Concepts of market and losses

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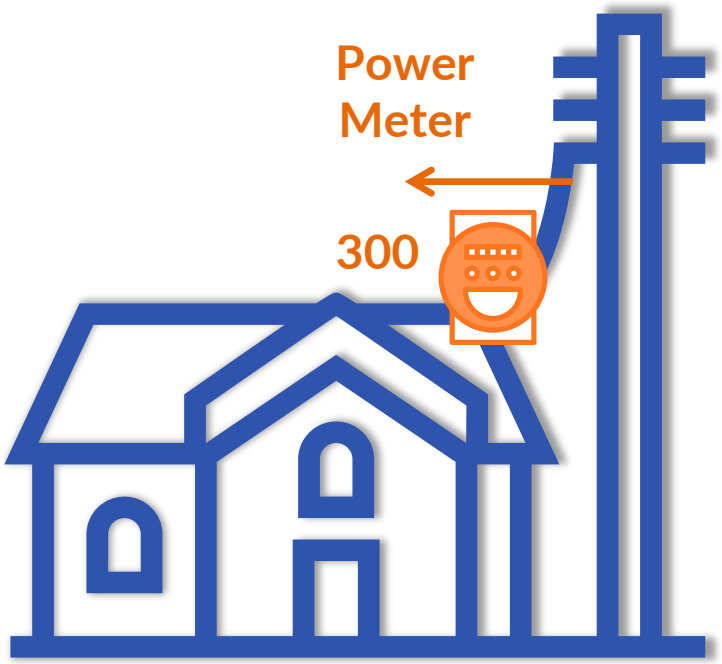
Regulation and Market

Superintendency of Strategic and Tariff Regulation

GRUPO equatorial

Energy balance (MWh)

Scenario 1



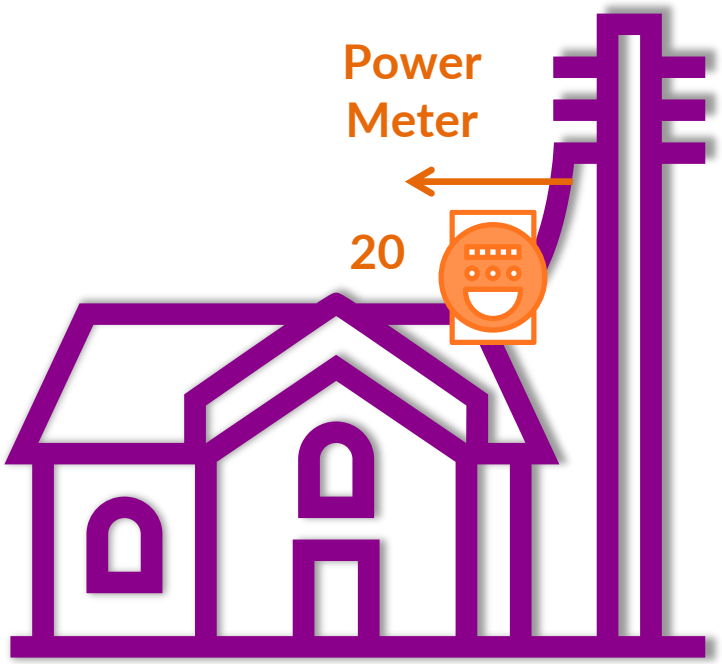
Measured energy = 300 kWh
(that passes through the meter)

Billed energy = 300 kWh
(that the distributor sees on its bill)

New market concepts and losses

Scenario 2

Energy balance (MWh)

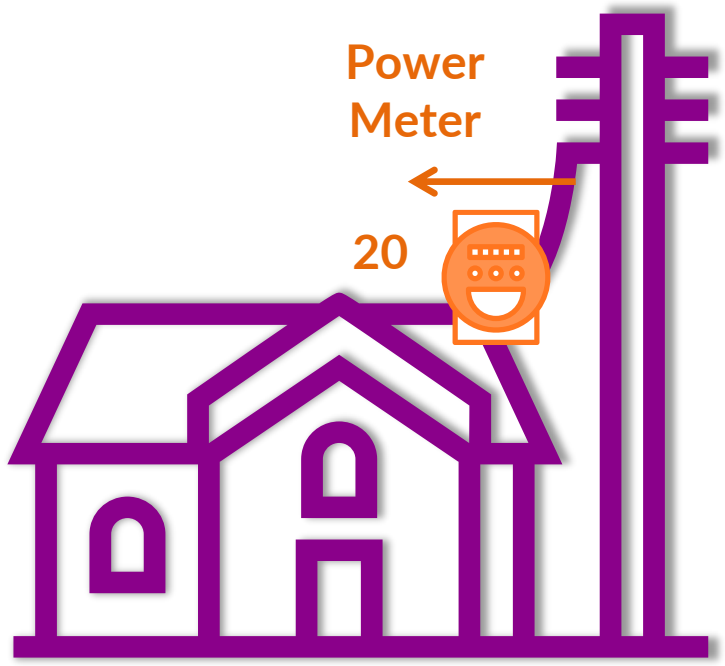


Measured energy = 20 kWh
(energy that pass throught the meter)

Billed energy = 30 kWh
(that the distributor sees on its bill)

Scenario 2

Energy balance (MWh)



Measured energy = 20 kWh
(energy that pass throught the meter)

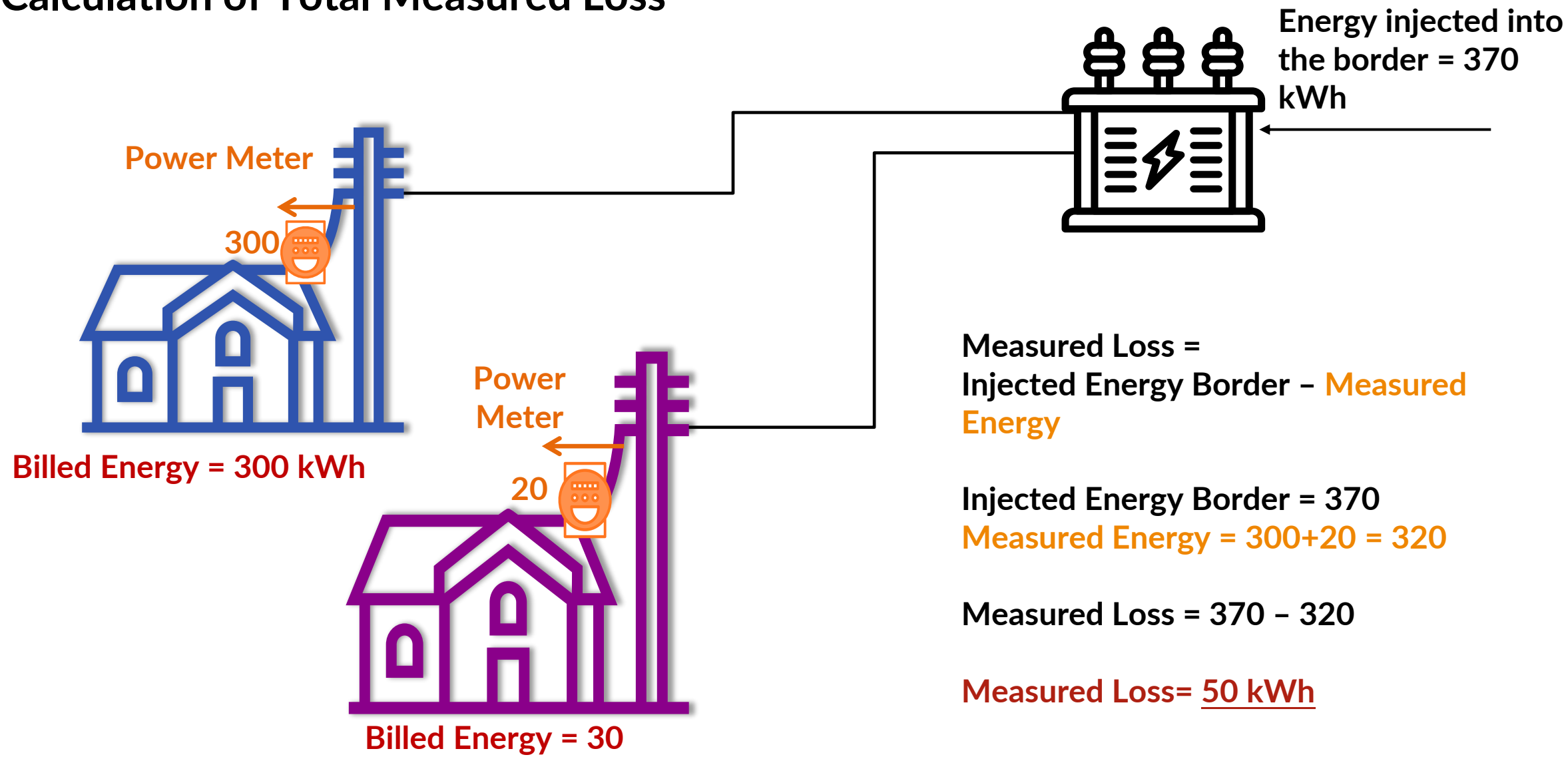
Billed energy = 30 kWh
(that the distributor sees on its bill)

↓

Cost of availability = value paid by the consumer for being connected to a (low voltage) network.

