical compensation		1970	Could be virtual	Could be virtual	(374)
	7	Regulatory scheme duration	Unlimited	Limited (e.g. 20 years for the FiT)	Could be limited	Unlimited	Limited (e.g. 20 years for the FiT)
	8	Third party ownership accepted	÷	(c. <del>4</del> .)	es <del>d</del> ie	( <b>.</b> +)	(.+)
Other system	9	Grid codes and additional taxes/fees	<del>ti</del> s	(1 <del>4</del> 1)	( <del>4</del> )	( <del>11</del> 1)	(9 <del>4</del> 3)
characteristics	10	Other enablers of self- consumption	73		ंज		
	11	PV System Size Limitations	27	2 <u>4</u> 5	120 1	120 1	120
	12	Electricity System Limitations	27		3 <b>2</b> 3	- 22	- 20
	13	Additional features	÷:	(1 <del>1</del> 5)		. ( <del>1</del> 1)	( <del>-</del> - )

Table 23. Summary of Self-consumption Business Models



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		Production based: classical "FiT" - style. No self-consumption	Self-consumption with constraints	Self-consumption + FiT	Net-billing	Net-metering	Self-consumption + Premium
1	Right to self- consume	Not Allowed	Yes	Yes	Yes	Yes	Yes
2	Revenues from self-consumed PV	N/A	Savings on the electricity bill	Savings on the electricity bill	Netting of production revenues and consumption costs	Savings on the electricity bill	Savings on the electricity bill
	Additional revenues on self- consumed PV	N/A	No	No	No	No	Premium
3	Charges to finance T&D cost	N/A	Yes	No	No	No	No
4	Revenues from excess electricity	N/A	Zero	< retail price	<= retail price	= retail price	> retail price
5	Maximum timeframe for compensation	N/A	Real-time	Real-time	Long period	Long period	Real time

Table 24. Range of business models from the perspective of the prosumer

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Figure 5. Illustration of annual PV generation and electricity consumption per Business Case



#### CASE 3: Net-billing





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Figure 6. Framework of the analysis

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# **THANK YOU!**