

Power Distribution Automation Solution Smart Grid Data Aggregation

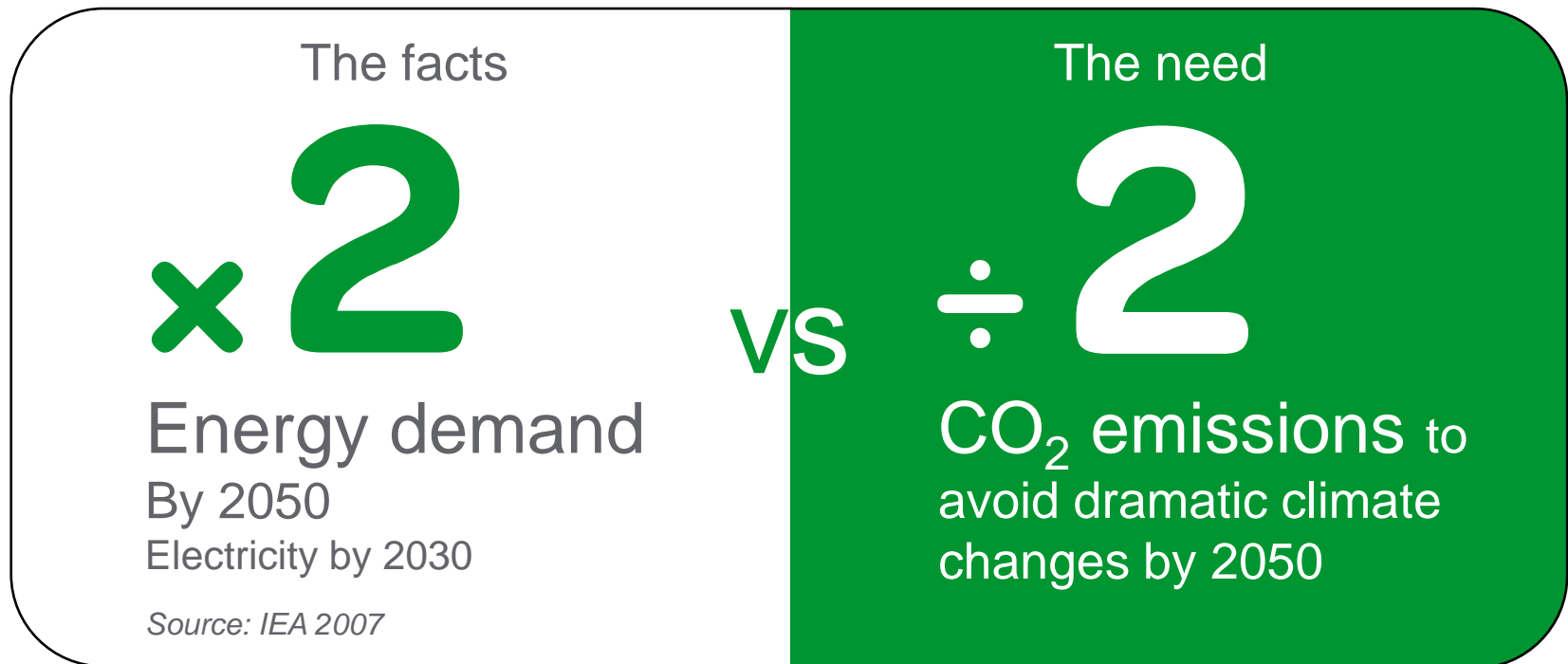
Patrick Pipet

IEA/ADEME Workshop XVII

may 18th, 2011



The energy dilemma is here to stay



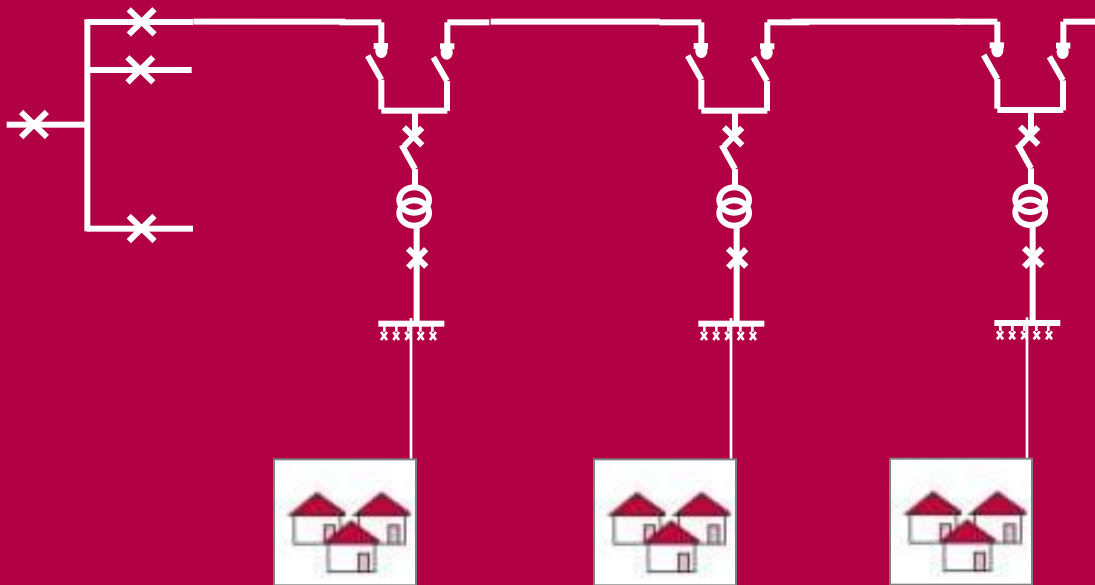
**Frequent
power outages**

**Rising
energy prices**

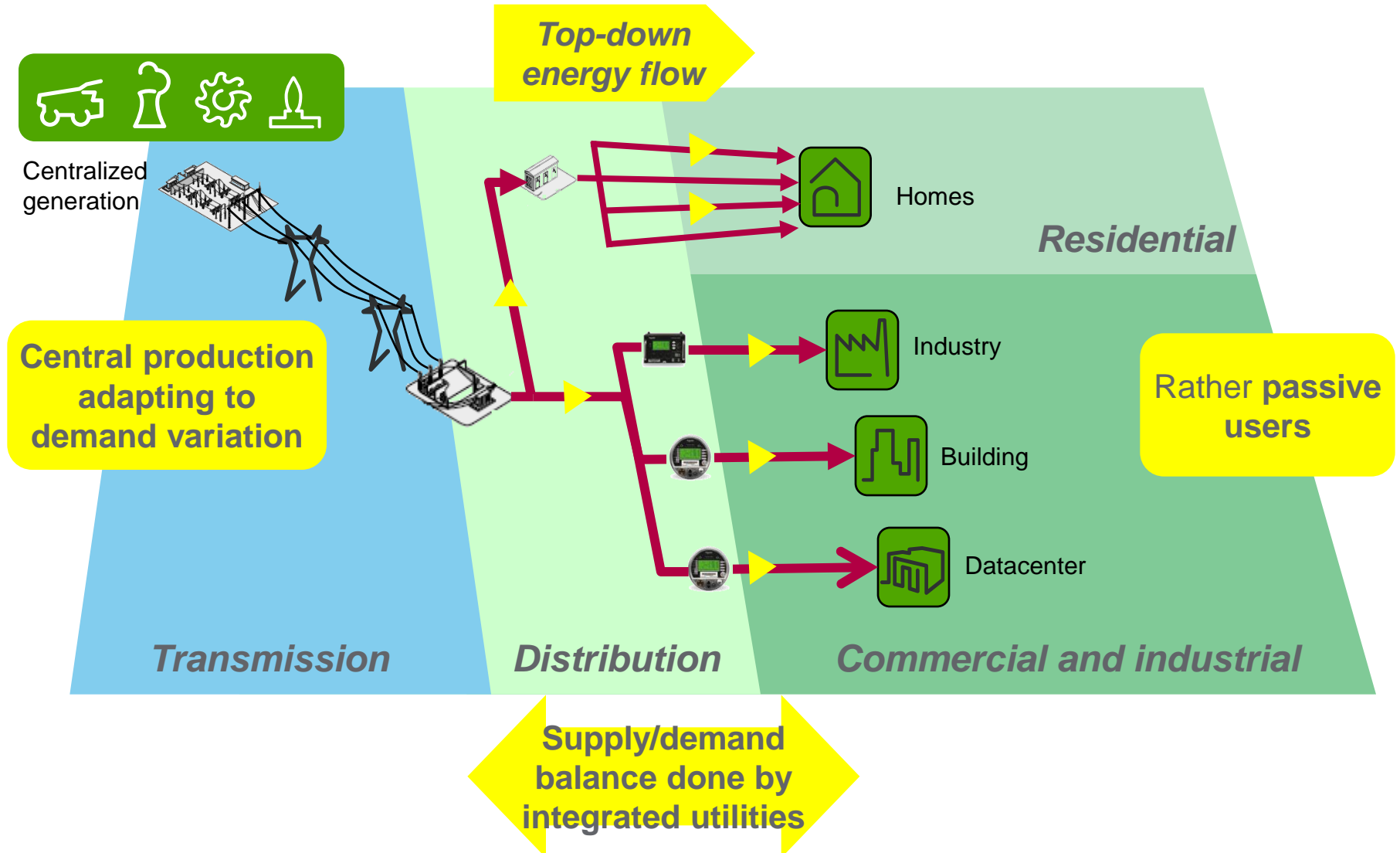
Climate change

**Conflicts for
resource access
& control**

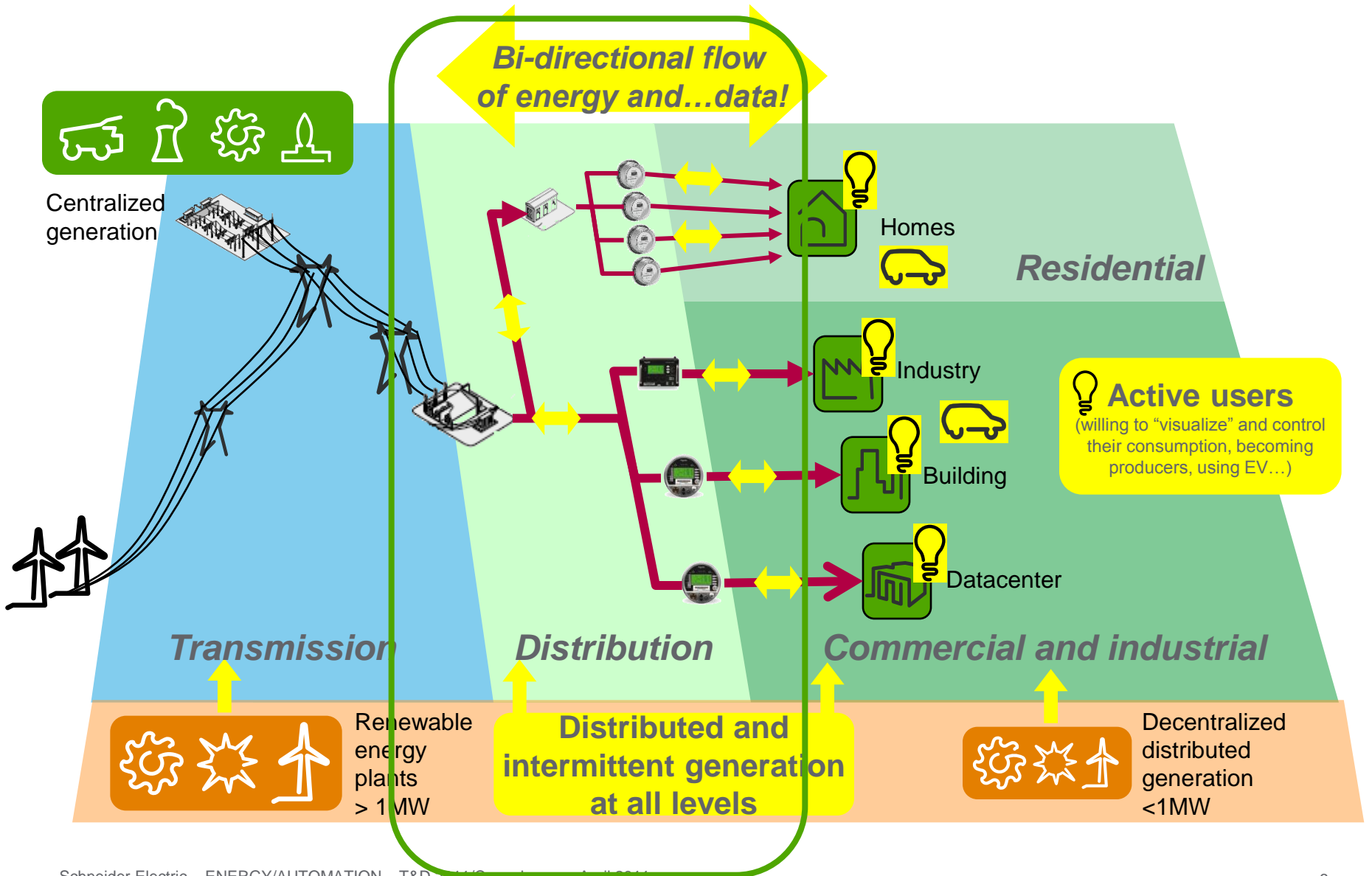
How does Smart Grids impact Distribution networks ?



