CLEAN ENERGY SOLUTIONS CENTER
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INTERNATIONAL SOLAR ALLIANCE

International Solar Alliance Expert Training Course: Session 6, Part 2

Solar PV Policy: Net Billing

In partnership with the Clean Energy Solutions Center

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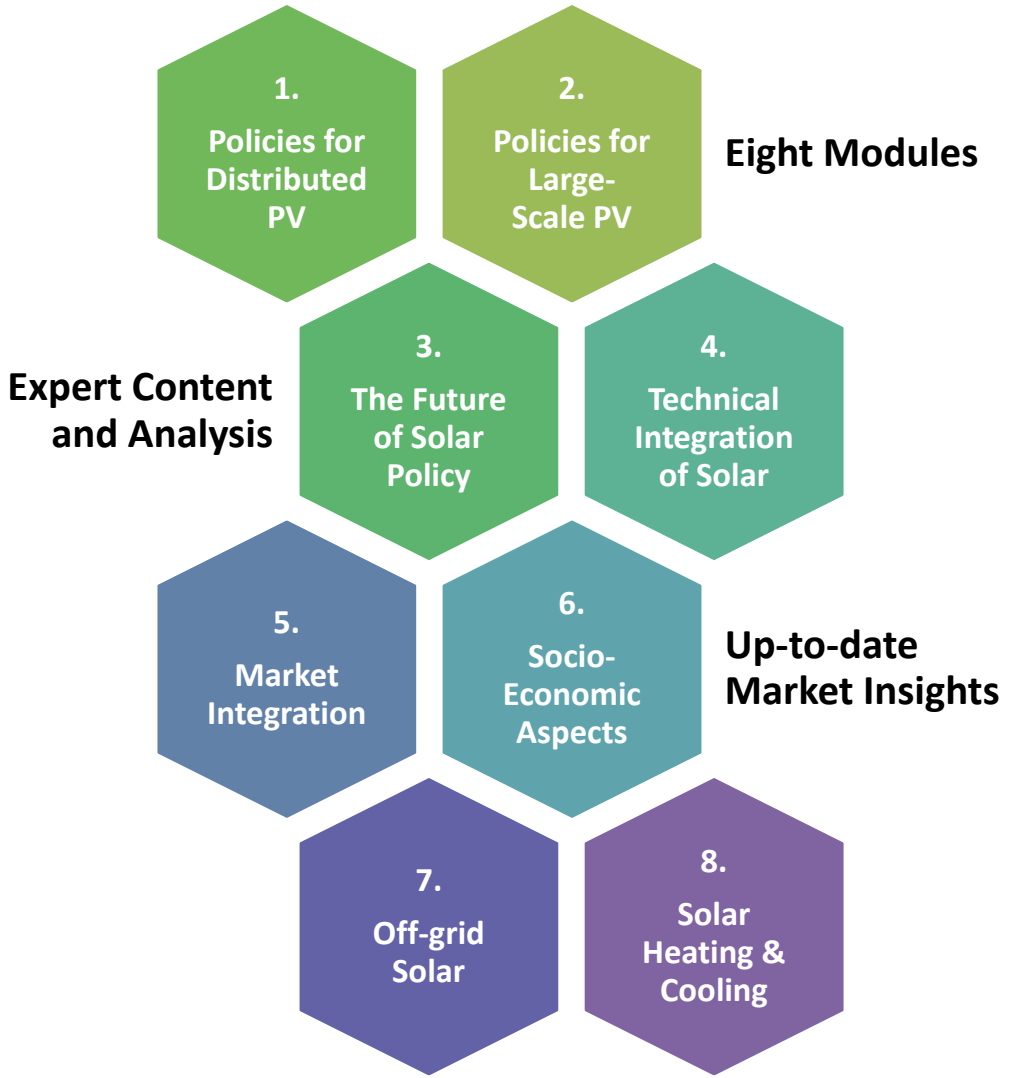
Overview of Training Course Modules