Single-phase = 30 kWh
Two-phase = 50 kWh
Three-phase = 100 kWh

Calculation of Total Measured Loss



Measured Loss =
Injected Energy Border – Measured Energy

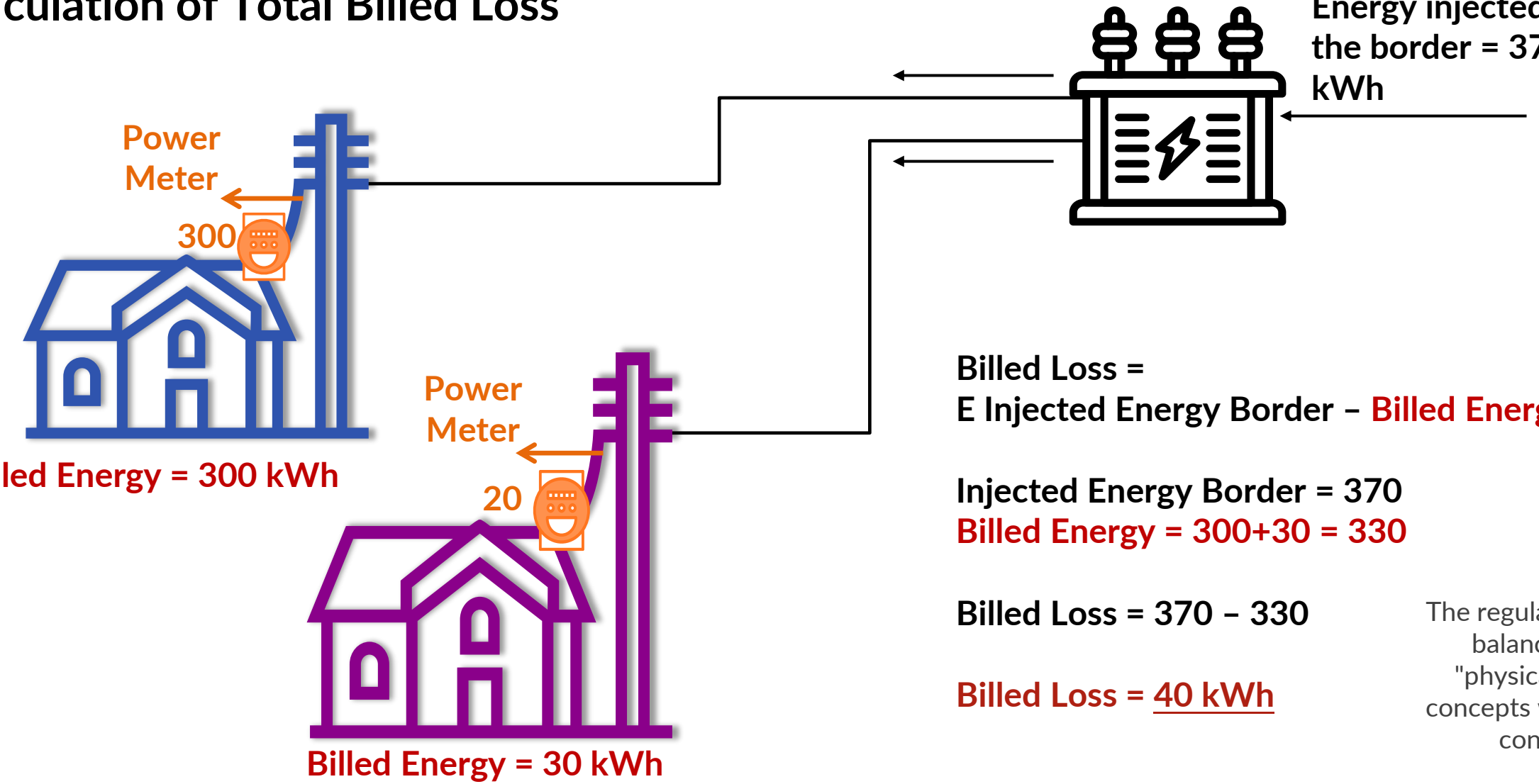
Injected Energy Border = 370
Measured Energy = 300+20 = 320

Measured Loss = 370 – 320

Measured Loss= 50 kWh

New market concepts and losses

Calculation of Total Billed Loss



Billed Loss =
E Injected Energy Border – Billed Energy

Injected Energy Border = 370
Billed Energy = 300+30 = 330

Billed Loss = 370 – 330

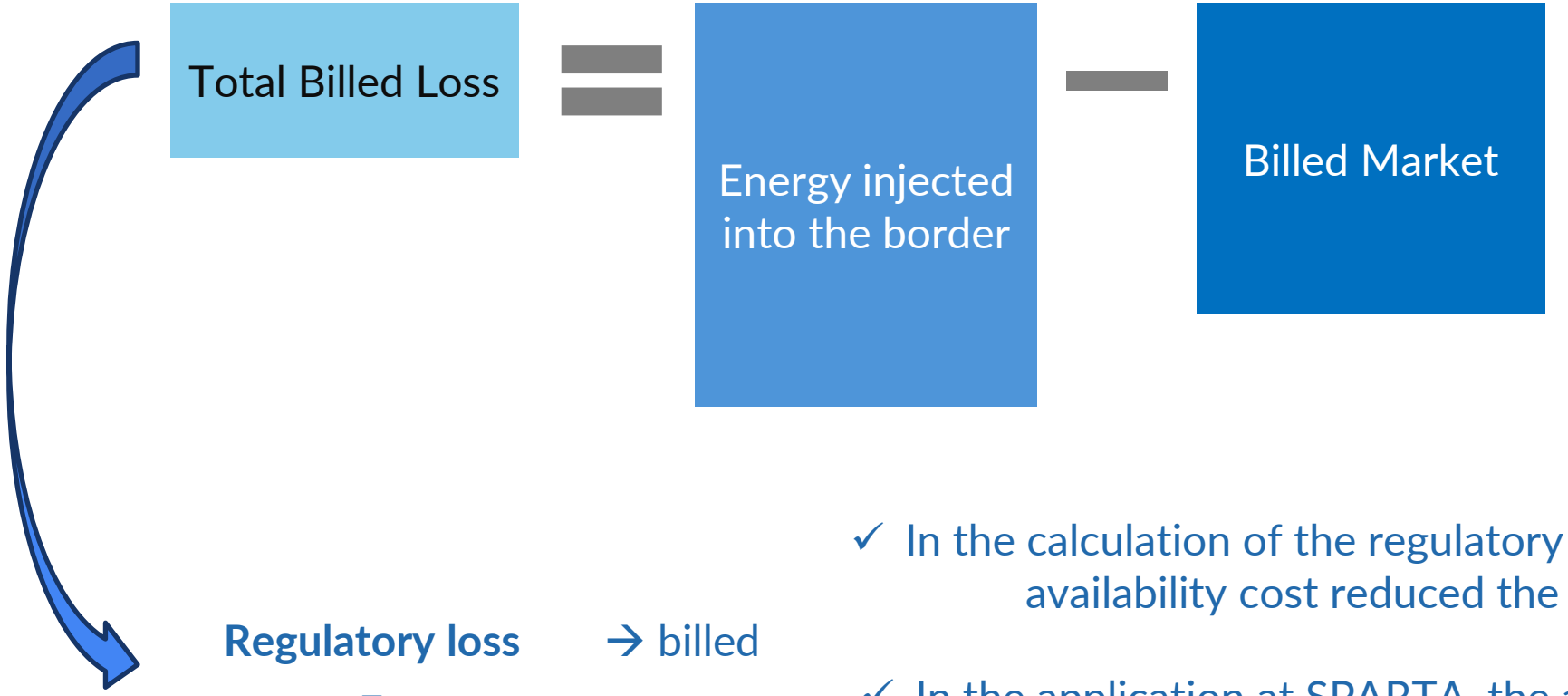
Billed Loss = 40 kWh

The regulatory energy balance mixed "physical" (MWh) concepts with "billing" concepts.

New market concepts and losses

Loss calculation (actual vs. regulatory)

Without DG:



There was equality of concept between real and regulatory

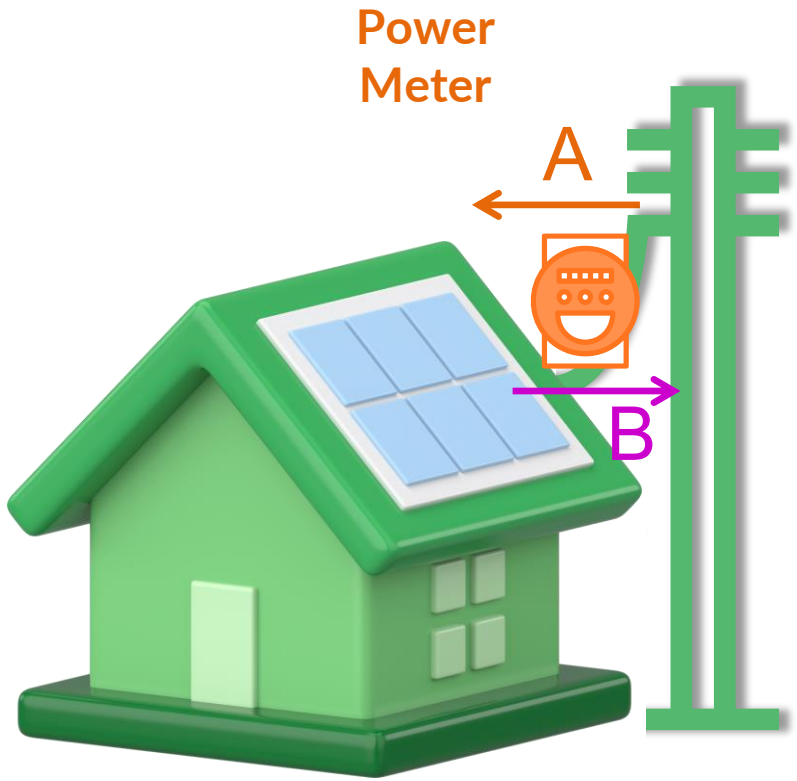
Billed

Regulatory loss
=
% regulatory
X
Market

→ billed

- ✓ In the calculation of the regulatory target, the availability cost reduced the loss.
- ✓ In the application at SPARTA, the availability cost increased the calculation base.
- ✓ Neutral effect in the regulatory calculation.