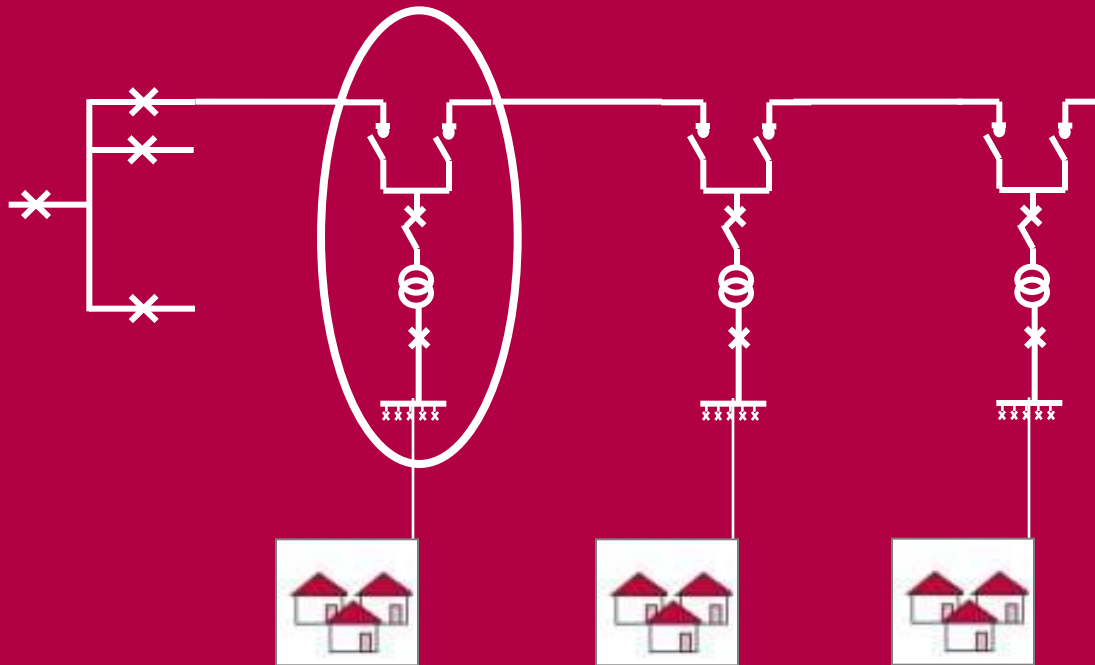
As we move from traditional grids ...



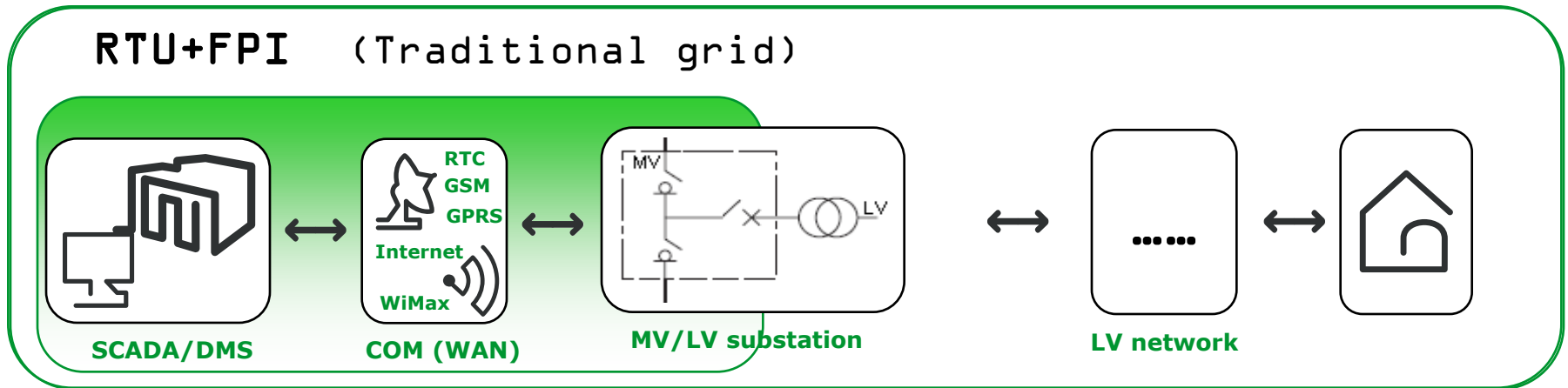
...to Smart Grids



The MV/LV Transformer Substation: A strategic point in distribution networks



Traditional grids have been focused on feeder automation ...

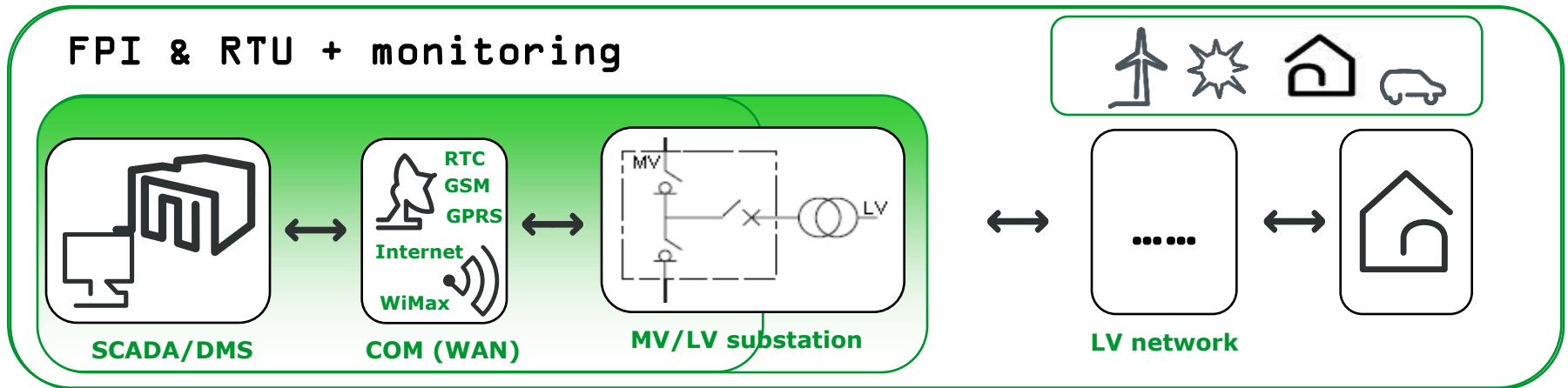


- **Improving energy availability**
 - MV fault location
 - Distribution network reconfiguration
 - MV distribution loop management

