ARDA™ power
DC-connected energy

BURLINGTON PROJECT: Grid Tied Microgrid and EV Fast Charger "Invisible" to Utility

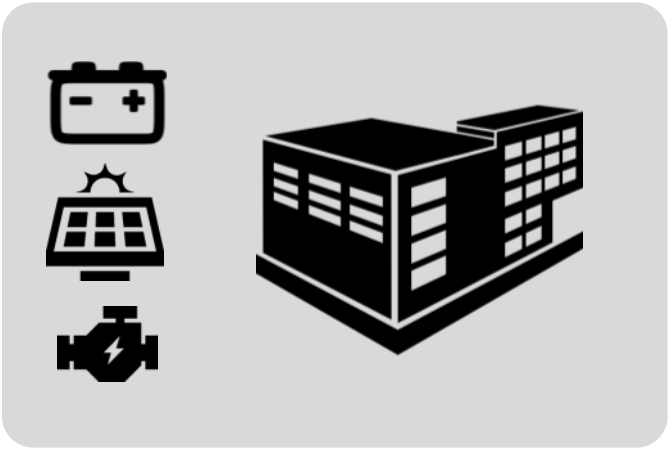
IDEA, Microgrid 2.0, Baltimore, MD
October 30, 2018

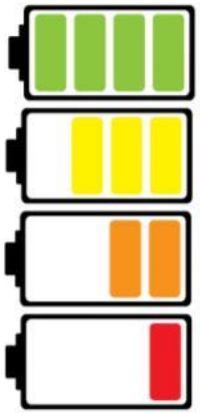
Energy Storage Revolution

