How to Scale-up Rooftop Solar: A Policymaker's Guide

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BRIEF PROFILE:

Toby Couture is Founder and Director of E3 Analytics, an international renewable energy consultancy based in Berlin that focuses on renewable energy markets, policy, and finance. He focuses on how to accelerate the transition to a sustainable energy system in the electricity, heating, cooling, and transport sectors.
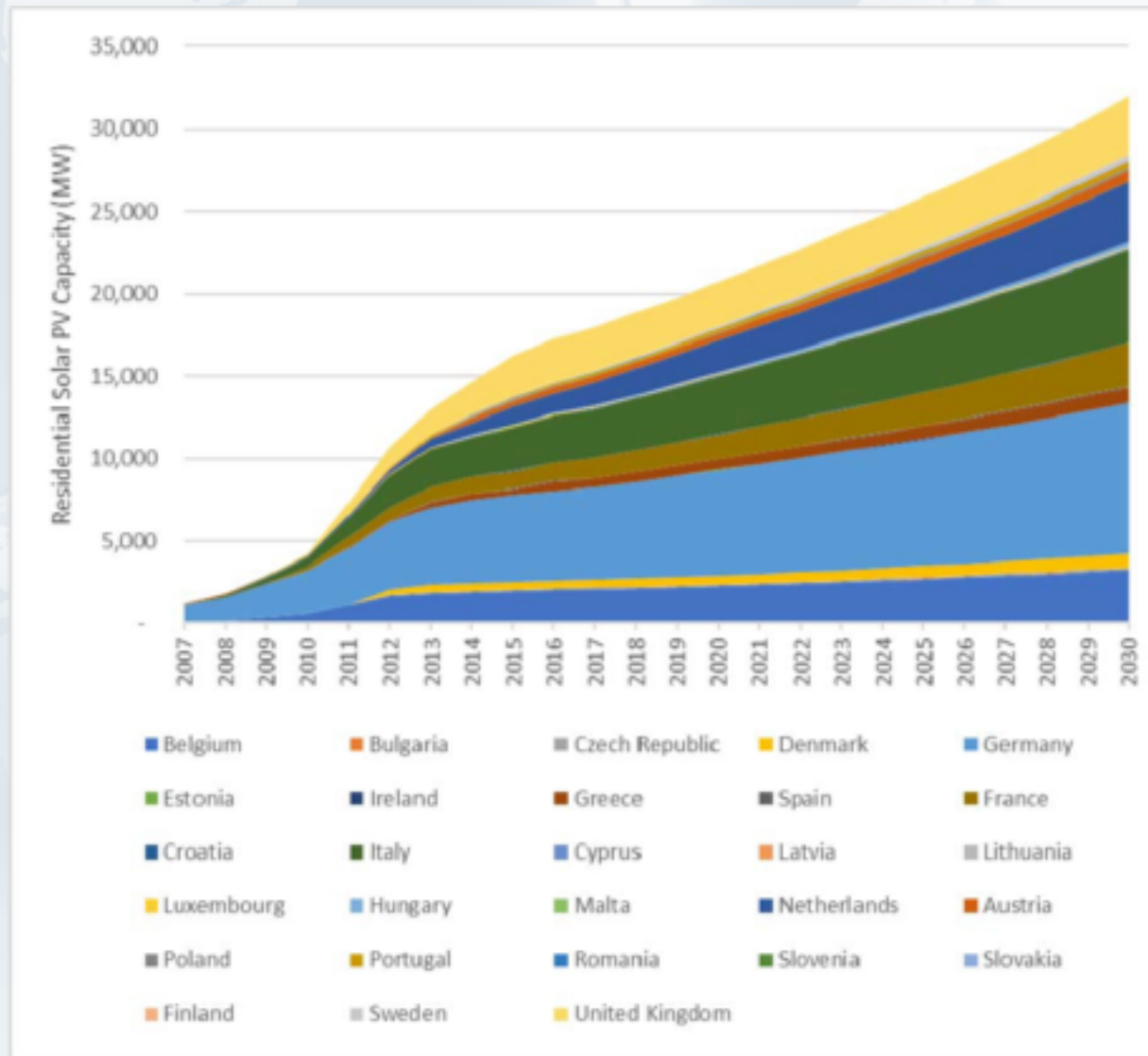
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Agenda

1. **Introduction**

2. **Net Metering**

3. **Net Billing**

4. **NET-FITs**

5. **Conclusion**

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The Rise of Distributed Solar in Europe

