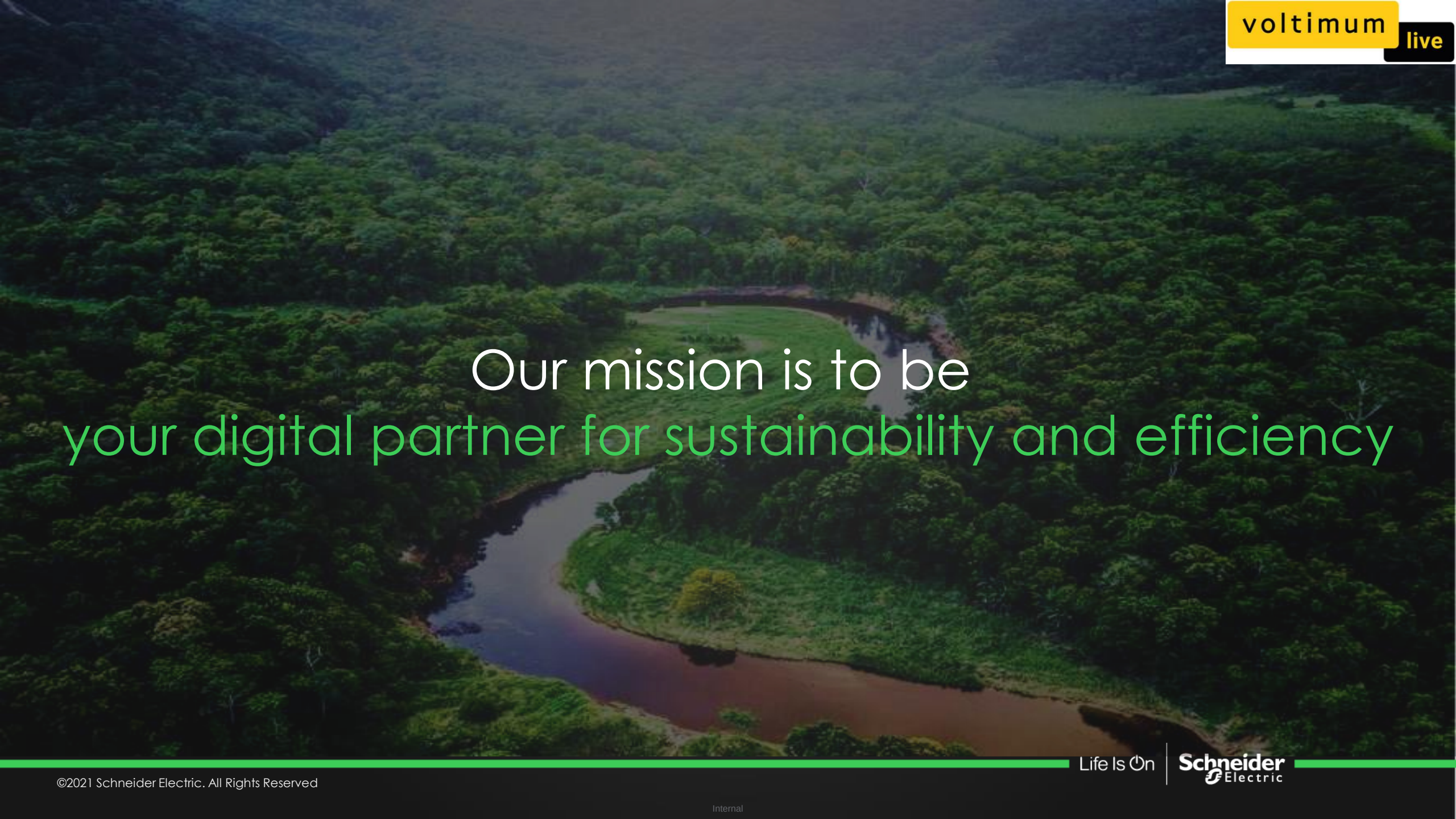
AFDDs, Multirow Units & Installations of the Future

Voltimum Live 9th June 2022
Presented by:
Kieran Whyte, Category Manager

voltimum live

voltimum live

Life Is On Schneider Electric



Electric and Digital convergence is the recipe for a more sustainable and resilient world

Electric

Makes energy Green

Digital

Builds a Smart future

Electricity is the most efficient energy and the best vector of decarbonization

+

Digital makes the invisible visible, eliminating waste and driving efficiency

Schneider Electric provides energy and automation digital solutions for efficiency and sustainability

Key figures for 2021

5% of revenues devoted to R&D

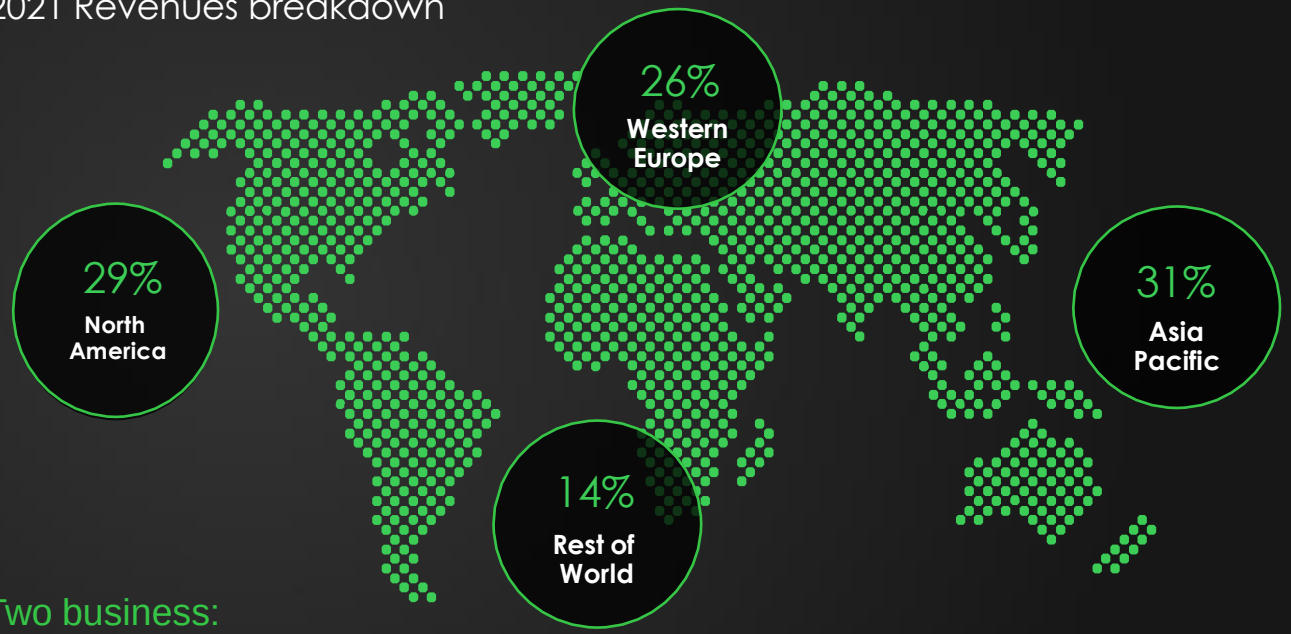
€29billion
2021 revenues

43%
of revenues in new economies

128,000+
Employees in over 100 countries

A well-balanced global presence

2021 Revenues breakdown

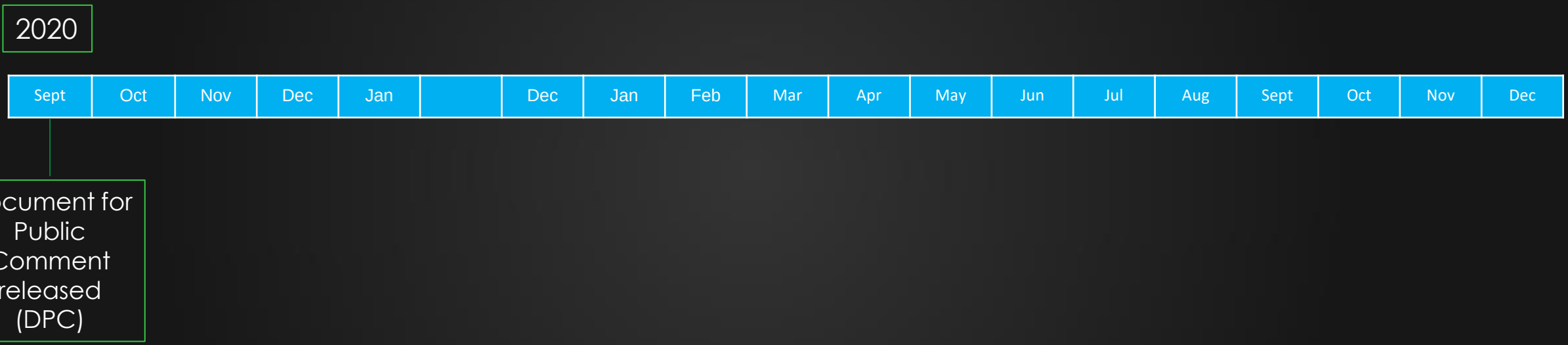


Two business:

23%	77%
€6.7 billion	€22.2 billion
Industrial automation	Energy management

BS7671:2018 + A2 2022
Requirements for Electrical Installations

BS7671 Amendment no 2 Timeline



BS7671 Amendment no 2 Timeline

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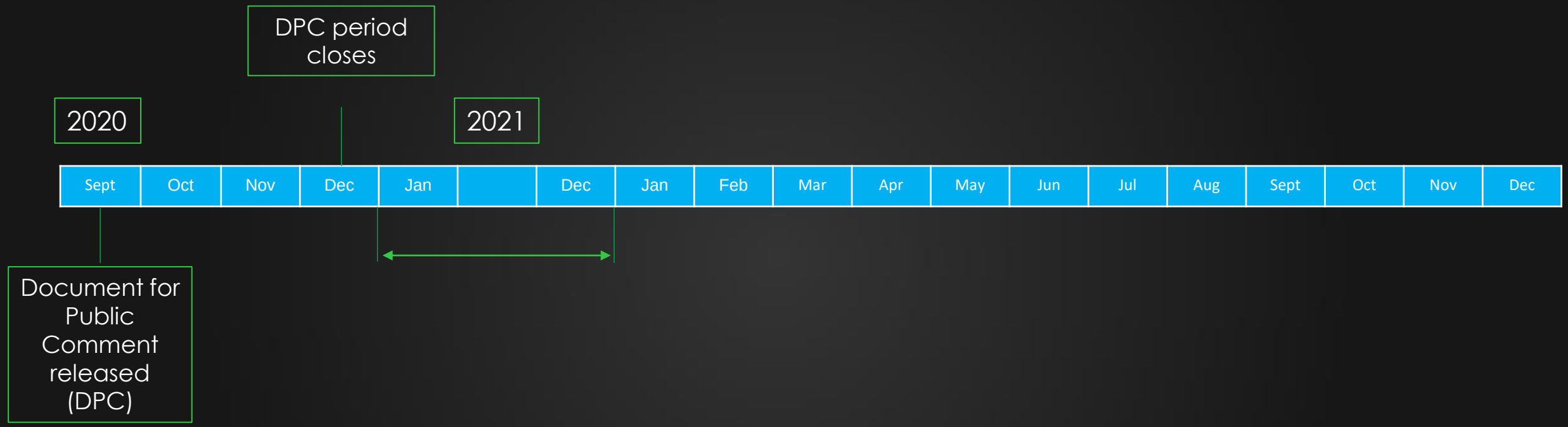
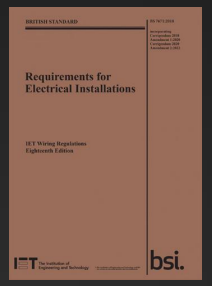


BS7671 Amendment no 2 Timeline

28th March 2022



DPC period closes

2020 | 2021 | 2022

Sept | Oct | Nov | Dec | Jan | | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec

Document for Public Comment released (DPC)

BS7671: 2018 + A2: 2022 released

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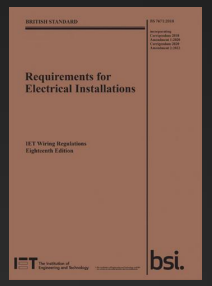

DPC period closes

6 Month grace period

2020 | 2021 | 2022

Sept	Oct	Nov	Dec	Jan		Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec

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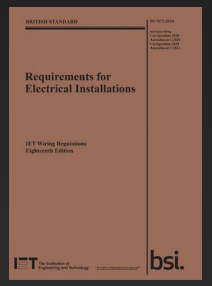

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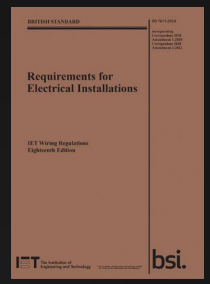

DPC period closes

2020 | 2021 | 2022

6 Month grace period

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BS7671: 2018 + A2: 2022 released

