



## **BURLINGTON PROJECT: Grid Tied Microgrid and EV Fast Charger “Invisible” to Utility**

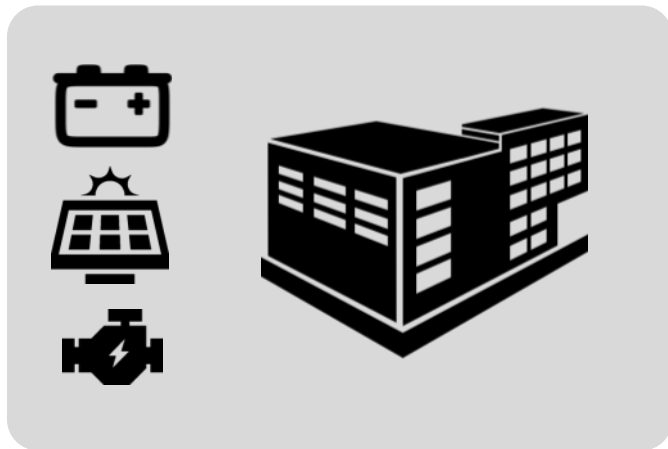
**IDEA, Microgrid 2.0, Baltimore, MD**

**October 30, 2018**

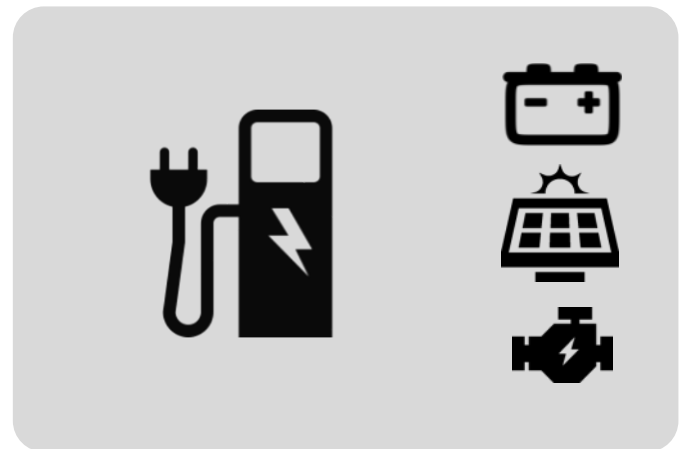
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millions of sites to emerge soon with  
energy storage centric DERs for