Residential Solar PV is becoming a major source of new power supply

Potential remains vast, and largely untapped

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The Evolution of Rooftop Solar Policy

Policy Mechanism	Relation to the Retail Rate	Possibility of Cash Payment (Y/N)
Net Metering	___At___ the retail rate	No
Net Billing	___Below___ the retail rate	Typically not*
NET-FIT	___Below___ the retail rate	Yes: cash payment for net excess generation
"Classic" FIT	No relation to the retail rate: **Set at the LCOE of each technology**	Yes

* If so, typically at the end of the year, and only to settle net excess generation (NEG) credits

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Net Metering Differs Widely Across Europe (selection)

Country	Policy framework in place
Albania	Classic Net Metering
Austria	Self-consumption + market price or FIT
Belgium	Pure self-consumption or net metering
France	Self-consumption or fixed FIT + subsidy
Italy	Self-consumption + either PPA or Net Billing
Netherlands	Net Metering (transition to new scheme in 2020)
Latvia	Net Metering: users must pay fees for grid usage
Luxembourg	System 1-4kW are exempt from income tax
Slovenia	Net Metering
Greece	Net Metering
Finland	NET-FIT: surplus electricity purchased through private PPAs
Slovakia	Self-consumption allowed: no compensation for net excess generation

Renewable energy policy is undergoing significant transformations

Policies governing **rooftop solar PV** are shifting away from classic Net Metering and toward :

1. Net Billing
2. NET-FITs
3. Value of solar tariffs
4. Buy-All, Sell-All policies
5. Etc.

In addition, other policies like preferential tax treatment, rate design, gov't subsidies continue to play a role
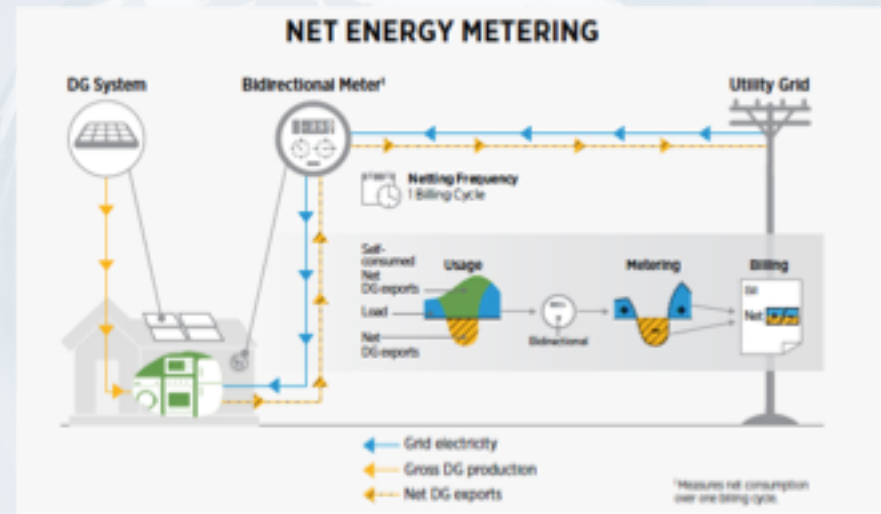