DG insertion



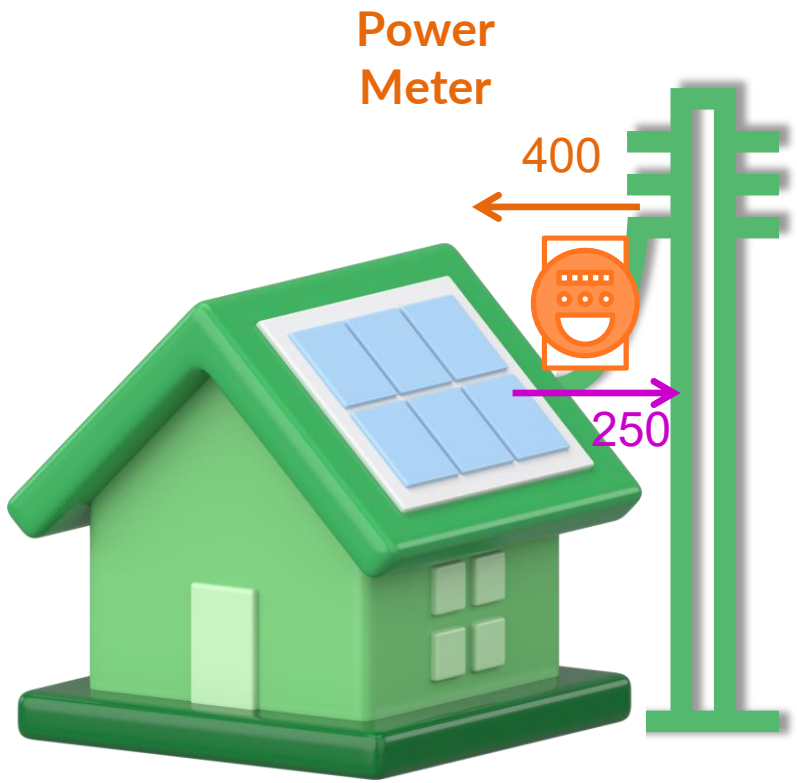
A — Energy measured from the distributor's grid to the consumer unit.

B — Energy measured from the consumer unit towards the distributor's grid.

To differentiate, A start to be called as consumed energy and B DG injected energy

New market concepts and losses

DG insertion

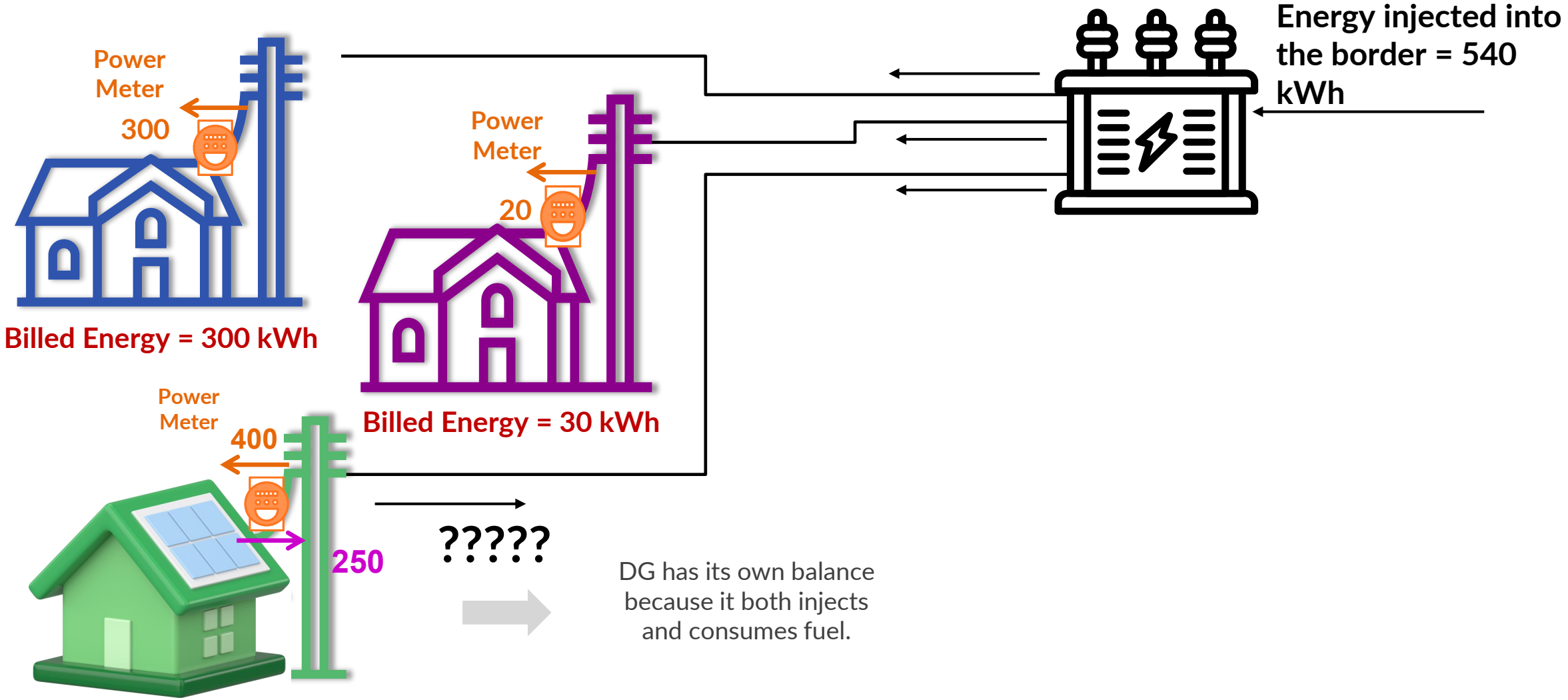


Energy balance (MWh)

Consumed Energy = 400 kWh
(which passes through the meter from the distributor to the consumer unit

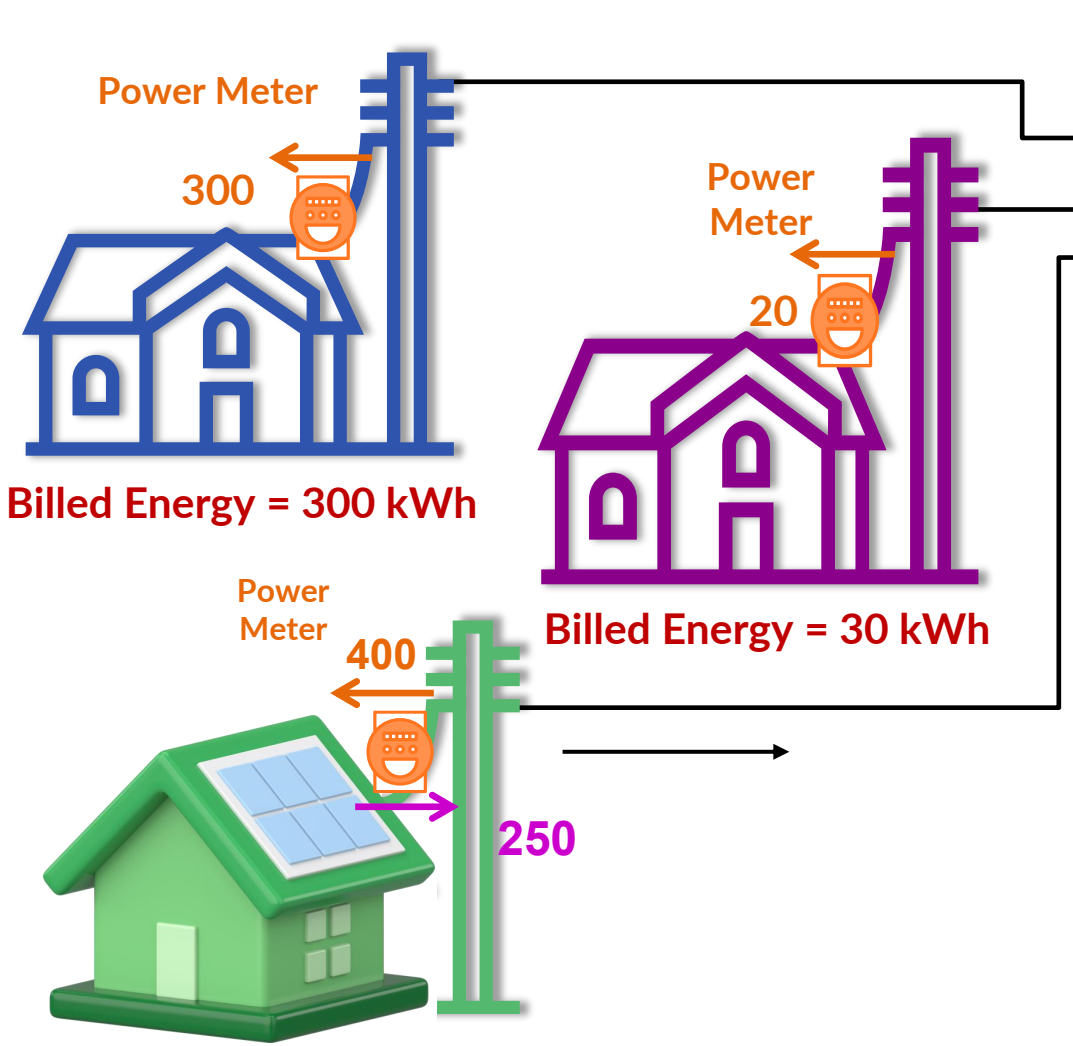
Energy injected by distributed generation (DG) = 250 kWh
(which passes through the meter from the consumer unit to the distributor)

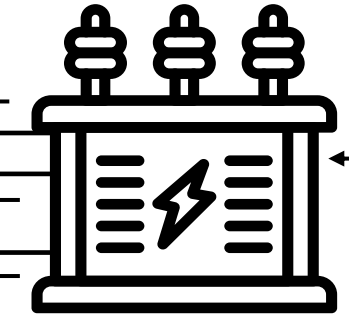
Calculation of Total Measured Loss



DG has its own balance because it both injects and consumes fuel.