✓ C&I Buildings

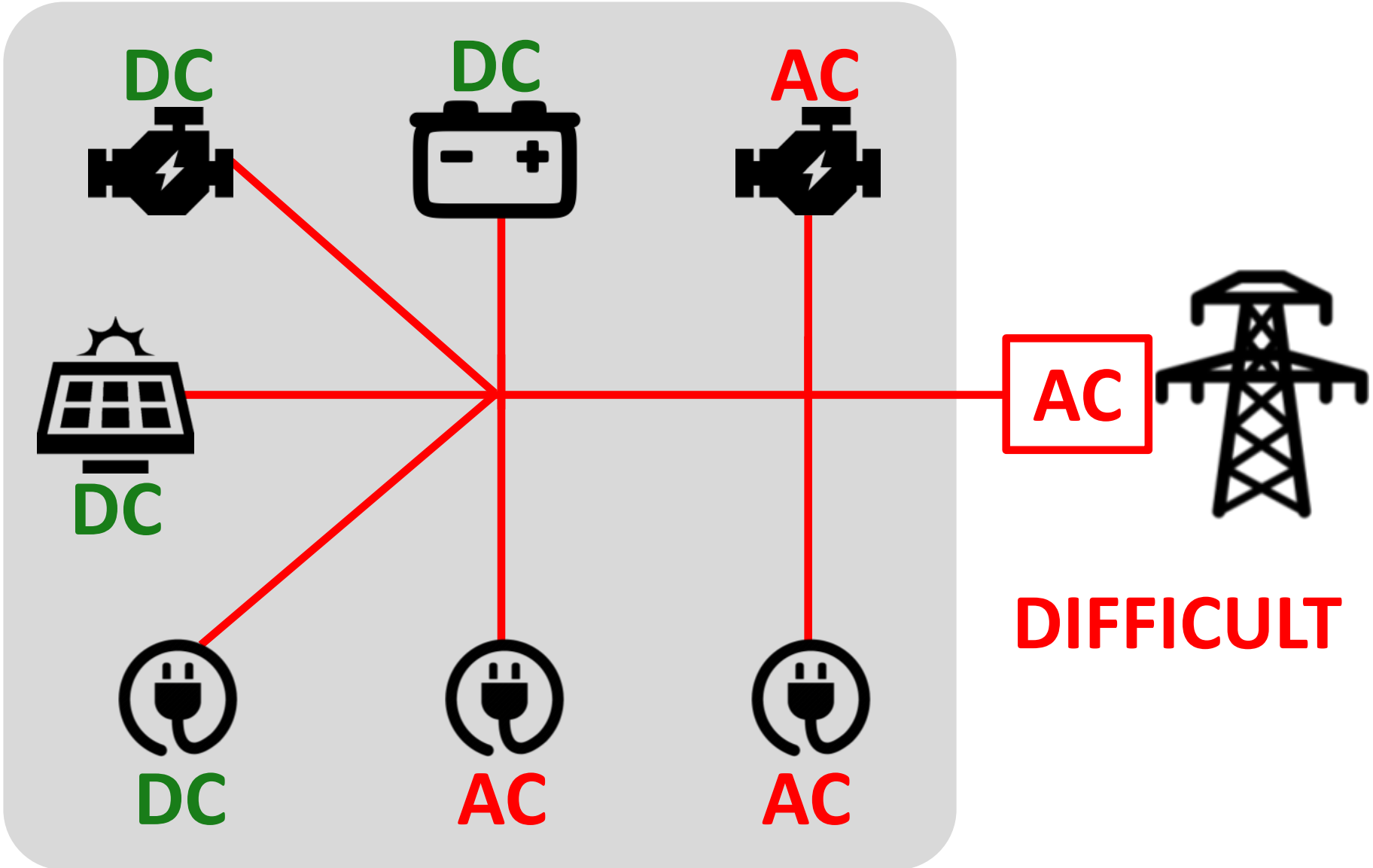


✓ EV Fast Chargers

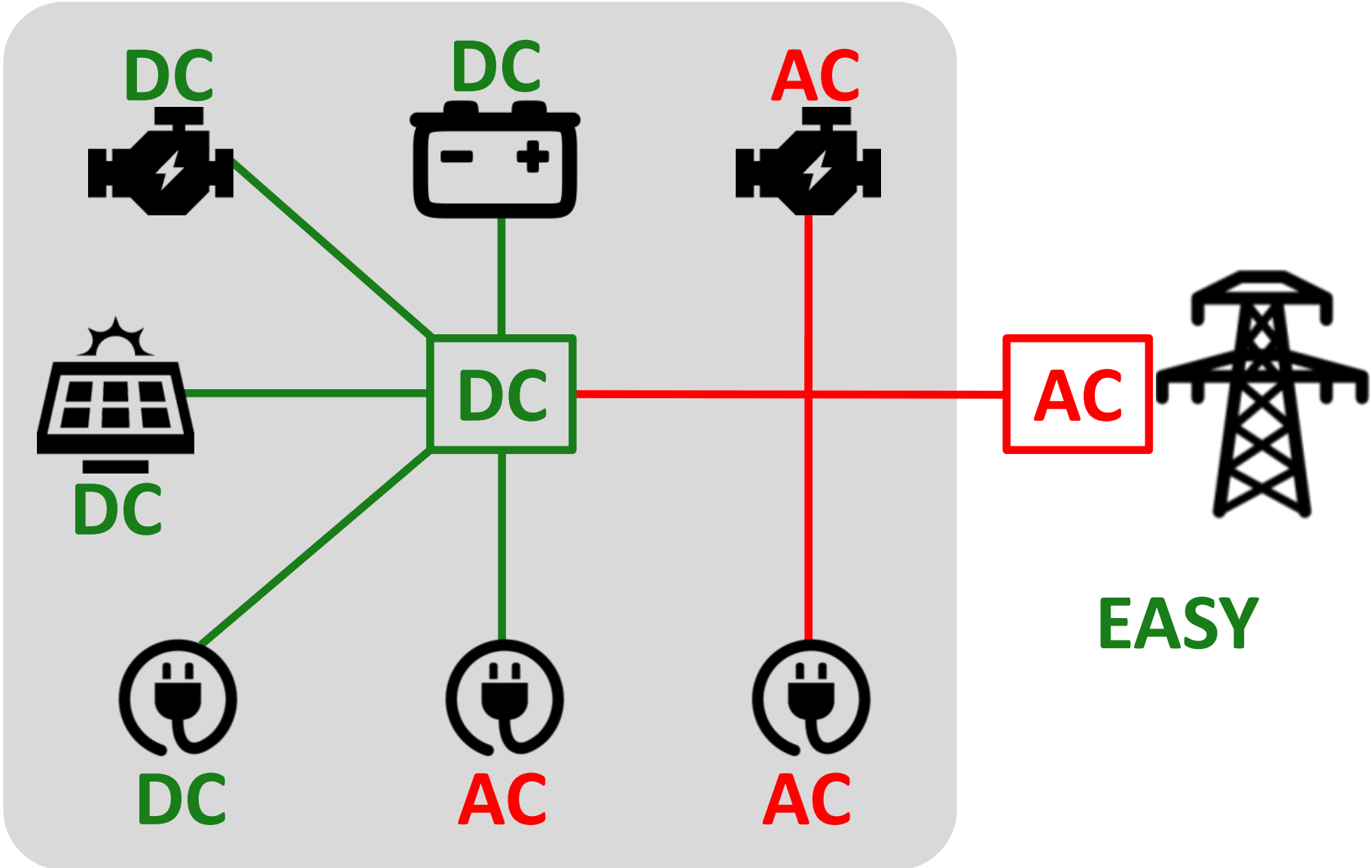


✓ other Applications

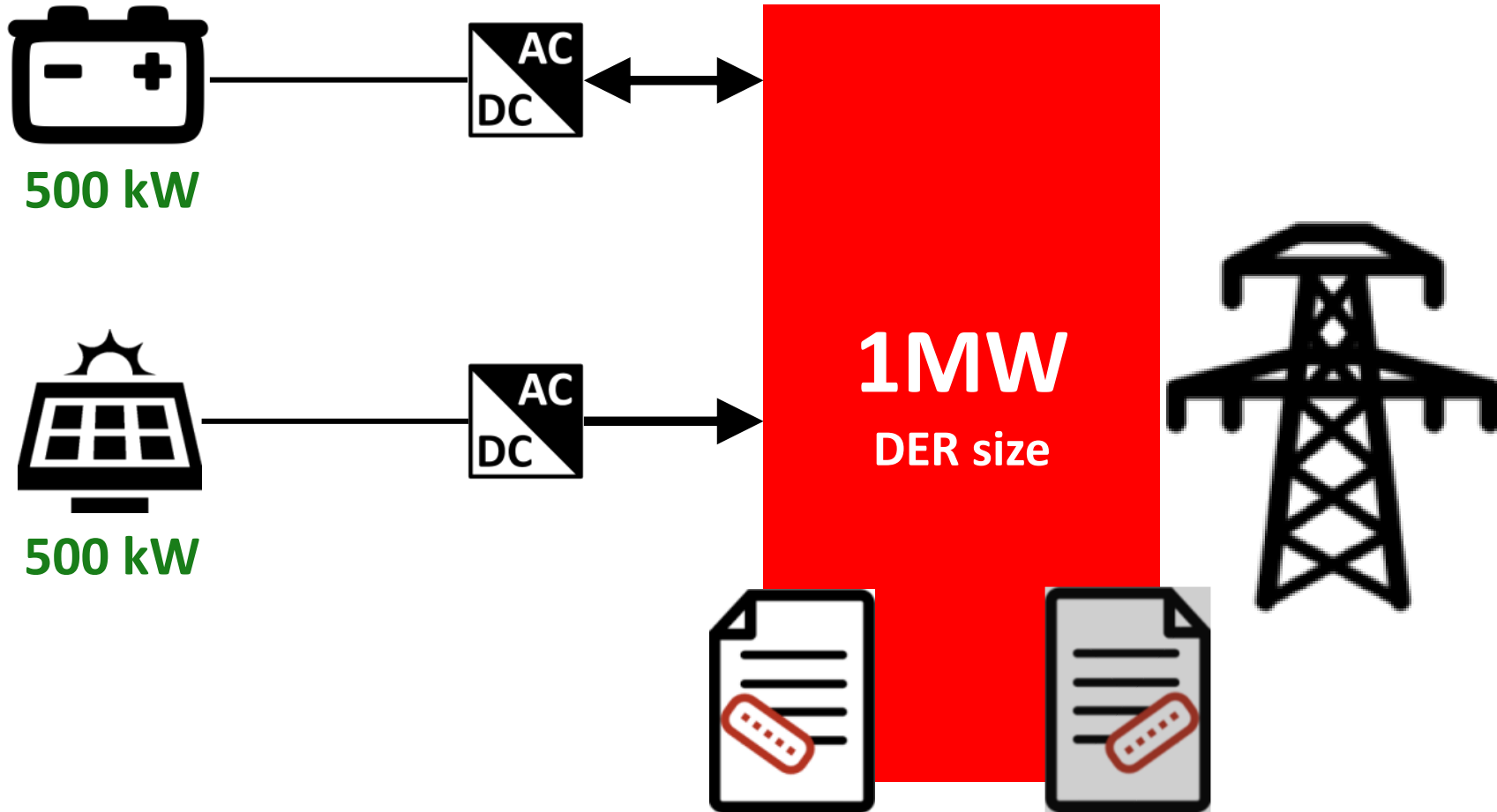
# AC coupling, Microgrid optional



# DC coupling, Microgrid included

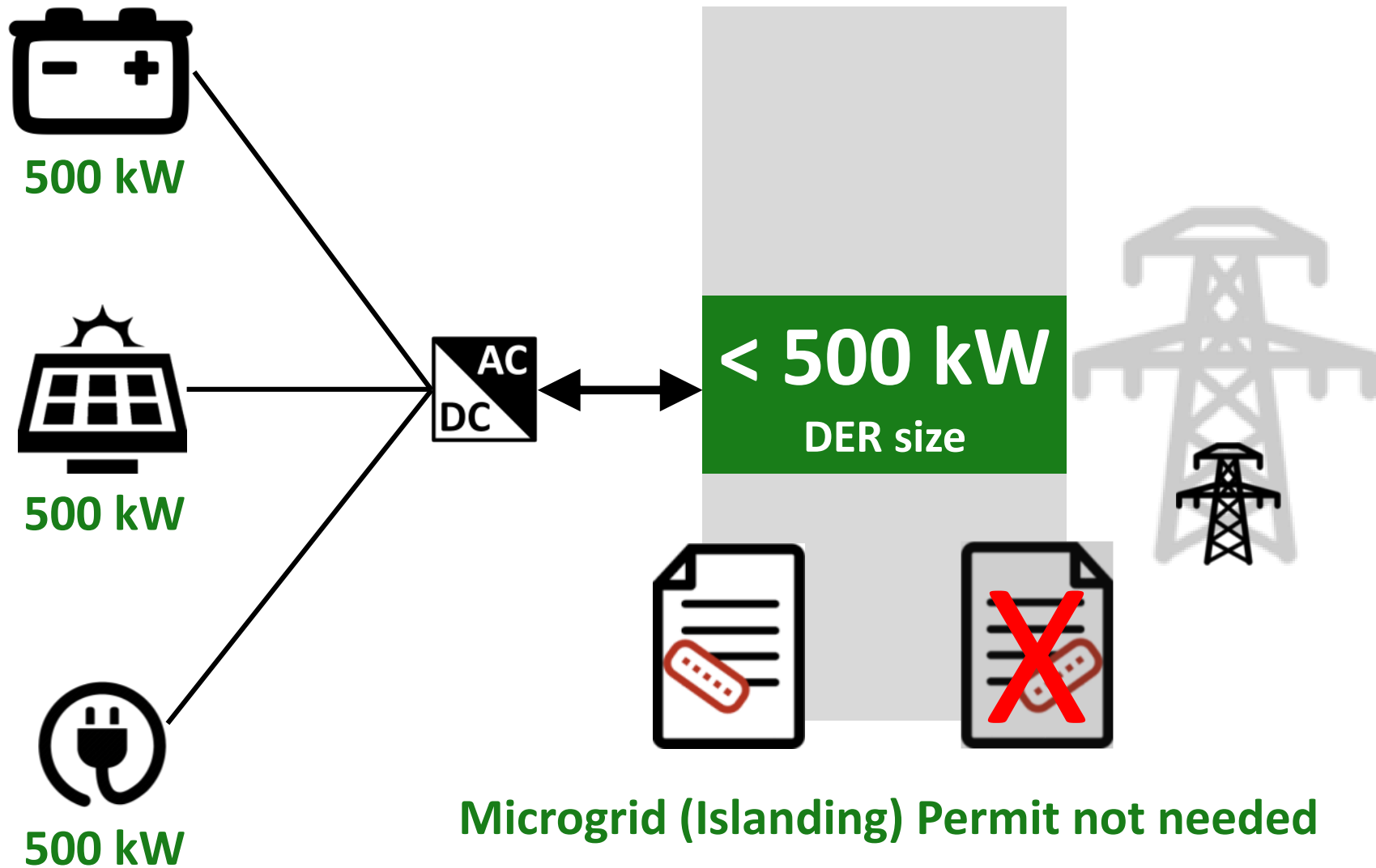


# AC coupling: Interconnection

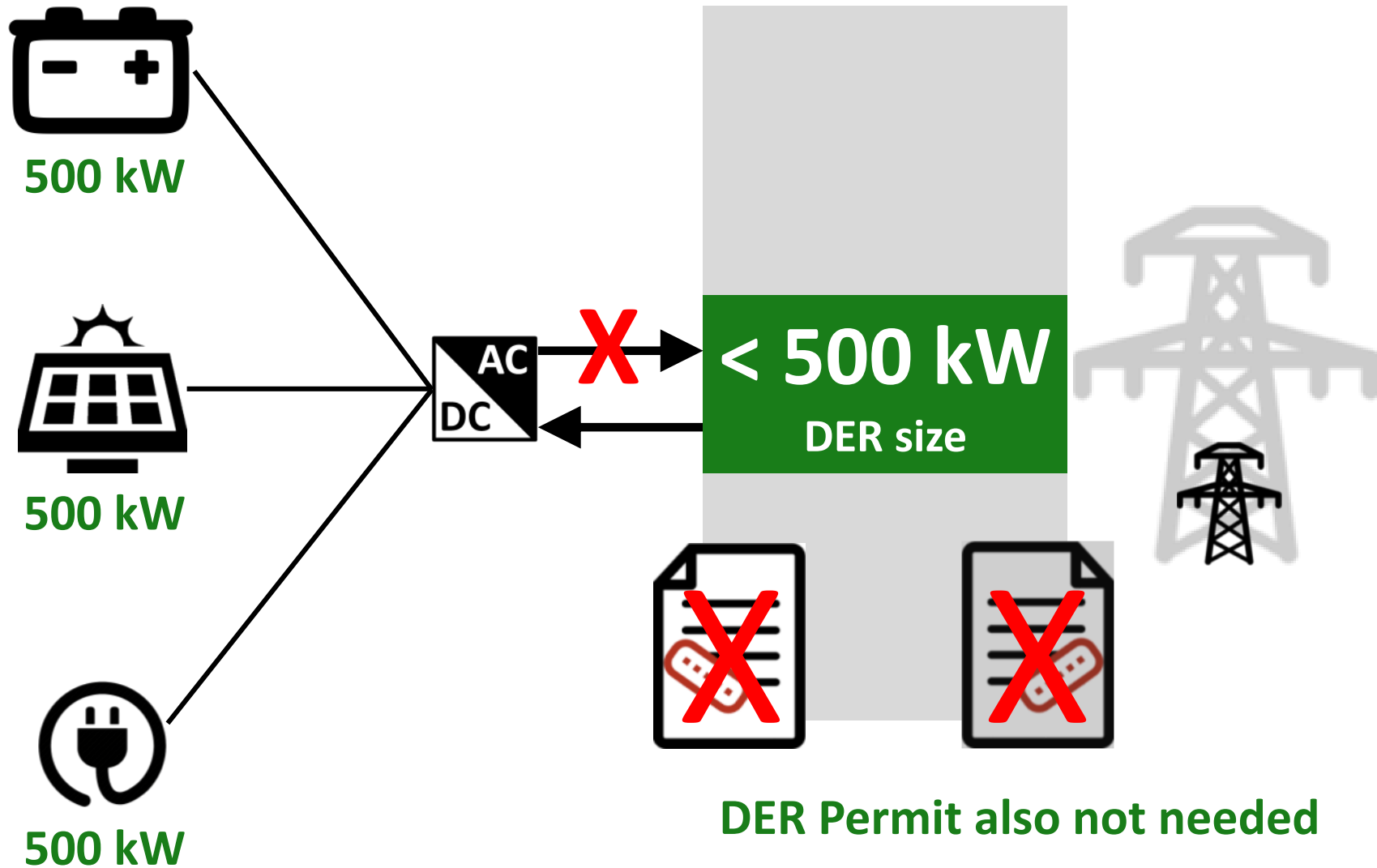


**often nightmare DER and Microgrid (Islanding) Permit Process**

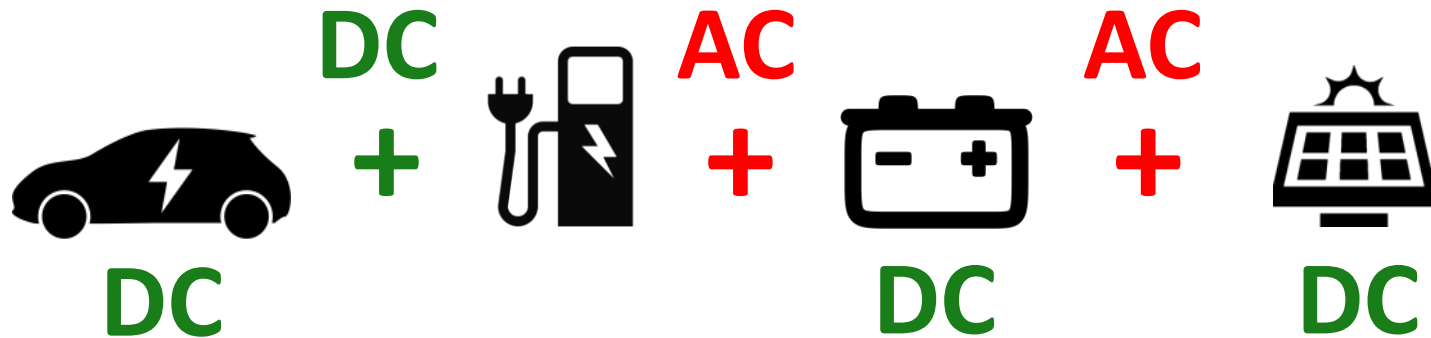