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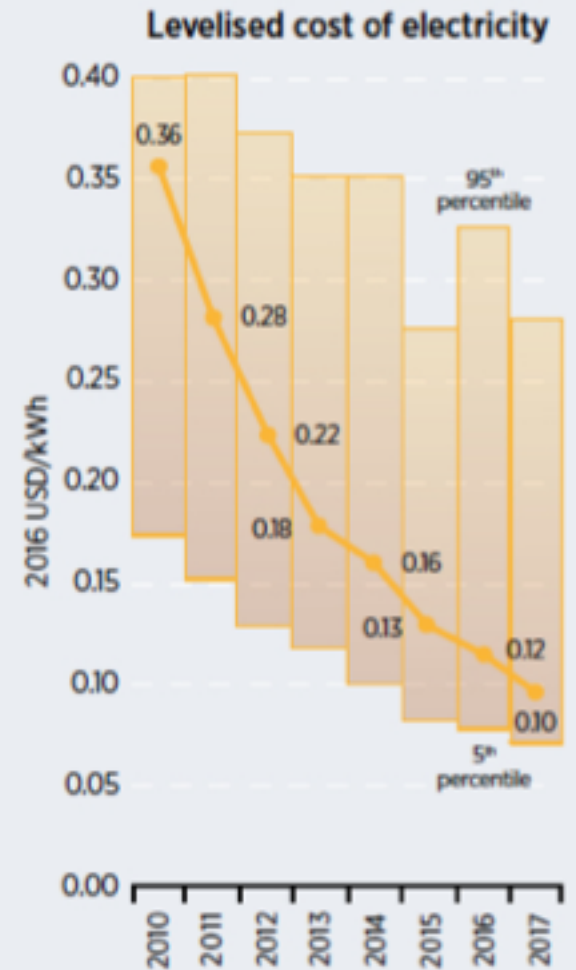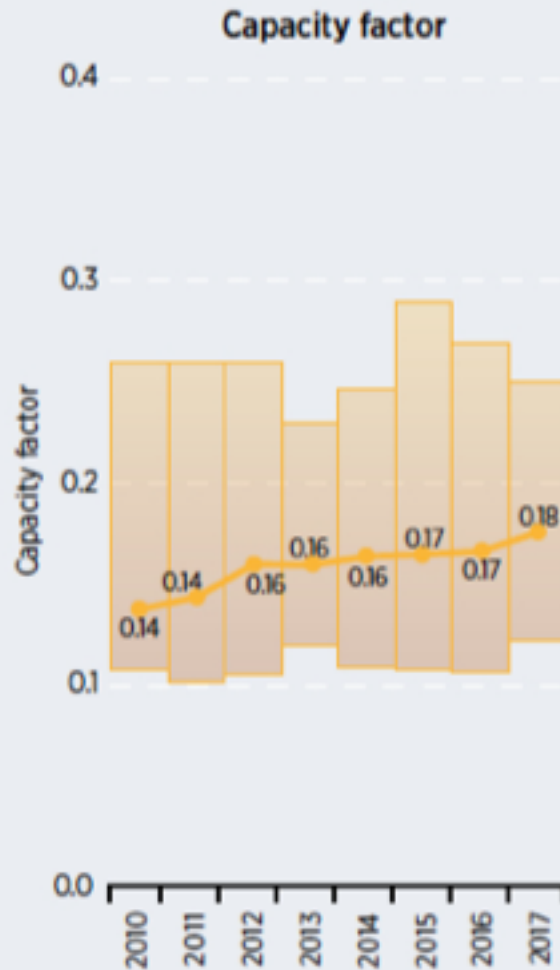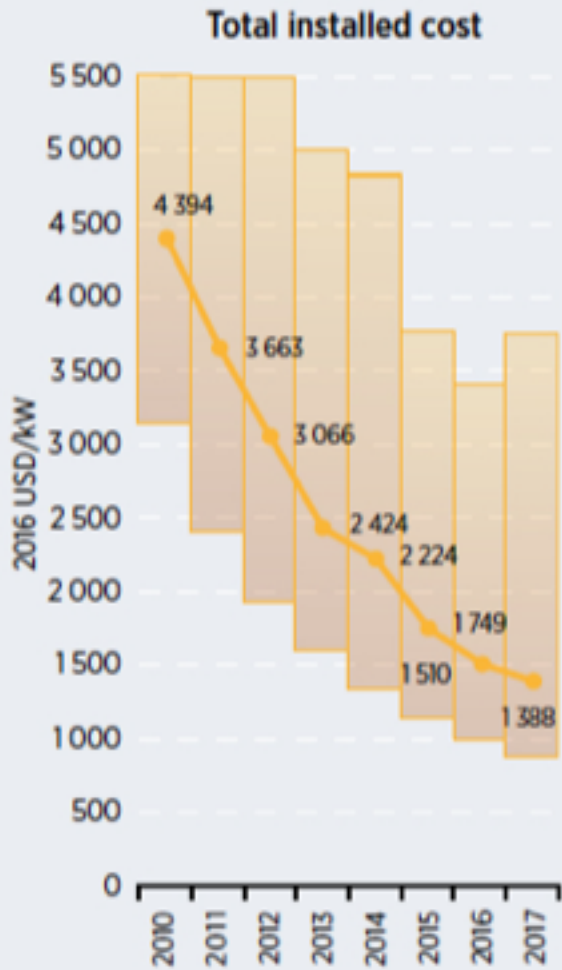# Debate on self-consumption policies in Europe is (comparatively) lacking

❖ There are few websites providing up-to-date information on policies and frameworks
  - RES-Legal barely even talks about self-consumption

❖ Emergence of new business models in the self-consumption sector has been much slower than the U.S. and Australia (no SunRun, SolarCity, etc.)