BS7671: 2018 + A2: 2022 is enforced

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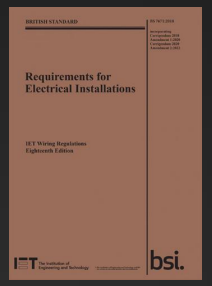

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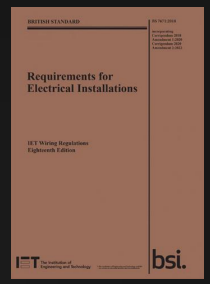

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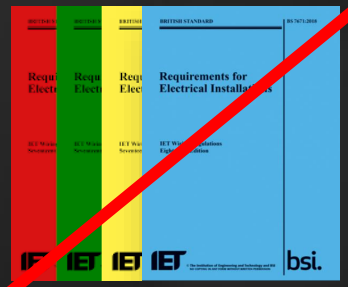


All previous editions will be withdrawn

Industry Legislation Driving The Change

1882 - 2022

Arc Fault Detection Devices

Prosumer

Earth Leakage Protection

Surge Protection Devices

Industry Legislation Driving The Change

1882 - 2022

Arc Fault Detection Devices

Prosumer

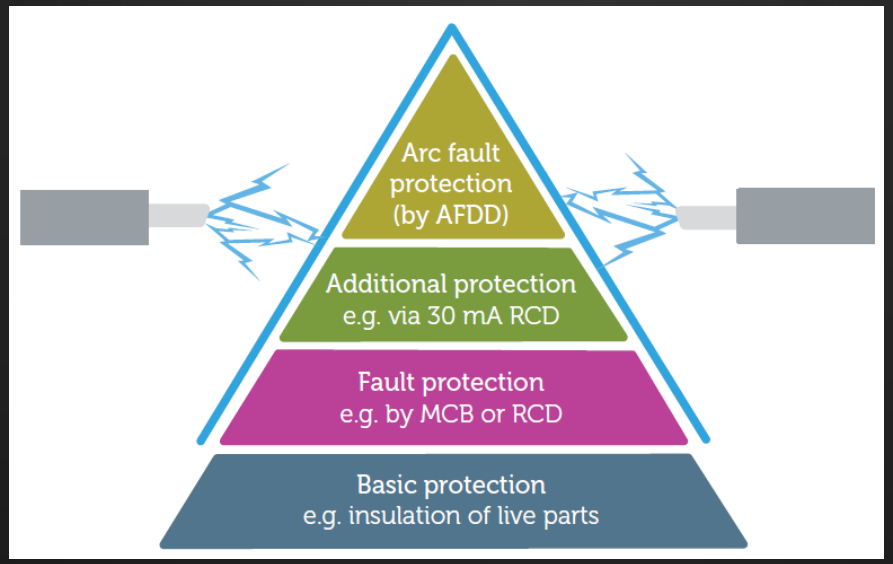
Earth Leakage Protection

Surge Protection Devices

Arc Fault Detection Devices

Types of Protective Devices

	Overload	Short Circuit	Earth Leakage	Series Arc	Parallel Arc	Over Voltage
MCB						
RCD						
RCBO						
AFDD						

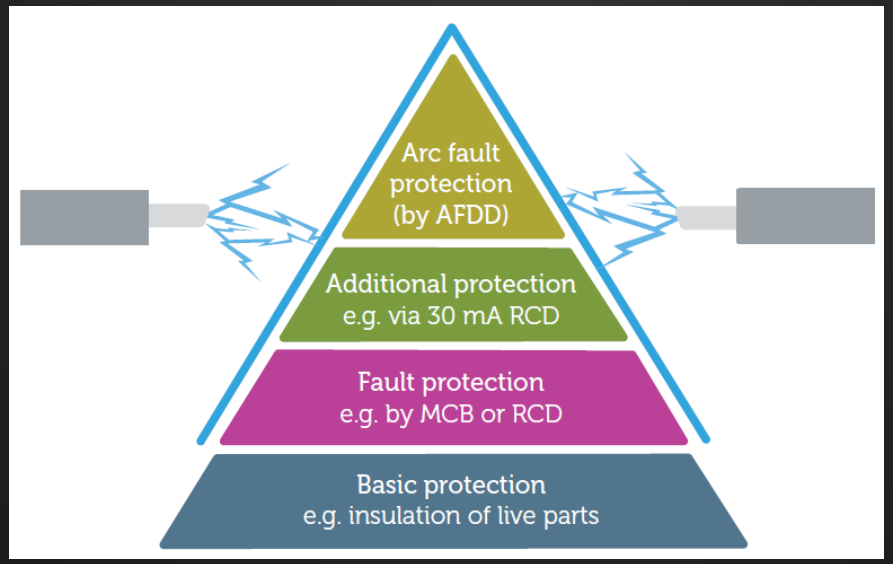


BEAMA Guide to AFDD - 2022

Types of Protective Devices

MCB

	Overload	Short Circuit	Earth Leakage	Series Arc	Parallel Arc	Over Voltage
MCB	✓	✓				
RCD						
RCBO						
AFDD						



BEAMA Guide to AFDD - 2022

Types of Protective Devices

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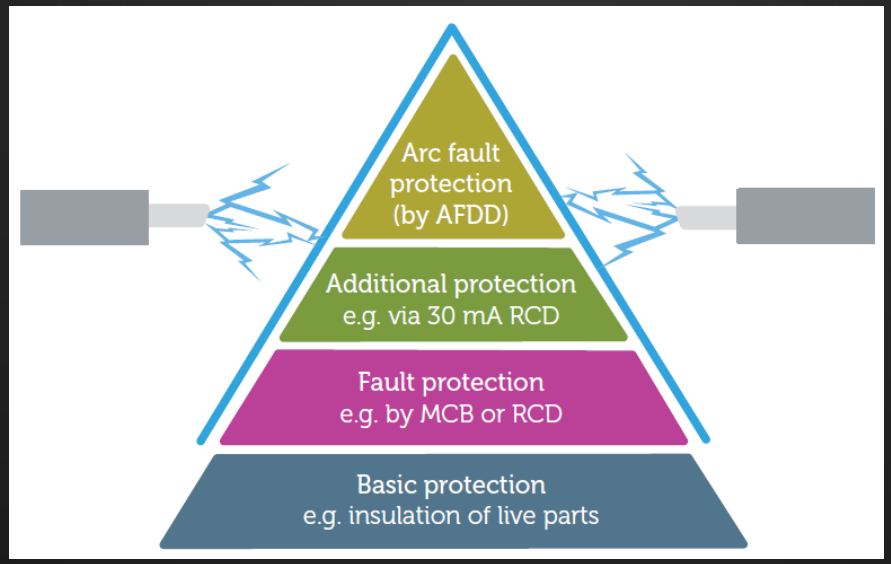
MCB	✓	✓				
RCD			✓			
RCBO						
AFDD						

RCD



BEAMA Guide to AFDD - 2022

Types of Protective Devices

MCB

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MCB	✓	✓				
RCD			✓			
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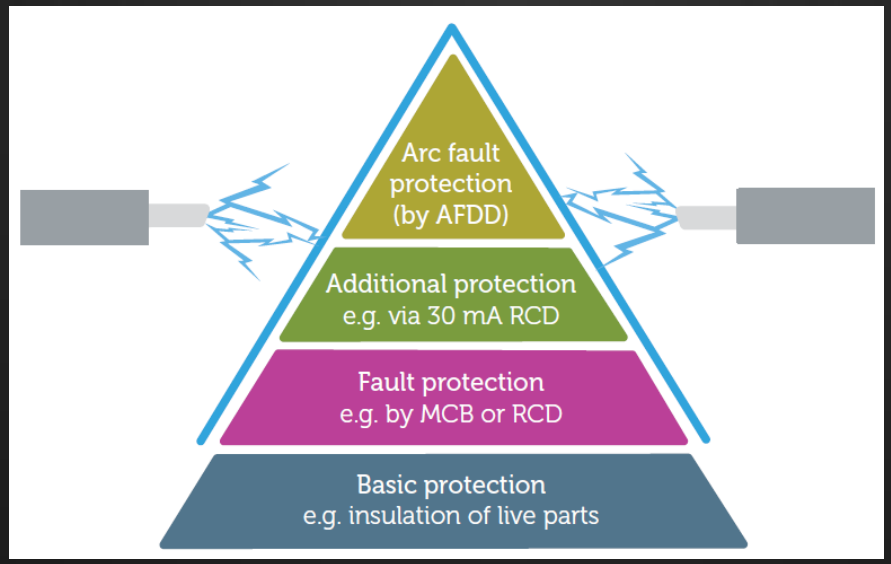
AFDD						

RCBO

RCD



BEAMA Guide to AFDD - 2022

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MCB	✓	✓				
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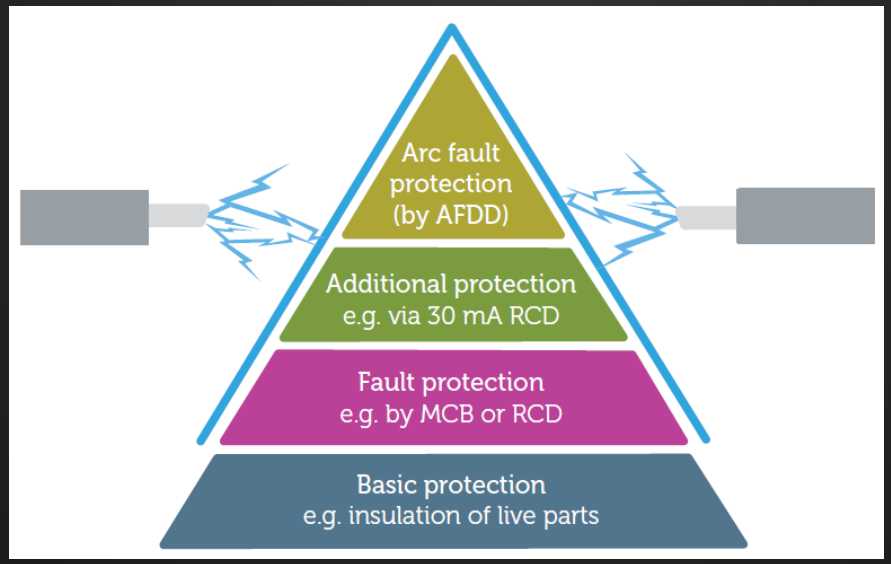
AFDD	✓	✓	✓	✓	✓	✓

RCBO

RCD



BEAMA Guide to AFDD - 2022

AFDD

Arc Fault Detection Devices

	Overload	Short Circuit	Earth Leakage	Series Arc	Parallel Arc	Over Voltage
AFDD	✓	✓	✓	✓	✓	✓

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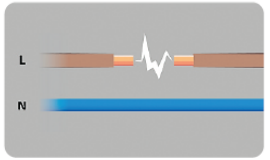


a) Series arc fault current

Originates from

- Damaged (e.g. crushed, broken, etc) cables
- Loose connections

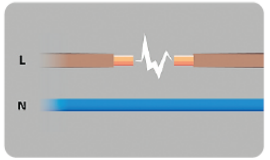
A series arc is in series with a load and at a lower level than a parallel arc. The series arc fault characteristics result in the rms value of current and I^2t being too low to operate a fuse or MCB.

Protection is provided by AFDDs.

BEAMA Guide AFDD - 2022

Arc Fault Detection Devices

	Overload	Short Circuit	Earth Leakage	Series Arc	Parallel Arc	Over Voltage
AFDD	✓	✓	✓	✓	✓	✓



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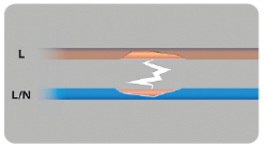


b) Parallel arc fault current (L-N)

Originates from :

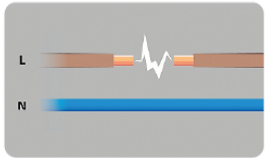
- Fault between L-N
- High impedance due to damaged insulation, fault current is too low to trip other protection devices

Parallel arc fault characteristics (including short duration high peak currents) result in rms, I^2t, and peak time values that are generally too low to operate protective devices such as fuses or MCBs.

Protection is provided by AFDDs.

Arc Fault Detection Devices

	Overload	Short Circuit	Earth Leakage	Series Arc	Parallel Arc	Over Voltage
AFDD	✓	✓	✓	✓	✓	✓



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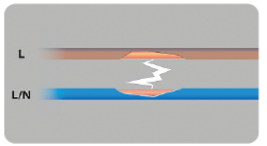

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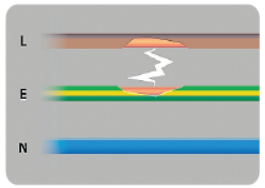


c) Parallel arc fault current (L-E)

Originates from :

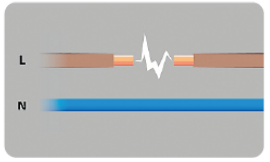
- Fault between L-E
- High impedance due to damaged insulation, fault current is too low to operate circuit breakers or fuses

Protection is provided by RCDs and AFDDs.