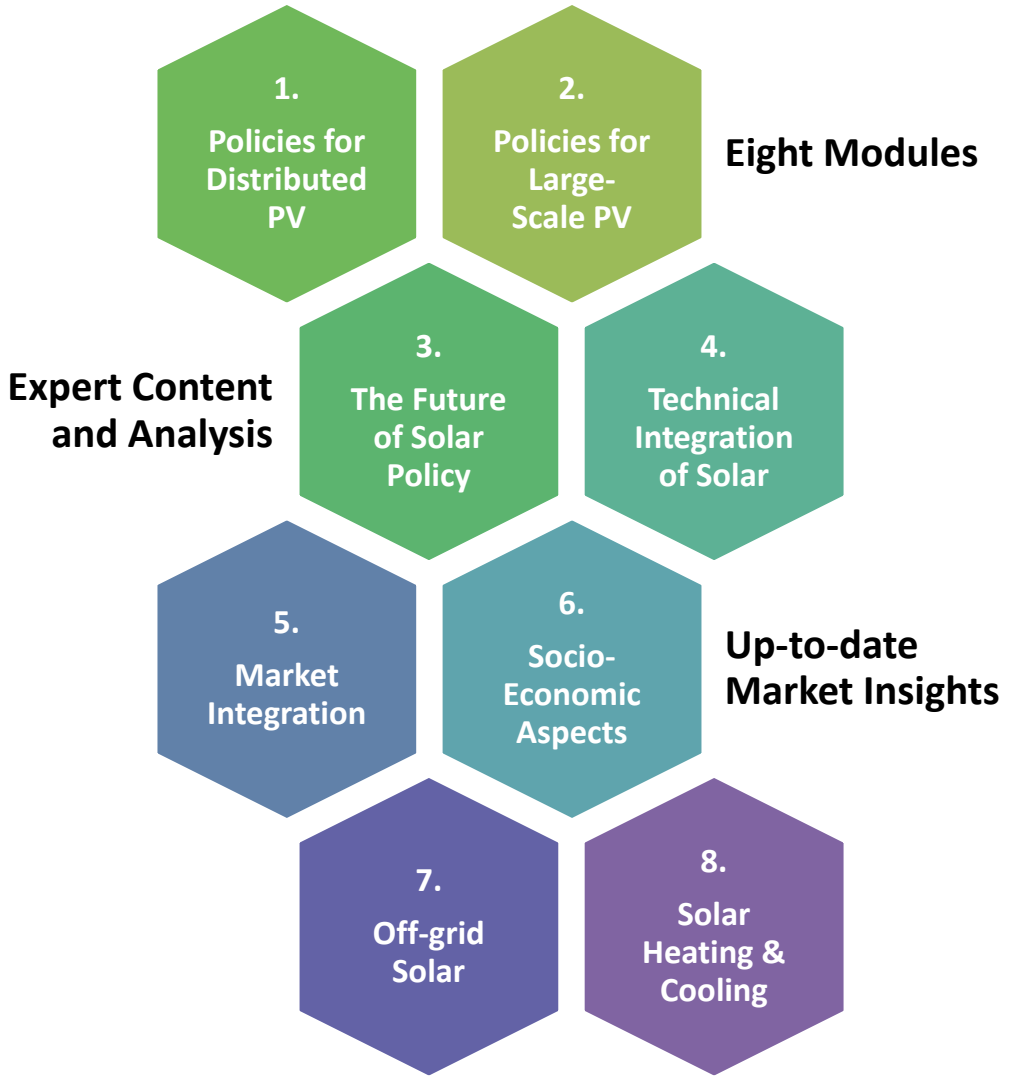
This Training is part of Module 1, and focuses on the issue of Net Billing



Two-Part Training

Part 1: Focuses on Net Metering

Part 2: Focuses on Net Billing



Overview of the Presentation

1. Introduction: Learning Objective
2. Main body of presentation
3. Concluding Remarks
4. Further Reading
5. Knowledge Check: Multiple-Choice Questions