millions of sites to emerge soon with

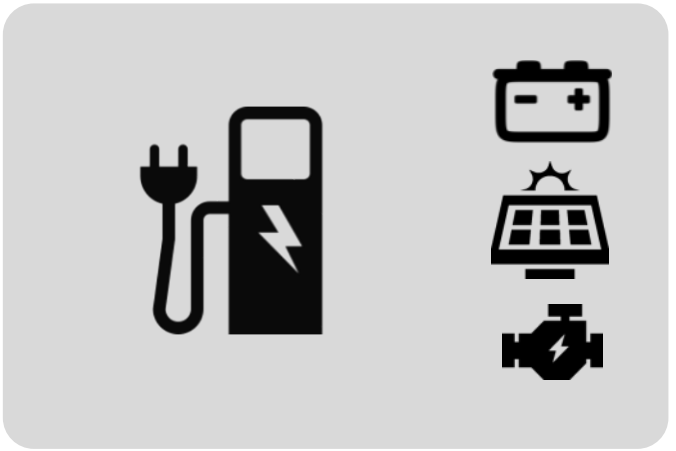
energy storage centric DERs for

✓ **C&I Buildings**



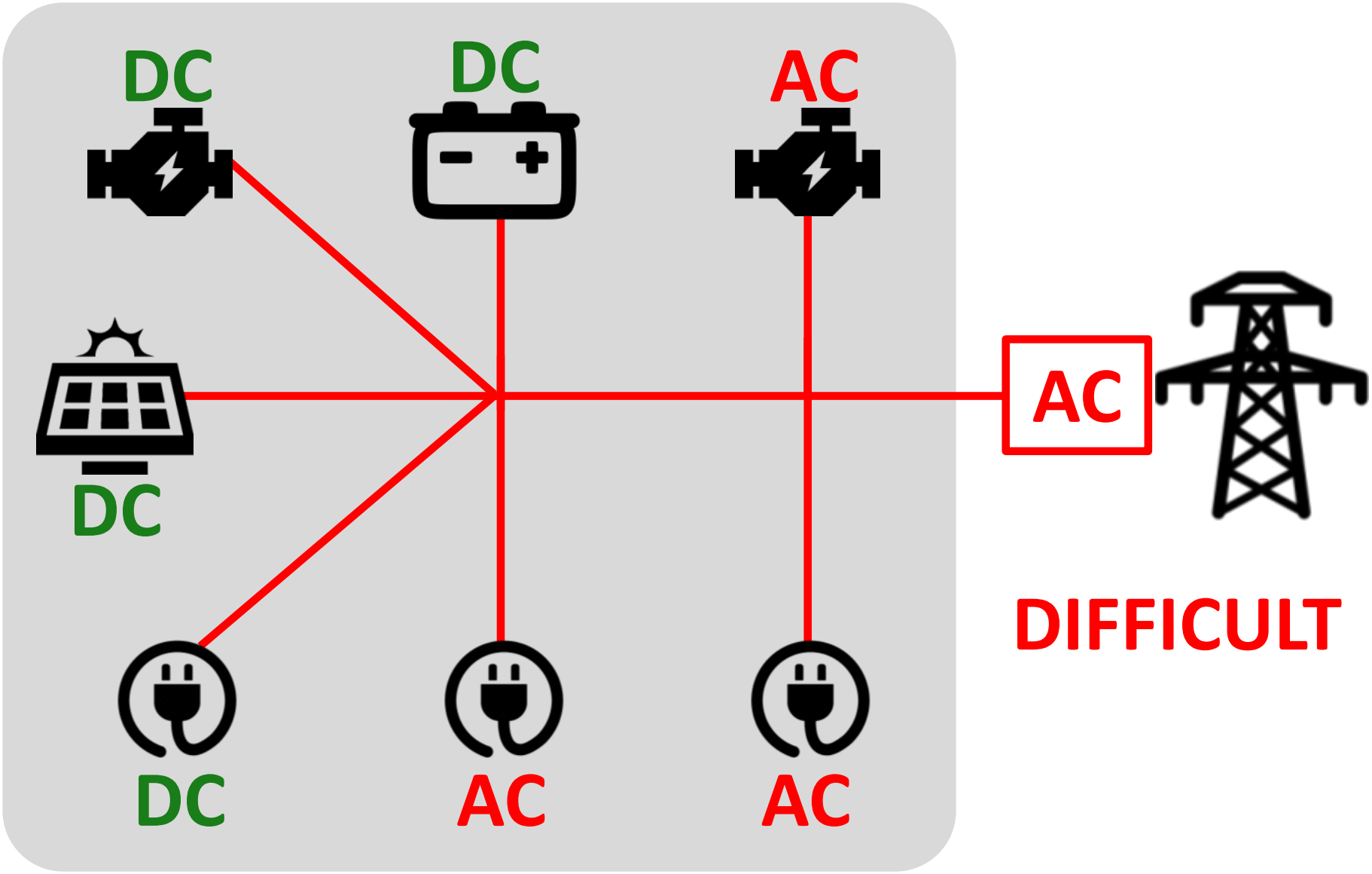


✓ **EV Fast Chargers**

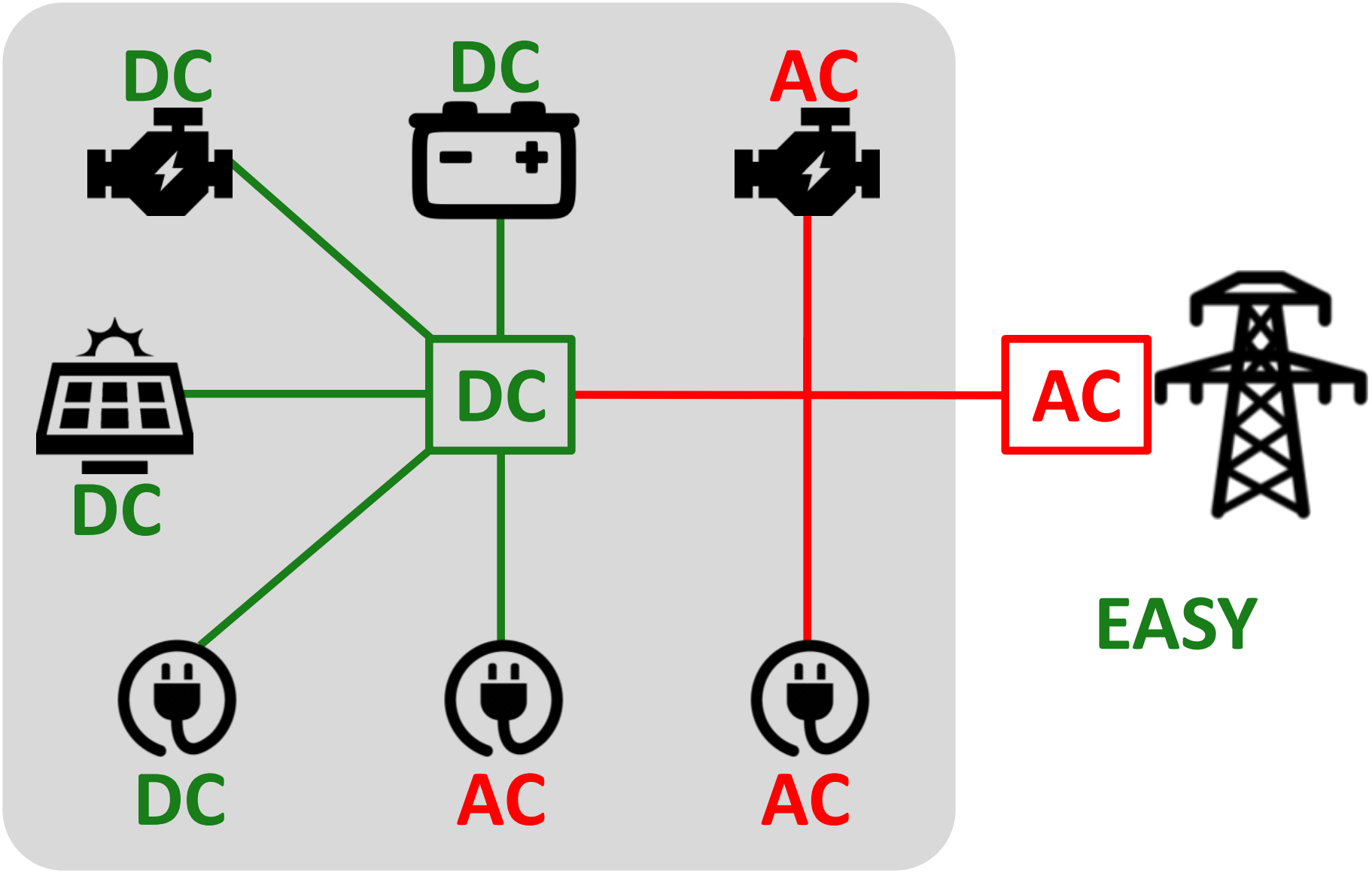


✓ **other Applications**