Benefits

- SAIDI/SAIFI optimization

... but as grids become smarter so must their feeder automation

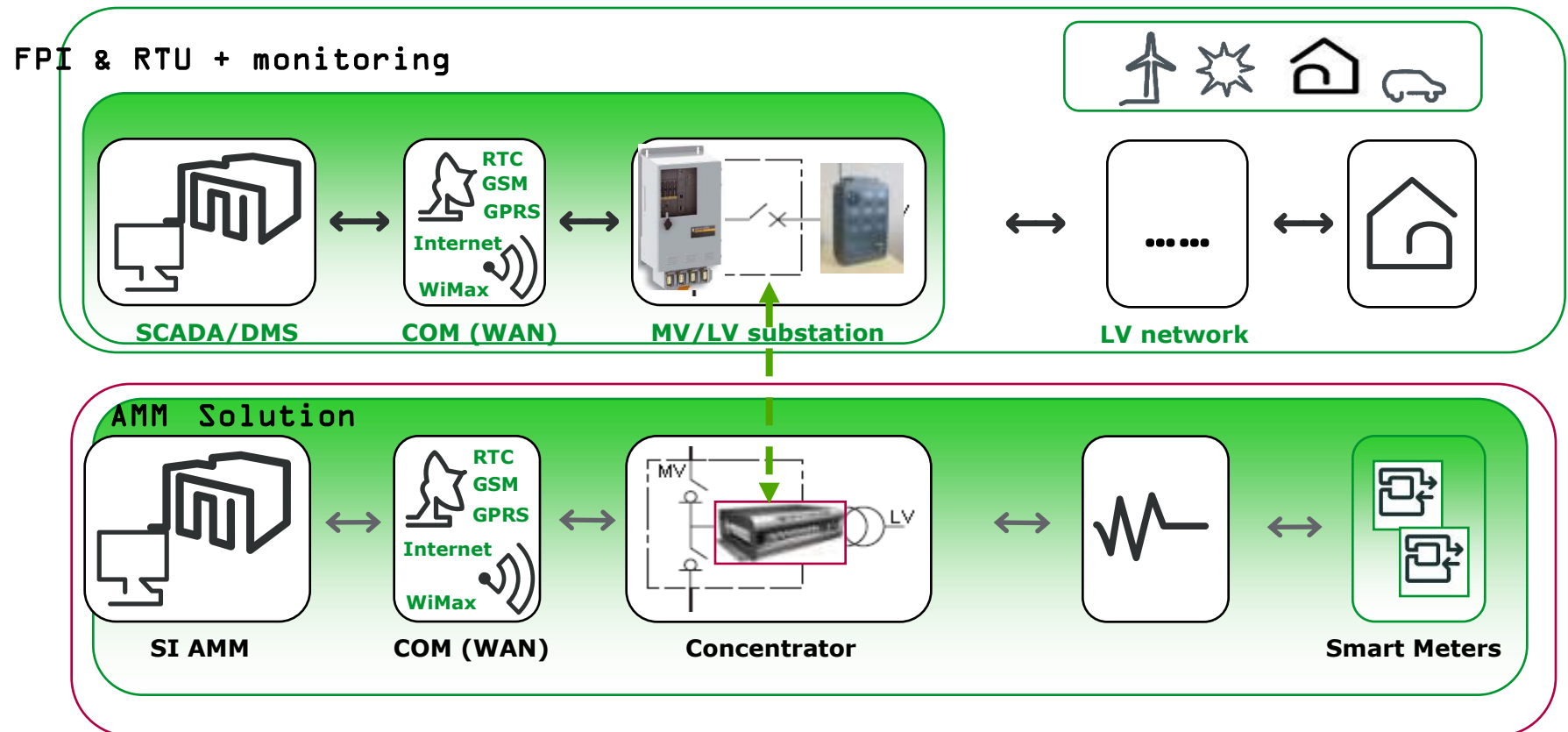


- **Growing Distributed generation integration**
 - MV fault location with multi-direction Energy
 - Energy Flow Monitoring
 - Monitoring of the LV feeders
- **Energy demand management**
 - LV load management
 - Transformer temperature overload

Focus

- Bi-directional energy flow
- Transformer monitoring

With AMM aggregation, MV/LV substations become communication hubs ...



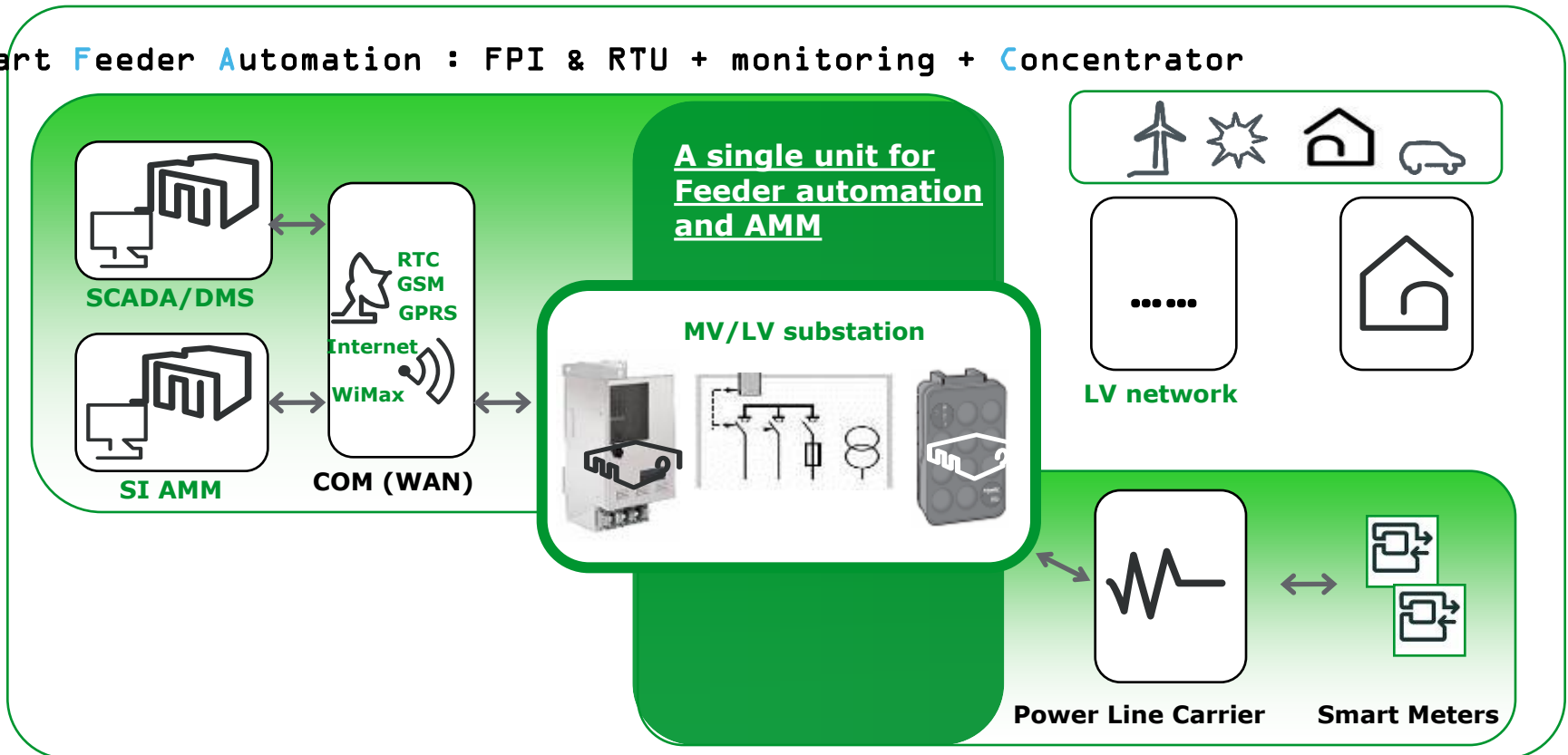
- AMM , Demand response
 - Meter Reading
 - Tariff management
 - Load management