1. Introduction: Learning Objective

Learning Objectives

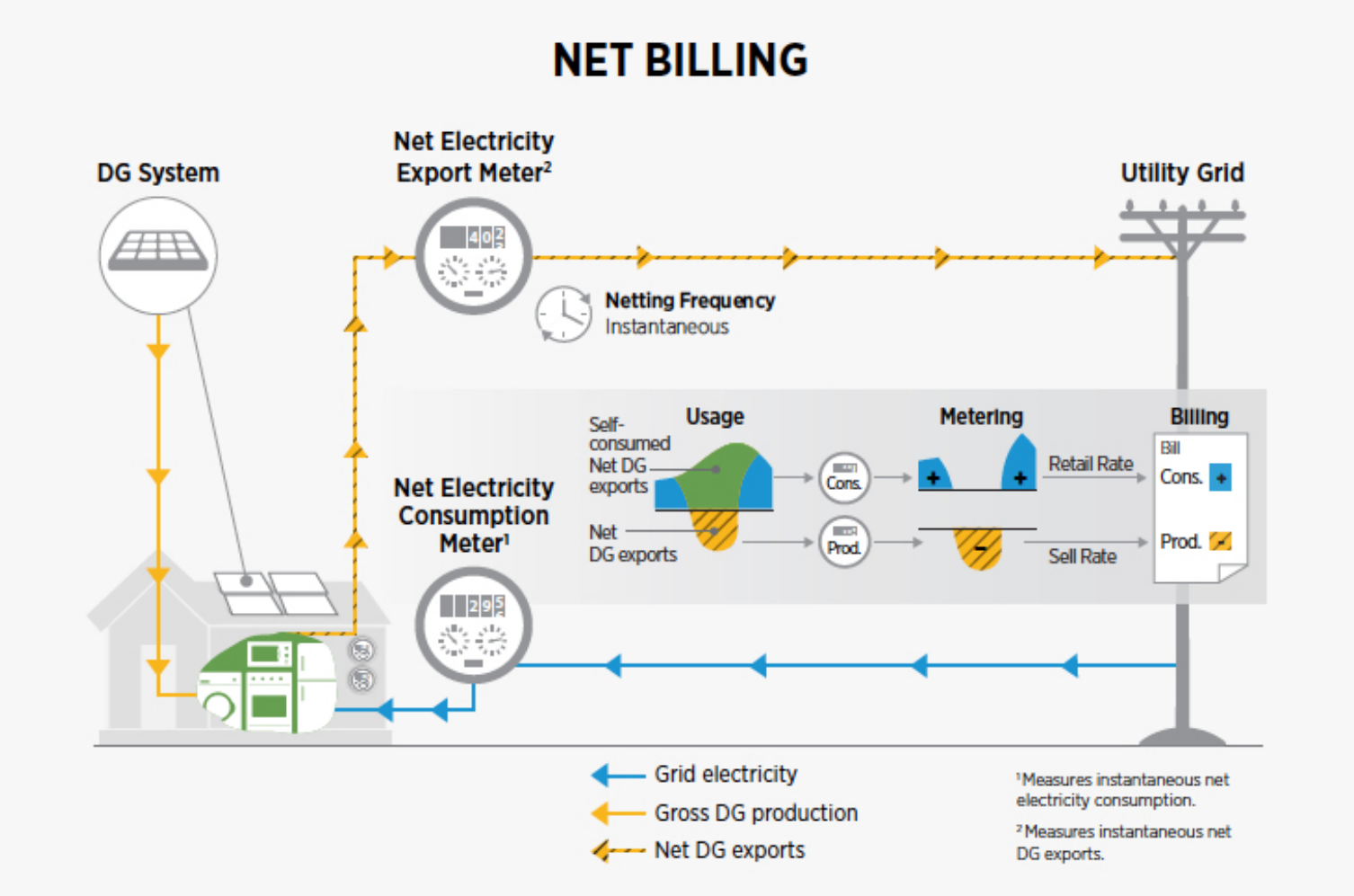
- Understand the rise of Net Billing
- Understand why Net Billing policies emerged and how they differ from traditional Net Metering
- Understand how Net Billing has been adapted in different jurisdictions around the world
- Understand the advantages and challenges

2. Net Billing Policies

Net Billing

- More recent policy innovation: first emerges in the late 2000s in island regions
- **Similar to Net Metering:** customers export their excess generation to the grid and receive a compensation on their future bills
- Main difference is that **the rate at which customer-sited generation is credited is different from the retail rate that customers pay**

Net Billing



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

Net Billing

Formula for Net Billing:

Compensation rate = A separate pre-determined rate

Excess electricity injected into the grid offsets the customer's bill at a predetermined rate

Net Billing does not involve a cash payment for net excess generation (if it did, it would be called a NET-FIT)

Net Billing

The Net Billing rate is simply an accounting mechanism: it refers to the rate at which a customer can offset their bill

e.g. 1 kWh of Net Excess Generation = USD $0.07

Net Billing severs the relationship between the value of a kWh consumed from the grid and the value of a kWh injected into the grid

Net Billing

Net Billing can also be structured even more conservatively:

Example:

The full output of the PV system is injected into the grid (no self-consumption). The Net Billing rate is the rate at which the electricity injected into the grid offsets the customer's bill (e.g. 1kWh = USD $0.07)

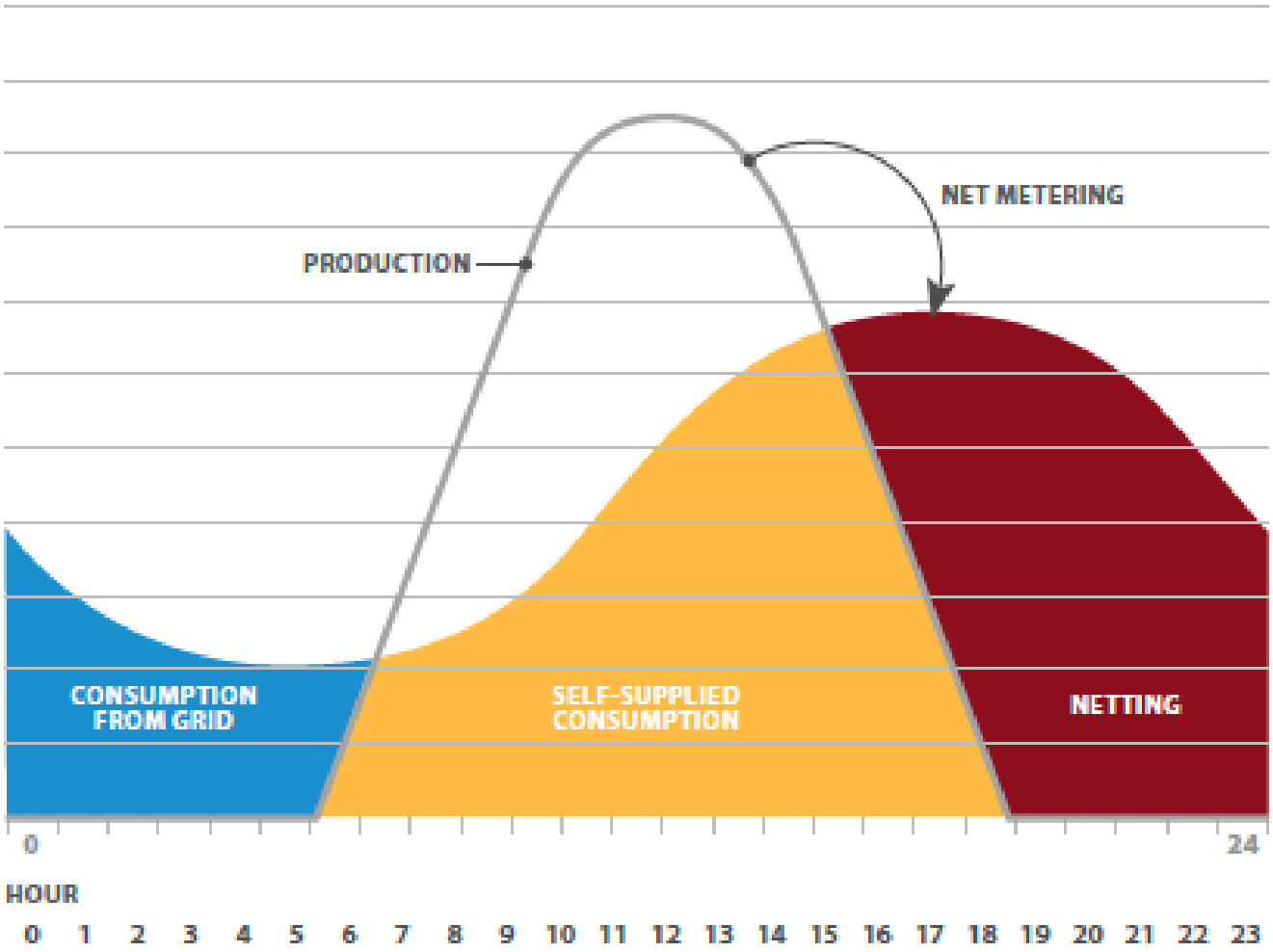
Net Billing

The net billing rate can be defined in a range of different ways:

1. **The wholesale market rate**
2. **The "time of use" rate**
3. **The avoided cost rate**
4. **The "value of solar" rate**
5. **Some other rate as set by the regulator**

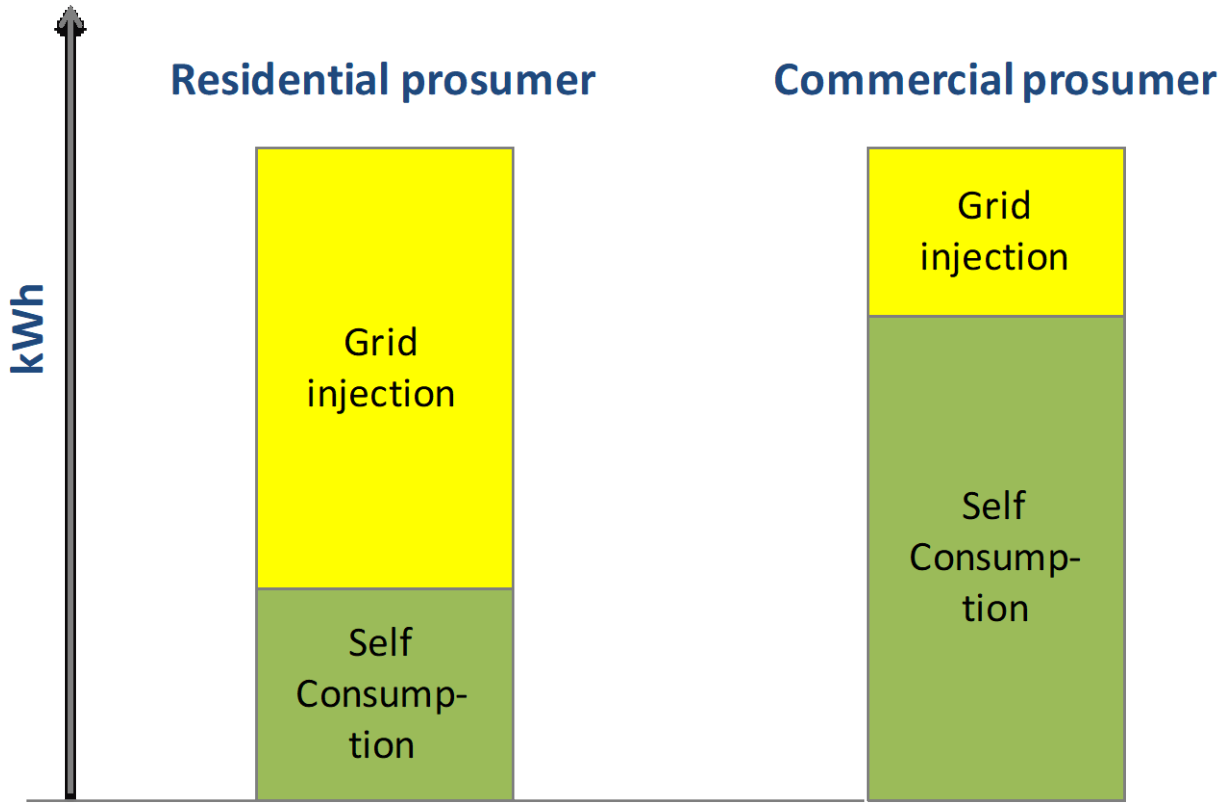
The Net Billing rate is typically <u>lower</u> than the retail rate paid by the customer.