BEAMA Guide AFDD - 2022

Arc Fault Detection Devices

	Overload	Short Circuit	Earth Leakage	Series Arc	Parallel Arc	Over Voltage
AFDD	✓	✓	✓	✓	✓	✓



a) Series arc fault current

Originates from

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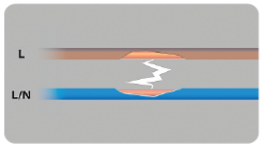
A series arc is in series with a load and at a lower level than a parallel arc. The series arc fault characteristics result in the rms value of current and I^2t being too low to operate a fuse or MCB.

Protection is provided by AFDDs.



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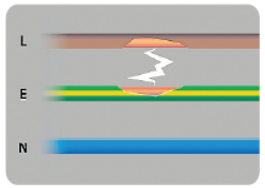
Protection is provided by AFDDs.

Loose Terminations

Rodent Damage



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- High impedance due to damaged insulation, fault current is too low to operate circuit breakers or fuses

Protection is provided by RCDs and AFDDs.

Damaged Insulation

Trapped / Crushed Cables

BEAMA Guide AFDD - 2022

Arc Fault Detection Devices

421.1.7

Arc Fault Detection Devices

421.1.7

421.1.7 Arc fault detection devices conforming to BS EN 62606 are recommended as a means of providing additional protection against fire caused by arc faults in AC final circuits. Arc fault detection devices (AFDD) conforming to BS EN 62606 shall be provided for single-phase AC final circuits supplying socket-outlets with a rated current not exceeding 32 A:

(Where used, an AFDD shall be placed at the origin of the circuit to be protected).

IET BS7671:2018+A2

Arc Fault Detection Devices

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(Where used, an AFDD shall be placed at the origin of the circuit to be protected).

- Higher Risk Residential Buildings (HRRB)
- Houses in Multiple Occupation (HMO)
- Purpose-built student accommodation
- Care homes

IET BS7671:2018+A2

Arc Fault Detection Devices

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- Higher Risk Residential Buildings (HRRB)
- Houses in Multiple Occupation (HMO)
- Purpose-built student accommodation
- Care homes

NOTE 1: Higher Risk Residential Buildings are assumed to be residential buildings over 18 m in height or in excess of six storeys, whichever is met first. It is anticipated that in many areas higher risk residential buildings will be defined in legislation which can be subject to change over time, as well as in risk management procedures adopted by fire and rescue services. Current legislation should be applied.

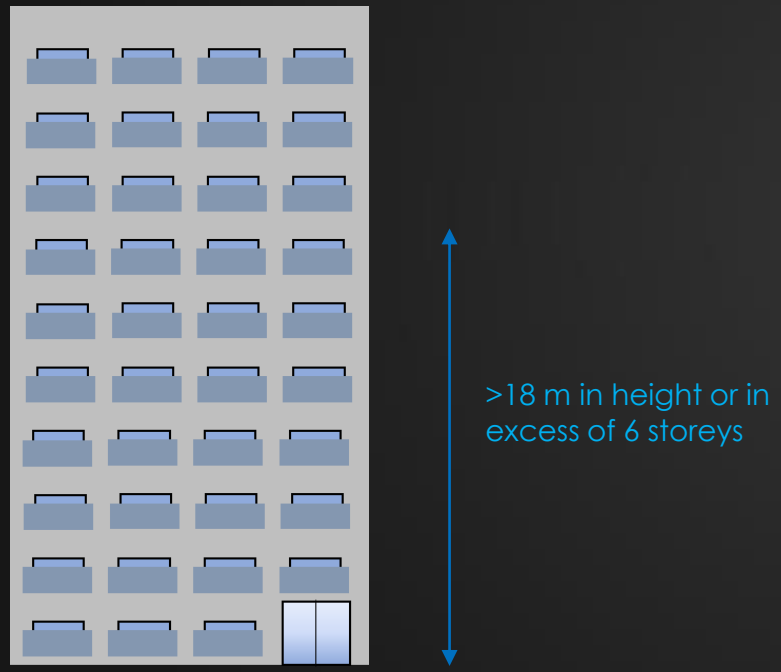
For all other premises, the use of AFDDs conforming to BS EN 62606 is recommended for single-phase AC final circuits supplying socket-outlets not exceeding 32 A.

Regulation 421.1.7

Arc Fault Detection Devices

Conforming to BS EN 62606 shall be provided for single-phase AC final circuits supplying socket-outlets with a rated current up to 32 A in:

Higher Risk Residential Buildings (HRRB)



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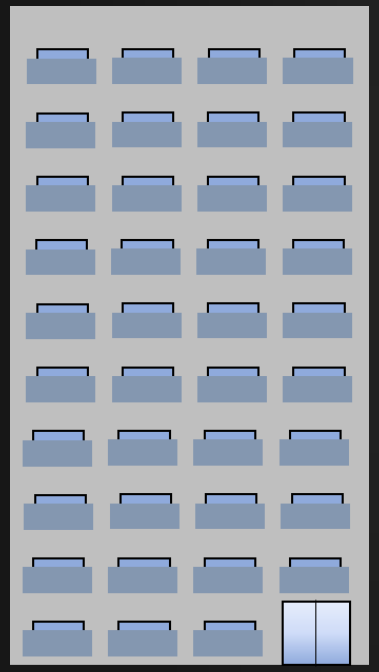
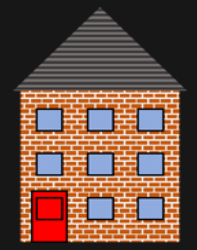


>18 m in height or in excess of 6 storeys

House in Multiple Occupation



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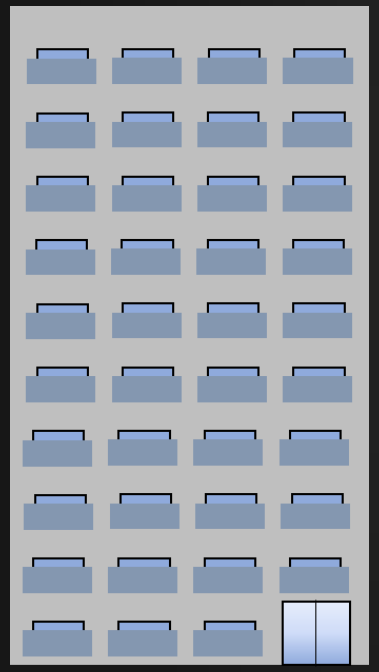

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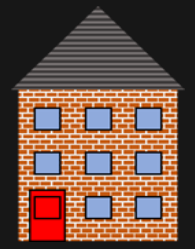

Purpose-built Student Accommodation

Regulation 421.1.7

Arc Fault Detection Devices

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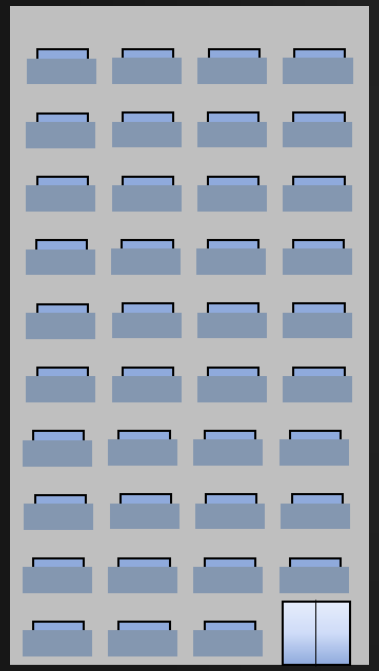

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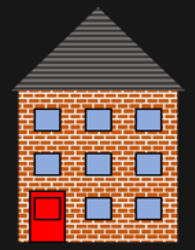

Purpose-built Student Accommodation

Care Homes

Easy9 Arc Fault Detection Device

Reference	Description	Rating
EZ9TDA7606	MCB / RCBO / AFDD / MSU	6A
EZ9TDA7610	MCB / RCBO / AFDD / MSU	10A
EZ9TDA7616	MCB / RCBO / AFDD / MSU	16A
EZ9TDA7620	MCB / RCBO / AFDD / MSU	20A
EZ9TDA7632	MCB / RCBO / AFDD / MSU	32A
EZ9TDA7640	MCB / RCBO / AFDD / MSU	40A

- Overload, Short Circuit, Earth Leakage and overvoltage
- Range 6A – 40A
- B and C Curve
- 6kA Breaking Capacity (domestic applications)
- Aids compliance with BS7671 18th Edition A2

Prosumer's Low Voltage Electrical Installations

Prosumer's Low Voltage Electrical Installations

"A prosumer is an entity or party which can be both a consumer and producer of electrical energy"

Prosumer's Low Voltage Electrical Installations (PEI)

Part 8, Chapter 82

A PEI is a set of electrical equipment that has the following functions:

IET BS7671:2018+A2

Prosumer's Low Voltage Electrical Installations (PEI)

Part 8, Chapter 82

A PEI is a set of electrical equipment that has the following functions:

(i) supply (i.e., connection to public power supply, local generator, photovoltaic systems, wind turbines, and batteries)
(ii) distribution
(iii) consumption (i.e., motors, heating systems, lighting, lifts)
(iv) energy management (i.e., load shedding equipment, monitoring device)

IET BS7671:2018+A2

Prosumer's Low Voltage Electrical Installations (PEI)

Part 8, Chapter 82

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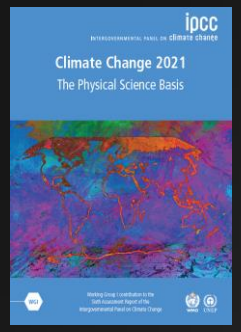
(ii) distribution
(iii) consumption (i.e., motors, heating systems, lighting, lifts)
(iv) energy management (i.e., load shedding equipment, monitoring device)

NOTE: A battery can be considered as a generator and as a load.
An uninterruptible power supply (UPS) is not considered to form part of a PEI as the purpose of a UPS is only to supply downstream critical loads and is not capable of reverse feeding the public network and/or current-using equipment in the upstream part of the electrical installation.

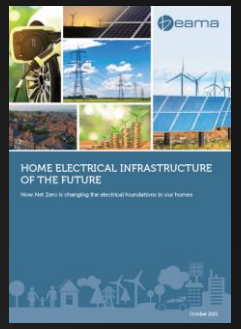
IET BS7671:2018+A2

Environmental Legislation Driving the Change

Chris Skidmore MP June 2019



29M Homes



+6M Homes

2020 — Accelerated take up of EVs and heat pumps

2025 — No gas boilers in new build homes

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2035 — All cars and vans to be Zero emission

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2050 — Domestic homes to be Net Zero level C or above

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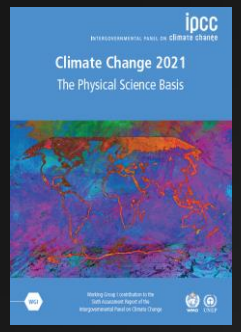

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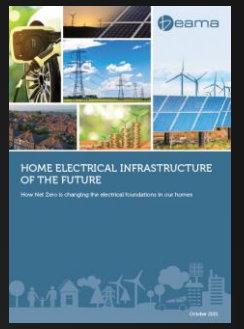

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Heat Pump	Amps	Supply
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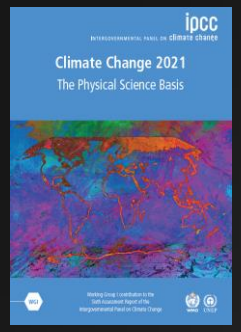

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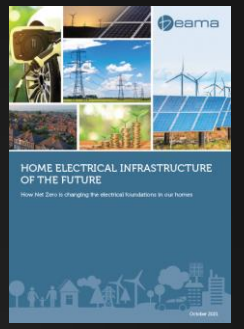

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7.4kW	32A	1ϕ	12 Hrs
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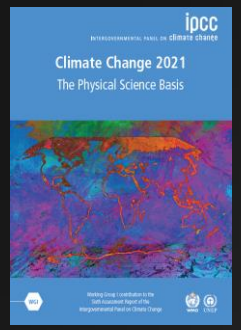

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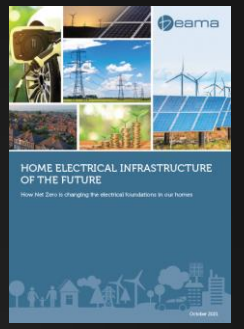

