Large scale, off-grid and distributed solar PV in Latin America
Promoting market growth after COP26

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Distributed Generation by Solar PV Energy in LATAM
Marcelo Alvarez
Which Model is Better? For How Long? How to exit without market problems?

Feed in tariff
The User receives a higher fee than the one he pays to the distributor. It injects all its production.

Net Metering
The surplus energy delivered to the distributor's network is remunerated at the same price as that taken from it.

Net Billing
The fee received by the User, for the surplus injected into the distributor's network, is lower than the one paid for the supply.

Model of Incentives for Distributed Generation by Renovable Energy (electricity)
There is no universal recipe to follow. Each country has different border conditions (tariffs/subsidies/natural resources/financing capacity, etc.). We have at our disposal many lessons learned from successes and mistakes in more mature markets. Not only is the opportunity enormous, It is an obligation, with our communities, to do it as quickly, cheaply and efficiently as possible.
Feed in Tariff

DG System → DG Production Meter\(^1\) → Netting Frequency → Not Applicable → Utility Grid

Consumption Meter\(^2\) → Usage → Metering → Billing

Load → DG → Cons. → Retail Rate
Prod. → Sell Rate

\(^1\) Measures gross DG production over one billing cycle.
\(^2\) Measures gross electricity consumption over one billing cycle.

Fuente; NREL
Net Metering

Diagram showing the flow of electricity in a net metering system, including DG System, Bidirectional Meter, Utility Grid, and Net Metering calculations. The diagram explains the netting frequency over one billing cycle, with grid electricity, gross DG production, and net DG exports indicated.

Fuente; NREL
Net Billing

DG System

Bidirectional Meter

Utility Grid

Nesting Frequency
1 Billing Cycle

Usage

Self-consumed Net DG exports
Load
Net DG exports

Metering

Billing

Grid electricity
Gross DG production
Net DG exports

1 Measures net consumption over one billing cycle.
### Which Model is Better? It depends on.....

<table>
<thead>
<tr>
<th>Feature</th>
<th>Net Energy Metering</th>
<th>Buy All, Sell All</th>
<th>Net Billing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Self-Consumption Allowed</strong></td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Netting Frequency</strong></td>
<td>Billing Cycle</td>
<td>Billing Cycle</td>
<td>Instantaneous</td>
</tr>
</tbody>
</table>
| **Quantities Measured and Billed** | 1) Net consumption over the billing cycle  
2) Net excess kWh credits to be compensated or banked | 1) Gross consumption over the billing cycle  
2) Gross DG production over the billing cycle | 1) Instantaneous net consumption throughout the billing cycle  
2) Instantaneous net exports throughout the billing cycle |
| **Sell Rate Applicability**      | Accrued net excess generation credits that have expired after credit reconciliation period | Gross DG production | Instantaneous DG exports |
| **Value of DG to Customer**      | • Retail rate for self-consumption and exported generation  
• Sell rate for expired net excess generation credits | • Sell rate for gross DG production | • Retail rate for instantaneous self-consumption  
• Sell rate for instantaneous net DG exports |
| **Intra-Billing Cycle Banking of Kilowatt-Hours** | Yes | No | No |
| **Key Benefits**                 | Simplicity          | No reduced sales for utility  
Potential for more precise compensation for DG production  
Can encourage self-consumption (if desired) | Potential for more precise compensation for net injections  
Can encourage self-consumption (if desired) |
| **Challenges**                   | Reduced utility sales  
Retail rate compensation may not be aligned with DG value | Customers may illegally wire for self-consumption if more economically desirable and utility enforcement unlikely | Reduced utility sales |
Case: Argentinean Distributed PV Market
Main issues of the New Federal RE Distributed Law 27.424

- Net billing
- Just for grid (utility) users
- Self consumption with possibility of selling (just excess) to Utility
- Maximum Power to install by user = power hired (*)
- FODIS (promotional fund)
- Cuota for new public buildings
Evolución del Mercado

Secretaría de Energía - Ministerio de Economía Argentina

Evolución por Potencia [kW]

**Pot. Instalada Usuarios-Generadores [kW]**

- Sep '20: 2.200 kW
- Oct '20: 2.594 kW
- Nov '20: 3.145 kW
- Dic '20: 3.402 kW
- Ene '21: 3.600 kW
- Feb '21: 4.205 kW
- Mar '21: 4.868 kW
- Abr '21: 5.216 kW
- May '21: 5.772 kW
- Jun '21: 6.387 kW