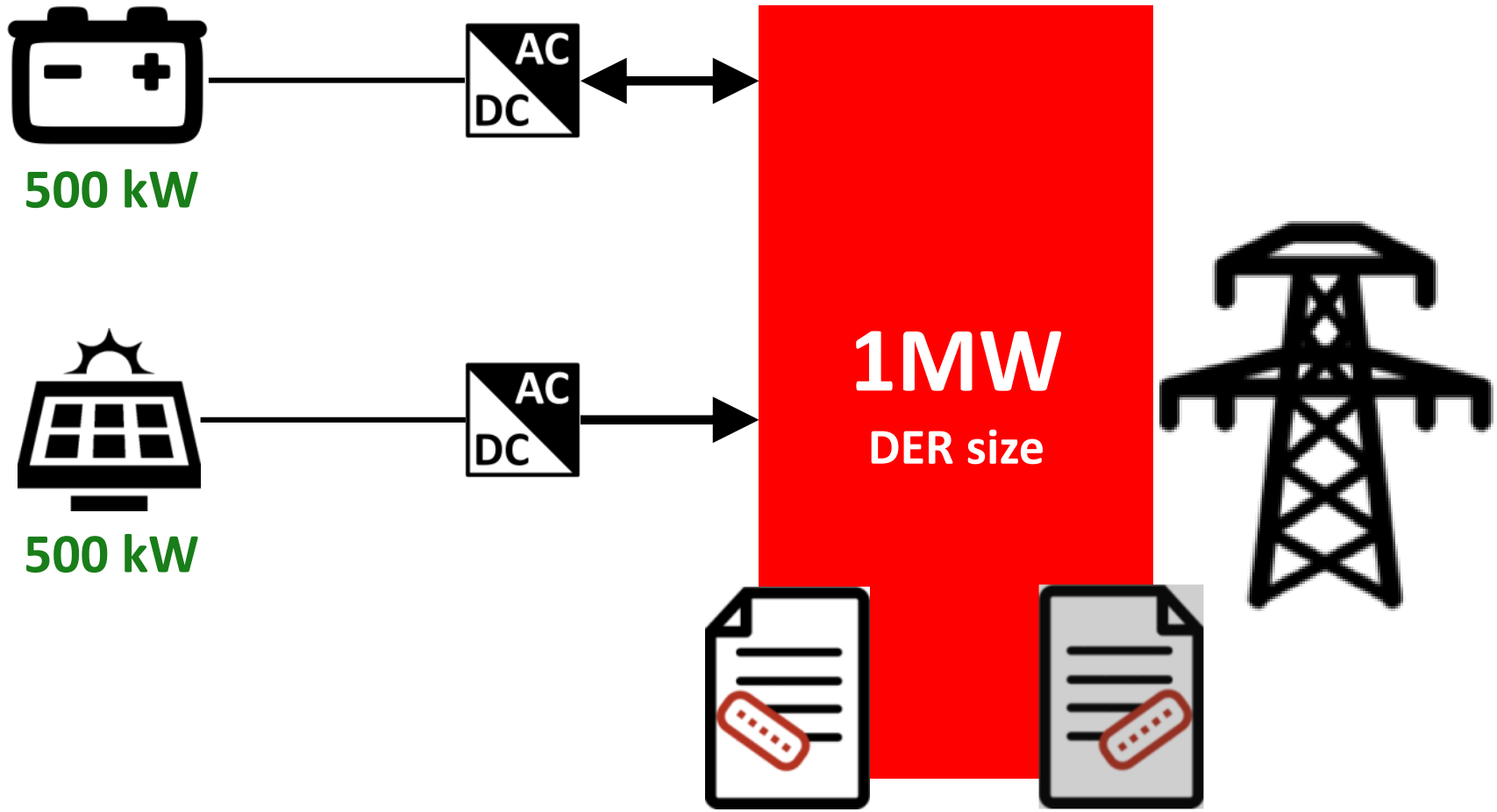
AC coupling, Microgrid optional



DC coupling, Microgrid included

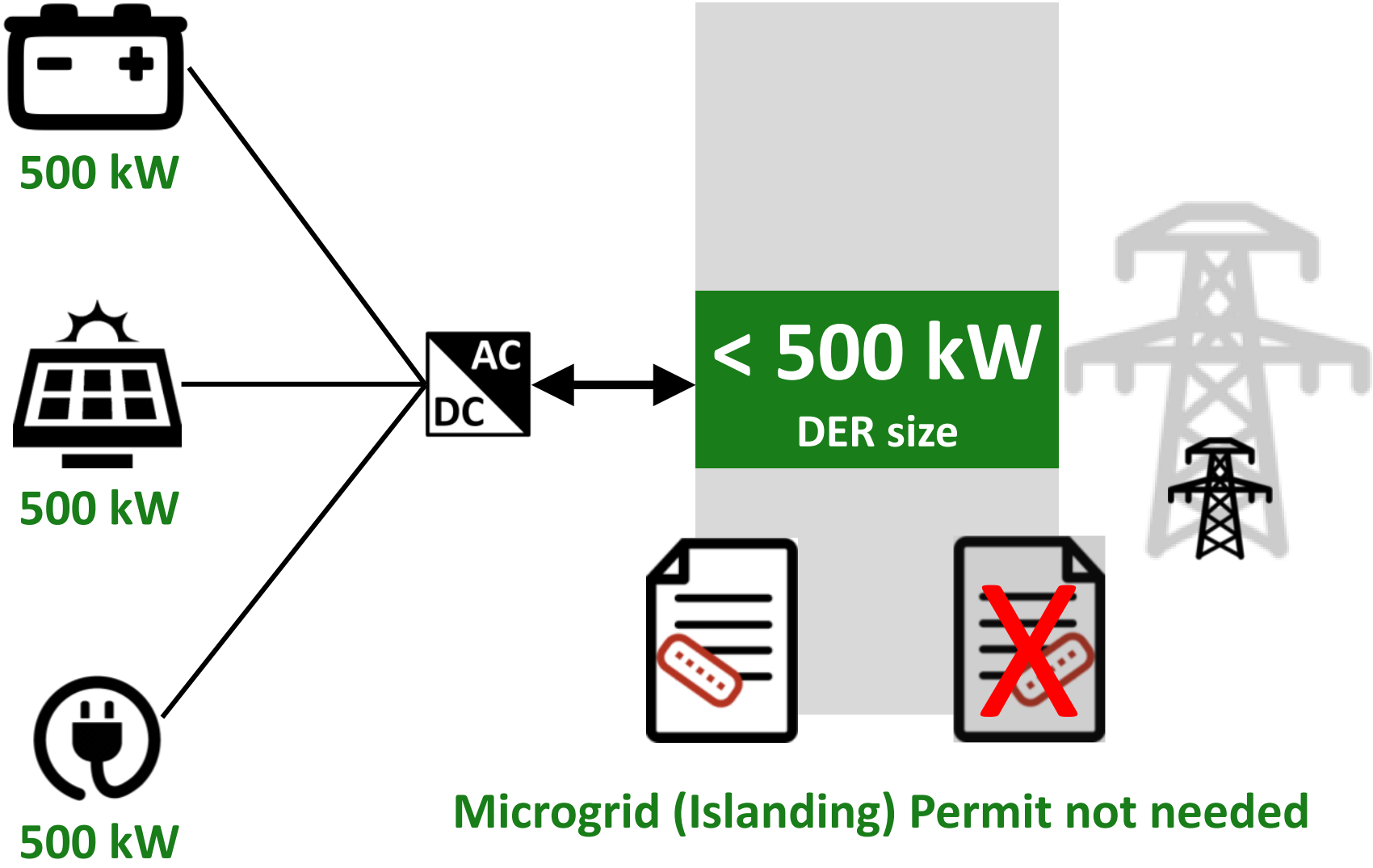


AC coupling: Interconnection



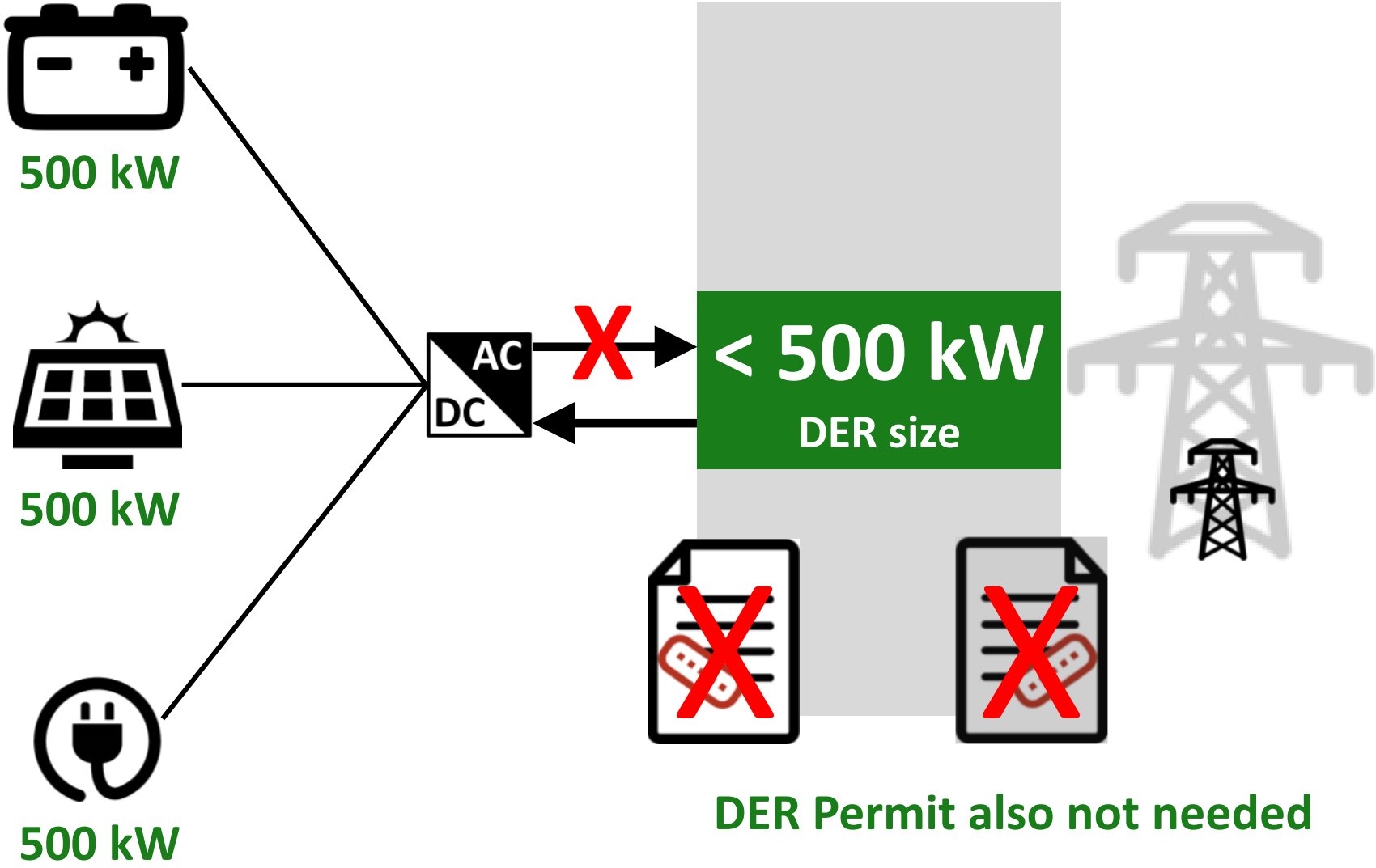
often nightmare DER and Microgrid (Islanding) Permit Process