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>60% of Allowance*

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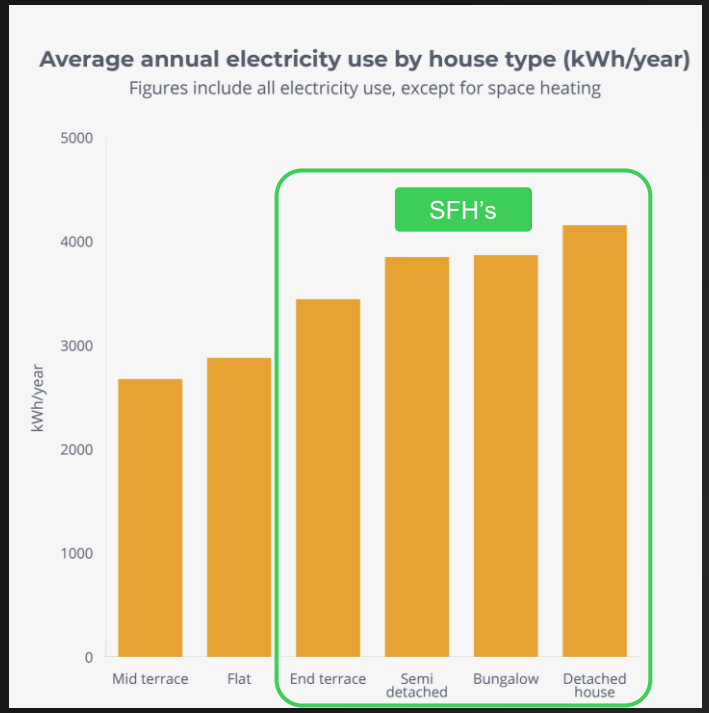
Home Energy Landscape

Energy consumption in the Home: Changing Demands



- Detached homes are typically larger so unsurprisingly consume the most energy
- These figures **don't include heating**. If homes use electric heating, then the figures would be much higher.
- UK average unit price per kWh is 18.9p in 2021
- Detached Houses average 4153 kWh annual use = £784.92

> 2.5M UK homes in fuel poverty in 2021 – an estimated 15% increase in utility bills suggested fuel poverty would rise to 3.5m homes
> 2021/2022 Energy Crisis: Energy Price caps to increase in 2022 with bills now expected to jump by 50%

+ Electric Heating

The estimated average annual electricity use for heating and hot water in the UK is 4,200 kWh.

Estimated cost for heating and hot water **using electricity** in the UK would be around £793.80 per year.

Estimated at around £200 more per year than gas heating today (using 2019 prices).

+ EV Charging

Example: Tesla Model 3 / Battery: 50 kWh / Range: 190 miles / Cost of charge: £9.54

8000 annual mileage = 2105 kWh energy use / £397.85

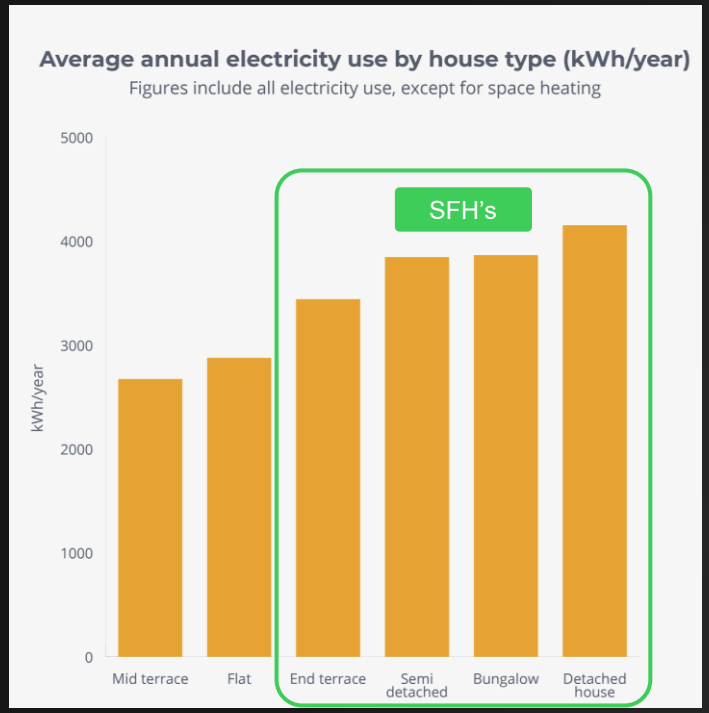
This example is using the current UK electricity average per kWh and Tesla Model 3 is one of the cheapest EV models to run.

Opportunities for efficiencies with off peak energy tariffs and Smart Charging.

Electric heating and EV charging added to a detached home averages 4,153 kWh annual use
= 10,458 kWh
= £1,976.56

Home Energy Landscape

Energy consumption in the Home: Changing Demands



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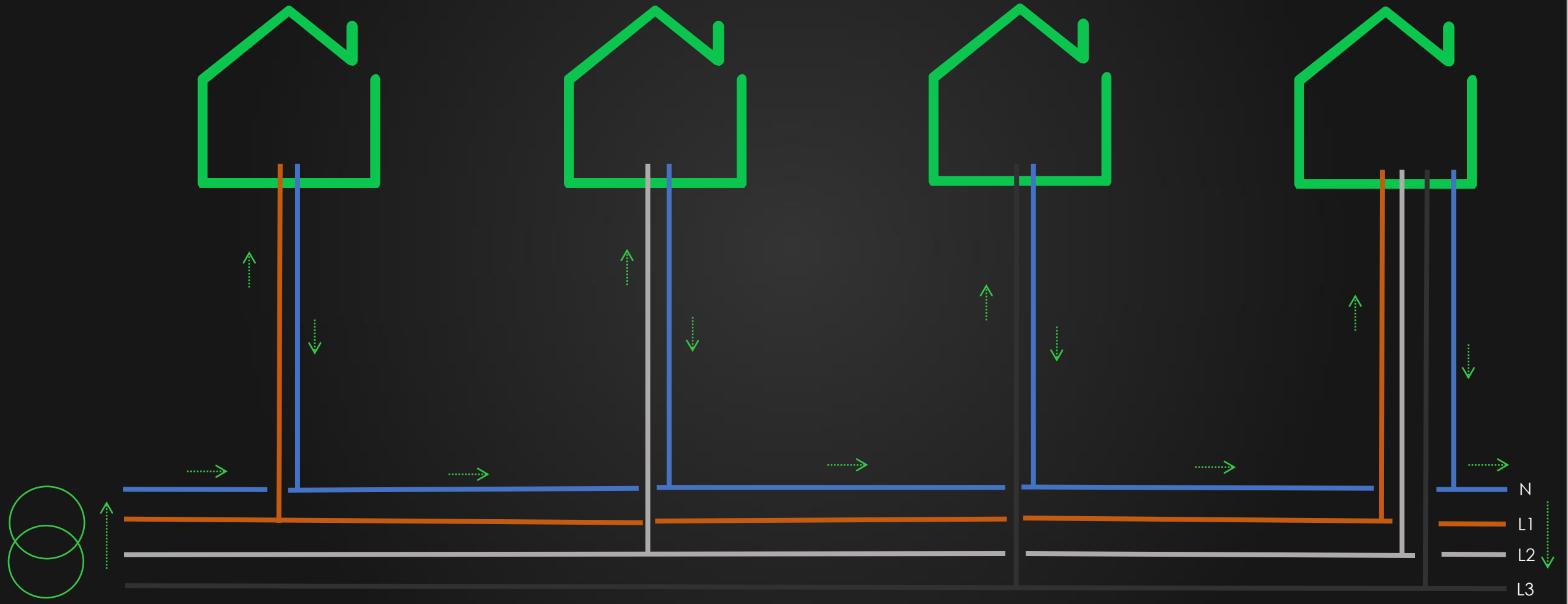
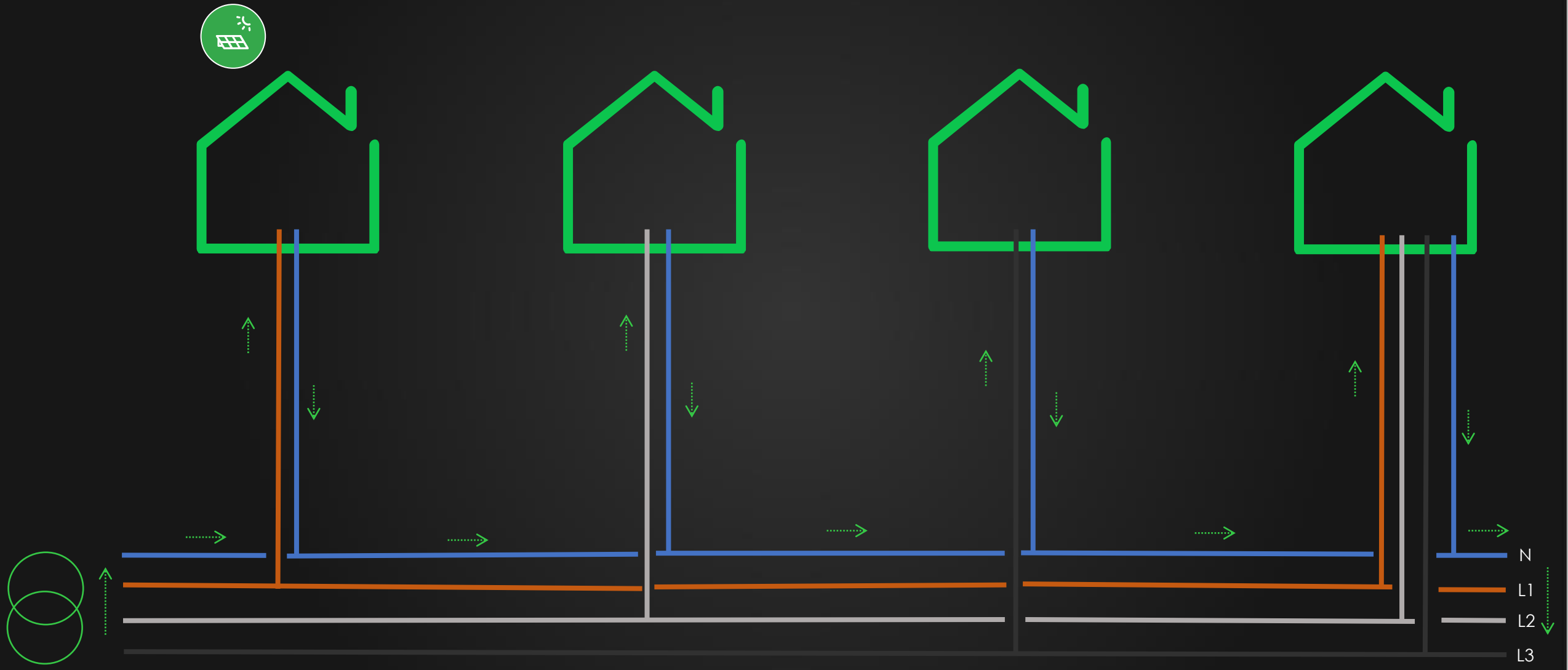
Conservative Estimate

Current Residential Distribution System

Prosumer's Electrical Installations



Prosumer's Electrical Installations



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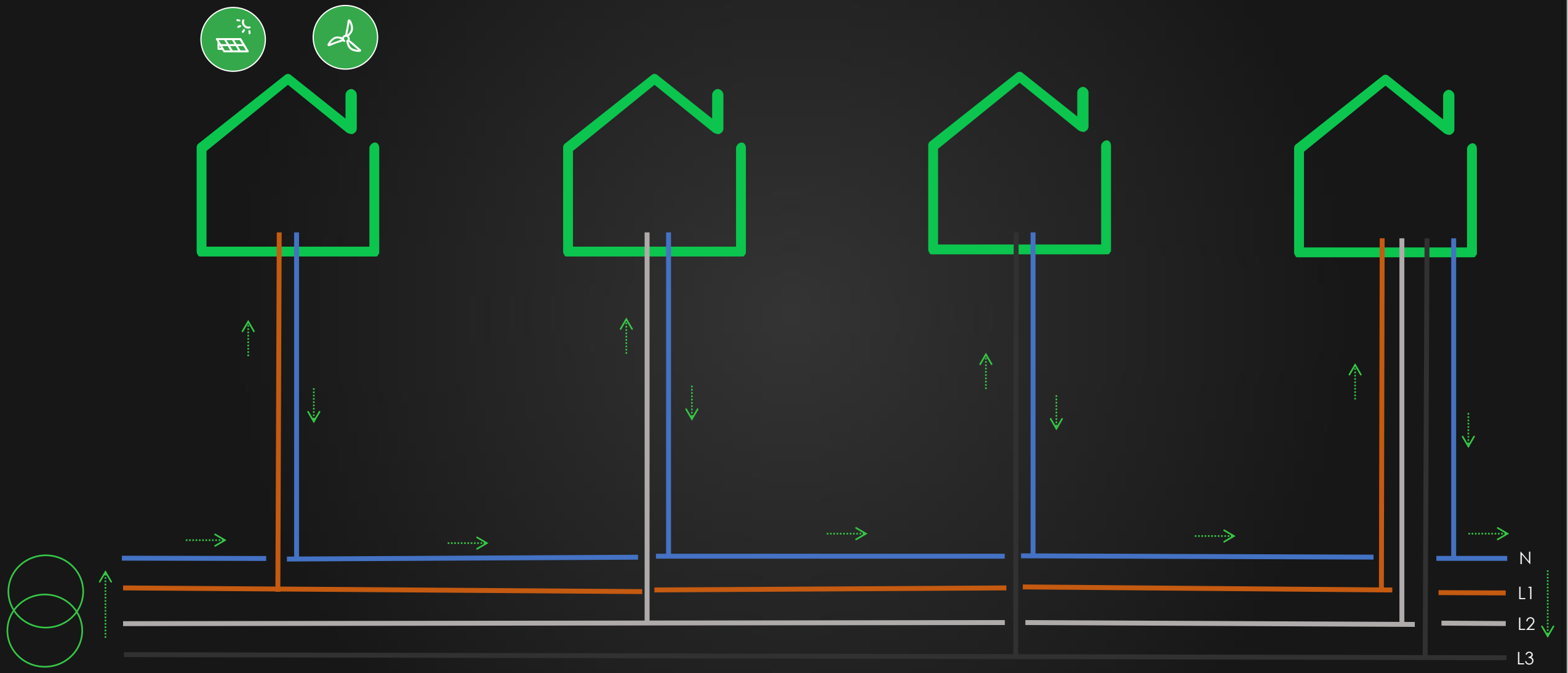