# DC coupling: Interconnection



# DC coupling: Interconnection



# AC coupling: EV Fast Charger + DERs



too large



nightmare



high cost

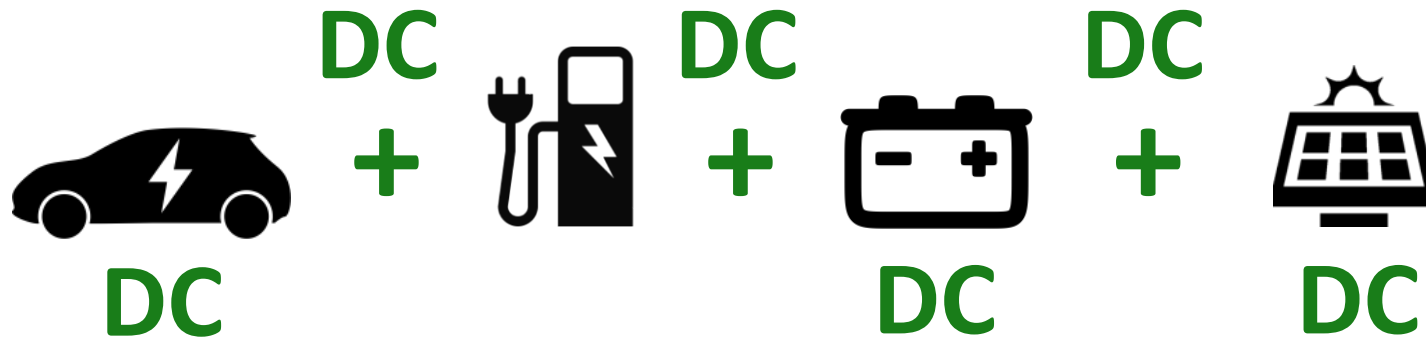


AC-DC, DC-AC, ...





# DC coupling: EV Fast Charger + DERs

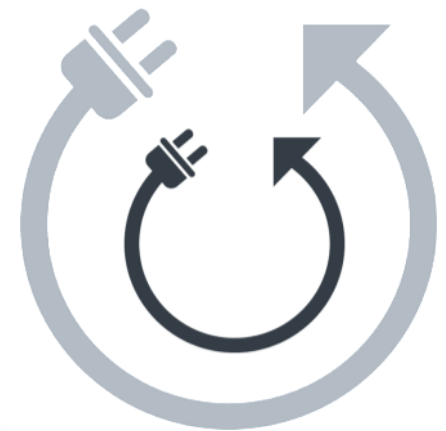
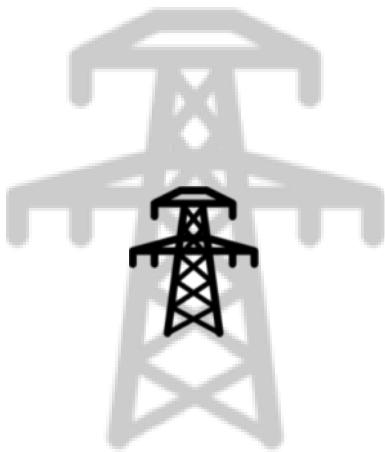


less than Half

no Permits\*

low cost

> 5% better



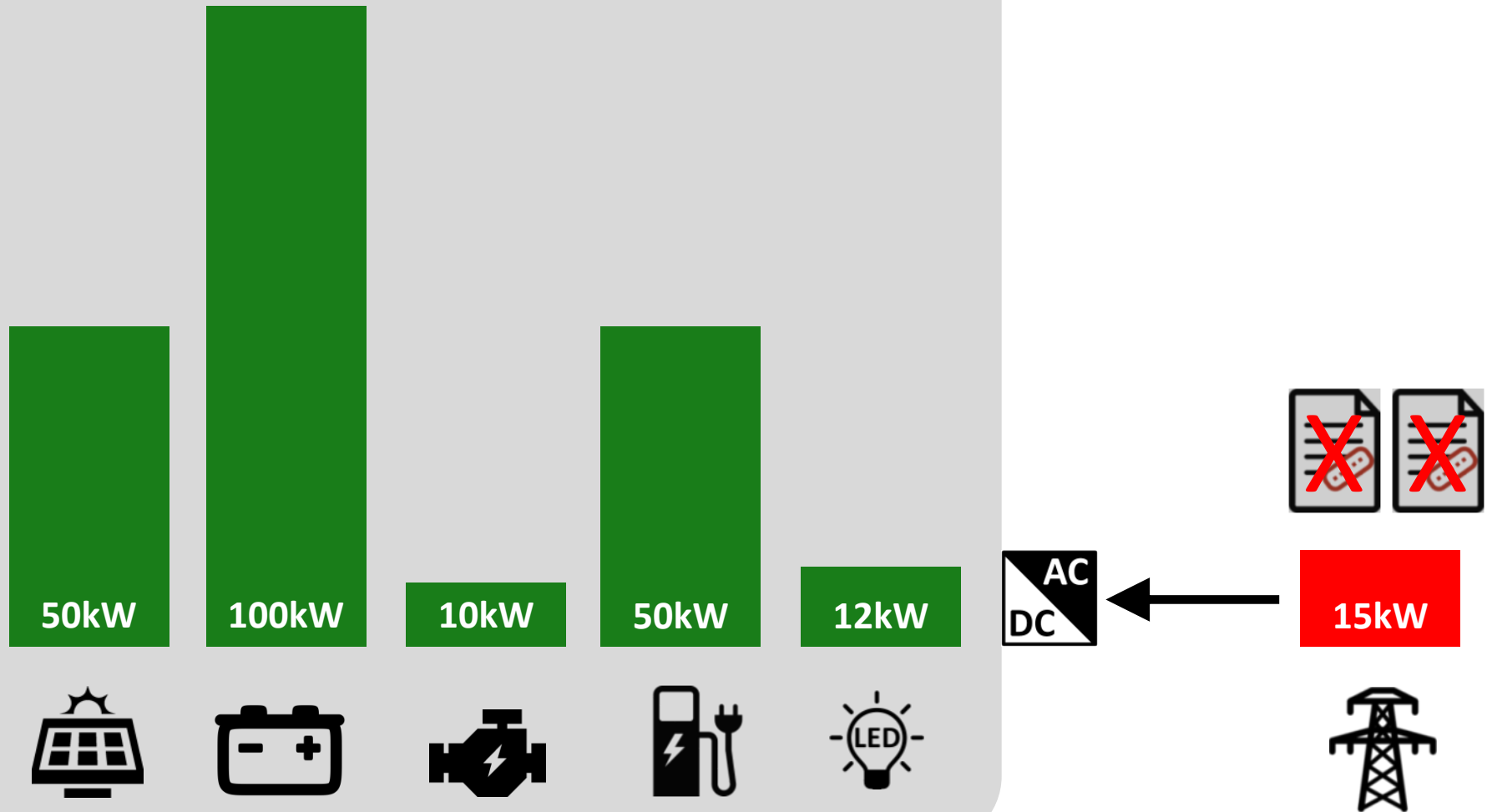
\* Islanding Permit never needed,  
DER Permit not needed with uni-directional AC-DC grid tie