DC coupling: Interconnection

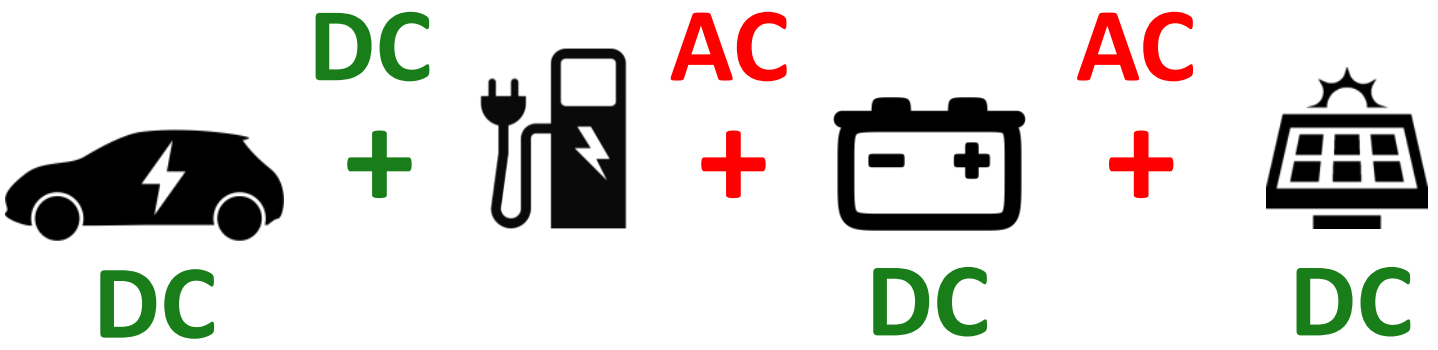


Microgrid (Islanding) Permit not needed

DC coupling: Interconnection



AC coupling: EV Fast Charger + DERs



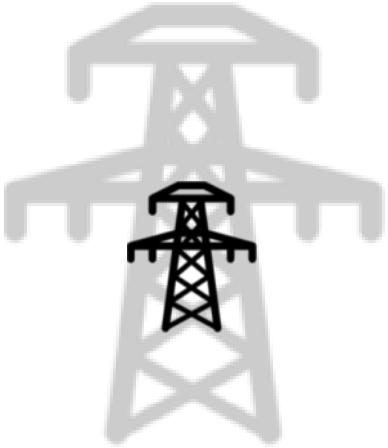
too large **nightmare** **high cost** **AC-DC, DC-AC, …**

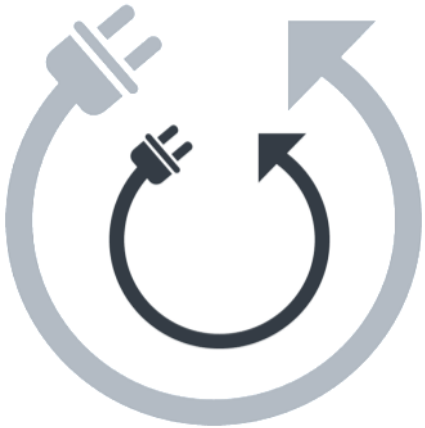
DC coupling: EV Fast Charger + DERs

DC + DC + DC + DC

DC DC DC

less than Half **no Permits*** **low cost** **> 5% better**





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

Burlington Project

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

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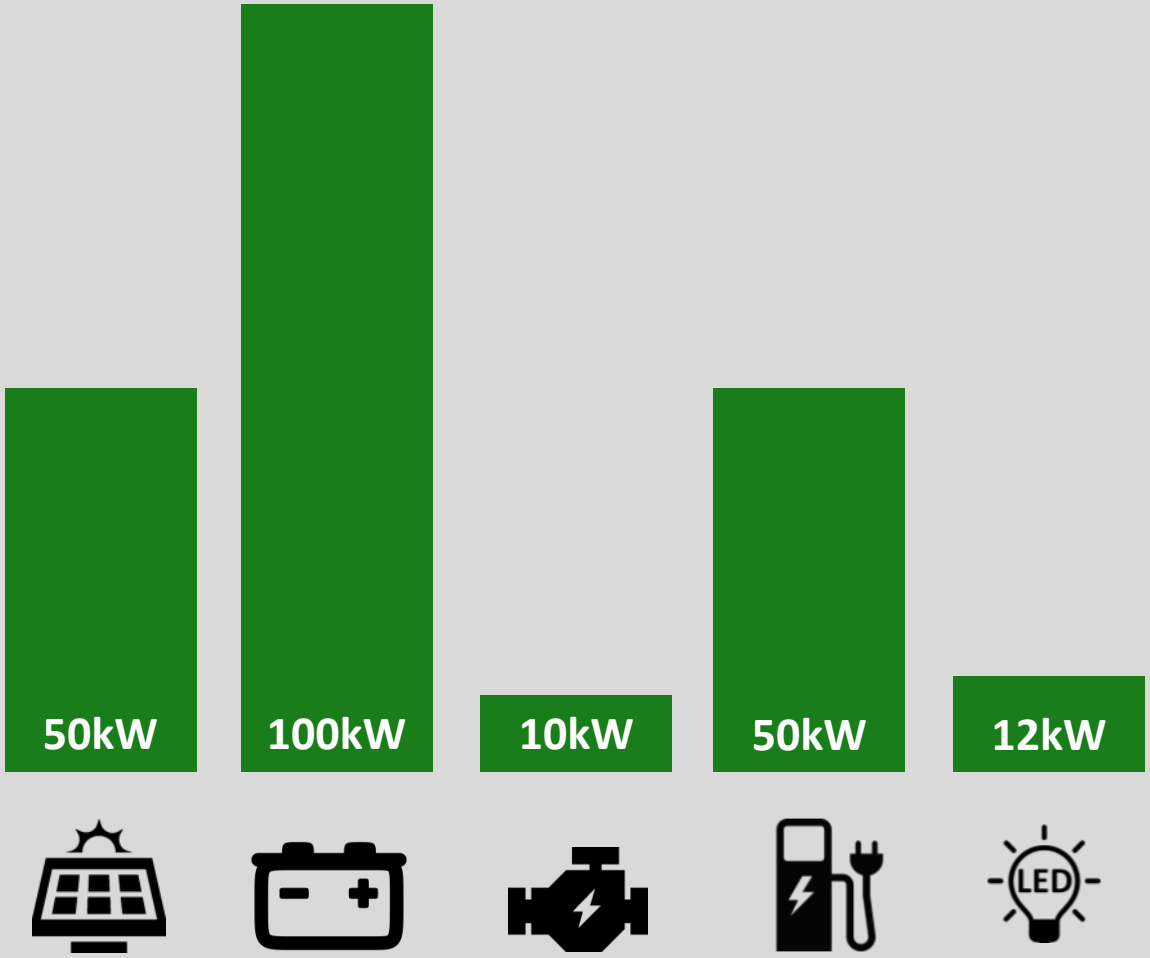
SUSTAINABLE DEVELOPMENT TECHNOLOGY CANADA
TECHNOLOGIES DU DÉVELOPPEMENT DURABLE CANADA