**Reservas dePotencia Aprobadas [kW]**

- Sep '20: 410 kW
- Oct '20: 965 kW
- Nov '20: 1.127 kW
- Dic '20: 1.497 kW
- Ene '21: 1.918 kW
- Feb '21: 2.152 kW
- Mar '21: 2.640 kW
- Abr '21: 3.627 kW
- May '21: 4.697 kW
- Jun '21: 1.070 kW
- Jul '21: 665 kW
- Ago '21: 322 kW

6.387 kW  
Instalados y conectados a la red mediante un medidor bidireccional

4.697 kW  
Potencia Reservada por el distribuidor, de los cuales 1.201 kW están a la espera de la conexión del medidor.
Market share by user

Usuarios-Generadores por Categoría

Distribución por Cantidad: 63% Residencial, 33% C&I

Distribución por Potencia: 20% Residencial, 71% C&I
# Market Share by Province

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Córdoba</td>
<td>332</td>
<td>3.942,2</td>
<td>104</td>
<td>1.936,3</td>
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<tr>
<td>Mendoza</td>
<td>30</td>
<td>752,1</td>
<td>9</td>
<td>321,5</td>
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<td>Buenos Aires</td>
<td>157</td>
<td>914,62</td>
<td>127</td>
<td>864,7</td>
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<td>CABA</td>
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<td>483,51</td>
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<td>Chubut</td>
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<tr>
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<td>101,7</td>
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<td>79,5</td>
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<tr>
<td>Corrientes</td>
<td>-</td>
<td>-</td>
<td>5</td>
<td>86</td>
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<tr>
<td>Río Negro</td>
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<td>12,8</td>
<td>14</td>
<td>98,7</td>
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<td>San Juan</td>
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<td>147,2</td>
<td>11</td>
<td>420</td>
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<tr>
<td>La Pampa</td>
<td>1</td>
<td>4,6</td>
<td>13</td>
<td>244,4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>586</strong></td>
<td><strong>6.387</strong></td>
<td><strong>319</strong></td>
<td><strong>4.697</strong></td>
</tr>
</tbody>
</table>
Herramienta que permite estimar la energía eléctrica que puedes generar y ahorrar anualmente si instalas paneles solares conectados a la red.

Más información acerca del programa de Generación Distribuida.

Información paso a paso para solicitar los beneficios
+ Link de Acceso a TAD
+ Instructivos.

Descargas: Ley 27.424 y toda la normativa vigente

+ Instructivo para Distribuidor
+ Instructivo para Instalador
+ Instructivo para Usuario-Generador

Bibliografía técnica
+ Introducción a las Energías Renovables y Generación Distribuida
+ Manual de Generación Distribuida Solar Fotovoltaica

+ Lista de Distribuidores por Provincia
Growing Market Niches

- Water Pumping
- Agro PV
- Industrial parks
- End of distribution lines
- Storage
Buenos Aires Province:
Secretaría de Servicios Públicos de la Provincia de Buenos Aires
Programa Provincial de Incentivos a la Generación de Energía Distribuida.
**Objective:** fortalecer redes débiles con problemas de calidad de servicio en punta de línea.

**Additional Externality:** Service Quality

**Local % of value chain 68%**
Argentina’s Renewable Energy targets

- Law 27.191 recently approved with high degree of support from all political parties
  - Had >80% approval in both Senate and Lower Chamber of Congress
- Target of 20% of power demand in 2025 (from 8% in previous law, and 1.9% in 2015)

20% RE → 10 GW*

2025 ENERGY MATRIX TARGET

- % of Power Consumed
  - 2025 Forecast: 4% Renewables, 30% Nuclear, 64% Hydro, 43% Thermal

ADDITIONAL CAPACITY

- Capacity, GW:
  - 2015: 0.8
  - 2018: 3.6
  - 2020: 7.1
  - 2022: 16%
  - 2024: 20%

* Estimated Additional Capacity. Source: AITPA based on Ministry of Energy and Mines
Current RE Generation

NUÉVO RECORD
3891 MW Total Renovable
3510 MW GRV- 25/09/2021 16:25hs

error: 26.47%

NUÉVO RECORD
28.84% - 26/09/2021 09:30hs

Legend:
- Hidráulico
- Bioenergías
- Fotovoltaico
- Eólico
- % Demanda Abastecida
- --- Record Anterior
Thank you
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THANK YOU