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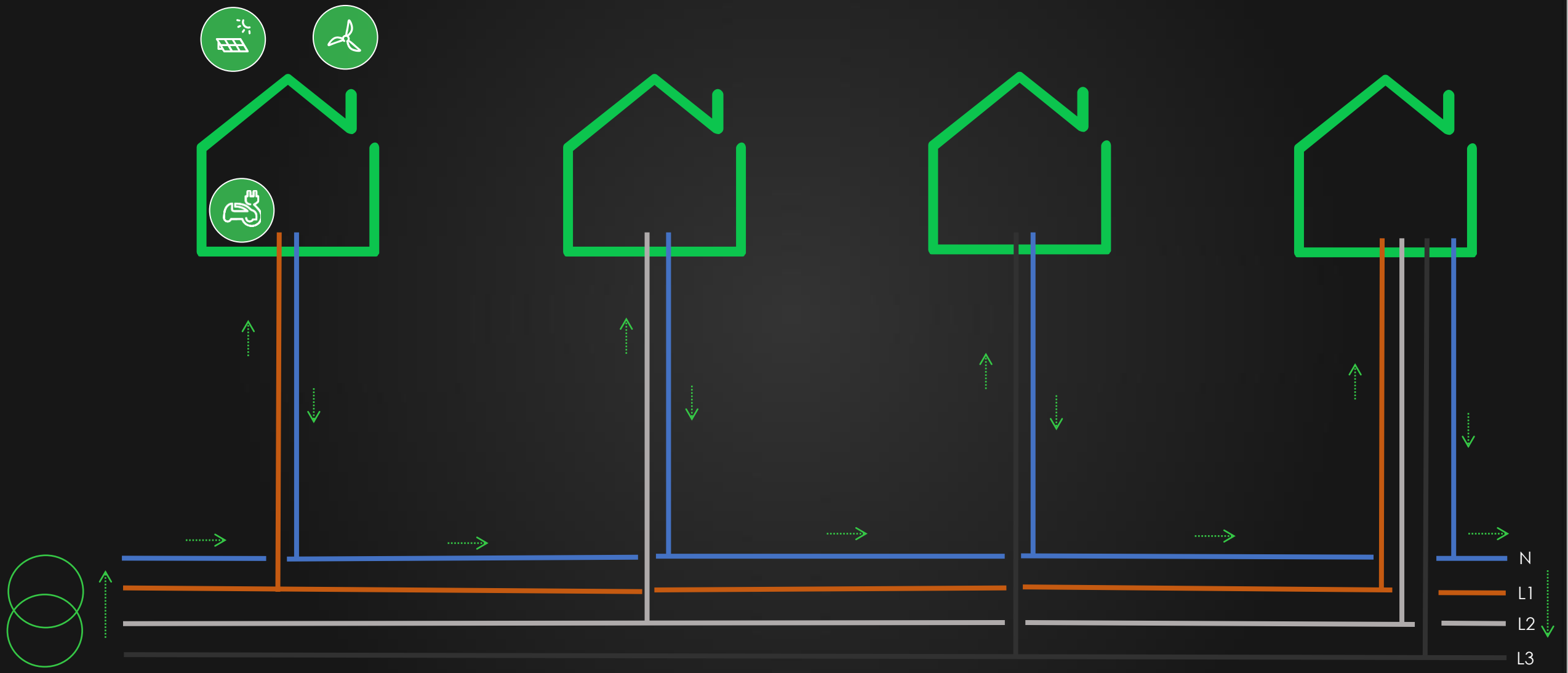

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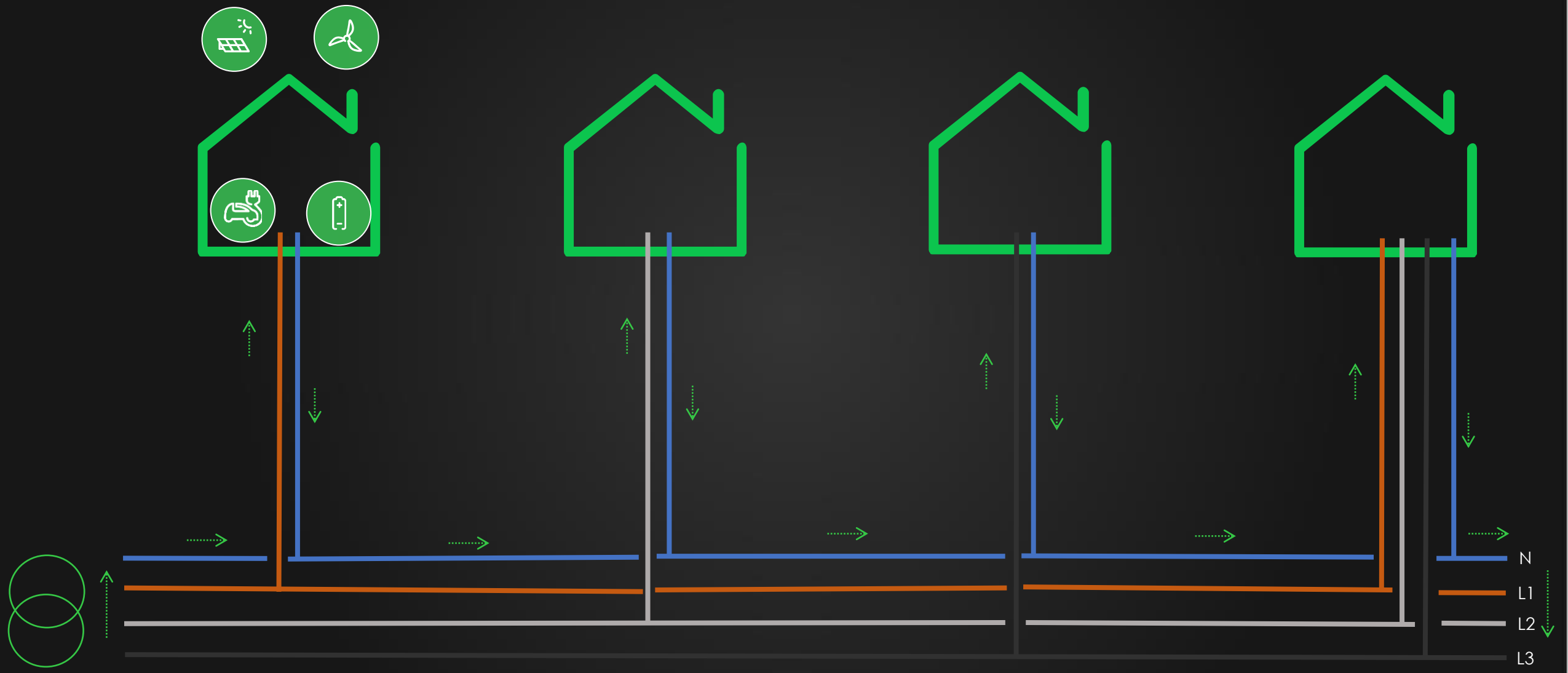

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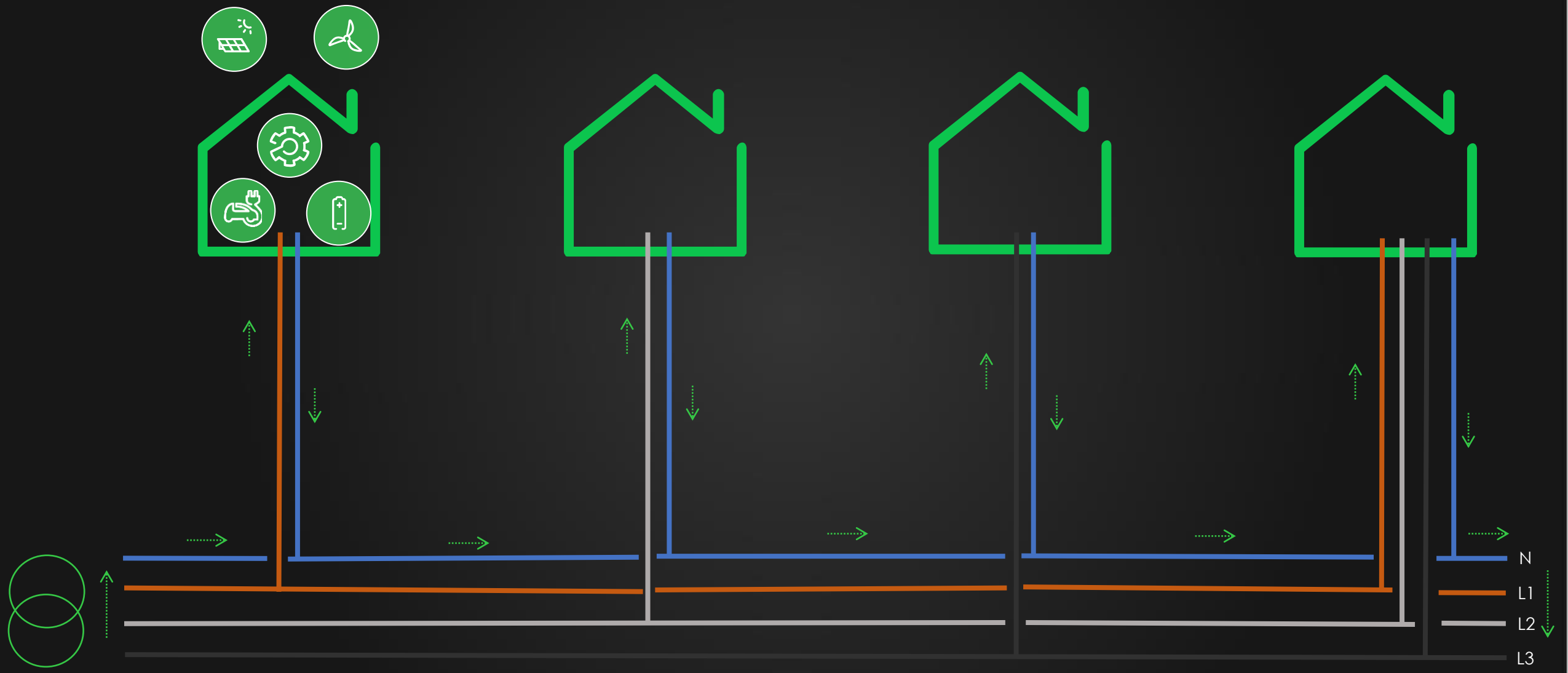