## Phase 1 (2017): world's first battery-centric DC Microgrid in industrial building



## Phase 2 (mid 2019): world's first DC coupled EV Fast Charger, DERs and Utility Grid

## Microgrid “Invisible” to the Utility

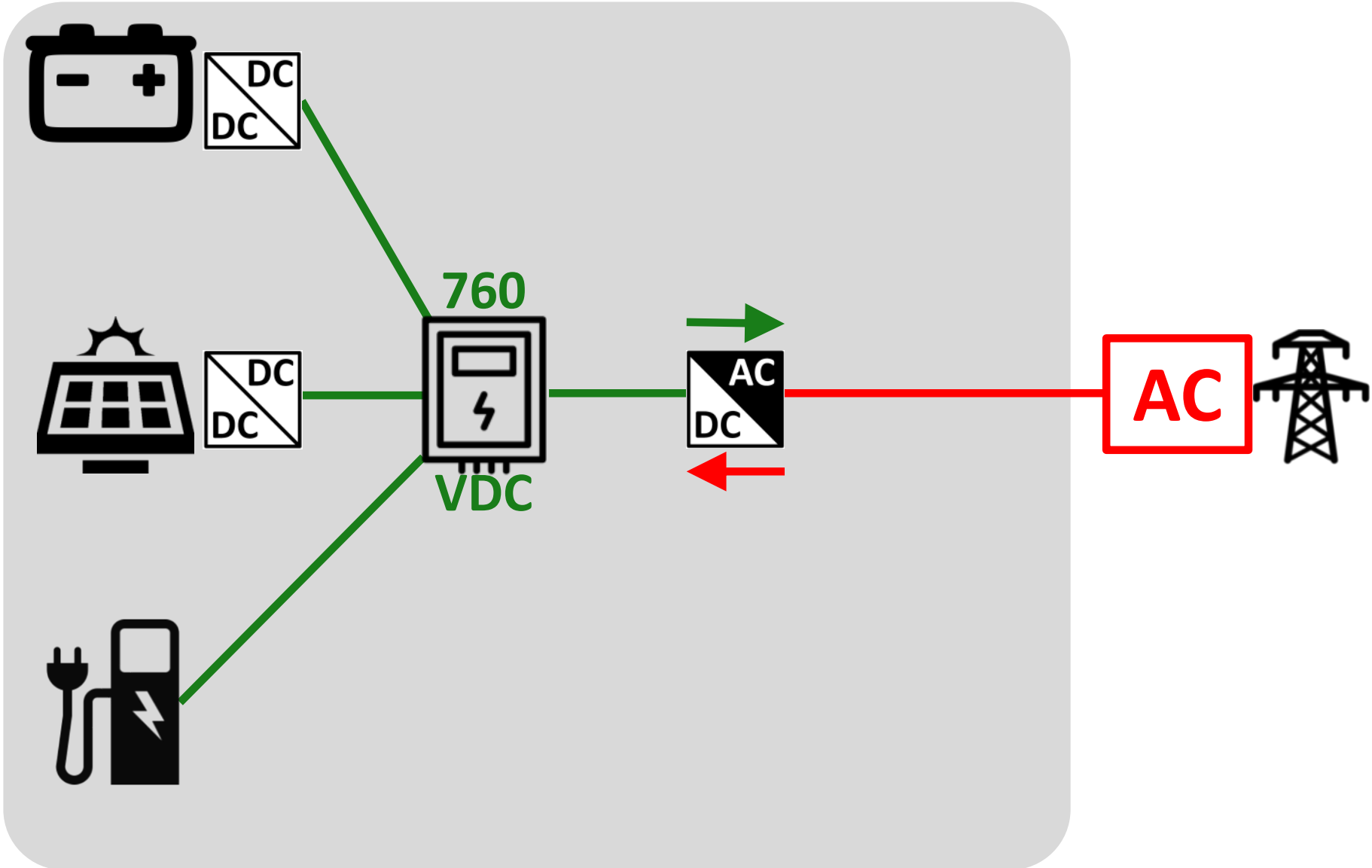




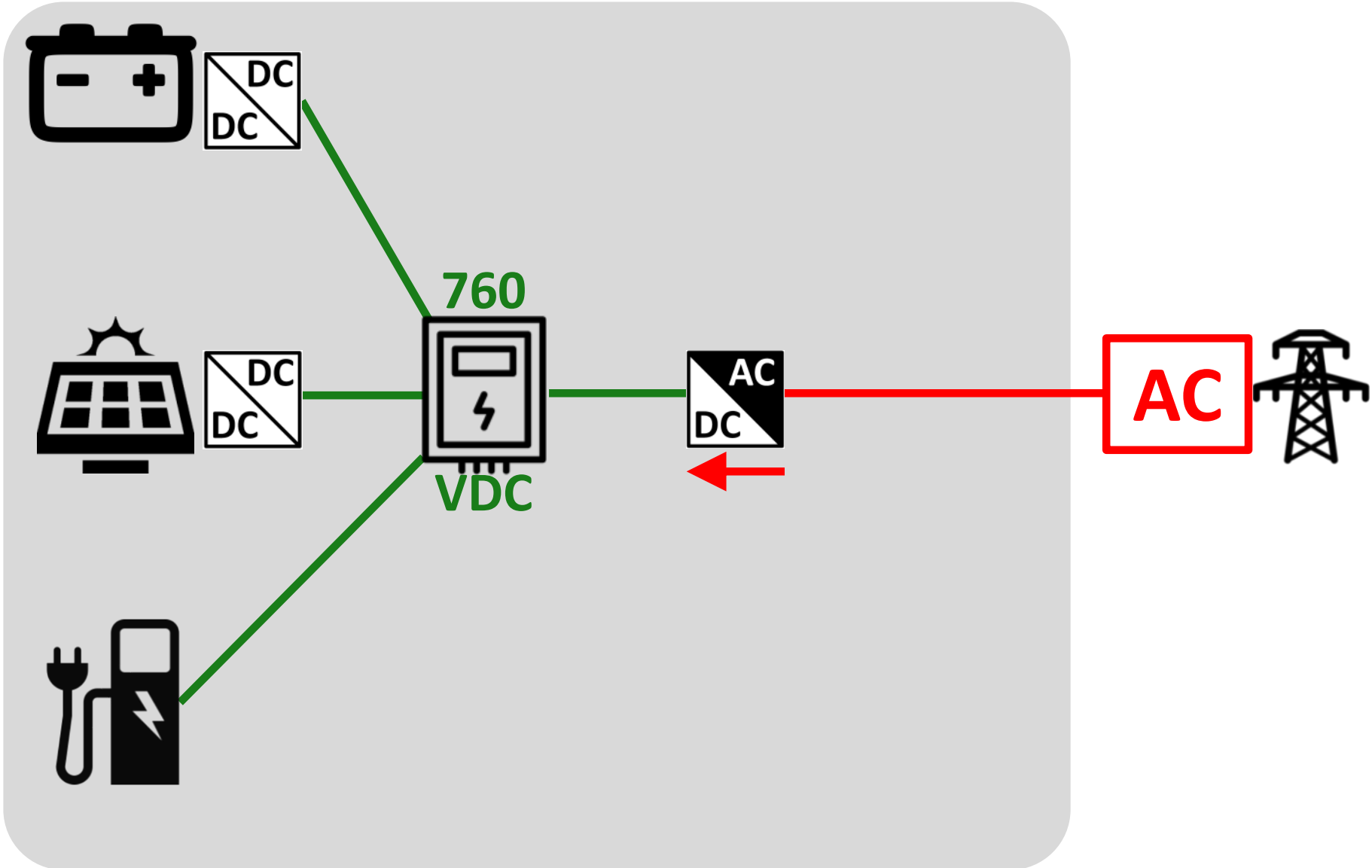
## EXAMPLES OF USE CASES

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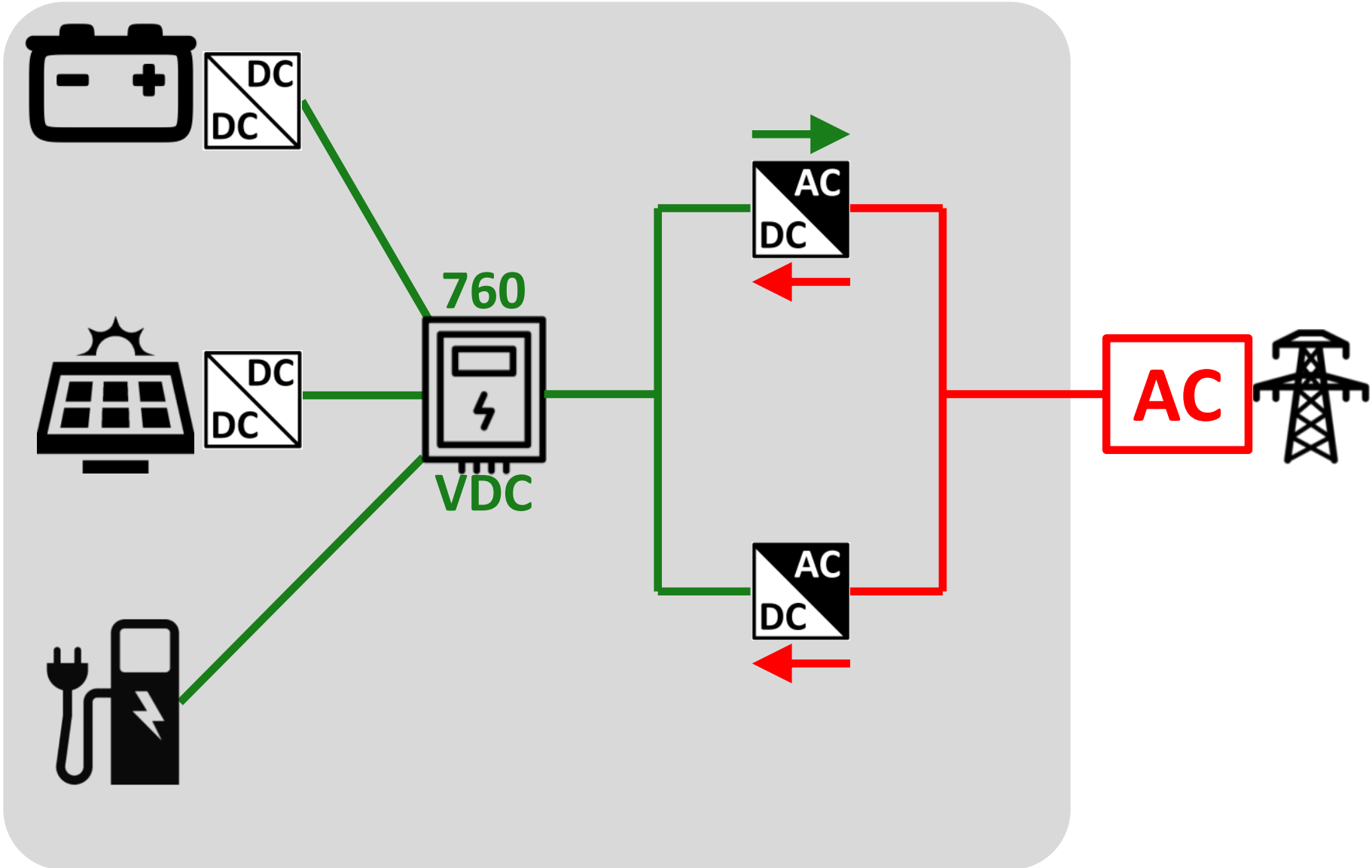
# Case 1: EV Fast Charger, Import/Export