Calculation of Total Measured Loss





Energy injected into the border = 540 kWh

⚠ Energy injected into distributed generation (DG) must be included in the energy injected into the grid.

Total Injected Energy = Boundary Injected Energy + DG Injected Energy

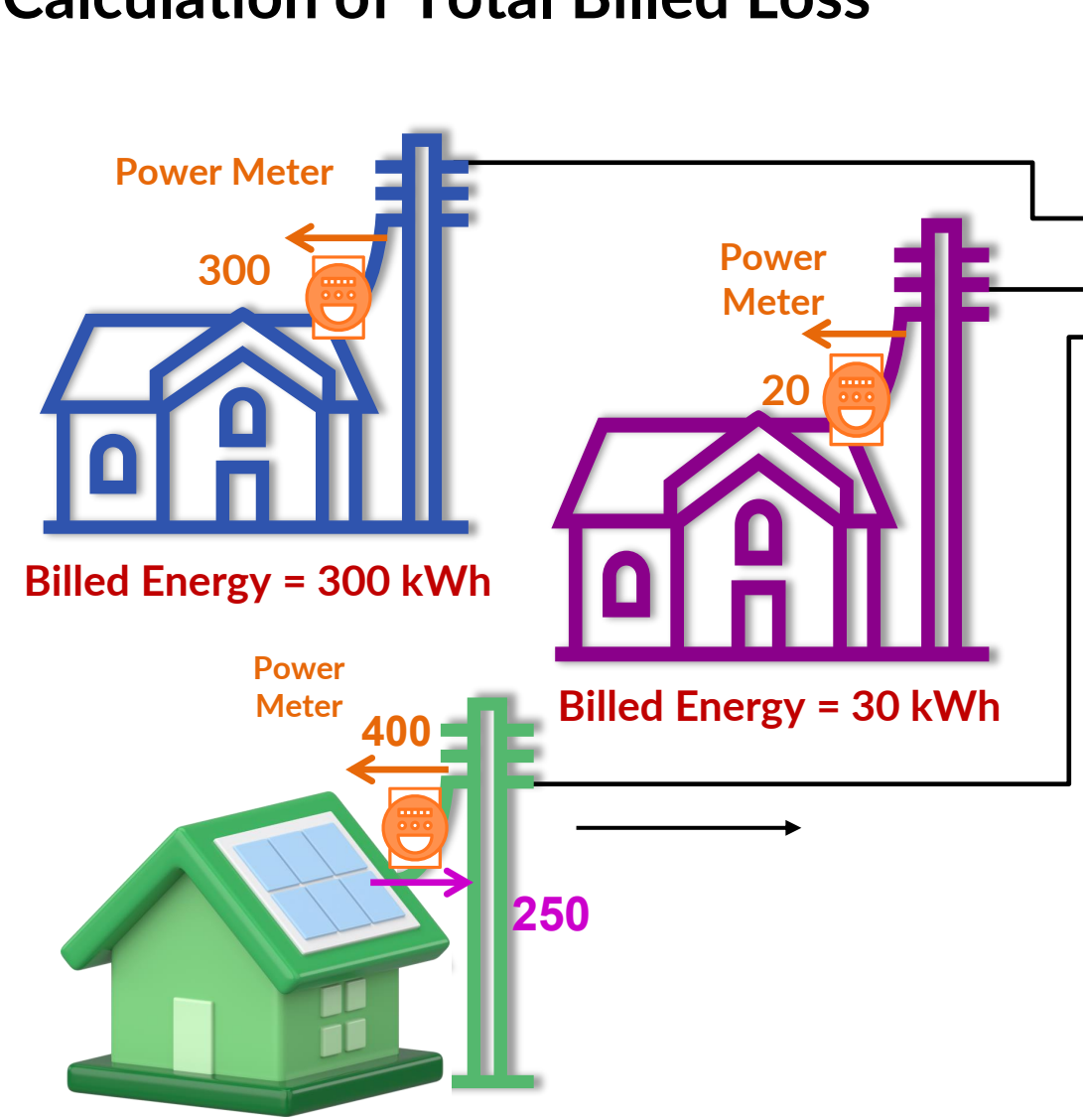
Total Injected Energy = 540 + 250 = 790

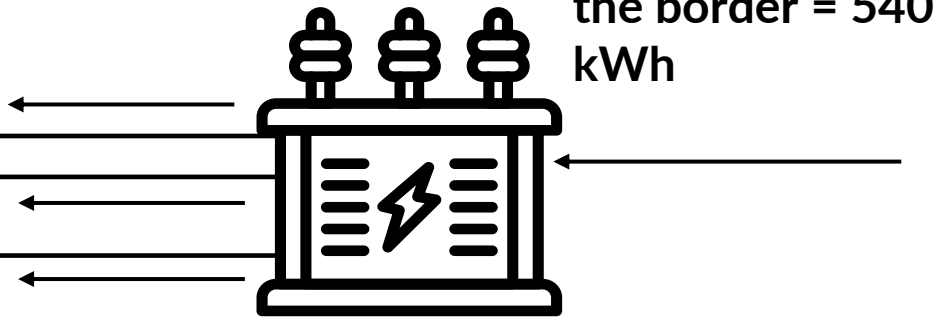
Billed Energy = 300 + 20 + 400 = 720

Measured Loss = 790 – 720

Measure Loss = 70

Calculation of Total Billed Loss

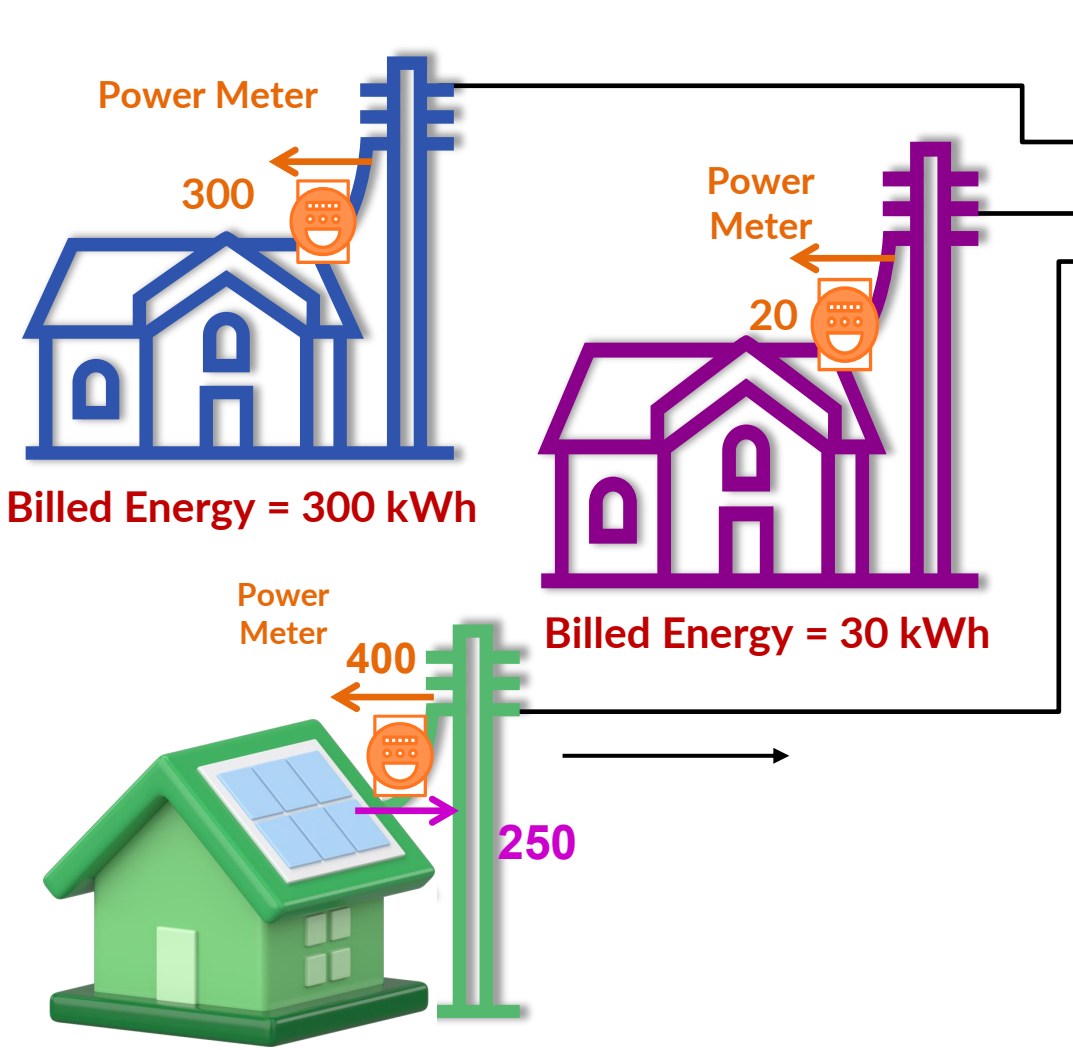


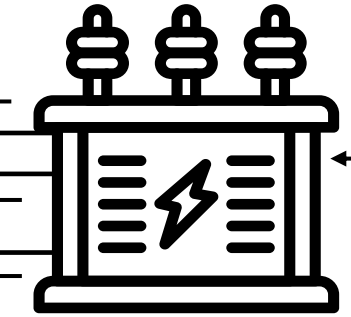


⚠ Energy injected into distributed generation (DG) must be included in the energy injected into the grid.