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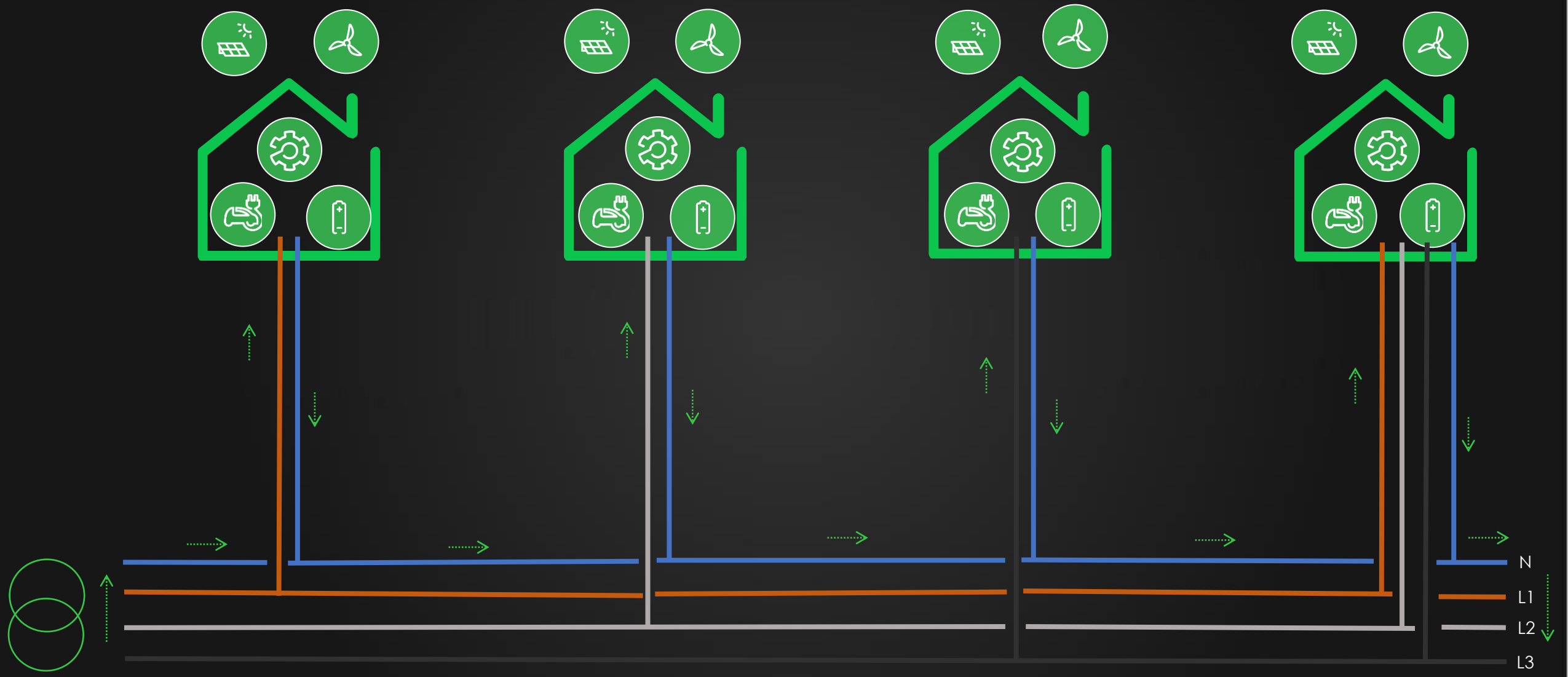
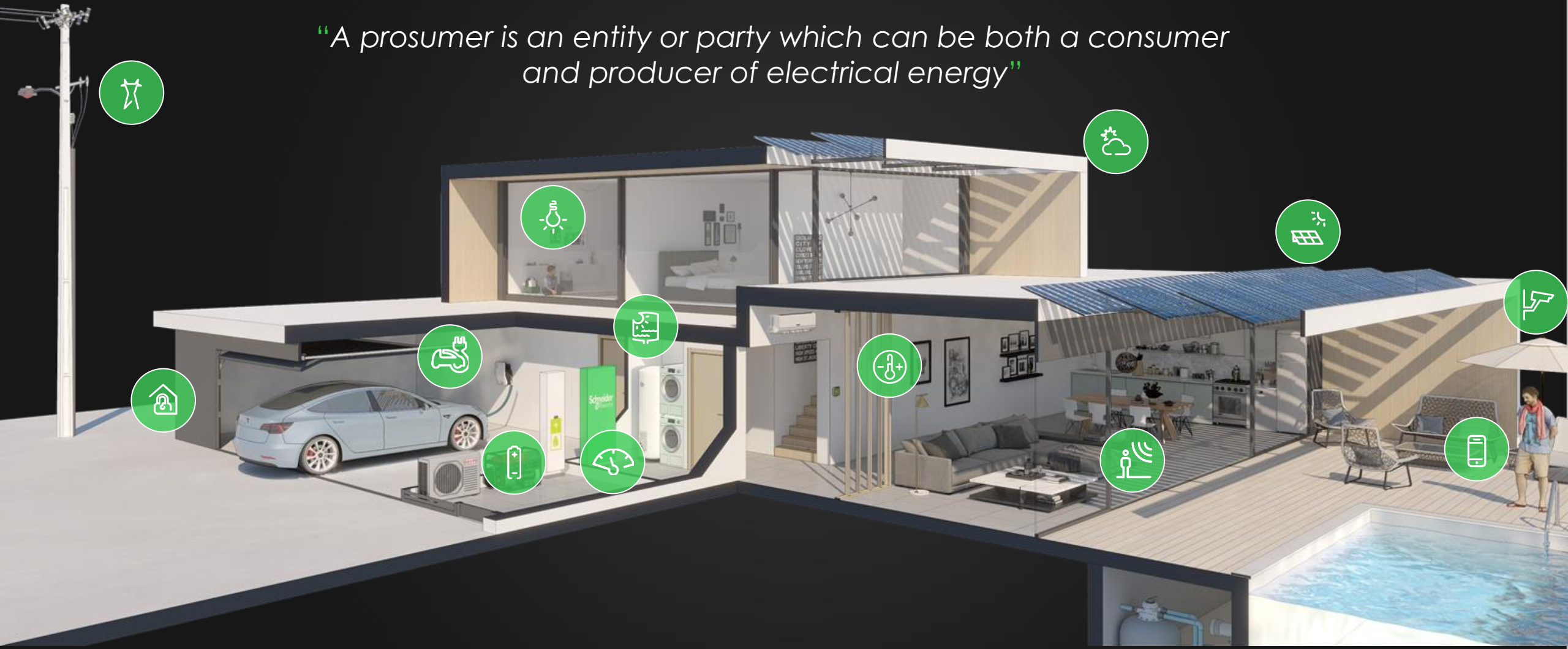


Prosumer's Electrical Installation

"A prosumer is an entity or party which can be both a consumer and producer of electrical energy"



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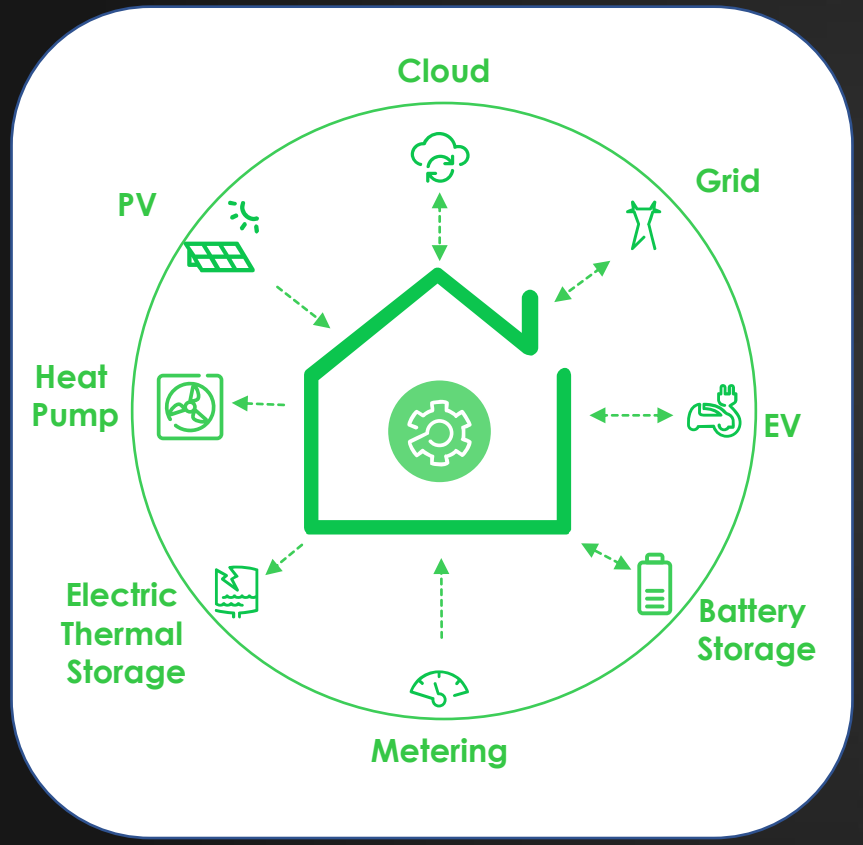

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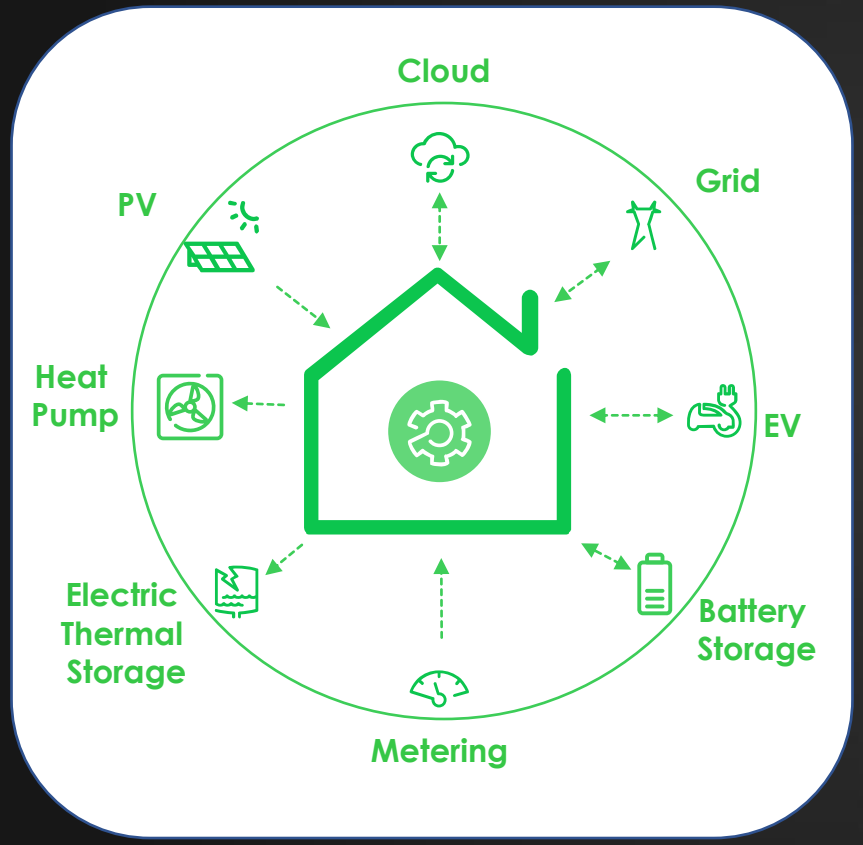
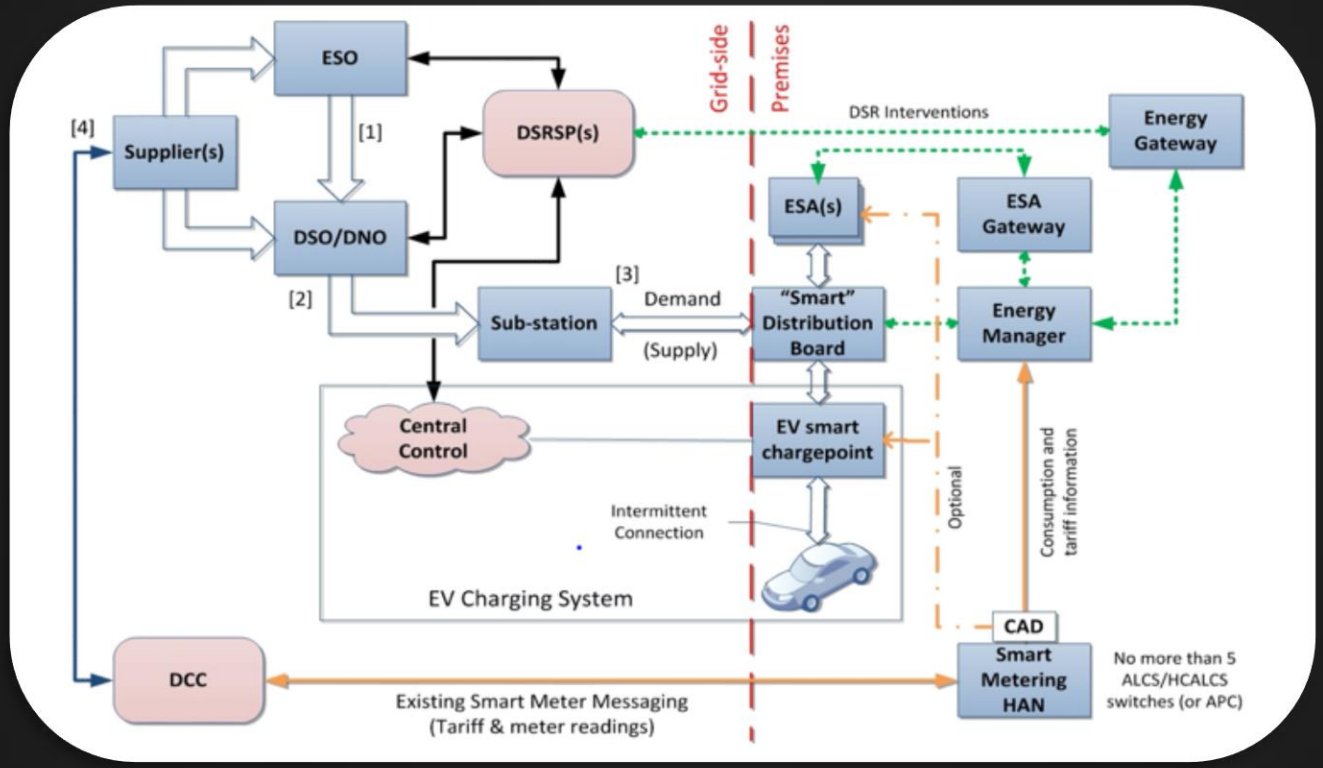