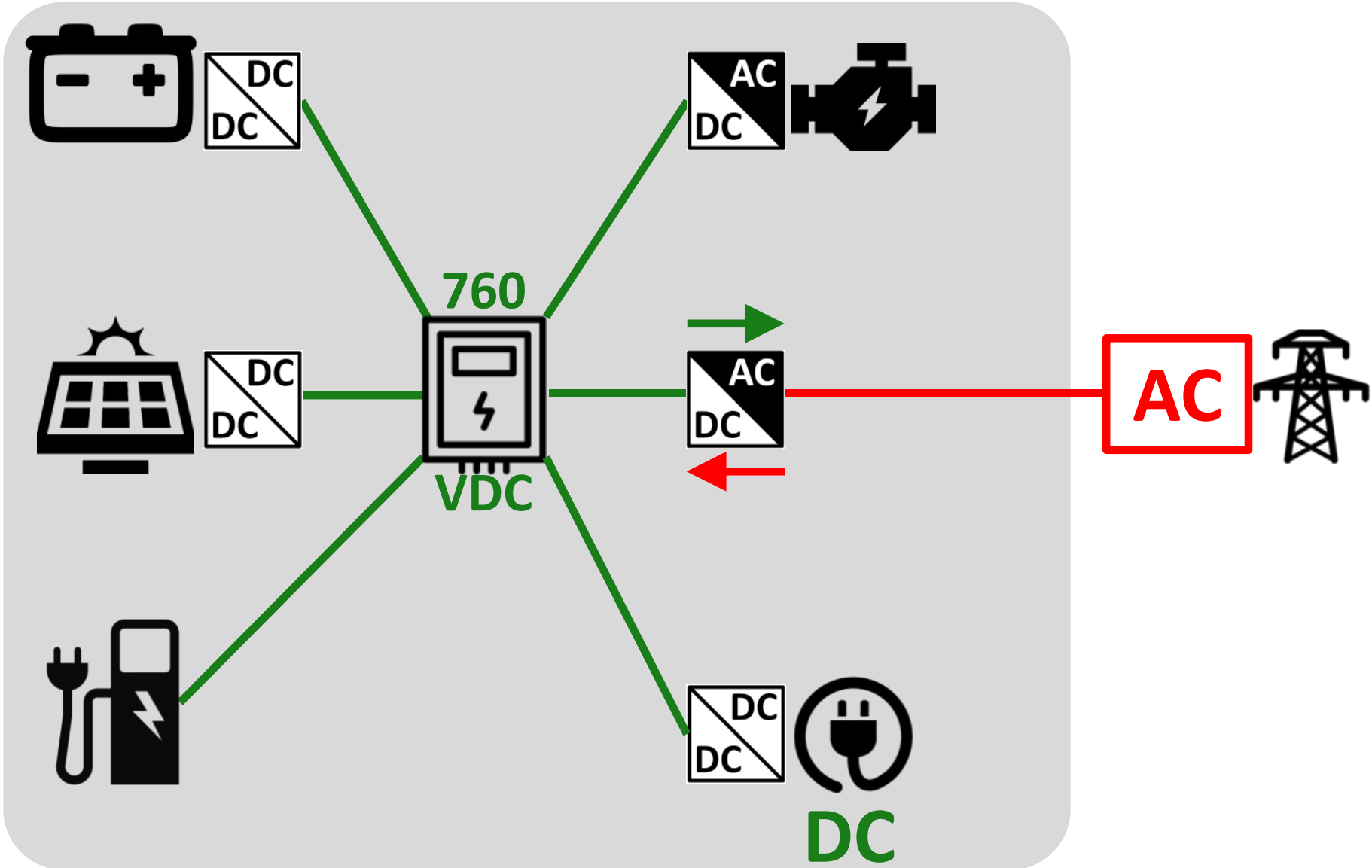
## Case 2: Import Only (no DER Permit needed)