Net Billing/Net Metering Diagram



https://gridworks.org/wp-content/uploads/2018/01/Gridworks_SustainingSolar_Online.pdf

Understanding Self-Consumption

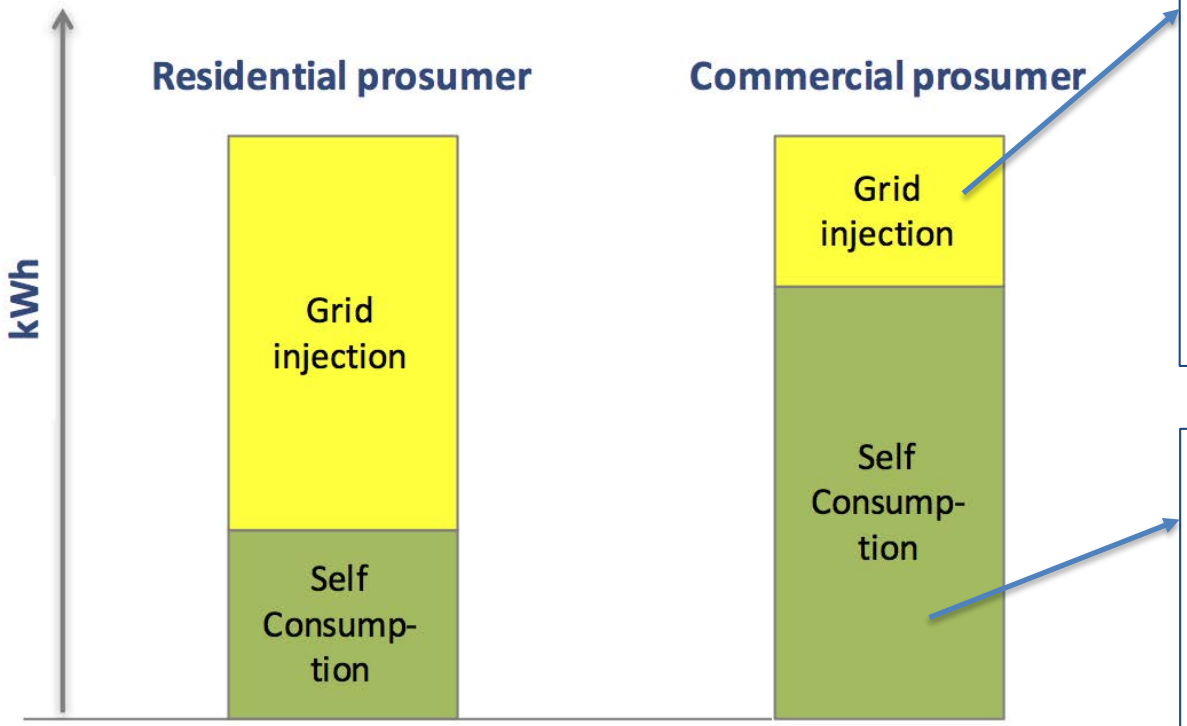


Under Net Billing, the value of net excess generation is de-coupled from retail tariffs

Under both NM and NB, the value of self-consumed electricity is equal to the retail tariff

For commercial customers, the self-consumption ratio is typically higher, and – due to the higher retail tariffs - its value is also higher, thus allowing for a better business case.

Understanding Self-Consumption



For Grid Injection:
Can be compensated @ the full retail rate

Or

Can be compensated at a separate rate

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

Or

Can offset one's bill at a separate rate

Net Billing

The Net Billing rate can be applied in two ways:

1. **For all customer-sited generation,** whether self-consumed or exported to the grid: purely an 'ex-post' bill adjustment, based on the specific net billing rate

2. **Strictly to the net excess generation:** this allows customers to offset their utility bill on a one-to-one basis just like net metering for all self-consumed electricity; then, prosumers are credited at the special net billing rate for all their net excess generation

Overview of DG Policies

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
"Classic" FIT	No relation to the retail rate: **Set at the LCOE of each technology**	Yes

Net Billing

Plus, additional restrictions can be added:

- For instance, the regulator can limit which components of the power bill can actually be erased via Net Billing

- This approach is referred to as ”ring-fencing”: certain components of the bill are protected, and cannot be bypassed