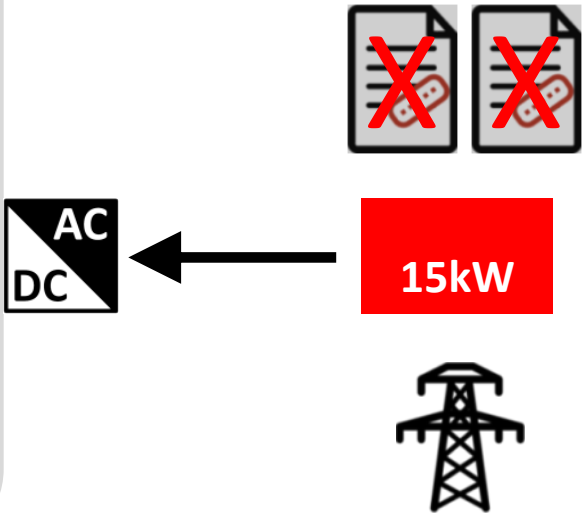
Ontario
Ministry of Energy

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

Burlington Project

Microgrid “Invisible” to the Utility





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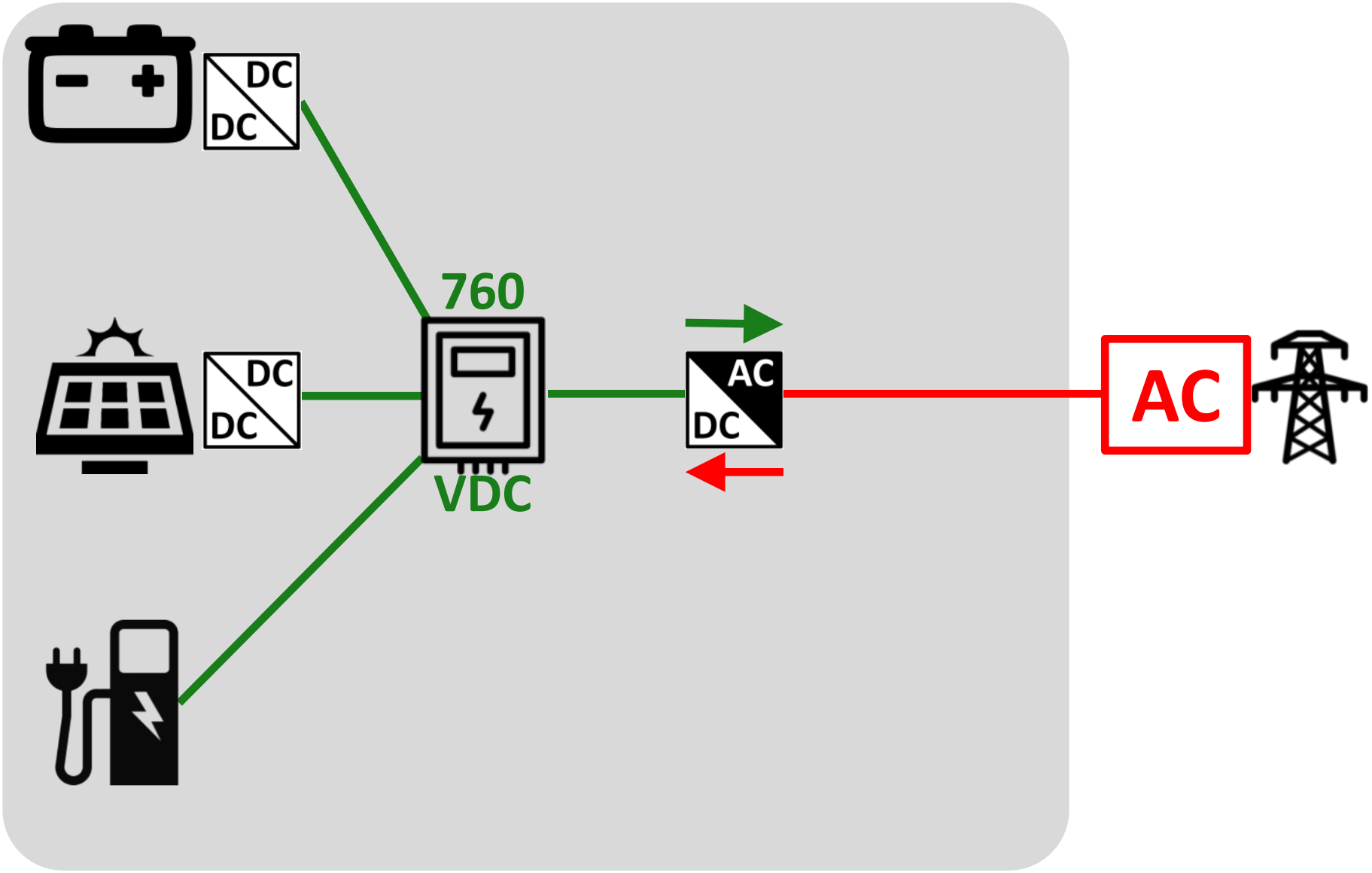
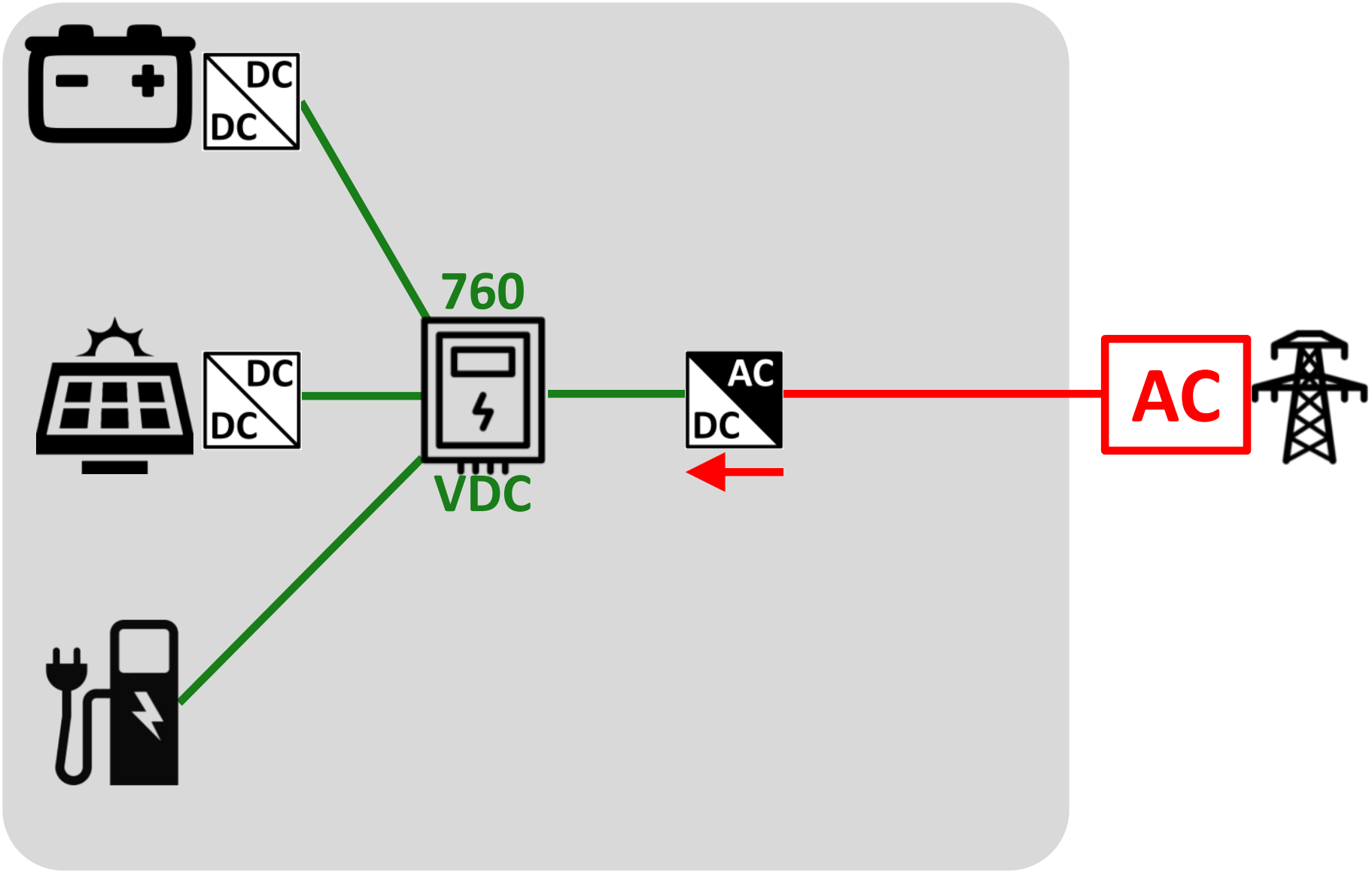
EXAMPLES OF USE CASES