The concept of **Distributed Energy** was created to include the balance of Distributed Generation in the overall calculation, once again mixing the concepts of metered and billed energy.

Calculation of Total Billed Loss





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Total Injected Energy = Boundary Injected Energy + DG Injected Energy

Total Injected Energy = 540 + 250 = 790

Distributed Energy = 300 + 30 + 400 = 730

Billed Loss = 790 – 730

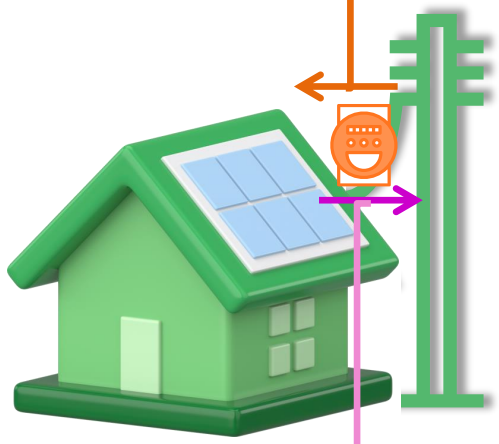
Billed Loss = 60

New market concepts and losses

With DG:

Total Loss Billed = Total Energy Injected (with Distributed Generation) − Distributed Market (with energy consumed by Distributed Generation)

Distributed Energy

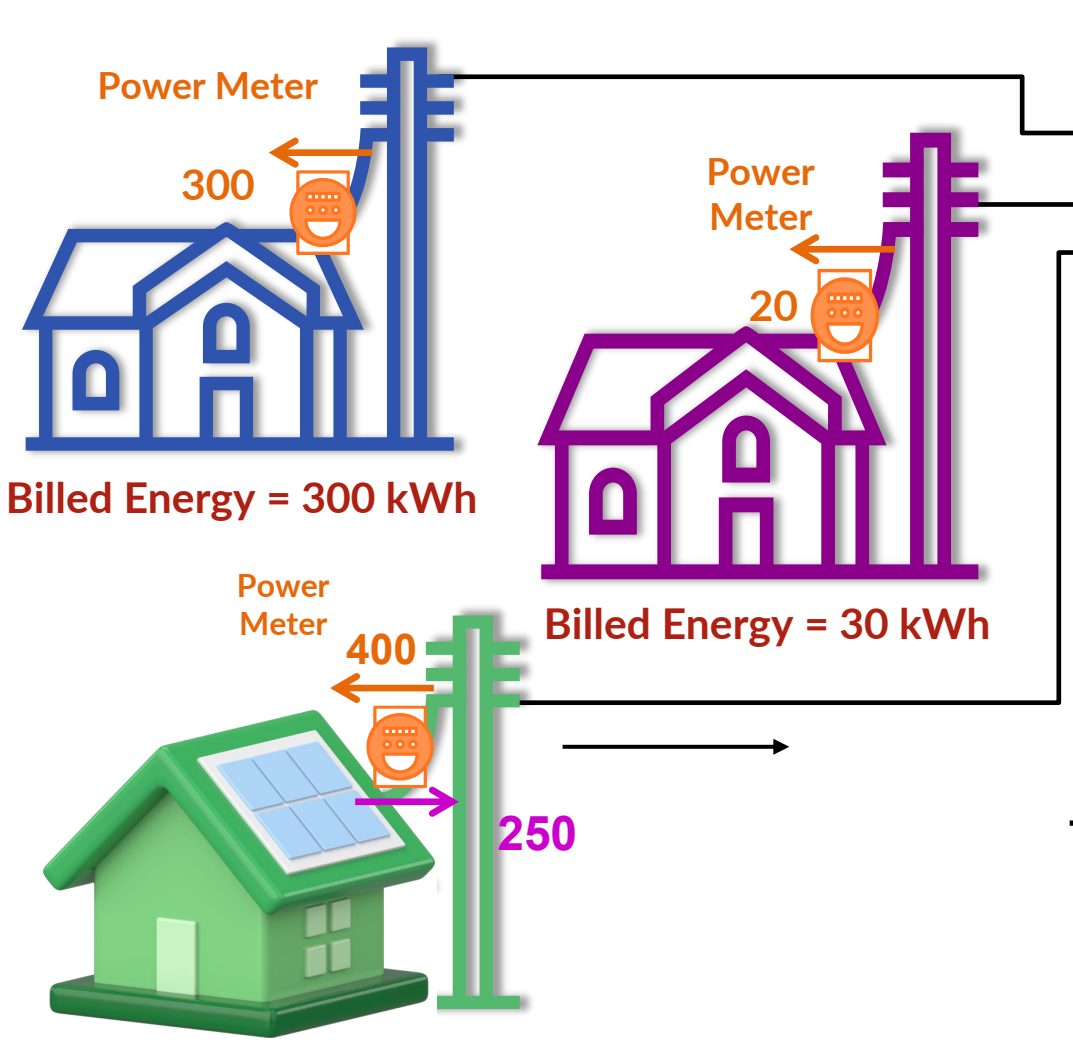


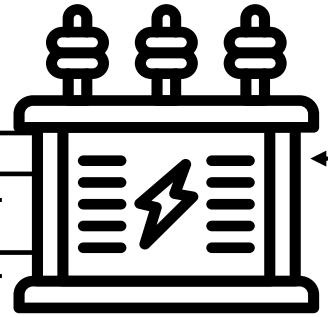
New market concepts and losses

With DG:

Total Loss Billed = Total Energy Injected (with Distributed Generation) − Distributed Market (with energy consumed by Distributed Generation) → Based on these values, ANEEL calculated the Regulatory Target percentages (formerly CP 09).

Calculation of Total Billed Loss





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Total Injected Energy = 540 + 250 = 790

Distributed Energy = 300 + 30 + 400 = 730

Target calculated based on:
300+30+400 = 730

Application in the pricing process based on:
300+30+(400-250)= 480

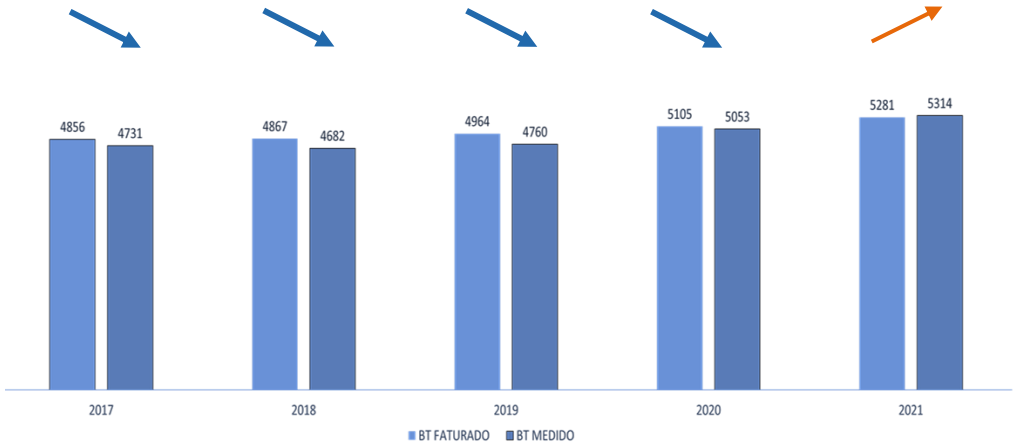
Net from DG

New market concepts and losses

Problematic of GD

DG alters the expected logic.

Low Tension DG (billed x Measured) GWh



Without DG:

Billed Market > Measured Market

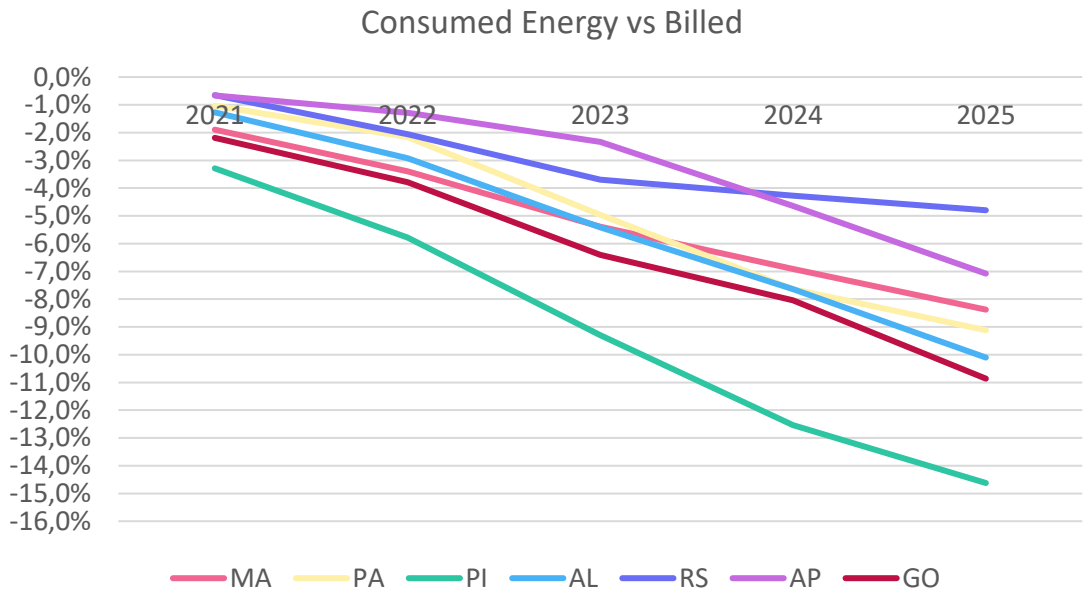
With DG:

Billed Market < Measured Market

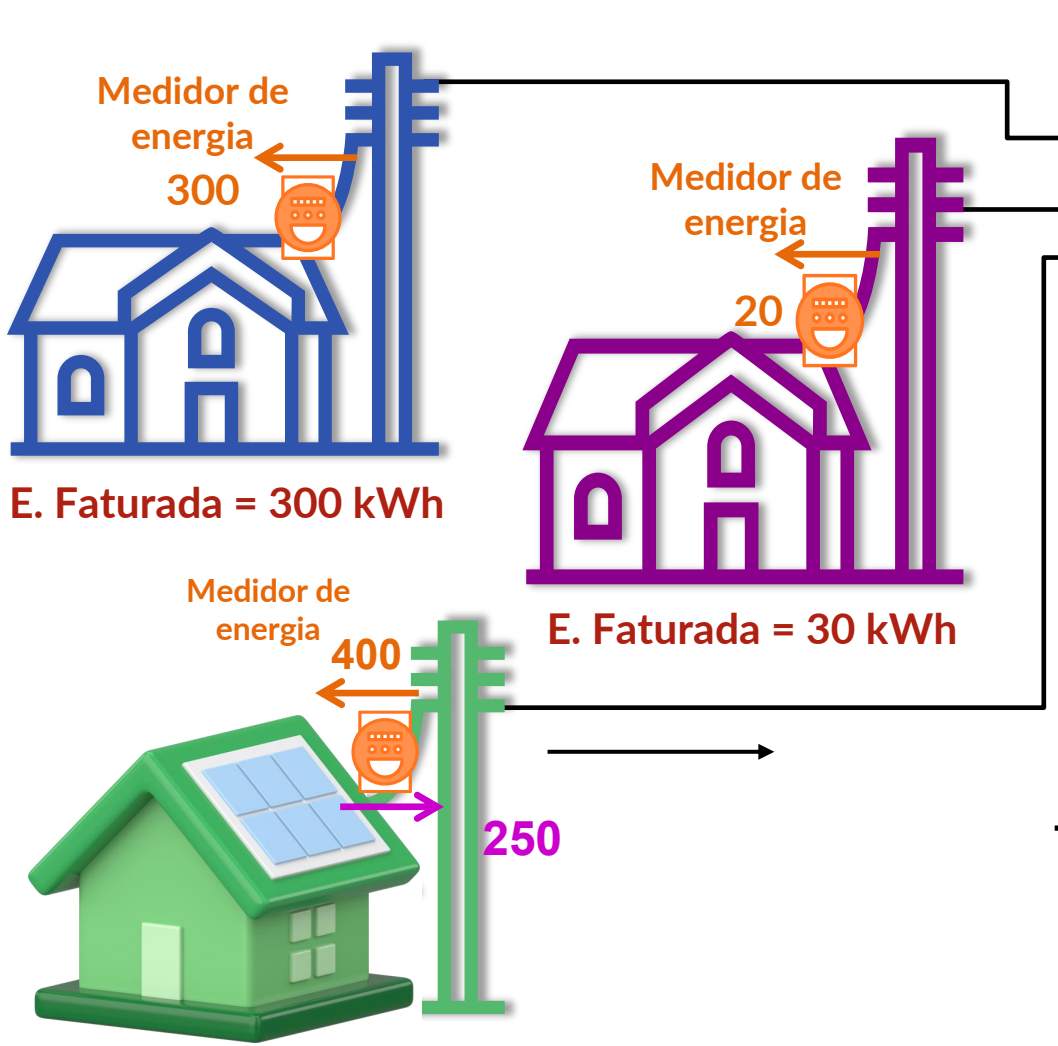
The target was defined based on the "billed" loss calculated from the distributed energy.

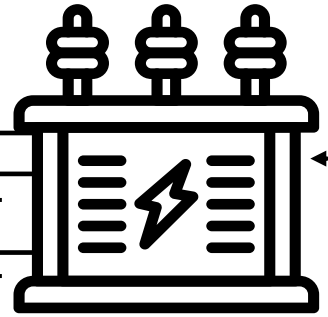
Application of the regulatory percentage (formerly CP 09)

- **TL (MWh) =** TL (%) * (NTL+TL+ **Billed Market**)
- **NTL(MWh) =** NTL (%) * **Market billed – Low Tension**



Calculation of Total Measured Loss





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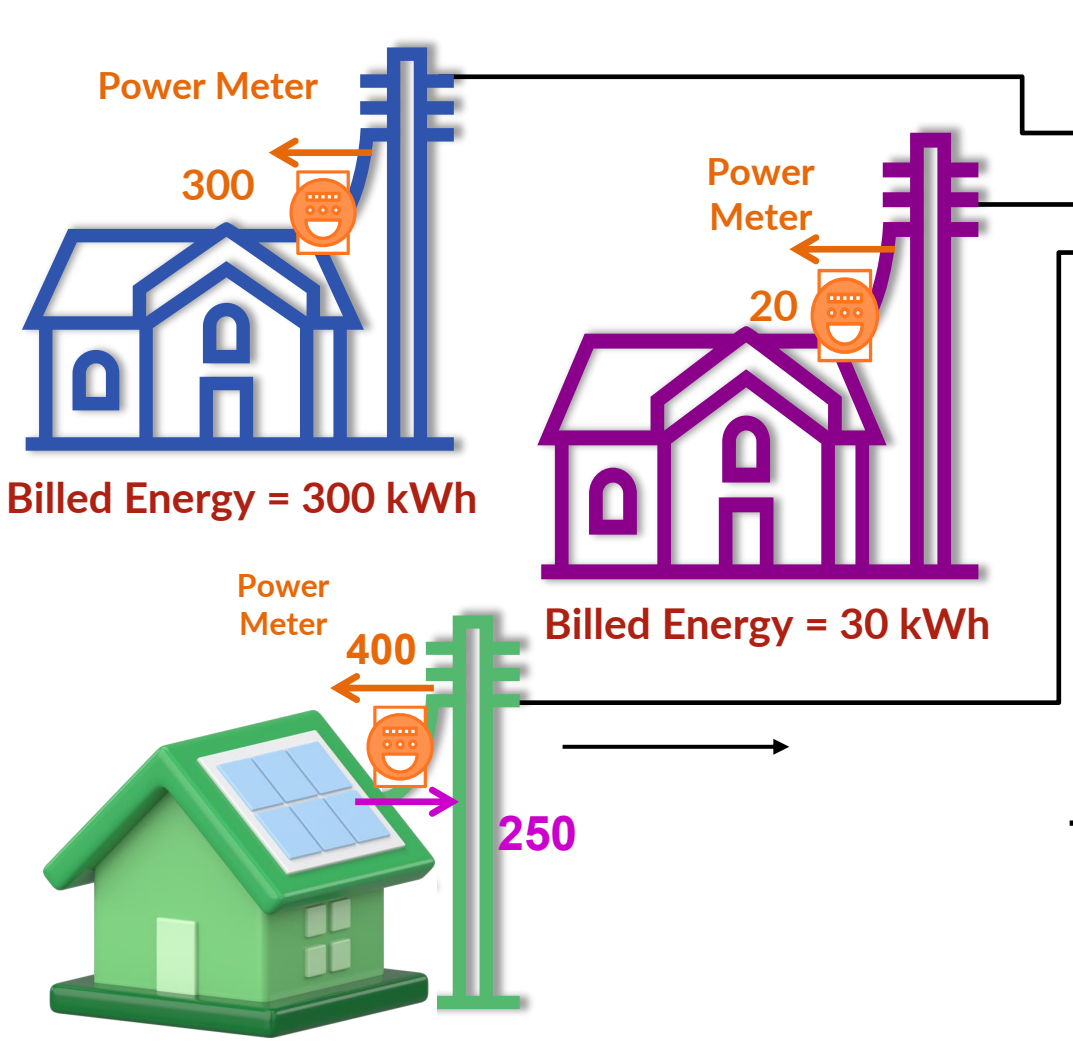
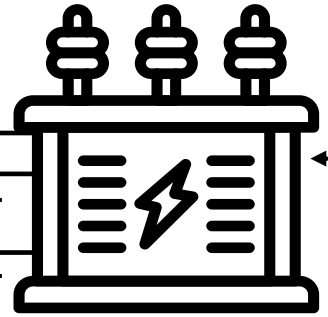
Target calculated based on:
300+20+400 = 730

Application in the pricing process based on:
300+20+400 = 730

Calculation of Total Billed Loss





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Total Injected Energy = 540 + 250 = 790

Distribuited Energy = 300 + 30 + 400 = 730

Target calculated based on:
300+20+400 = 730

Application in the pricing process based on:
300+20+400 = 730

=

New market concepts and losses

Availability (without Distribution Management)

Measured Market

- Measured free energy
- Measured consumers GD
- Measured interchange other Discos

=

Distributed Market

- Measured free energy
- Measured distributed generation (DG) consumers
- Measured interchange with other distribution networks (Discos)
- Invoiced captive without DG
- minimum phase cost applies

=

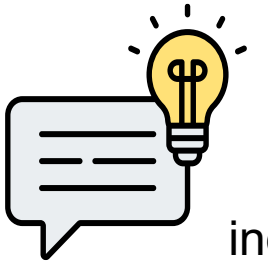
Compensated Energy

Billed Energy

- Billed free energy
- Billed consumers DG
- Billed interchange other Discos
- Billed captive without DG
- minimum cost of the phase applies

Measured market: total electrical energy recorded in metering systems, including estimated energy from public lighting and transformation losses.