# Case 3: Import larger than DER Permit

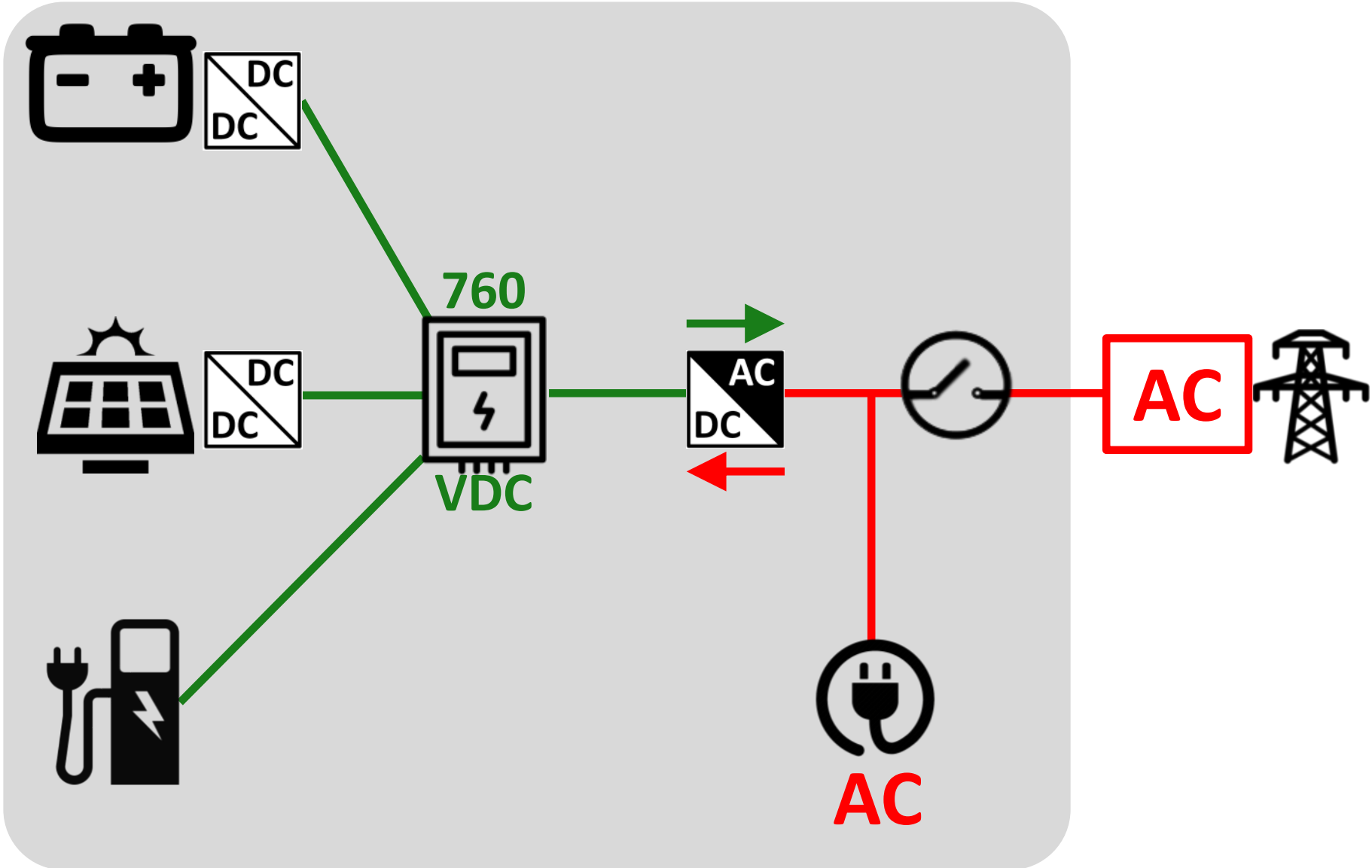


## Case 4: add DC Load or Generator

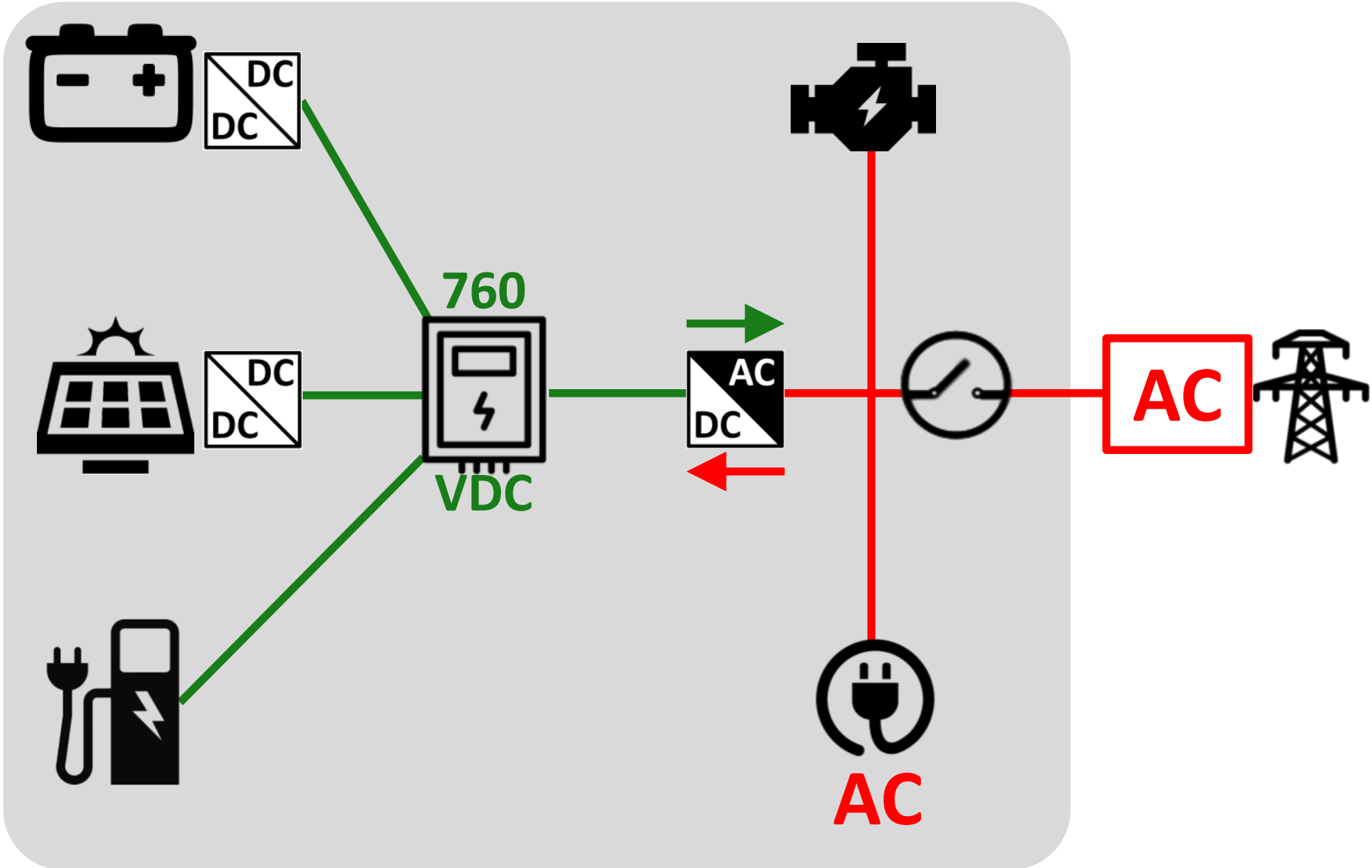




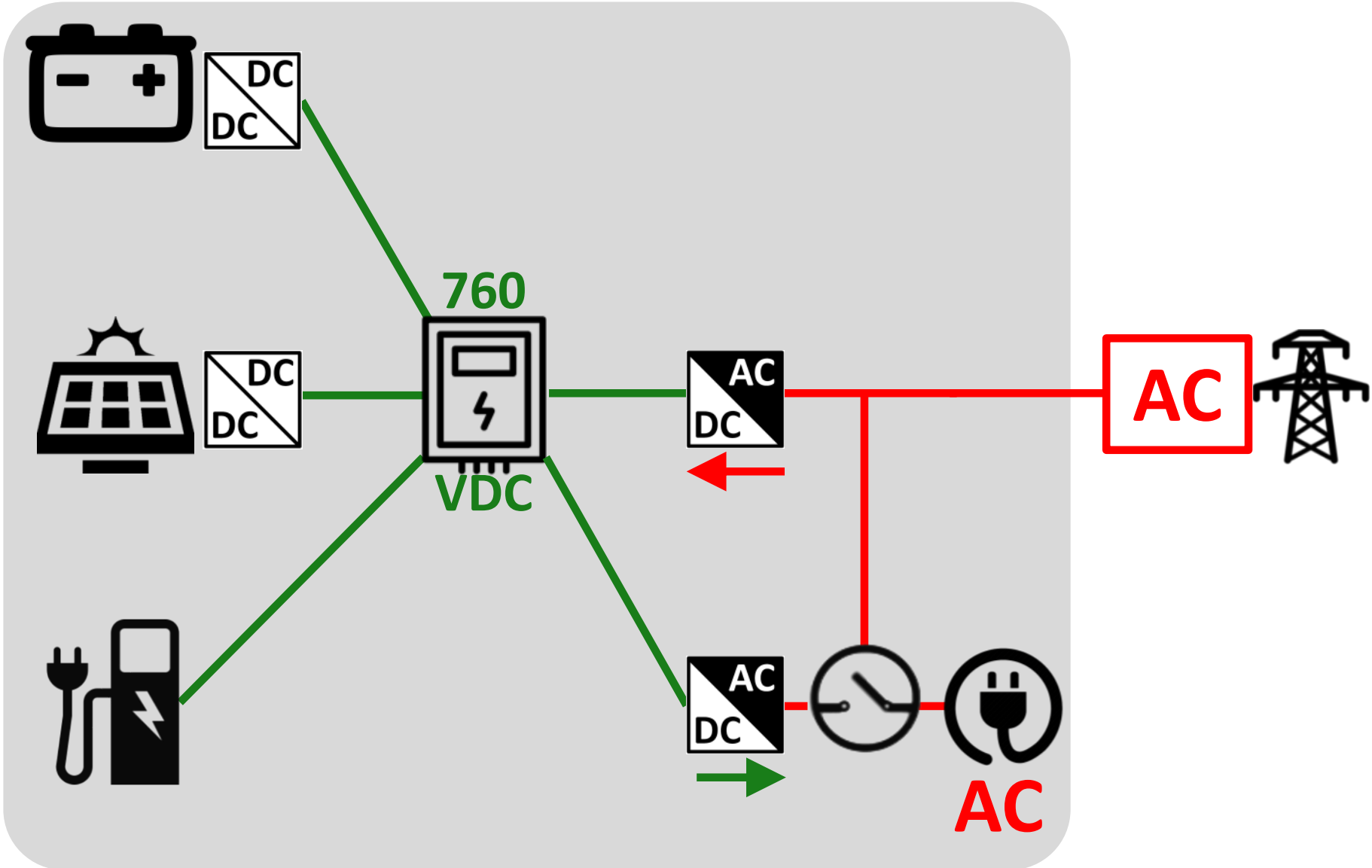
# Case 5: AC Load Demand Charges, Backup