Focus

- Demand Response

... capable of managing demand response and LV network distribution

Smart Feeder Automation : FPI & RTU + monitoring + Concentrator



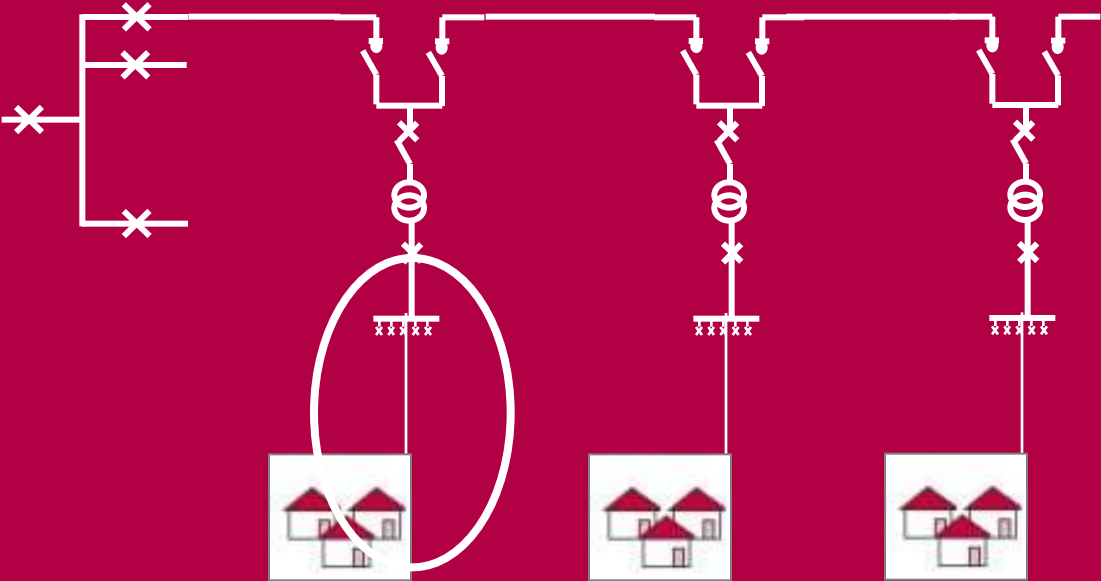
- **AMM , Demand response**

- Meter Reading
- Tariff management
- Load management

Focus

- LV Network distribution
- Demand Response

Smart Meter data aggregation benefits



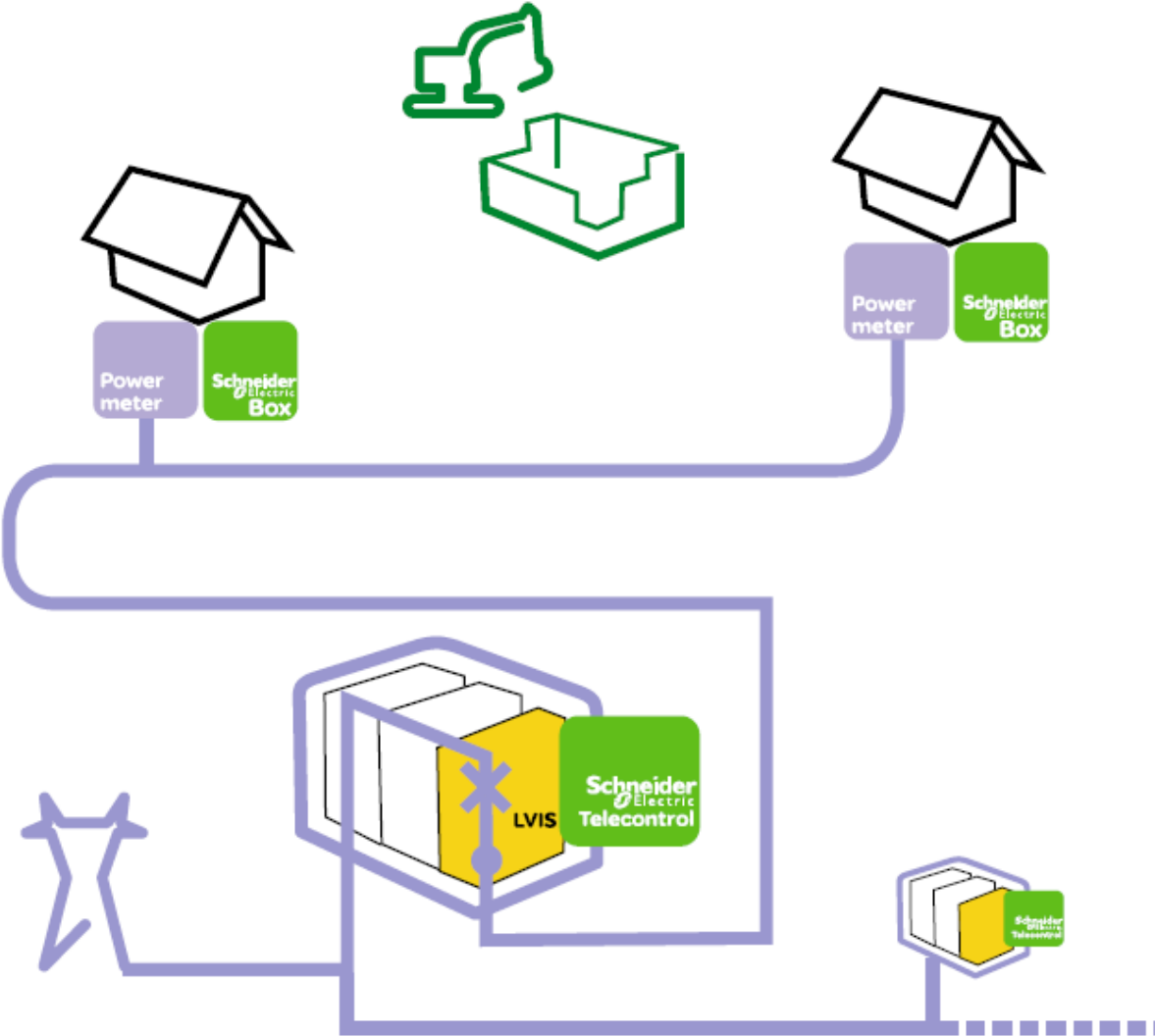
Out of the 10 applications, let's take a look at some network operation benefits



- 1. New customer connection**
2. Permanent fault
3. Transient default
4. Voltage management : over voltage
5. Voltage management : under voltage
6. Load management : unbalance currents
7. Non technical losses
8. Network disturbances : Harmonics , power factor ...
9. Load shedding
10. Neutral cutout