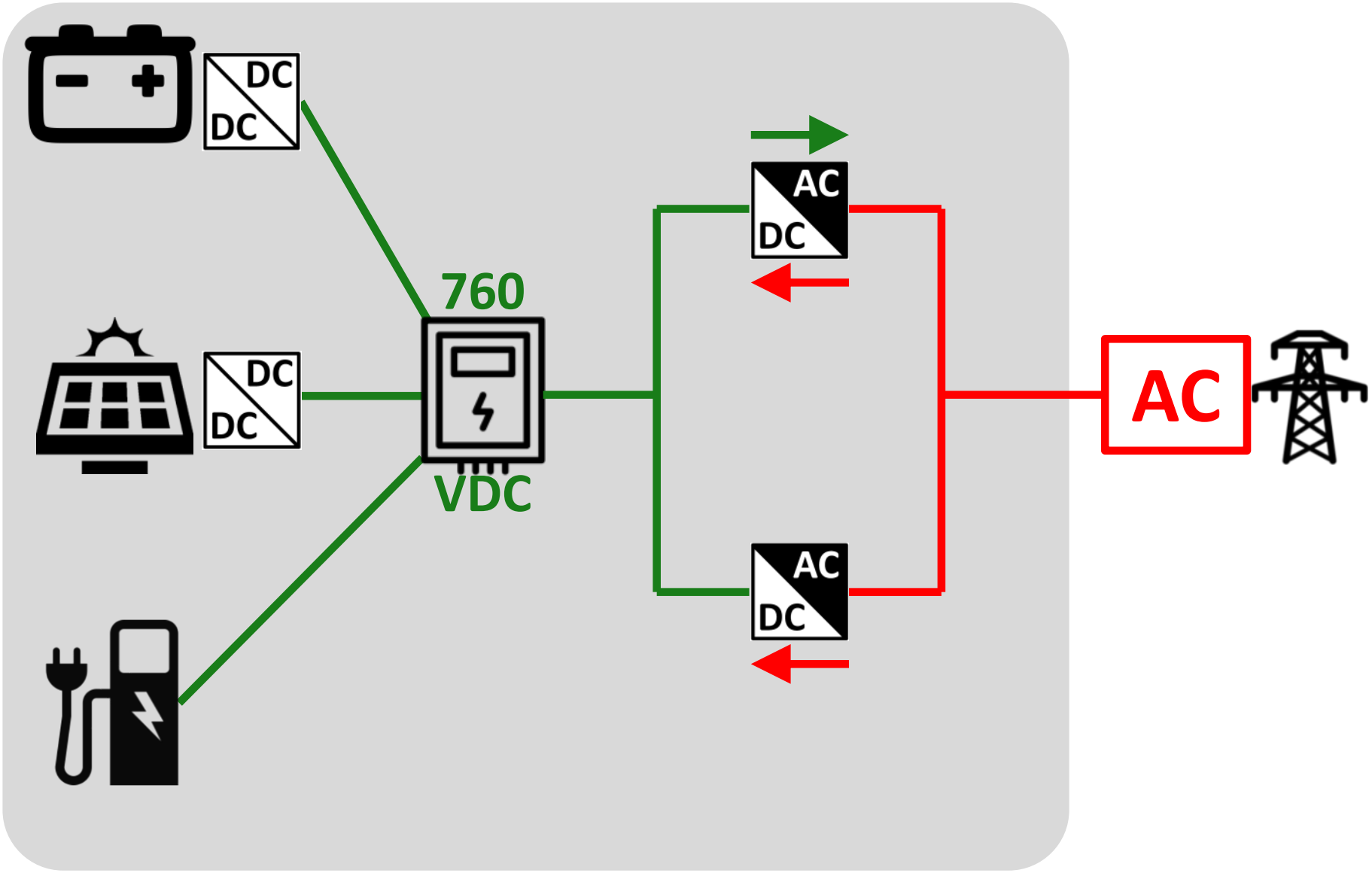
Case 1: EV Fast Charger, Import/Export



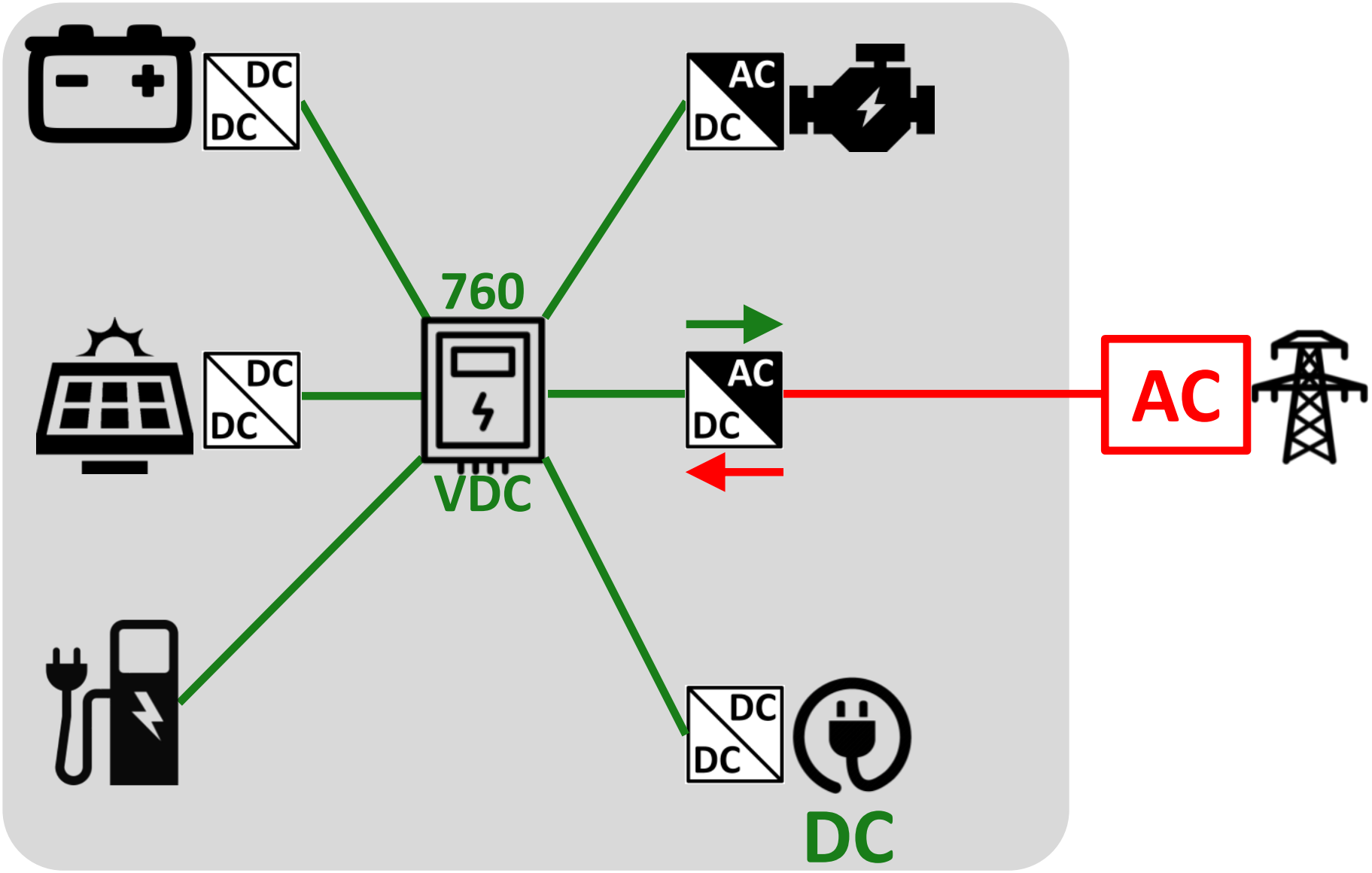
Case 2: Import Only (no DER Permit needed)