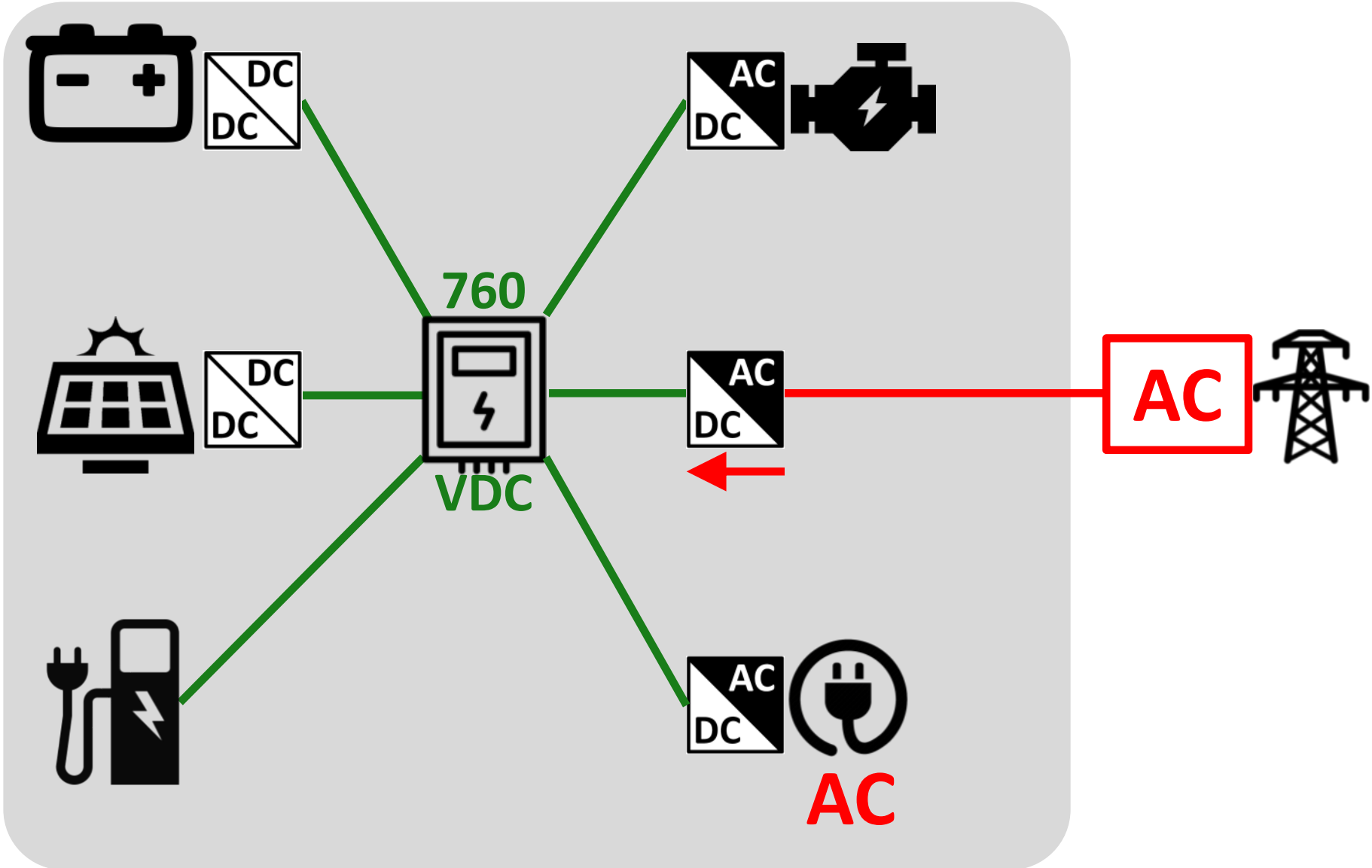
# Case 6: add existing Backup Generator



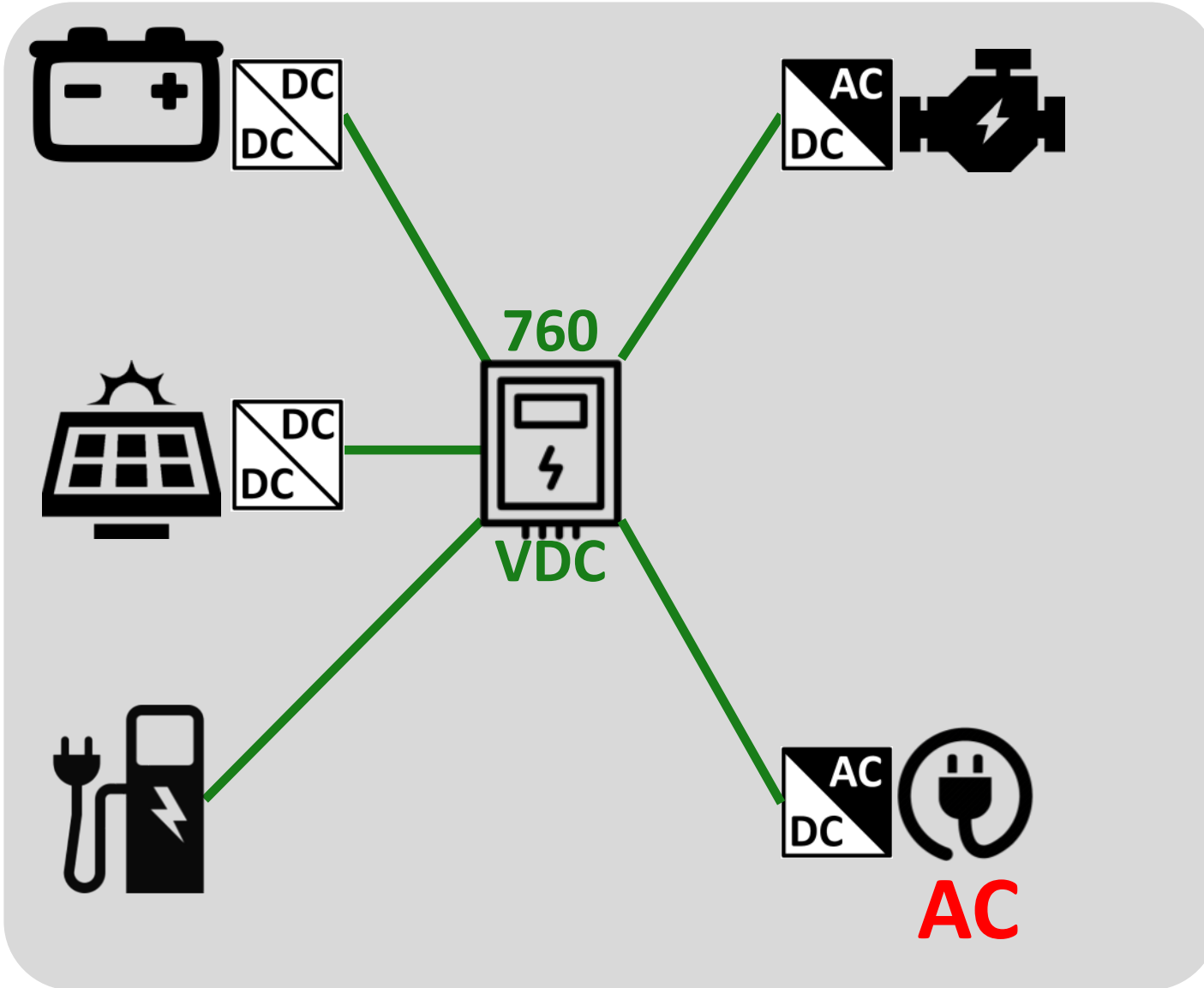
# Case 7: serve AC Load without DER Permit