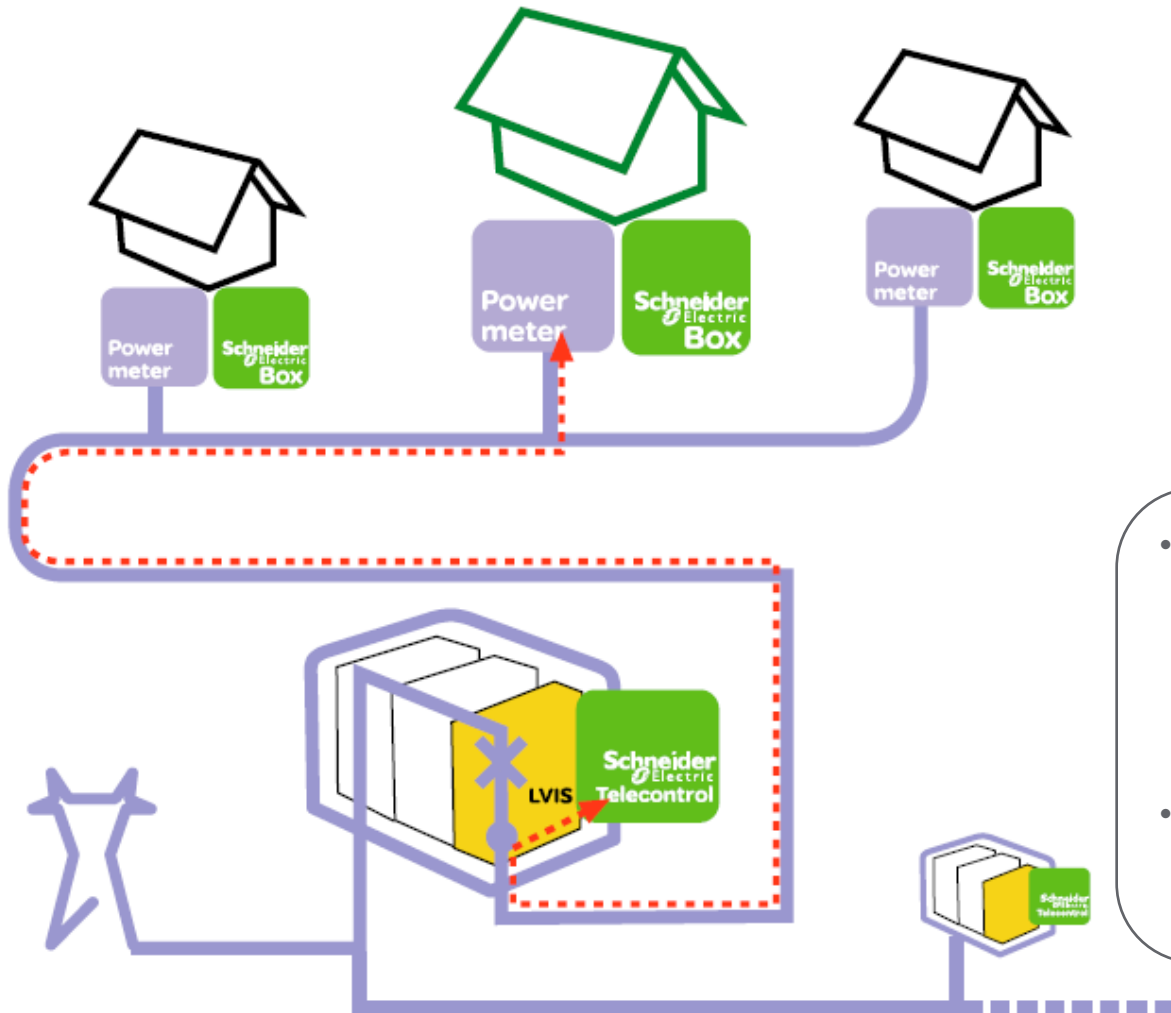
New customer connection

1



New customer connection

1



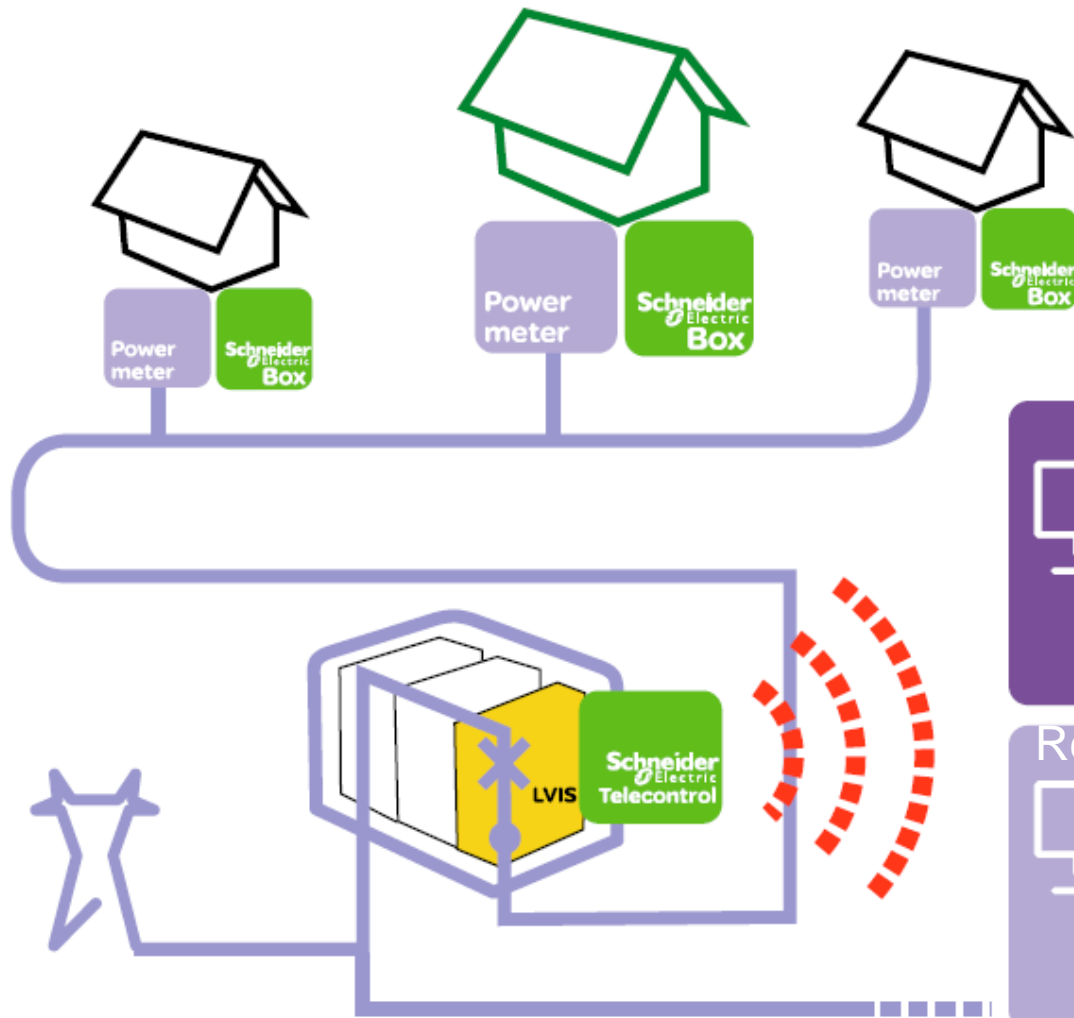
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Meter connected ?
On which feeder ?
On which phase ?

- **Meter+Box deliverables:**
 - Customer identification
 - Contract
 - Loads & production
 - Outgoing & phase
 - Reflectometrie data
- **KSFA deliverables:**
 - SLD updating
 - Data storage & transmission

New customer connection

1



Benefits

Real time update of network/customer topology



•Manage commercial data

Retailer



•Manage drawings & technical data

DNO

Out of the 10 applications, let's take a look at some network operation benefits

1. New customer connection



2. Permanent fault

3. Transient default

4. Voltage management : over voltage

5. Voltage management : under voltage

6. Load management : unbalance currents

7. Non technical losses

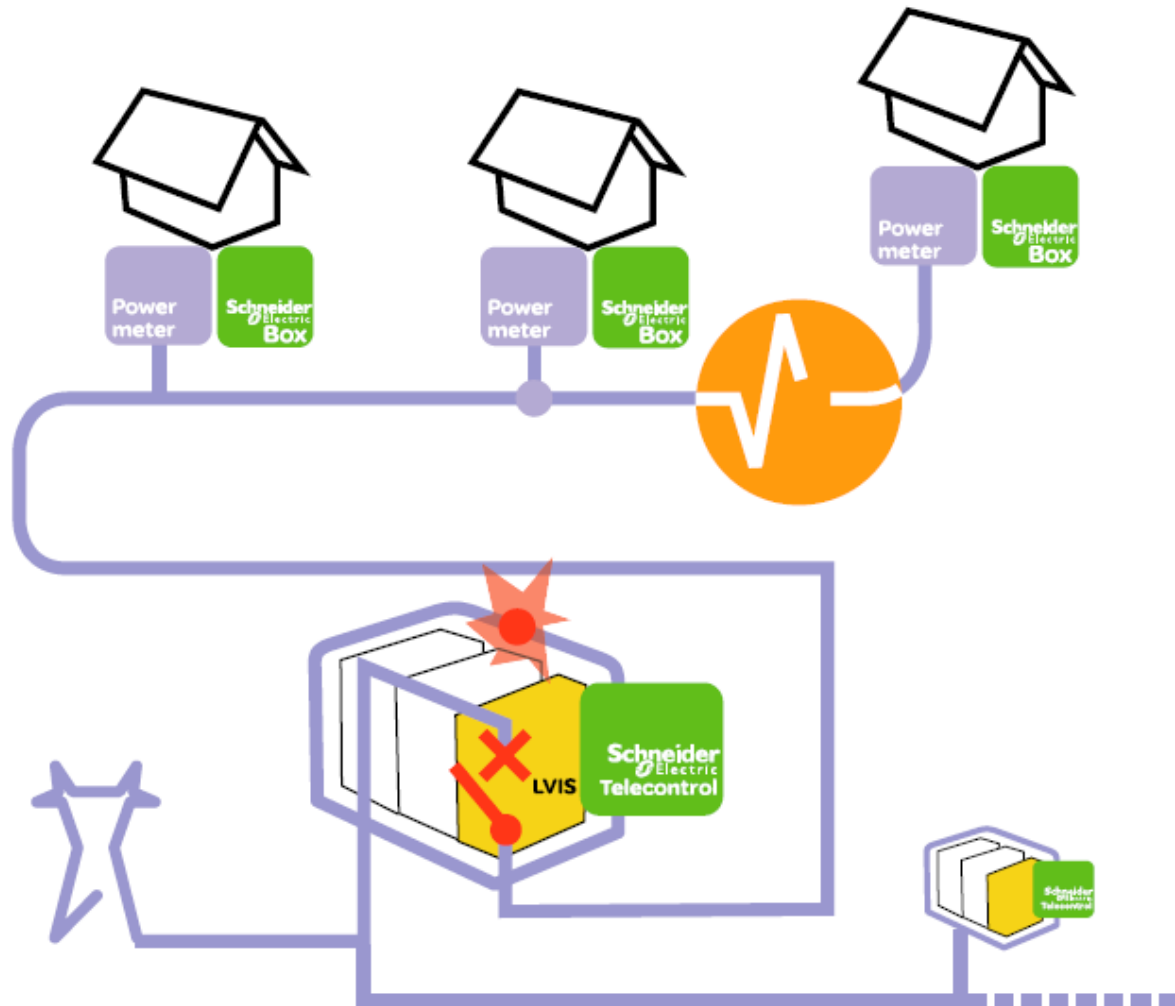
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Permanent fault

2



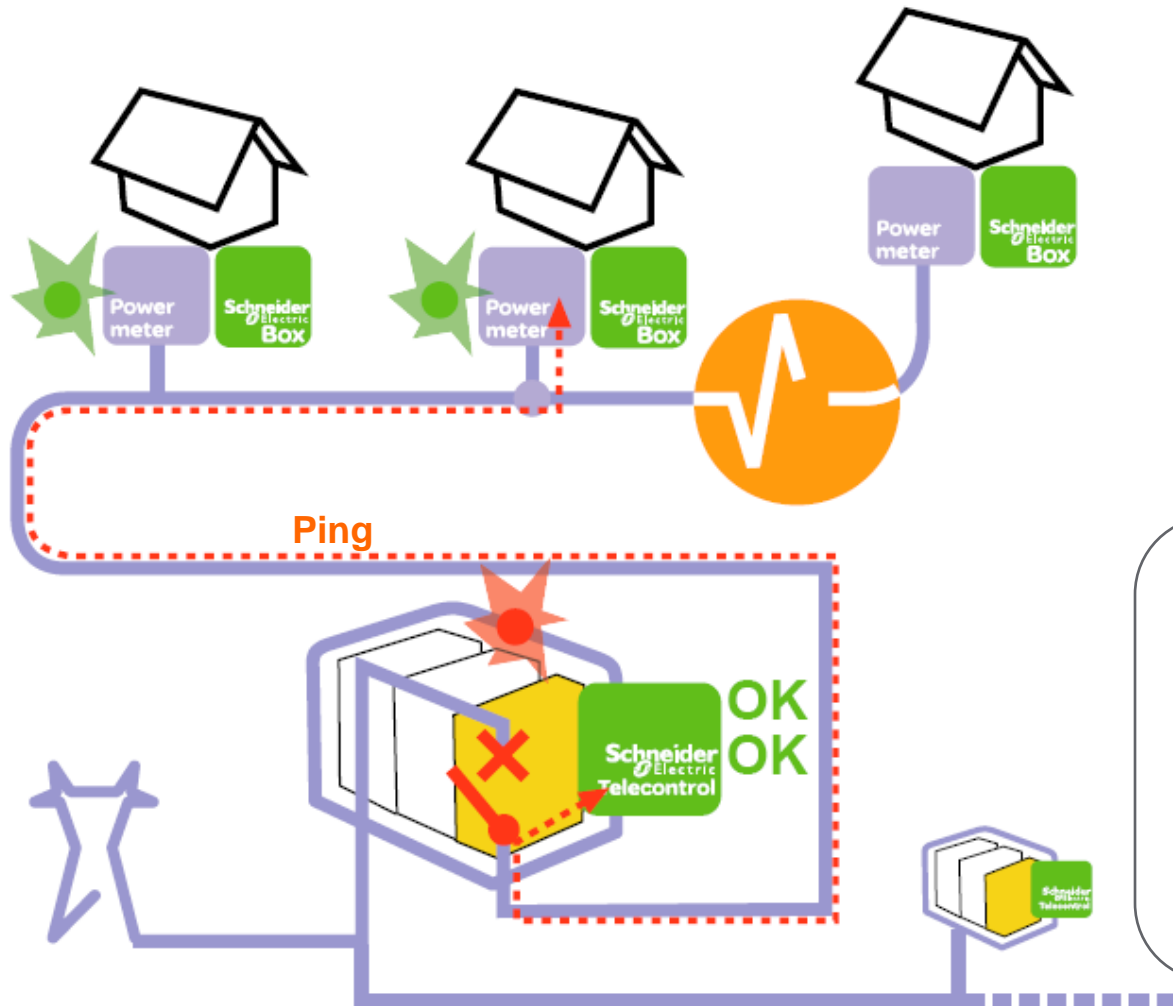
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On which phase ?