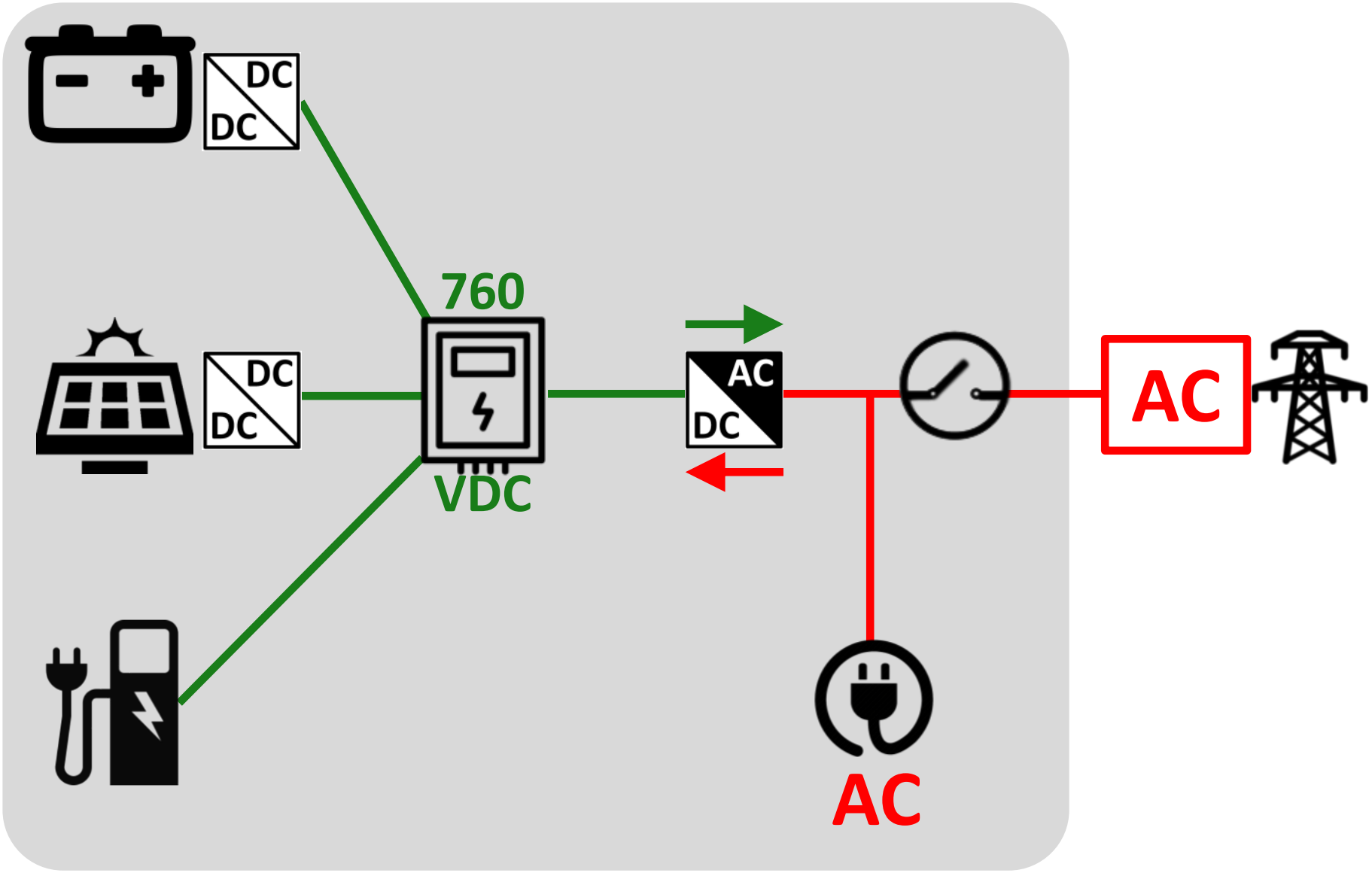
Case 3: Import larger than DER Permit



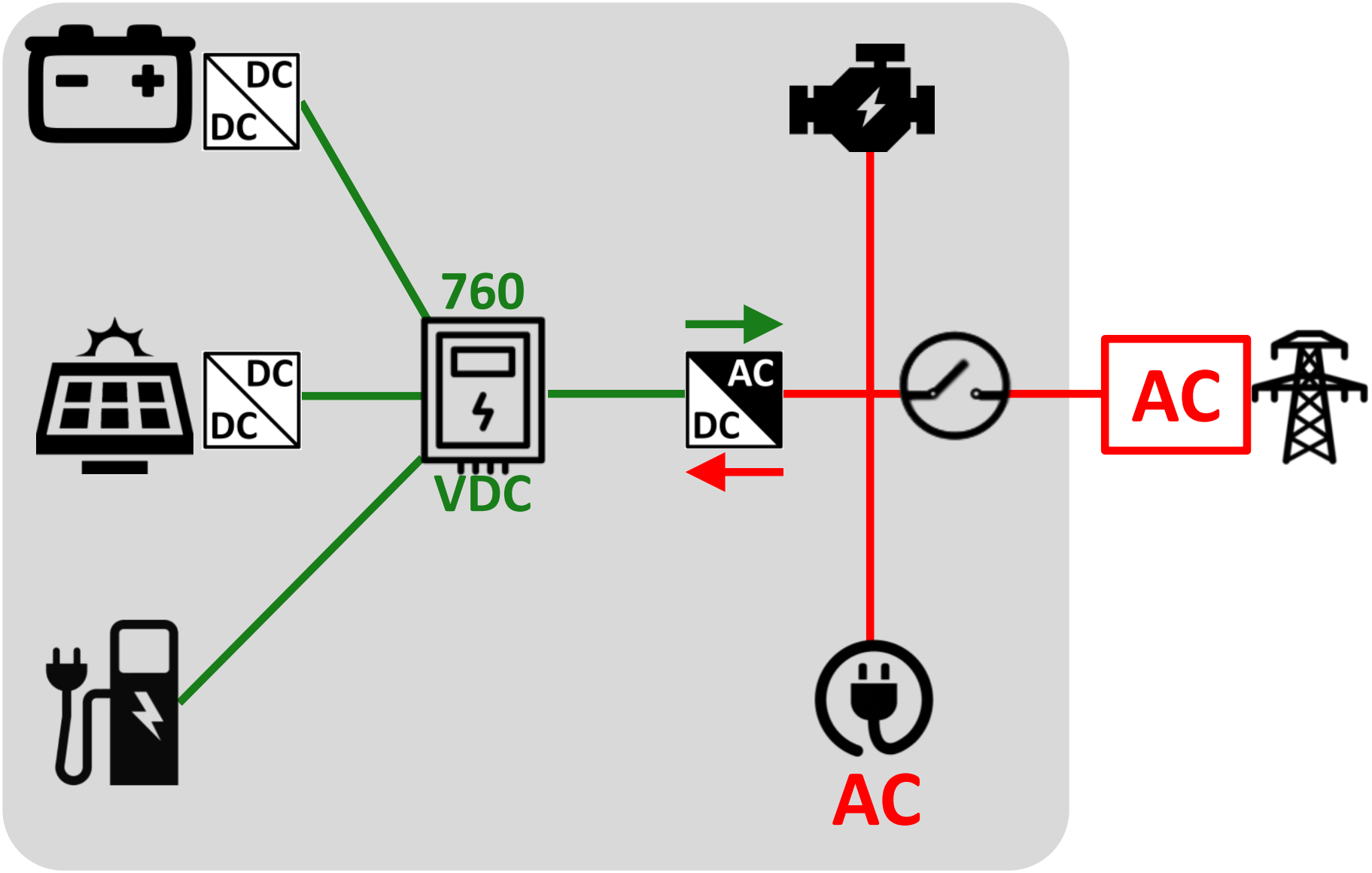