- Remote, cloud Analytics and control
- Local Override
- Billing
- Scheduling
- Metering
- VPP / Aggregation
- Optimised control
- Efficiency

Grid to Plug – Demand Side Response



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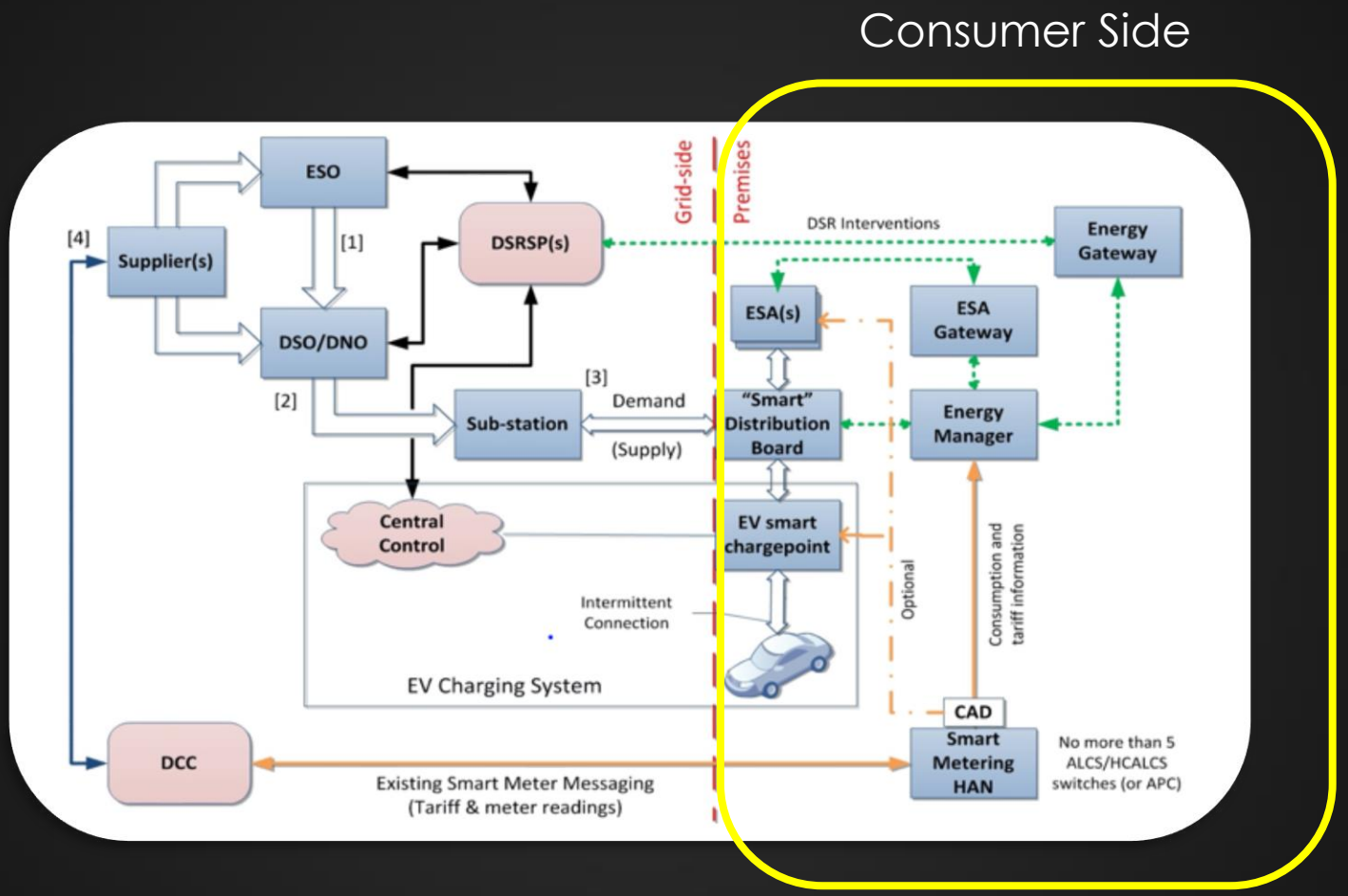

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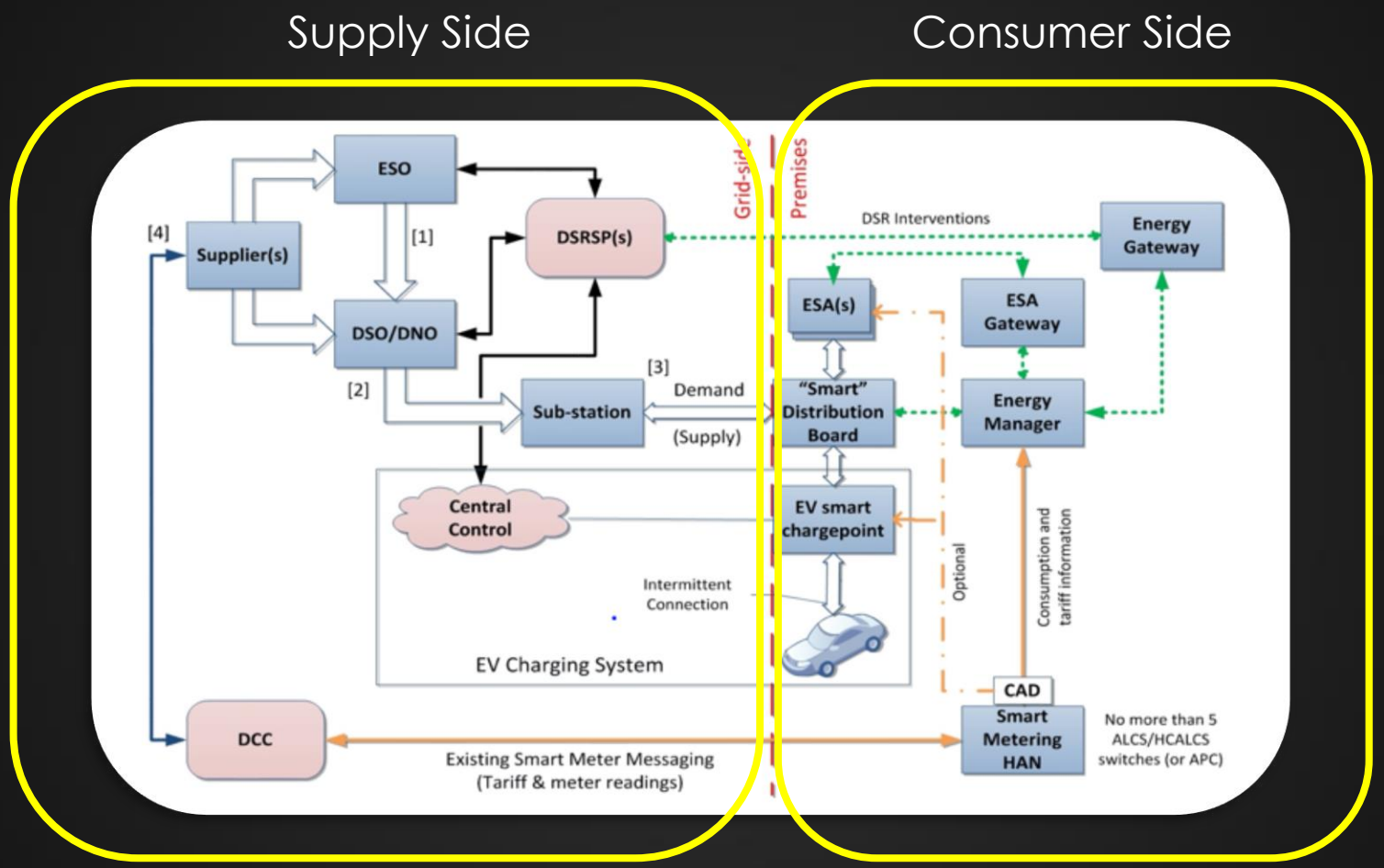
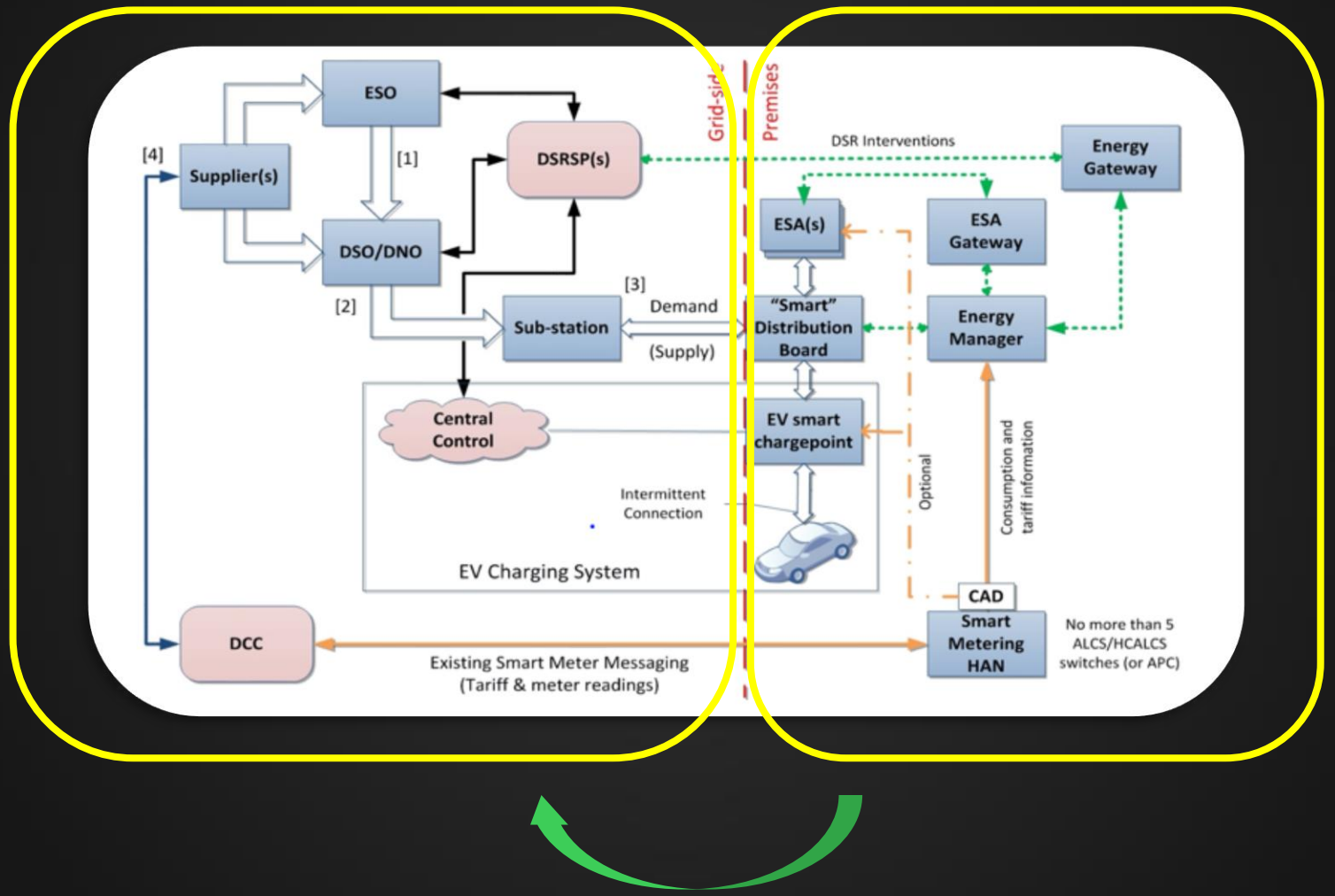