Where ?

Permanent fault

2



•Meter + Box deliverables:

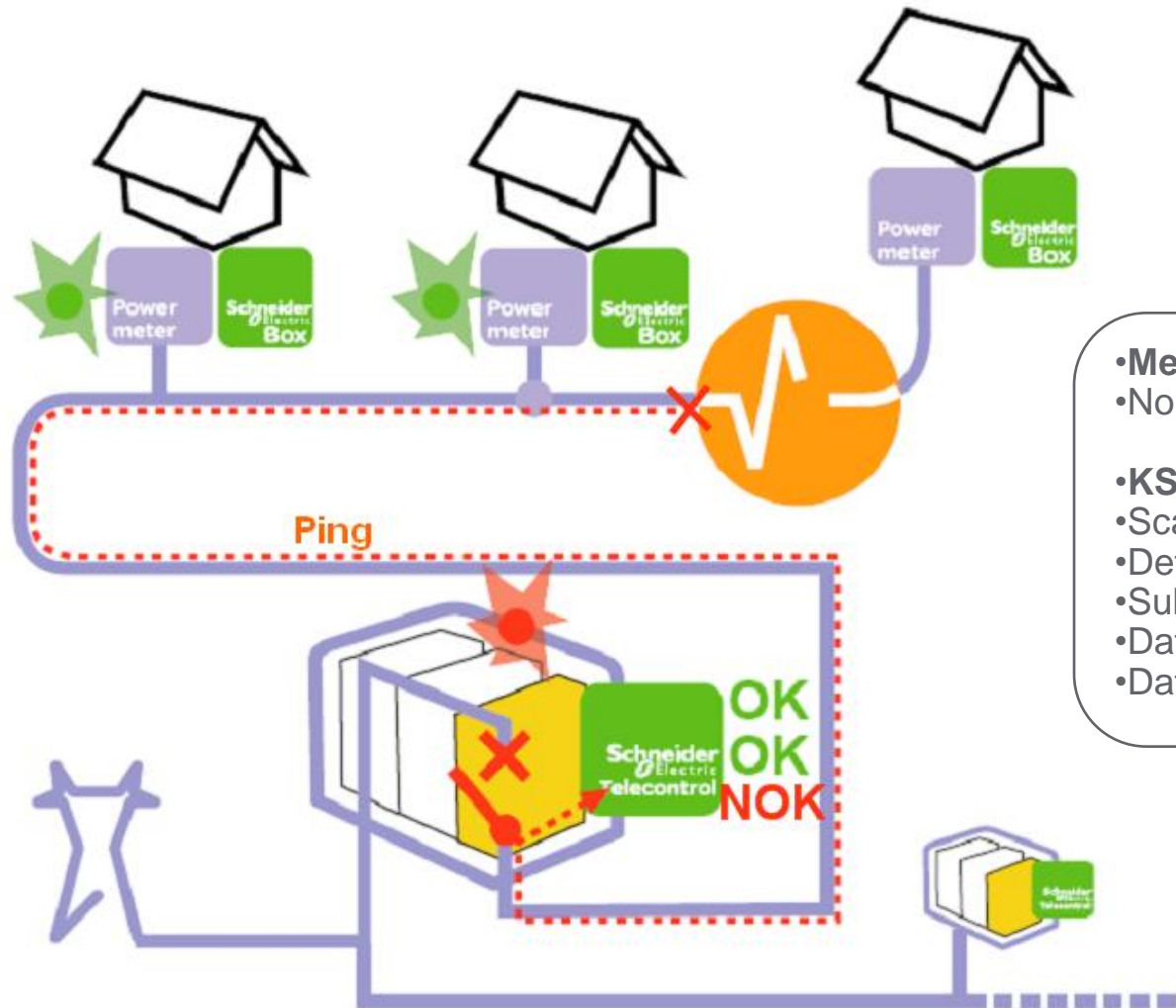
- Answer to ping
- Customer identifications
- Contract
- Loads & productions

•KSA deliverables:

- Scan the meters
- Substation fault indication
- Data storage

Permanent fault

2



•Meter + Box deliverables:

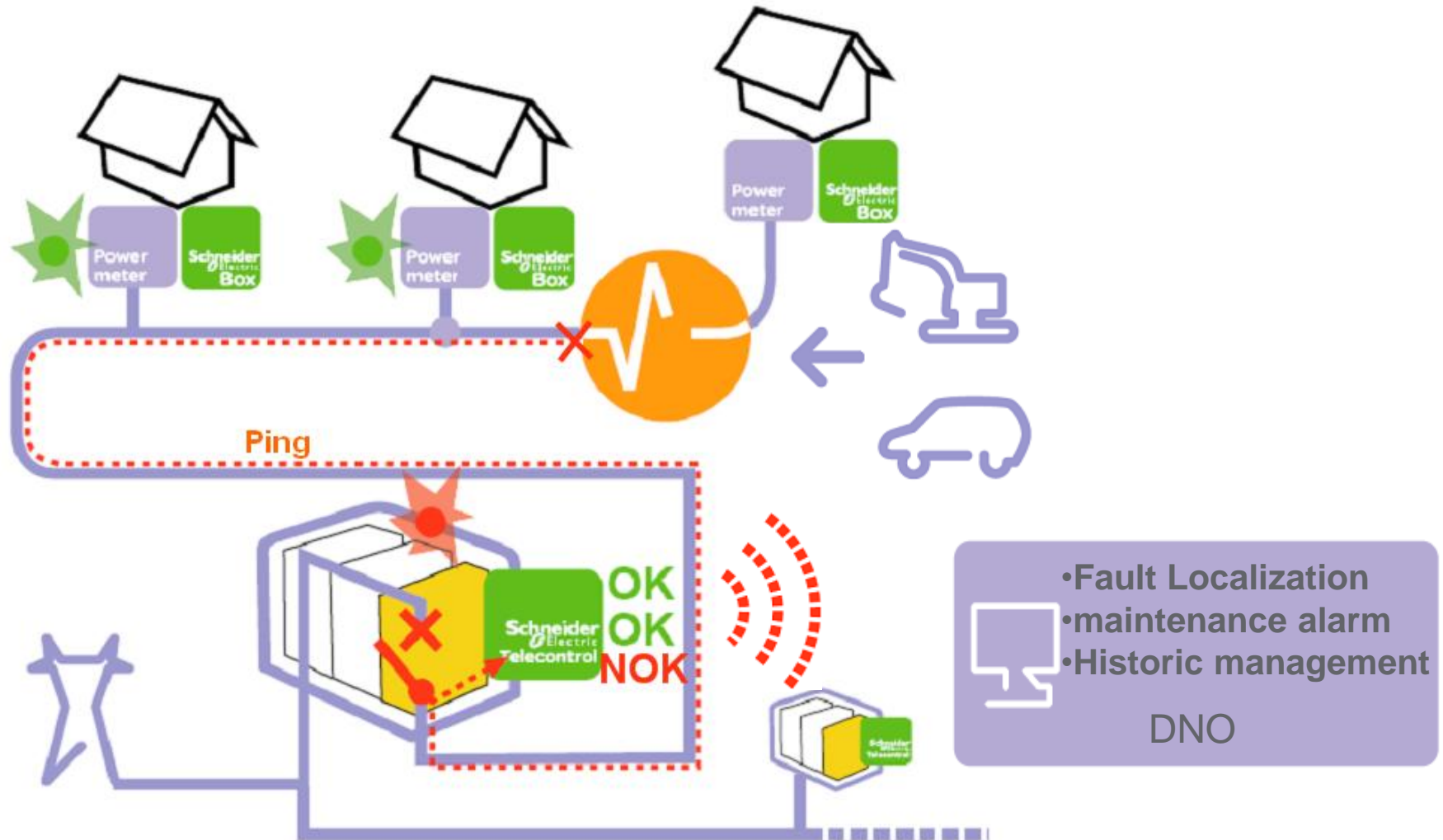
- No answer to ping

•KSFA deliverables:

- Scan the meters
- Detects lack of communication
- Substation fault indication
- Data storage
- Data transmission