❖ Moreover, EU-wide discussion and knowledge sharing appears to be far more limited than in other policy areas (e.g. FITs and auction schemes, biomass, data, etc.)

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Net Metering policies are evolving rapidly due to a host of factors:

- **Rapid declines in solar PV costs**

- **The rise of new business models**

- **Changing electricity markets**

- **Impacts utility cost recovery**

- **Concerns over impacts on utility solvency**

- **Concerns over cross-subsidization**

- **Etc.**

NET ENERGY METERING

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Solar PV Cost and Performance Trends

Source: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Jan/IRENA_2017_Power_Costs_2018.pdf

Levelized Cost of Generation Technologies ($/MWh)

Recent solar PV auction results have seen prices fall below $20/MWh!

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Net Metering

Net Metering, the rate is the same, and credits are rendered in kWh (not $)

Residential prosumer

Commercial prosumer

kWh

Grid injection

Self Consumption

Grid injection

Self Consumption

For Net Excess Generation:

Compensated at the retail rate **in kWh** for every kWh of net grid injection

For Self-Consumption:

Offsets utility consumption @ the full retail rate:

Attractiveness of self-consumption differs based on customer type and individual load profile

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Source: E3 Analytics 2018

Net Metering

Over 60 countries around the world have adopted some form of Net Metering

Formula:

Compensation rate = retail rate

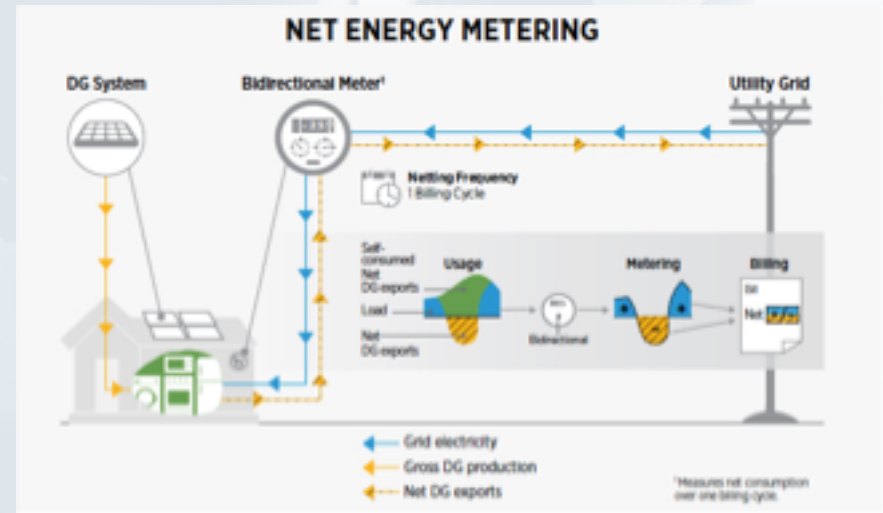**No Cash Payment**: Net Excess Generation can be exported to the grid and used to offset future consumption

NEG credits typically "netted" at the end of the year (12 months)

NET ENERGY METERING

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Source: https://www.nrel.gov/docs/fy18osti/68469.pdf

Net Metering: Pros and Cons:

Pros	Cons
Allows customers to connect to the grid and export their surplus generation (avoid the need of investing in battery storage)	**No incentive to self-consume:** customer is neutral whether they self-consume or not
Easy to understand: compensation rate = retail rate	**Compensation rate arguably arbitrary** (different customer classes get different compensation rate)
As **retail rates rise**, so too does the value of self-consumption	As PV costs come down, **Net Metering arguably results in over-compensation**
Declining PV costs are making Net Metering increasingly attractive	Can negatively affect **utility cost recovery and lead to cross subsidies** between customers with and those without solar
Can be **easily combined with new business models (leasing, community solar)**	**Tax treatment** can be complicated

Net Billing

Net Billing

Formula:

Compensation rate = a separate, pre-determined rate

Rate is typically <u>lower</u> than retail prices

Net Billing compensation is rendered in monetary terms: customers "bank" a monetary amount as a <u>bill credit</u>, not a kWh amount

❖ **Like Net Metering, there is typically <u>No Cash Payment</u>: simply a monetary "credit" on the bill**