- This is often done by utilities in order to protect against revenue erosion

Roll-over Provisions

Most Net Billing are similar to Net Metering policies: they enable the customer to “bank” their excess generation up to 12-months: excess credits in one month (or billing cycle) can then be used to offset credits in subsequent months

However, after the 12-month ”settlement period” (for instance), the excess credits are then ***credited*** to be customer at the Net Billing rate

This settlement can be done at the end of the year, and **may** in some cases involve a cash payment (differs from a full ”NET-FIT” policy, which typically pays for all net excess generation on a rolling basis every month: see Session 7))

Settlement Period

The **settlement period** refers to the time at which the net excess generation credits are “trued-up”, and ”settled” financially

The settlement period is typically 12 months
Main options for dealing with net excess generation after 12-month period:

a) Excess generation is forfeited (Net Metering)
b) Excess generation *credited* at some rate (e.g. wholesale rate): i.e. receives a further bill credit (**Net Billing**)
c) Excess generation *remunerated* at some rate (e.g. avoided costs): i.e. receives a cash payment (NET-FIT)

Net Billing Design Features: Same as Net Metering

Key Design Features		
Compensation Mechanism	Eligibility	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 Processing
Contract Duration	Demand Charges	Grid interconnection Rules
Treatment of RECs	Minimum Bills/Ring-fencing	Permitting Fees

Net Billing: Case Studies: Palau

Quick Facts:

- Population: Approx. 20,000
- Annual Generation: 89 GWh (2011)
- Installed Capacity: Approx. 35MW
- Retail Electricity Tariffs: USD $0.405/kWh

Source: http://www.irena.org/DocumentDownloads/Publications/Palau.pdf

Net Billing: Case Studies: Palau

Payment Structure:

- credited for any excess generation in a particular month at a rate **no less than 50% of the tariff applicable during that monthly billing period**.

→ in other words, excess generation is purchased at a significant ***discount*** to the retail rate paid by the customer.

- Rollover period is 12 months; TBD by the PPUC

Source: http://www.spc.int/edd/en/document-download/finish/11-reports/654-palau-energy-country-profile

Net Billing: Case Studies: Vanuatu

- Producers export their **excess** power to the grid
- One meter, provided by utility UNELCO

Payment Structure:

- No cash payment ("no negative bills")
- Onsite generation offsets onsite consumption first
- Then, **excess generation offsets the fixed connection charge *and* the grid access fee at a rate of 13 vatu** (~USD 0.135/kWh) for each excess kWh injected

Net Billing: Case Studies: Tucson, AZ

Tucson Electric Power (TEP) has recently proposed altering the rate at which it ***credits*** solar generation from customers from the retail rate, to the rate paid for utility-scale solar PV projects.

→ USD $0.058/kWh, or roughly half the current retail rate in Arizona

Source: http://www.utilitydive.com/news/whats-solar-worth-inside-arizona-utilities-push-to-reform-net-metering-r/399706/

Net Billing: Additional considerations

- Key issue is also whether a prosumer can offset all components of their bill, or only the energy component:
  - In other words, whether they can erase all grid fees and taxes with their net excess generation
- In jurisdictions with fully volumetric tariffs (e.g. where all the costs of power distribution and supply are bundled into a simple per-kWh rate), offsetting the full rate is often possible: no restrictions.
- In jurisdictions where taxes and fees are accounted for separately, it is often not: **one can only erase the energy-related components of the bill**
- Or, as in Vanuatu, only a portion of the power bill is erased at a fixed rate

Net Billing: Additional considerations

- It is also critical whether customers have to contribute to renewable energy support costs (e.g. RE surcharges), or other subsidy categories in the bill (e.g. low-income residents, energy efficiency programs, etc.)