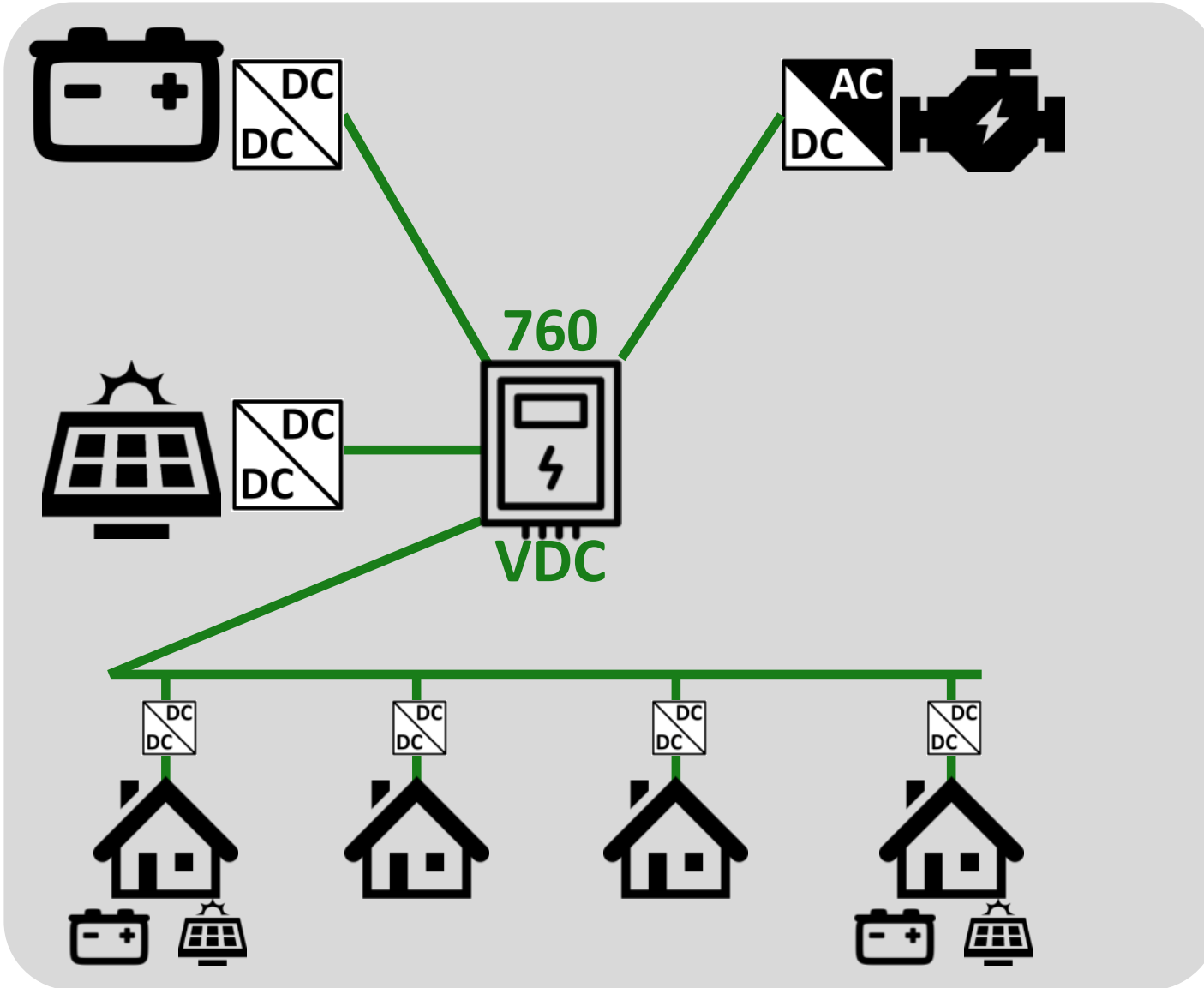
## Case 8: AC Load on the DC side



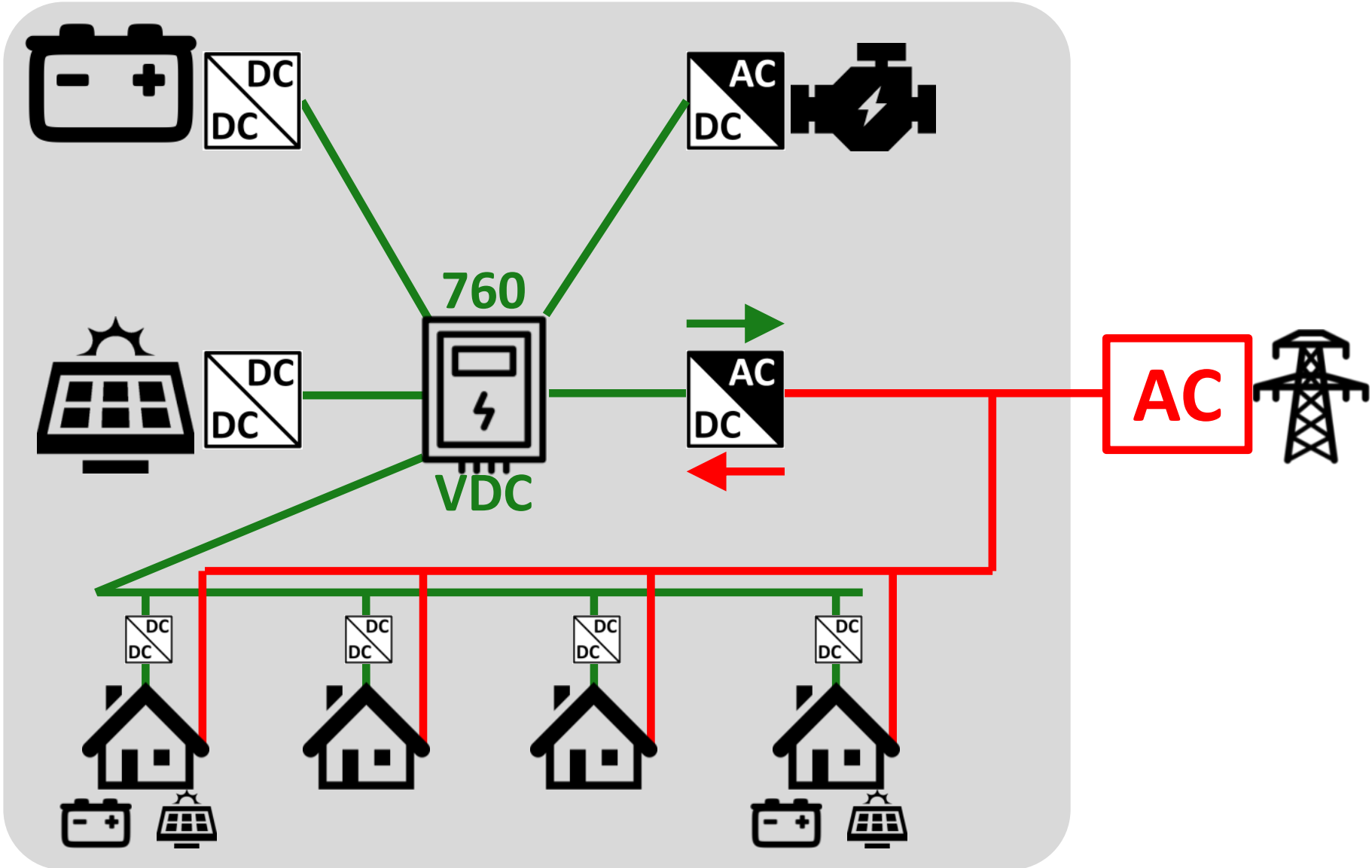
# Case 9: Off Grid Application



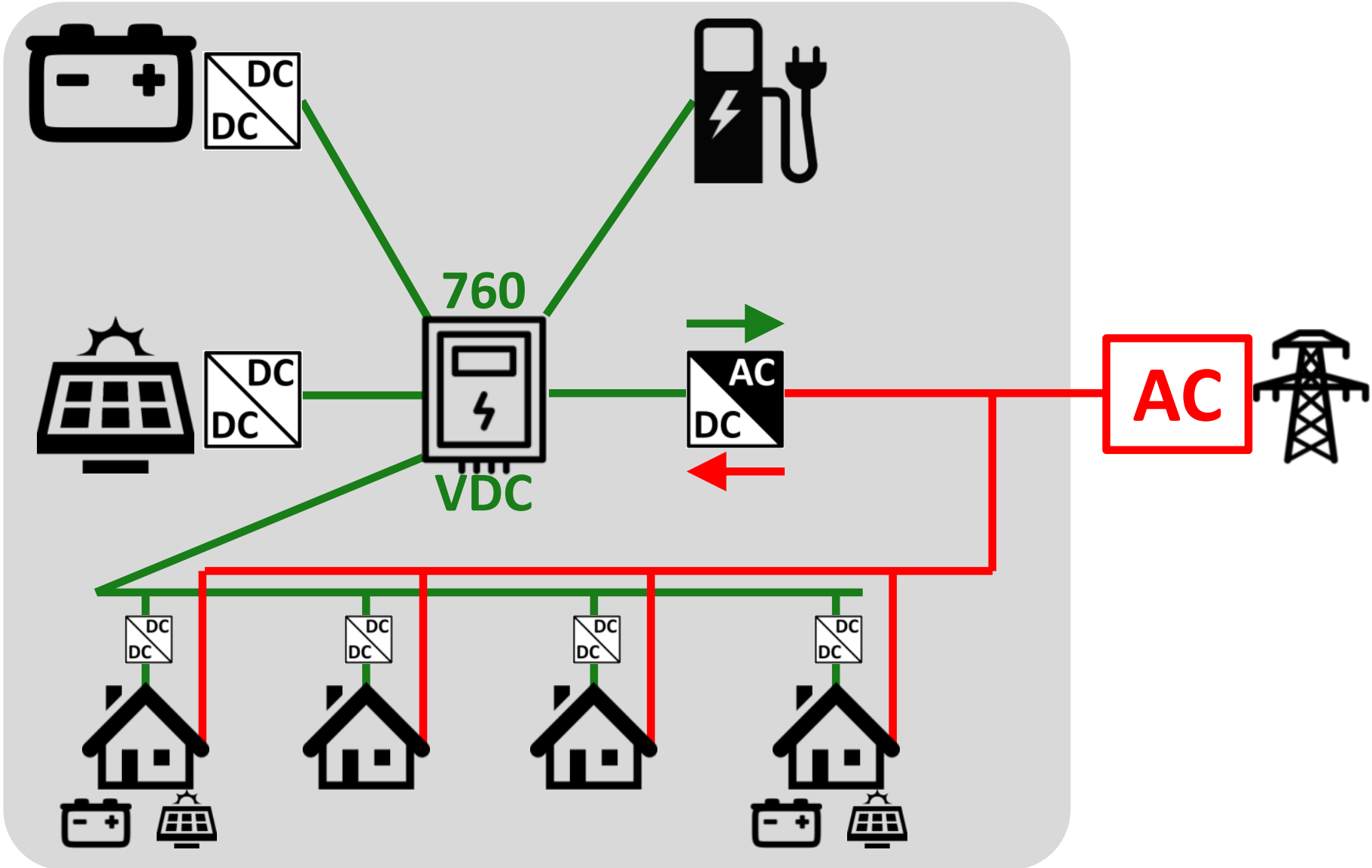
# Case 10: Off Grid Residential Community



# Case 11: On Grid Residential Community



# Case 12: On Grid EV/Residential Community



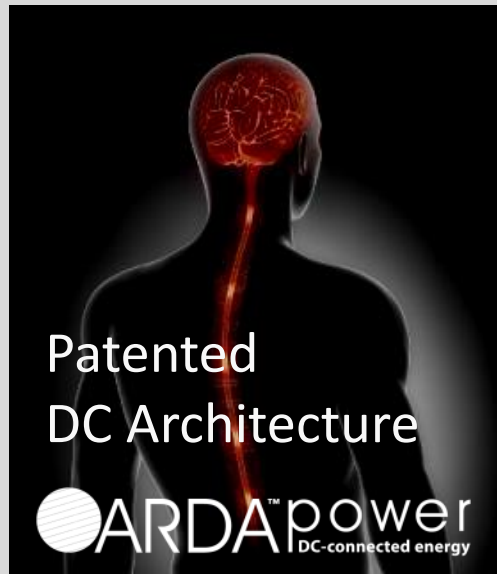




**BACK UP SILDES**

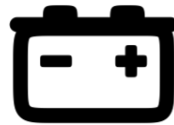
**SYSTEM AND COMPONENTS**

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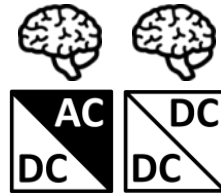
## ARDA Master Controller

- ✓ inside ARDA Storage DCDC Converter
- ✓ flexible and easy to configure EMS
- ✓ interface to 3<sup>rd</sup> Party Optimization Software



## 3<sup>rd</sup> Party ESS

- ✓ Storage Technology Agnostic
- ✓ with ARDA Storage DCDC Converter



## 3<sup>rd</sup> Party Power Converters

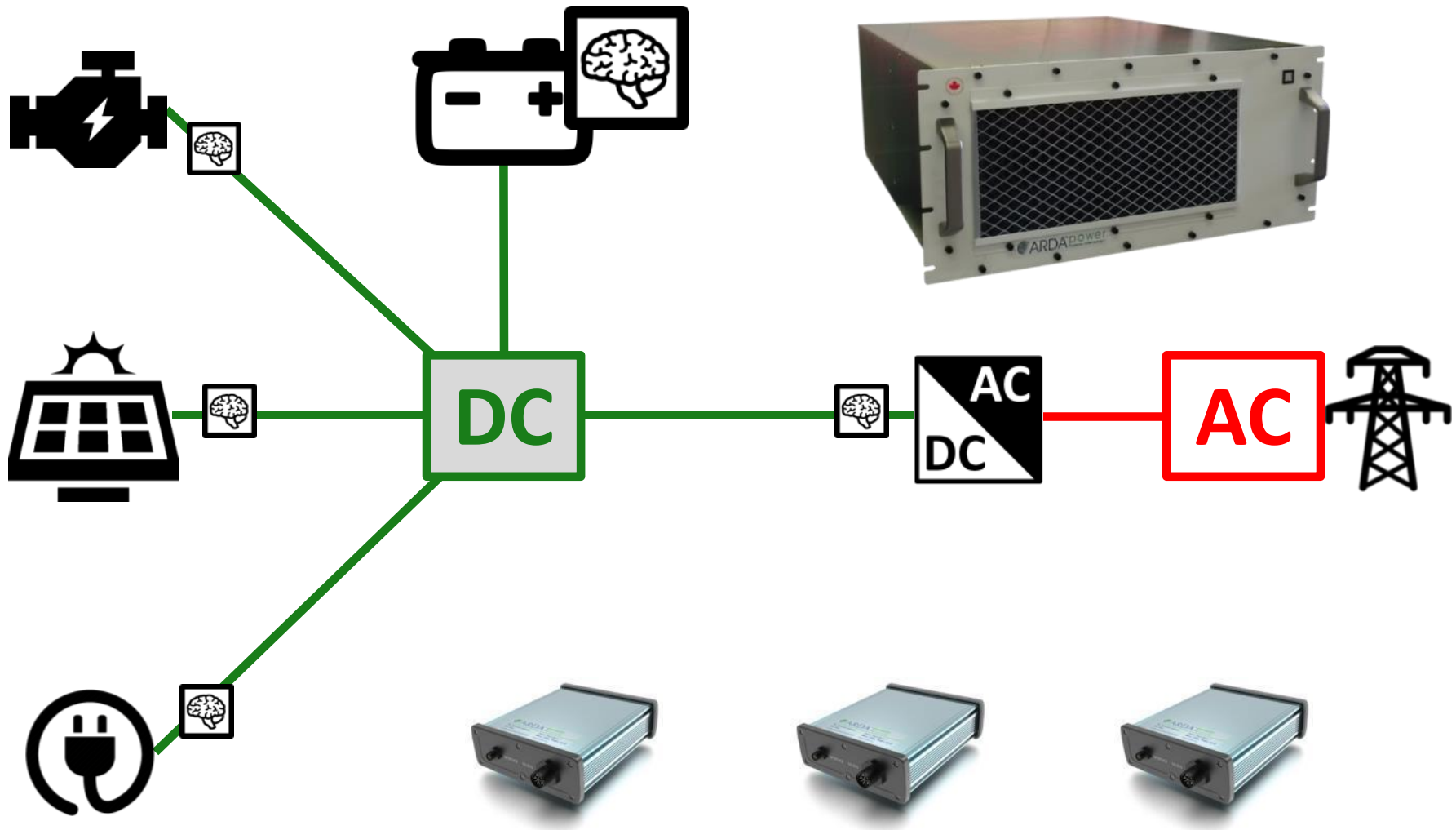
- ✓ off-the-shelf Modular Converters / Inverters
- ✓ interfacing Utility Grid, Sources and Loads
- ✓ accompanied by ARDA Response Controllers



## 3<sup>rd</sup> Party DC Protection Panel

- ✓ coupling Battery, Sources, Grid and Loads
- ✓ DC Breaker Over-Current Protection
- ✓ Intelligent Ground Fault Protection

# ARDA DC coupling: Plug-and-Play Controls



# Modular Standard 3<sup>rd</sup> party PCS Components



**Sinexcel**



**socomec**  
Innovative Power Solutions



**TABUCHI  
ELECTRIC**





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# EV Fast Charger with DC output & input



• andromeda power