Grid to Plug – Demand Side Response

Supply Side

Consumer Side



Future Configurations

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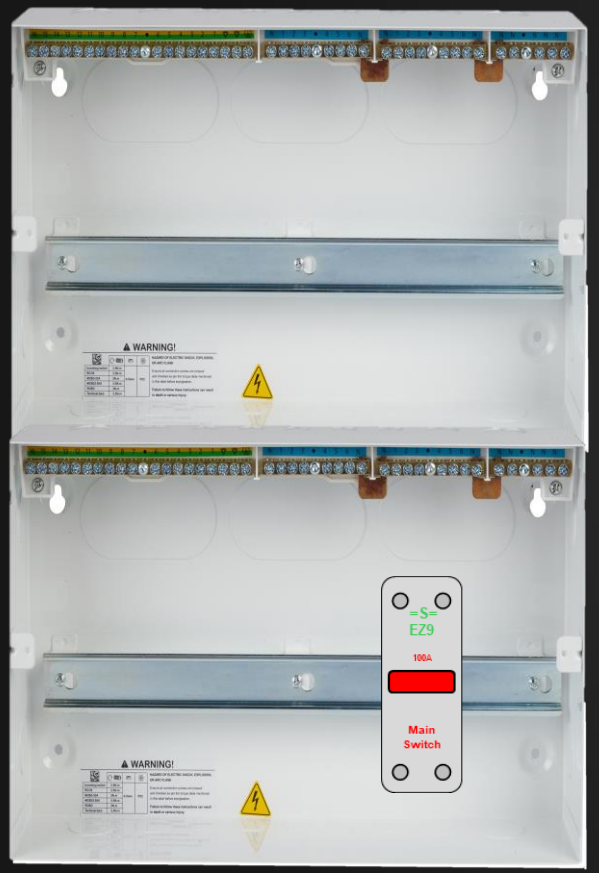

- Main Isolator

Future Configurations

- Main Isolator
- Surge Protection Device & MCB

Future Configurations

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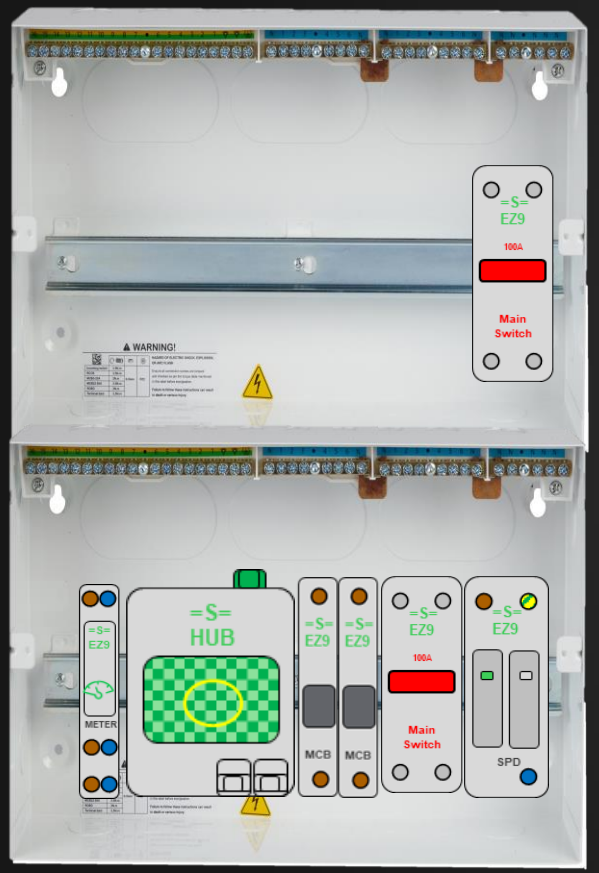

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- PV Isolator

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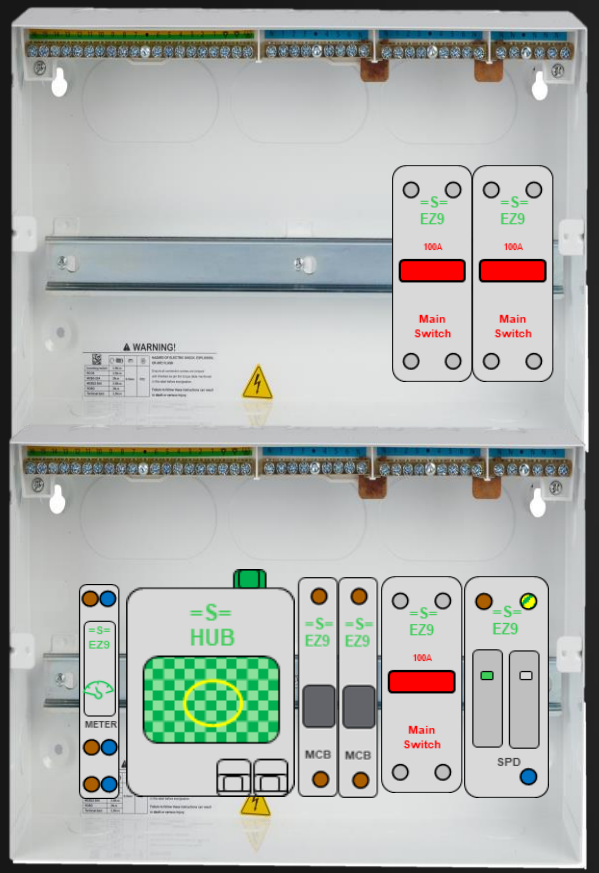

- Main Isolator
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- PV Isolator
- Battery Isolator

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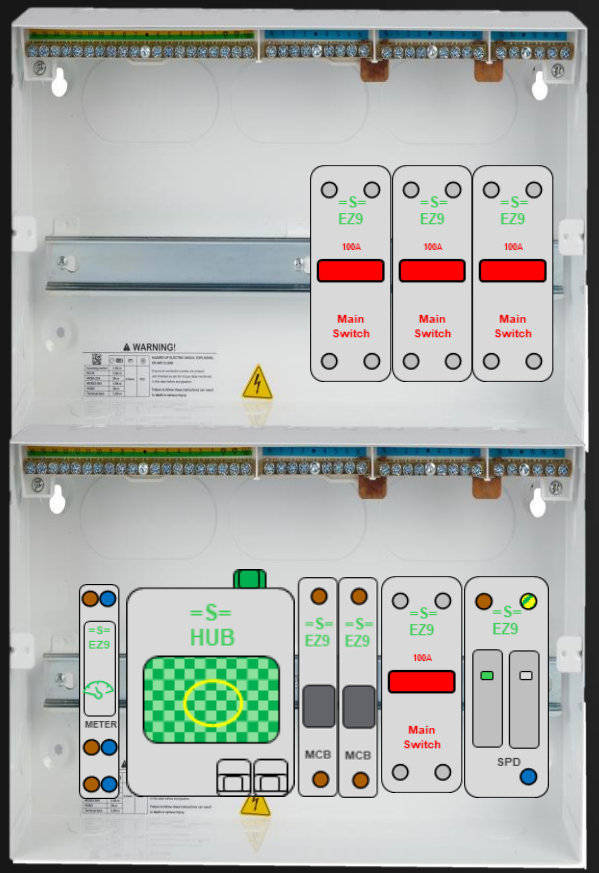


17 Modules

- Main Isolator
- Surge Protection Device & MCB
- Gateway & MCB
- Meter
- PV Isolator
- Battery Isolator
- Wind Turbine Isolator

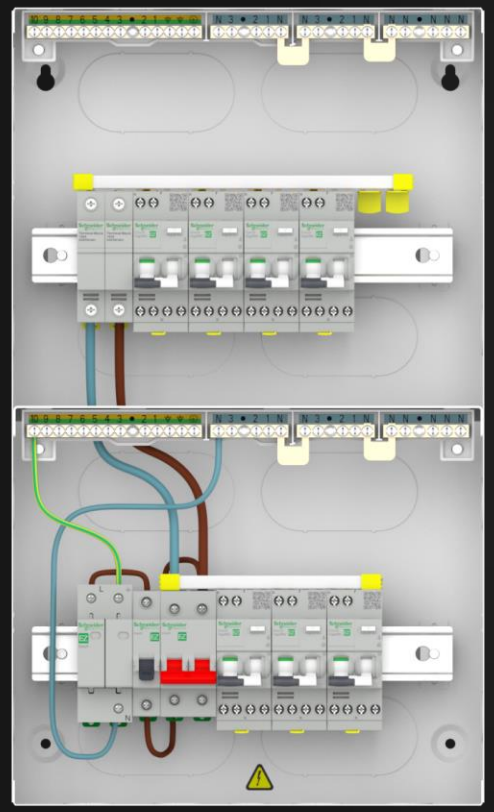
Easy9 Compact Consumer Unit Multirow Range

new

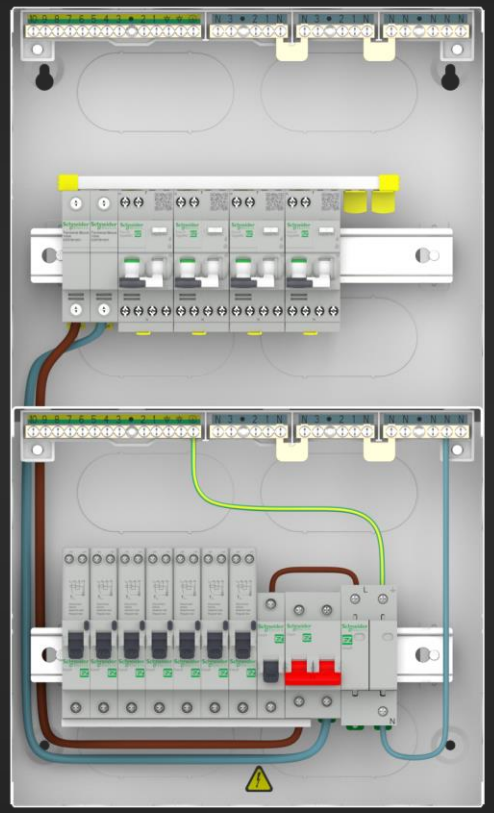
new

Easy9 Compact Consumer Unit Multirow

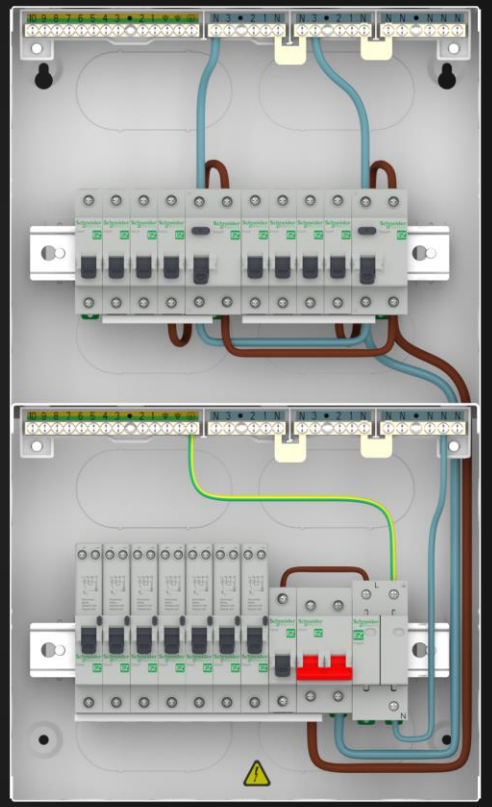
Flexibility in device configurations



AFDD installation
With busbar and terminal block accessories



AFDD + RCBO circuits
In typical Configurations

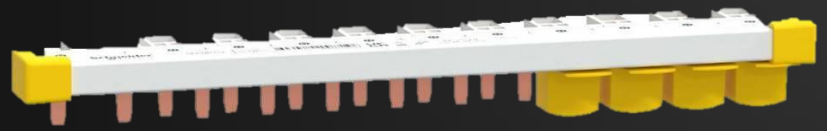


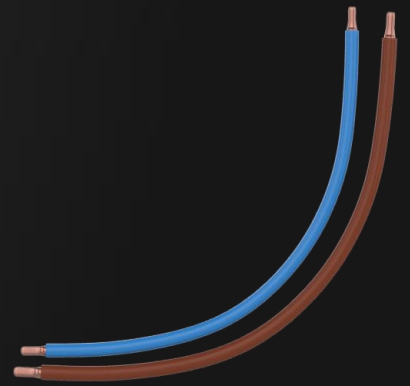
Additional Capacity
Suitable for Larger installation

Easy9 Compact Consumer Unit Multirow

Reference	Description	Total Ways	Usable ways
EZ9E212MCCU	2 Row, 12 modules each	24	22
EZ9E312MCCU	3 Row, 12 modules each	36	34

Reference	Height mm	Width mm	Depth mm
EZ9E212MCCU	523	313	112
EZ9E312MCCU	781	313	112





Easy9 Compact Consumer Unit Multirow Accessories

Reference	Description
SEPNB112	AFDD Phase Neutral Comb Busbar 12 Modules,100A
EZ9TB1001	Easy9 100A Terminal Block
EZ9CCUCABLEKITMR	Inter row Cable Kit for Multirow

EASY9 Compact Consumer Unit Multirow

The easy choice for a compact, reliable and flexible circuit protection solution

Questions