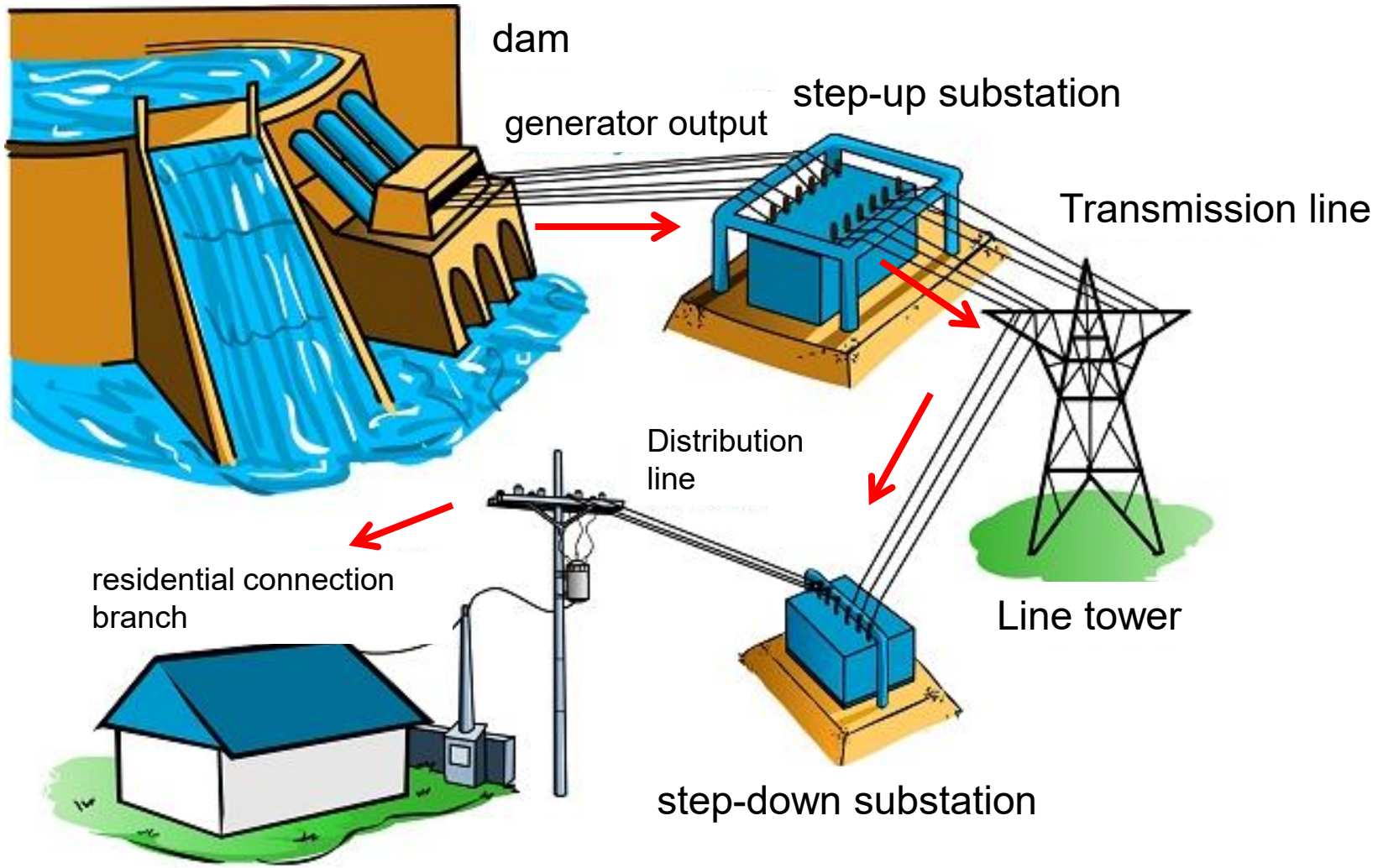
Distributed market: total measured electricity plus the availability cost, corresponding to the minimum billed consumption of Group B consumers.



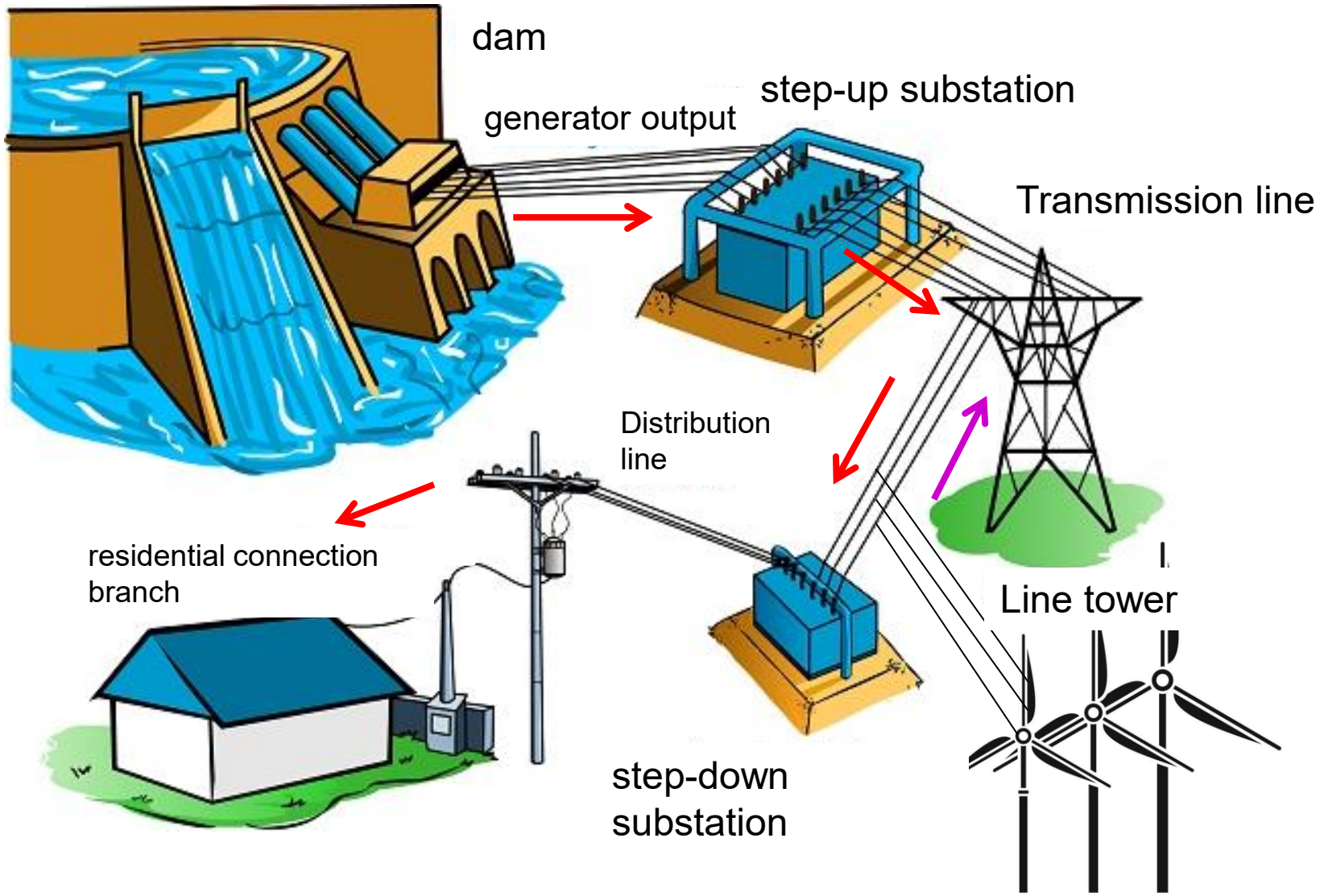
RELEASE

Distributed energy is no longer included in the report, having been replaced by measured energy.