- In a growing number of cases, these different charges are starting to be **ring-fenced: i.e. they cannot be erased via self-consumption**

- Some jurisdictions have also introduced **”minimum bills”:** a fixed cost per customer per month, regardless of electricity consumption that cannot be erased with self-consumption

Net Billing: Advantages

- Net Billing recognizes that the cost of rooftop solar is increasingly below the retail price that customers pay: hence, full retail price compensation (some argue) results in ”over-compensation”; Net Billing can therefore provide a fairer compensation structure with fewer cross-subsidization issues

- Decouples DG compensation from the customer class the prosumer happens to be in: all owners of DPV systems of the same size category can receive the same Net Billing rate, regardless of which rate category they happen to be in

Net Billing: Advantages (con't)

- Allows utilities to avoid cross-subsidies between different customer classes (and between those with solar PV systems and those without)
- Makes it easier to adjust the compensation rate, since the Net Billing rate is not linked to the retail price
- Net Billing offers more flexibility in terms of setting the value of distributed generation to the system

Net Billing: Advantages (con't)

- Enables utilities to mitigate revenue losses
- Net billing enables "degression": 'x'/kWh for customers connecting in 2018, 'y'/kWh in 2019, etc.
- Net Billing may have the unintended (positive) effect of encouraging the emergence of new business models and platforms that enable prosumers to trade power with one another (and thereby receive closer to the full retail rate for their net excess generation): e.g. peer-to-peer energy sharing

Net Billing: Challenges

- Under Net Billing, customers may be unfairly/insufficiently compensated for their electricity: distributed generation **may be worth *more*** than the net billing rate provided

- By decoupling the compensation rate from the retail rate, Net Billing means that customers will not gain as much from future utility rate increases as they would under Net Metering

- Net Billing arguably signals a “tightening” of the regulatory conditions around DPV: often less financially attractive than Net Metering

Net Billing: Key Decision Points

1. How to determine the Net Billing rate?
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 NB 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)?

4. Concluding Remarks

Concluding Remarks

- Trend toward **compensation being set below the retail rate** (i.e. Net Billing)
- **Ring-fencing** is becoming more common: i.e. making certain bill components “non-erasable” via self-consumption to protect against utility revenue erosion
- However, NET-FITs are also becoming more widespread, as governments and regulators start to see the potential of encouraging more investment in distributed generation (see Session 2 and Session 7)

Concluding Remarks

- Net Billing helps address utility concerns around revenue loss: as a result, it may help create a more sustainable, long-term foundation for the growth of distributed solar

- However, it may also foreshadow more regulatory tightening and trigger the rise of more disruptive business models: e.g. peer-to-peer power sharing, Blockchain, etc.

5. Further Reading

Further Reading

- Jacobs, D., Couture, T.D., Zinaman, O., Cochran, J., (2016). “RE-TRANSITION: Transitioning to Policy Frameworks for Cost-Competitive Renewables,” IEA-RETD, Paris. Available at: http://iea-retd.org/wp-content/uploads/2016/03/IEA-RETD_RE-TRANSITION.pdf
- Rickerson, W., Koo, J., Crowe, J., Couture, T., (2016). “Tapping the Potential of Commercial Prosumers: Drivers and Policy Options,” IEA-RETD, Paris. Available at: http://iea-retd.org/wp-content/uploads/2016/04/RE-COM-PROSUMERS-Report.pdf
- Zinaman et al. (2018). Distributed Generation Compensation Mechanisms (2018): https://www.nrel.gov/docs/fy18osti/68469.pdf
- https://gridworks.org/wp-content/uploads/2018/01/Gridworks_SustainingSolar_Online.pdf

Further Reading

- Couture, T., Jacobs, J., Rickerson, W., Healey, V., (2015). "The Next Generation of Renewable Electricity Policies: How Rapid Change is Breaking Down Conventional Policy Categories," Clean Energy Solutions Center, in collaboration with the National Renewable Energy Laboratory, Available at: http://www.nrel.gov/docs/fy15osti/63149.pdf

- Rickerson, W., Couture, T., Barbose, G., Jacobs, D., Parkinson, G., Belden, A., Becker-Birck, C., Chessin, E., (2014). "A Study on the Effects of a Large Uptake of Non-Incentivised Residential PV (RE-PROSUMERS)", IEA-RETD: Paris, France. Available at: http://iea-retd.org/wp-content/uploads/2014/06/RE-PROSUMERS_IEA-RETD_2014.pdf

- EU Study on Prosumers in the EU: https://ec.europa.eu/commission/sites/beta-political/files/study-residential-prosumers-energy-union_en.pdf

Thank you for your time!

6. Knowledge Checkpoint: Multiple Choice Questions