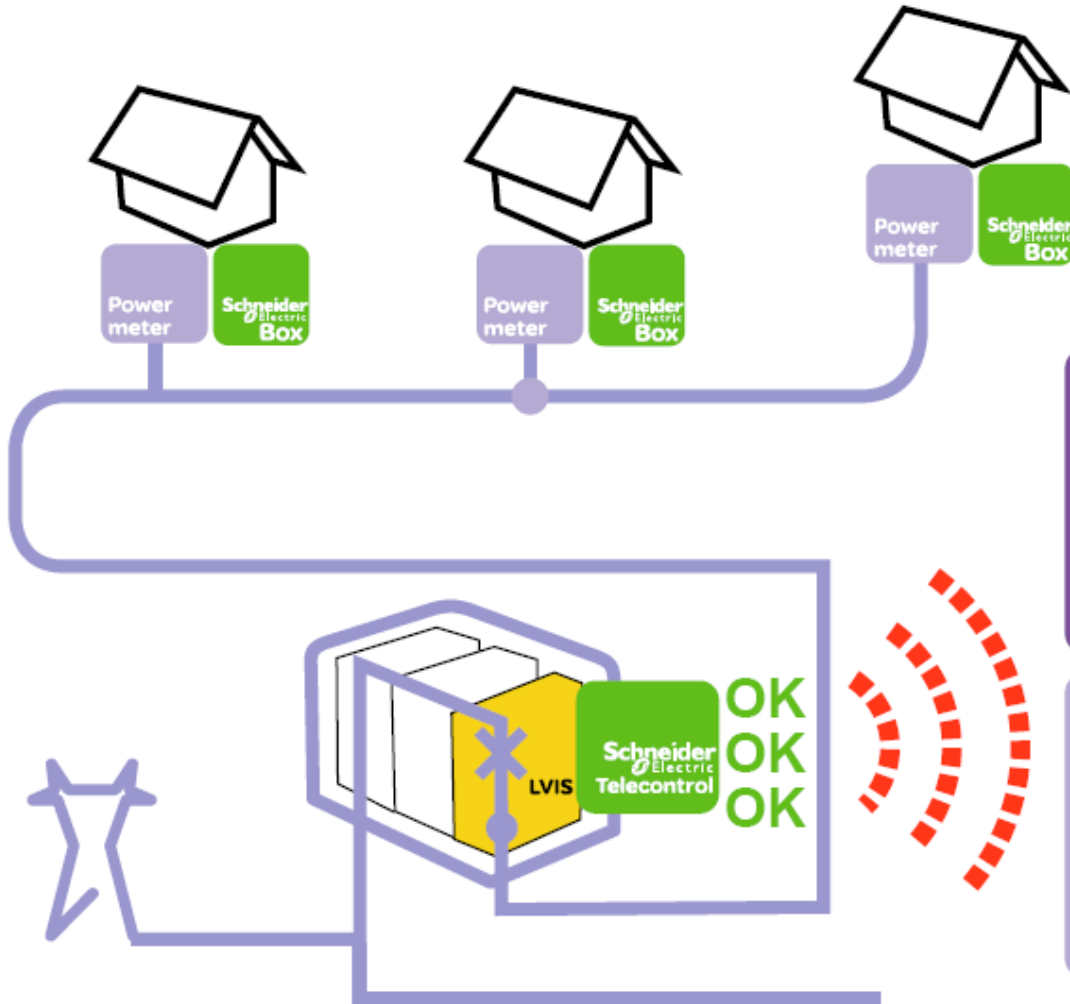
Permanent fault

2



Permanent fault

2



Benefits

- Save time to repair (SAIDI improved)
- Real time update of data base


•Historic management

Retailer

•Historic management

DNO

Out of the 10 applications, let's take a look at some network operation benefits

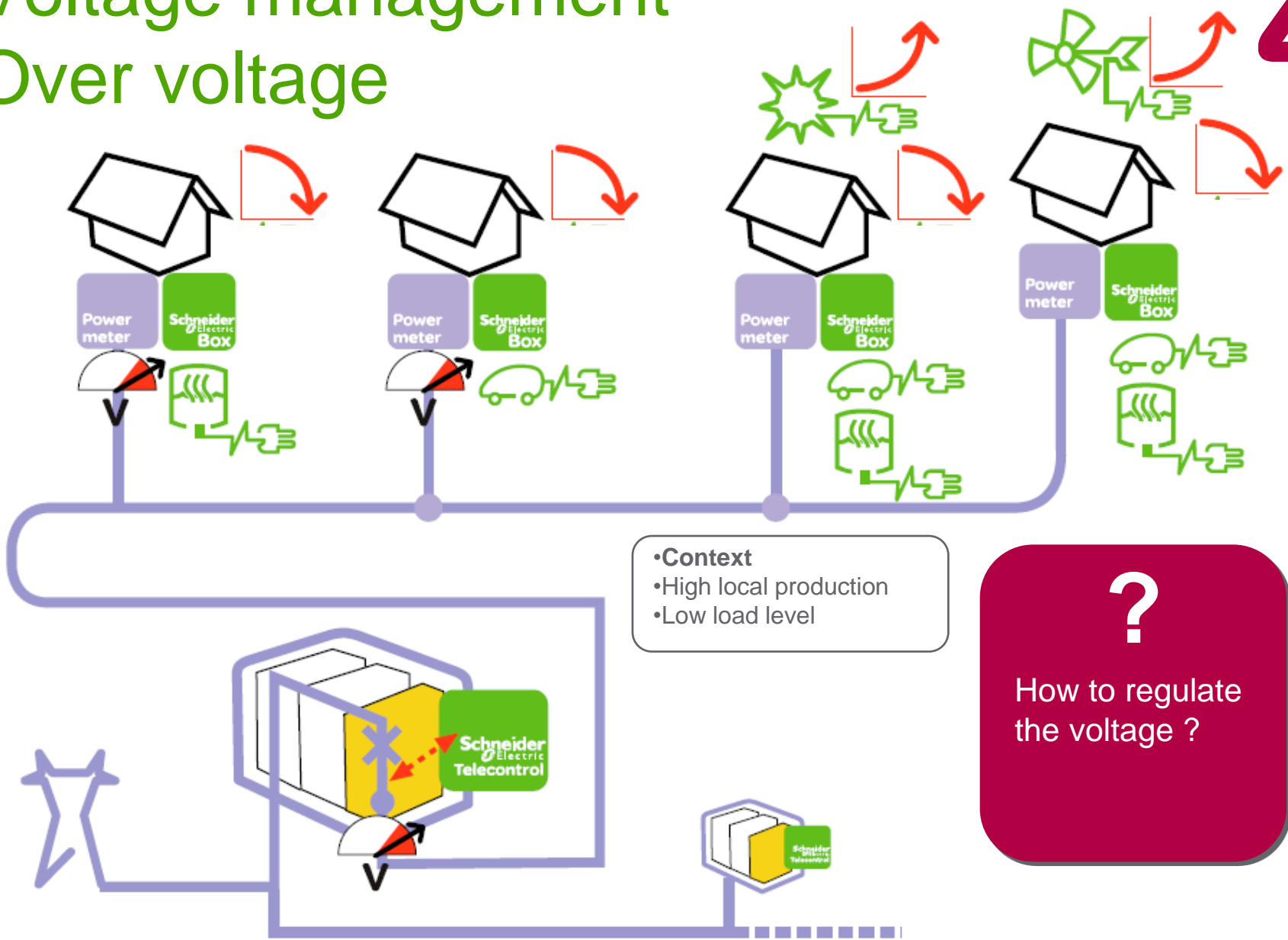
1. New customer connection
2. Permanent fault
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- 4. **Voltage management : over voltage**
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Voltage management

Over voltage

Sunny & Windy
spring afternoon

4



•Context
•High local production
•Low load level

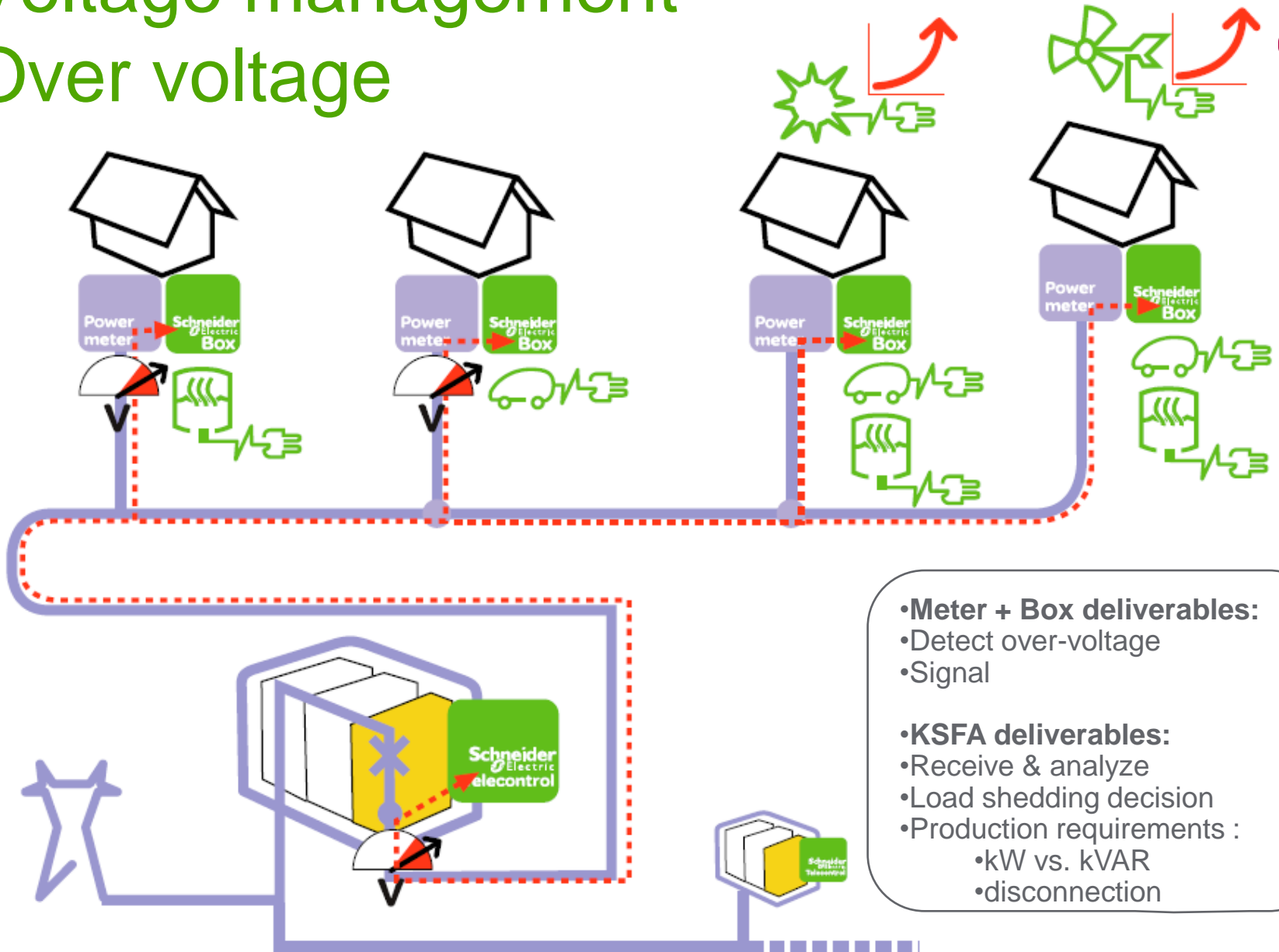
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How to regulate the voltage ?