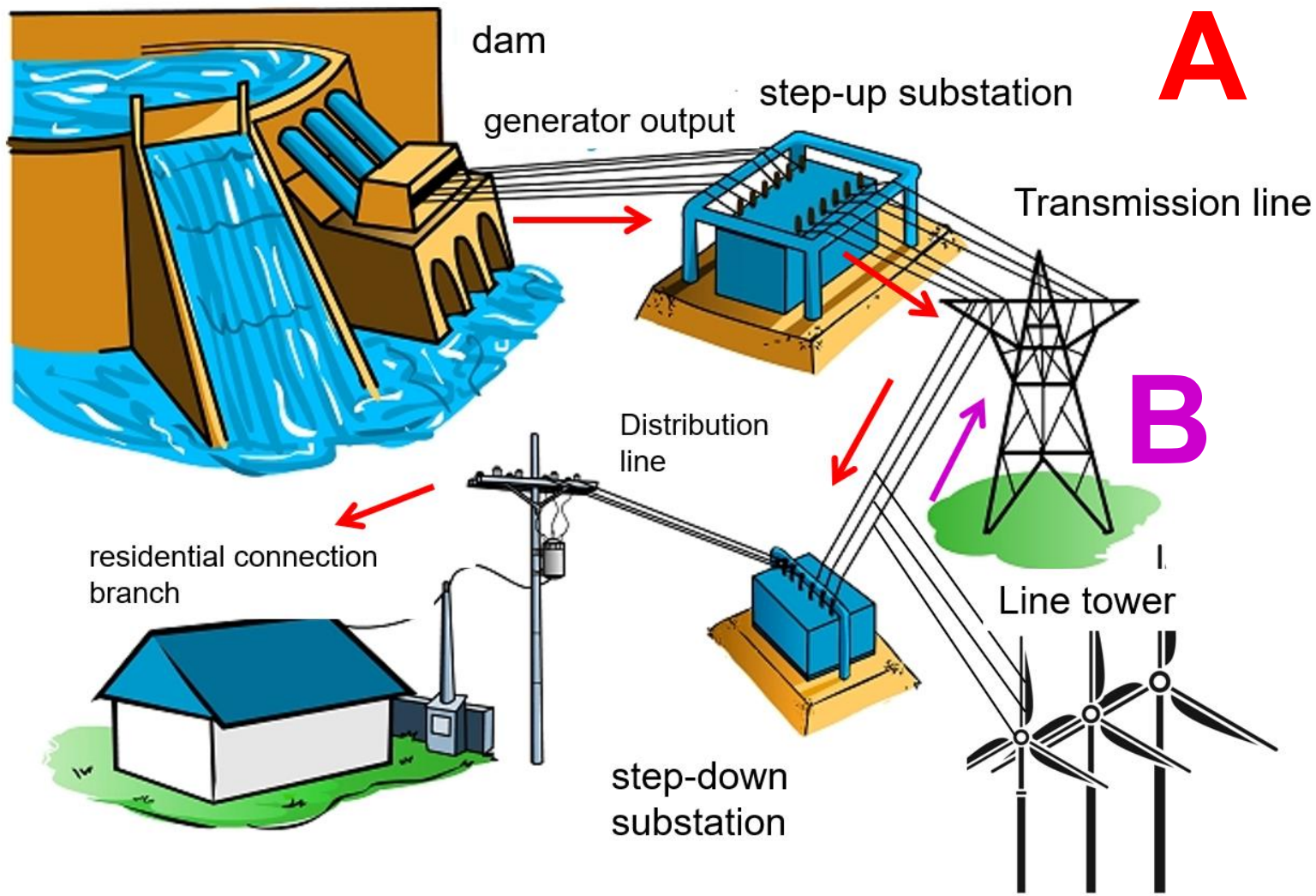
Secondary discussions CP 09



Discussões secundárias CP 09



Secondary discussions CP 09

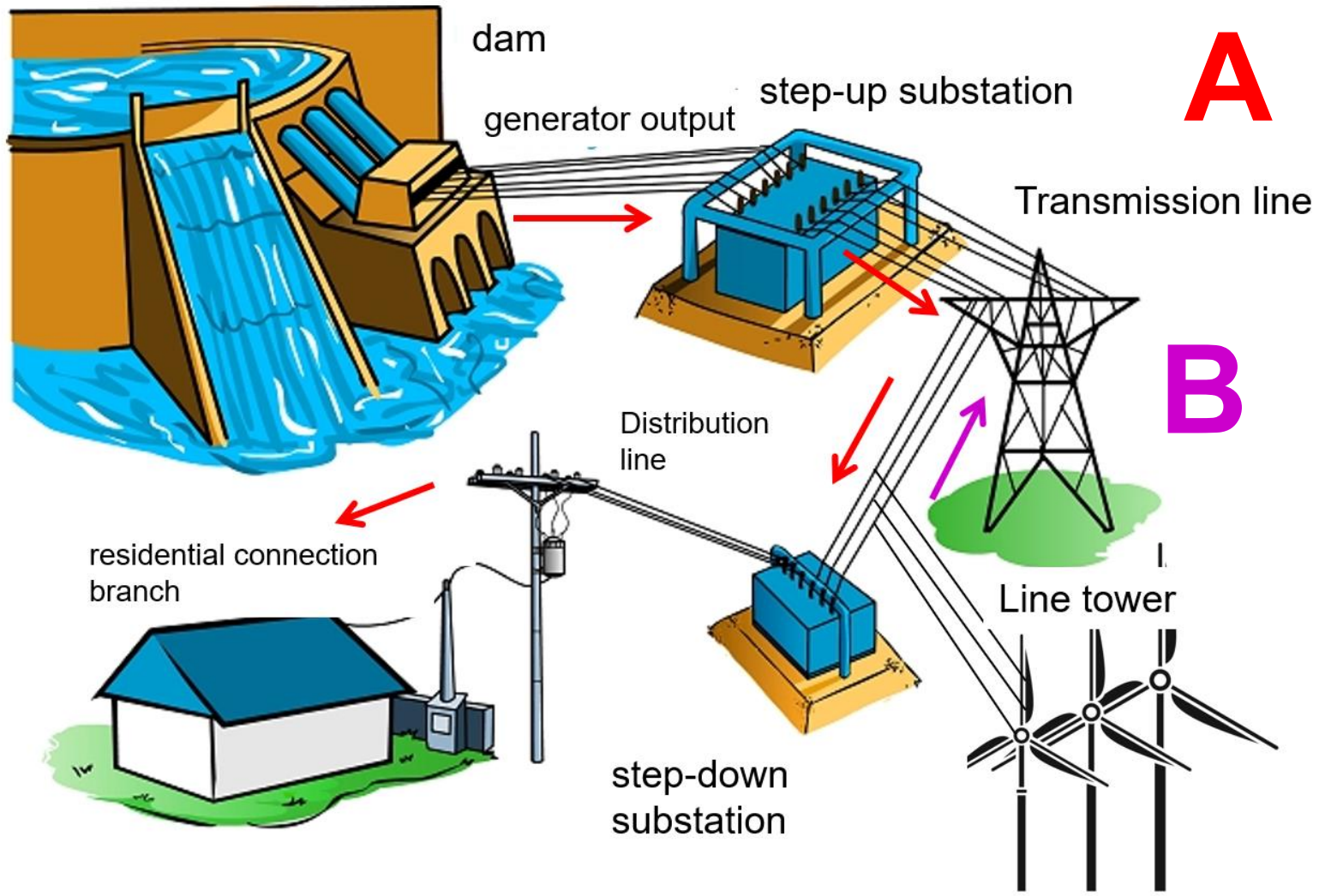


Energy injected at the border =

A - B

But what about the technical losses that B causes in the network?

Secondary discussions CP 09



Gross energy injected into the border =

A

Passing Flow =

B

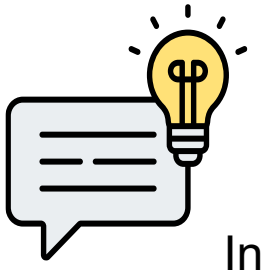
Net injected energy =

A - B

New market concepts and losses

Losses Calculation

Total Losses Measured = Gross Injected Energy − Measured Market − Passing Flow

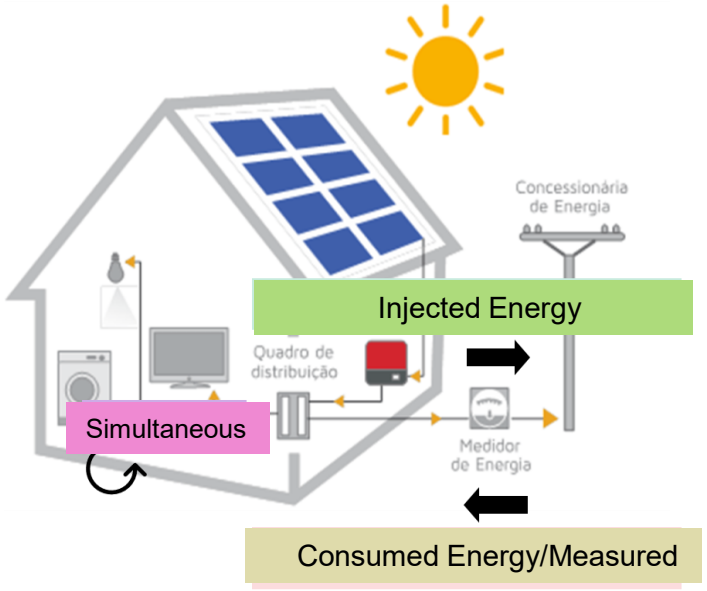


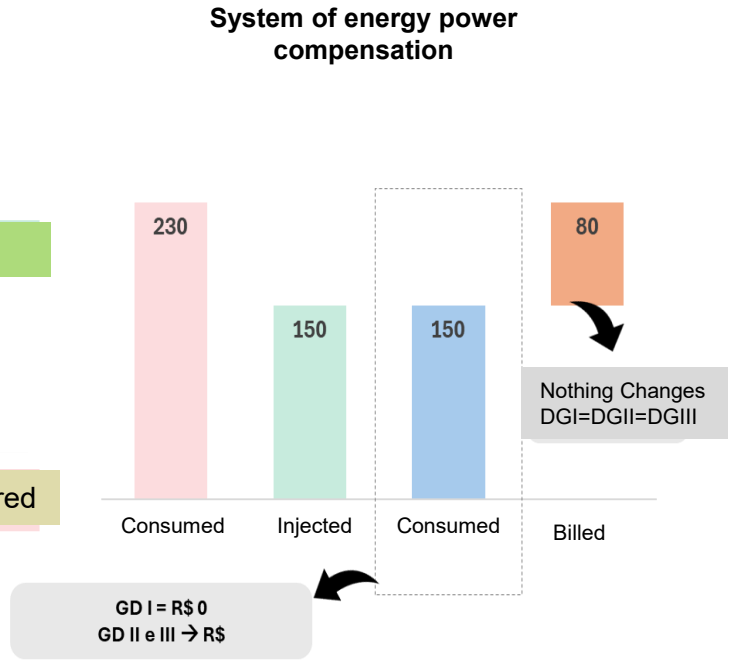
RELEASE

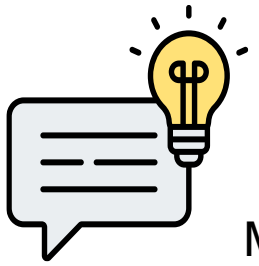
Injected energy (previously net) was replaced by gross injected energy.
Added Passing Flow

New market concepts and losses

DG legal framework







RELEASE

Creating the concept of Wire B Market = a market that generates revenue for the distributor.