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Source: https://www.nrel.gov/docs/fy18osti/68469.pdf
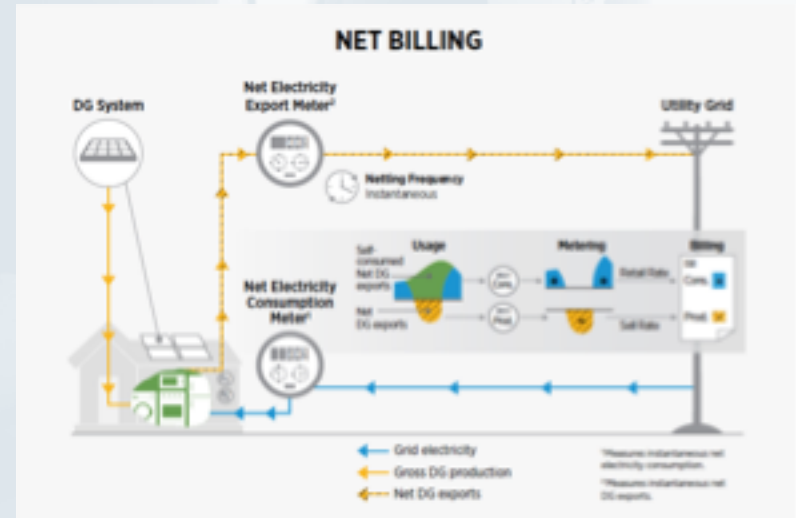
Net Billing: compensation rate for NEG is _different_ from the retail rate, and credits in $ (not kWh)
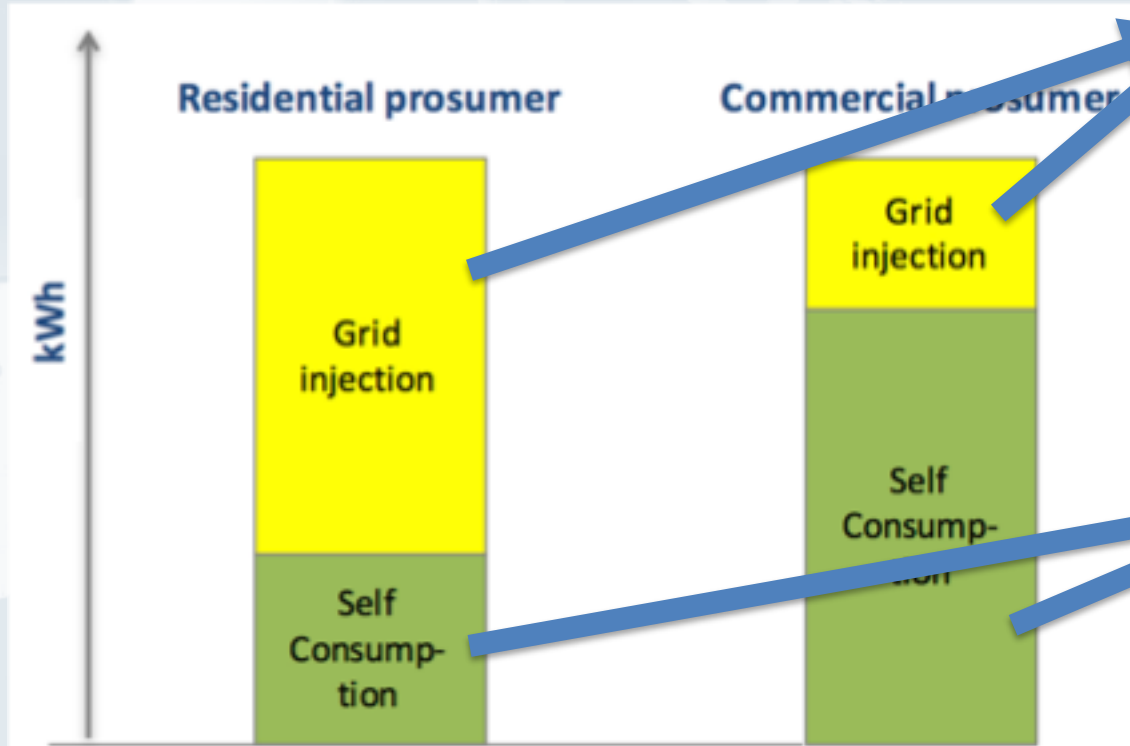
For Net Excess Generation:

Compensated at a separate rate, typically as a **$/kWh credit** on your bill

For Self-Consumption:
Can offset utility consumption @ the full retail rate:

Or

Can offset one's bill at a separate rate

Residential prosumer

Commercial prosumer

kWh

Grid injection

Self Consumption

Grid injection

Self Consumption

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Source: E3 Analytics 2018

Net Billing: Pros and Cons:

| Pros	Cons
Net Billing leads to **fewer cross-subsidization issues and helps protect utilities from revenue loss**	**Net Billing rate may _undervalue_ distributed generation**
Can create an incentive to increase self-consumption (when the export rate it lower than the self-consumption rate)	**Difficult to set a fair Net Billing rate for multiple different customer types,** with different load profiles and rate structures
Net Billing rate can be adjusted independently of the retail rate	**Less profitable for households and businesses** than classic Net Metering
Declining PV costs make it possible for even Net Billing to be profitable for customers	**Net Billing reflects a "tightening"** of the regulatory conditions for rooftop solar
Net Billing rate can be linked to independent benchmarks (e.g. wholesale prices, avoided costs)	As under Net Metering, **tax treatment** can be complicated

NET-FITs

NET-FITs offer cash payment for net excess generation exported to the grid

Formula:

NET-FIT Payment = a cash payment for all net excess generation exported to the grid
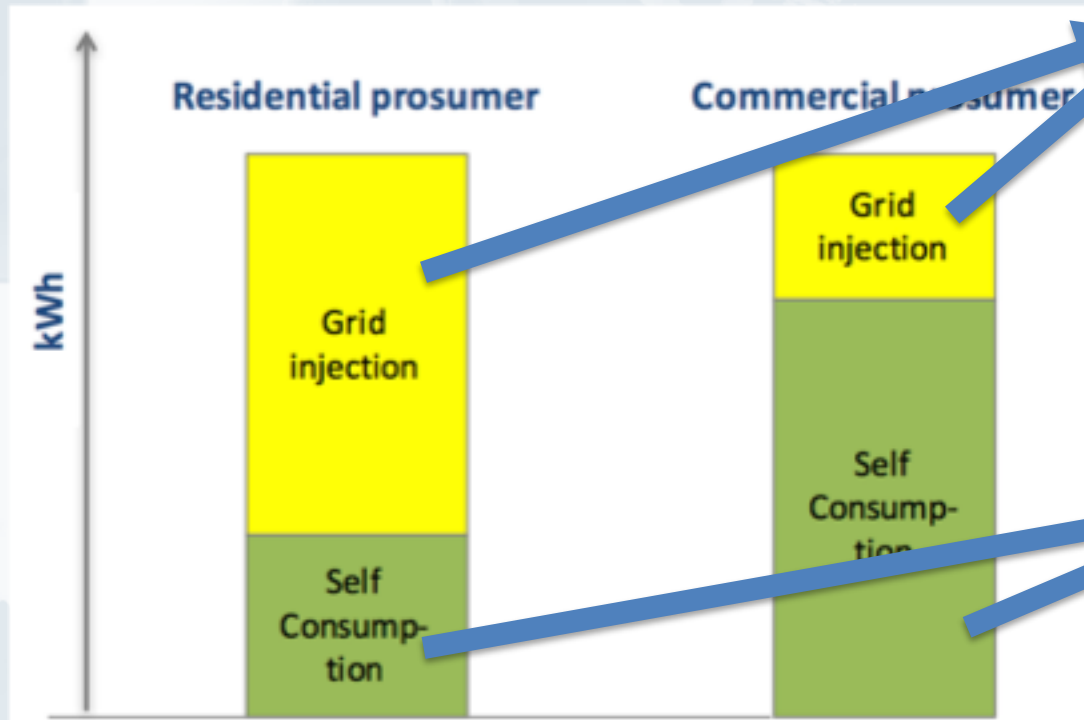
Tariff level typically <u>below retail</u>