Voltage management

Over voltage

4

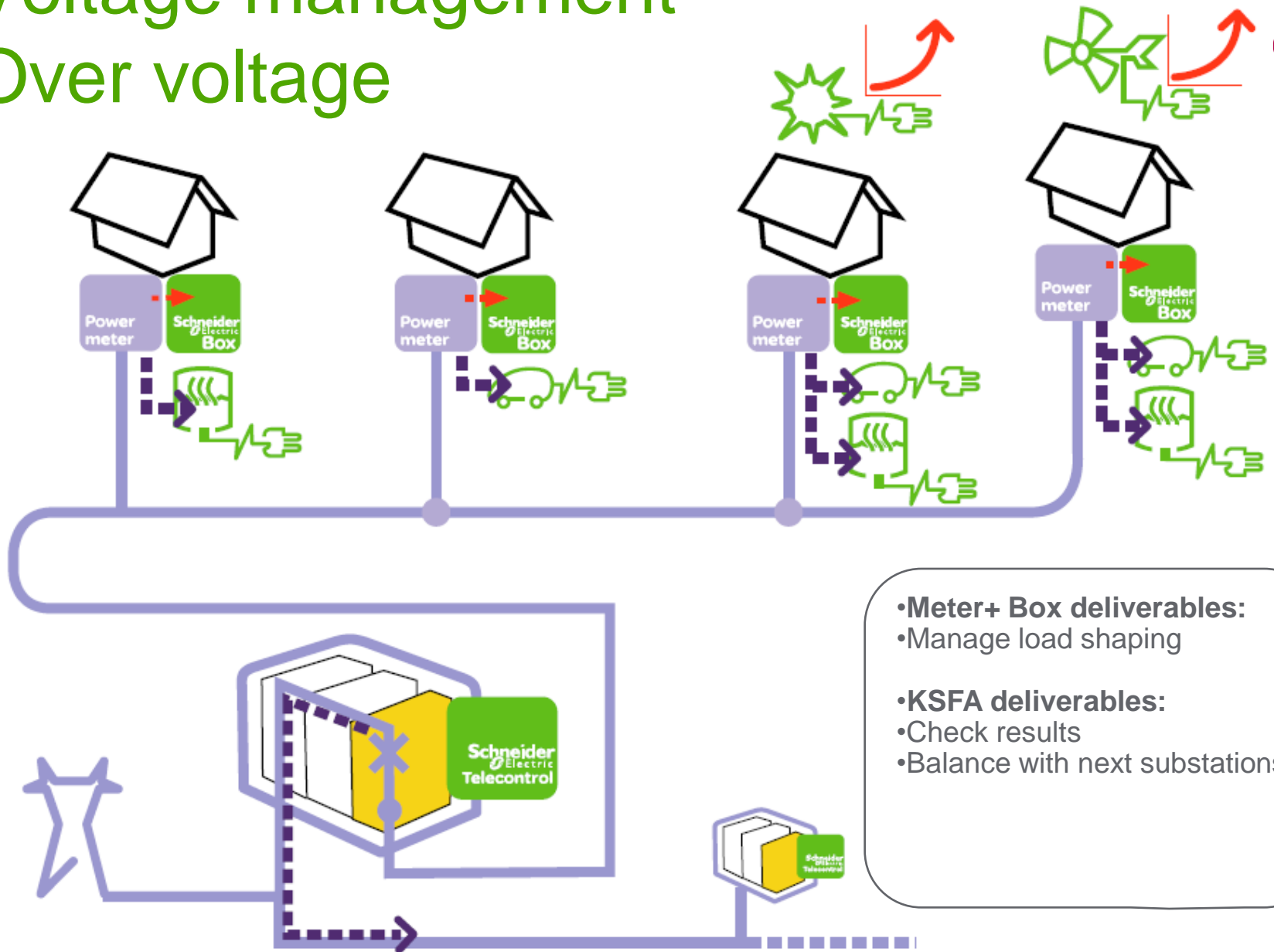


- **Meter + Box deliverables:**
 - Detect over-voltage
 - Signal
- **KSFA deliverables:**
 - Receive & analyze
 - Load shedding decision
 - Production requirements :
 - kW vs. kVAR
 - disconnection

Voltage management

Over voltage

4

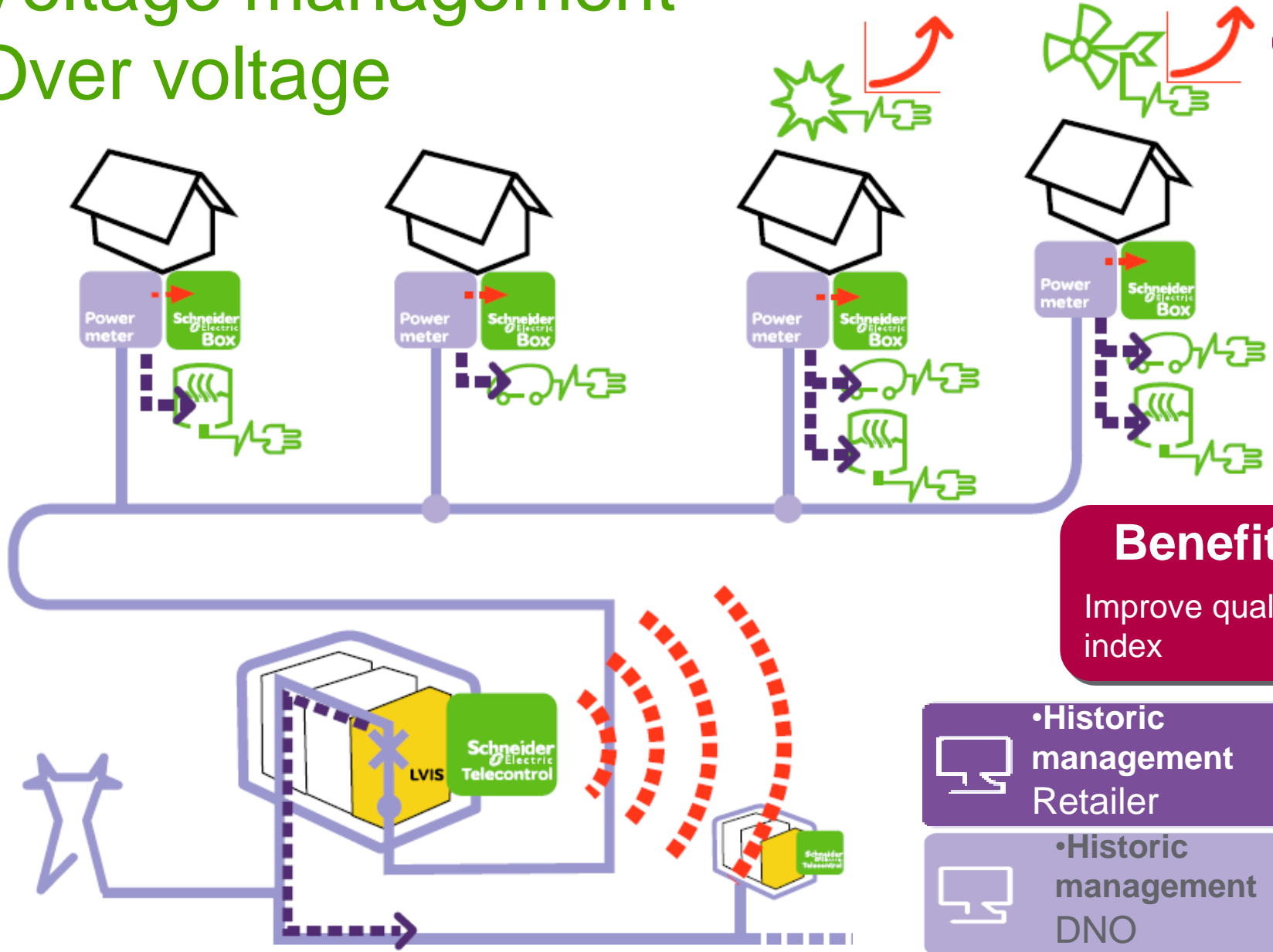


- **Meter+ Box deliverables:**
 - Manage load shaping
- **KSFA deliverables:**
 - Check results
 - Balance with next substations

Voltage management

Over voltage

4



Benefits
Improve quality index

•Historic management Retailer

•Historic management DNO

MV/LV substations are set to gain the most from data aggregation

MV/LV substations: data hub for

- MV Current, Voltage and FPI
- LV Current and voltage monitoring
- Smart meter data

Gathering all functions in one unit

- Optimise equipment and installation costs
- Guarantee a high industrial grade for concentrator functions
- Optimise the communication interface
- Naturally share the data

LV Distribution becomes under control

- Data base updating
- Voltage management
- Fault localisation
- . . .

Make the most of
your energy™



Thank you for your attention !