NET-FITs treat customer-sited generation as a new (and potentially large) source of new power supply
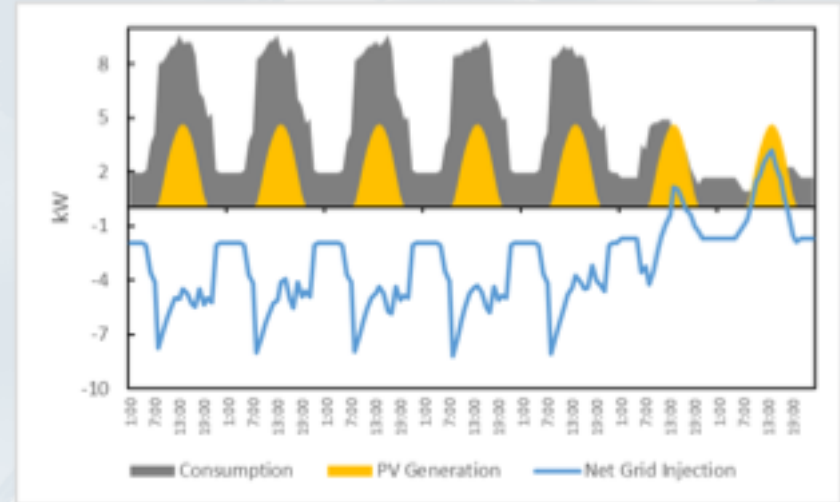
DPV no longer seen solely as "demand reduction"

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NET-FITs increase the bankability of investments in self-consumption

For Net Excess Generation:

Utility payment (in $/kWh) for all net excess generation exported to the grid

For Self-Consumption:

Offsets utility consumption @ the full retail rate

Residential prosumer

Commercial prosumer

kWh

Grid injection

Self Consumption

Grid injection

Self Consumption

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Source: E3 Analytics 2018

NET-FITs: Pros and Cons:

Pros	Cons
NET-FITs offer a <u>cash payment</u> rather than simply a bill credit	**NET-FIT rate may still _<u>undervalue</u>_** distributed generation
Can significantly improves the _<u>bankability</u>_ of distributed generation	**May be difficult to set a fair NET-FIT rate for multiple different customer types,** with different load profiles and rate structures
NET-FIT rate can be adjusted independently of the retail rate	**May be difficult to set a fair NET-FIT rate for different project sizes**
NET-FIT rate can be linked to independent benchmarks (e.g. wholesale prices, avoided costs)	**NET-FIT rate may not reflect the real "value" of solar** to the system
Recognizes distributed solar as a new source of power supply	As under Net Metering and Net Billing, **tax treatment** can be complicated

How to Set the Rate for Net Excess Generation?

1. The wholesale market rate

2. The avoided cost rate

3. The fuel cost rate – '*x*' (e.g. in islands)

4. The "time of use" rate

5. The "value of solar" rate

6. Some other rate as set by the regulator

Key distinction between compensation (i.e. bill credits) and cash payment

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Key Net Metering Design Features

Compensation Mechanism	Eligibility (e.g. which Technologies?)	Permitting Fees
Time of Use (TOU) Option	Roll-over Provisions	Grid Impact Study fees
Project Size Caps	Settlement Period	Metering approach: who pays?
Program Size Caps	Fixed Charges ($/kW)	Application Fees
Contract Duration	Demand Charges	Grid interconnection Rules
Treatment of RECs	Minimum Bills/Ring-fencing	Permitting Fees

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Key Decision Points

1. What is the rate for Net Excess Generation?
2. Does the same rate apply both to self-consumption and exported generation?
3. Which technologies are eligible?
4. Which customer types are eligible?
5. What are the project size categories?
6. Is there a cap on the total allowable capacity?
7. What is the length of the NM agreement?
8. Do existing projects qualify?
9. Are there any additional charges or fees?
10. Are any bill components "ring-fenced" (i.e. non-erasable through self-consumption)?

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Concluding Remarks

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Policies for distributed generation are poised to become increasingly important in the years ahead as **solar costs continue to decline**

Need for **more dialogue and information sharing** on self-consumption policies across Europe and across the region

The potential for a substantial scale-up of rooftop solar PV in SE Europe is **large, and largely untapped**

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Thank you!

Questions?

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Recent Publications:

How to Achieve Low-Cost Renewables (Sept 2018), Agora Energiewende:
https://www.agora-energiewende.de/fileadmin2/Projekte/2018/A_word_on/Agora_Energiewende_a_word_on_low-cost-renewables_WEB.pdf

The Global Energy Transformation: Roadmap to 2050 (April 2018), IRENA:
https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Apr/IRENA_Report_GET_2018.pdf

Enter the Shark Curve (May 2018), E3 Analytics:
http://www.e3analytics.eu/wp-content/uploads/2018/05/Analytical-Brief_May-2018_FINAL.pdf

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