Case 4: add DC Load or Generator



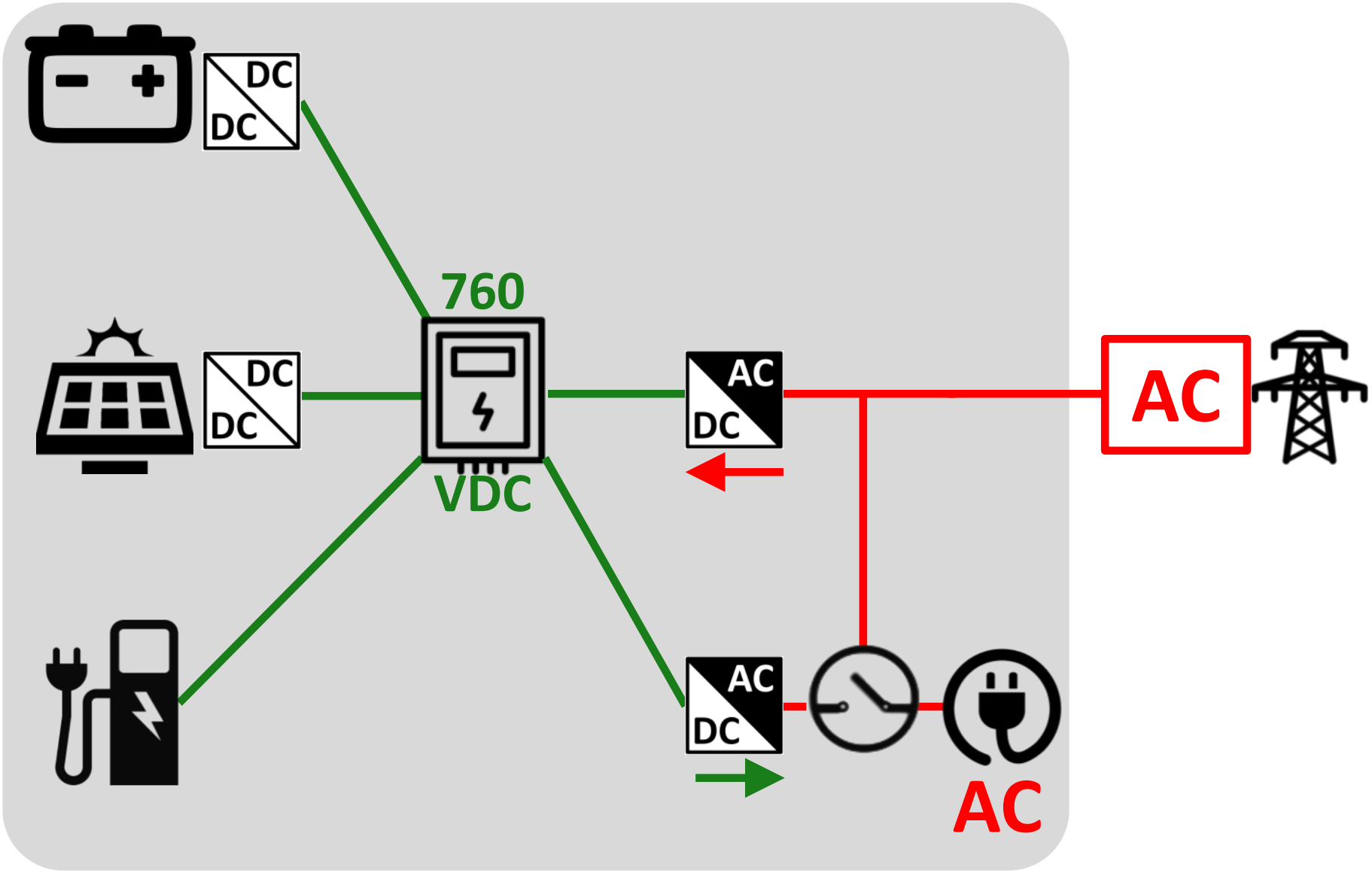
Case 5: AC Load Demand Charges, Backup



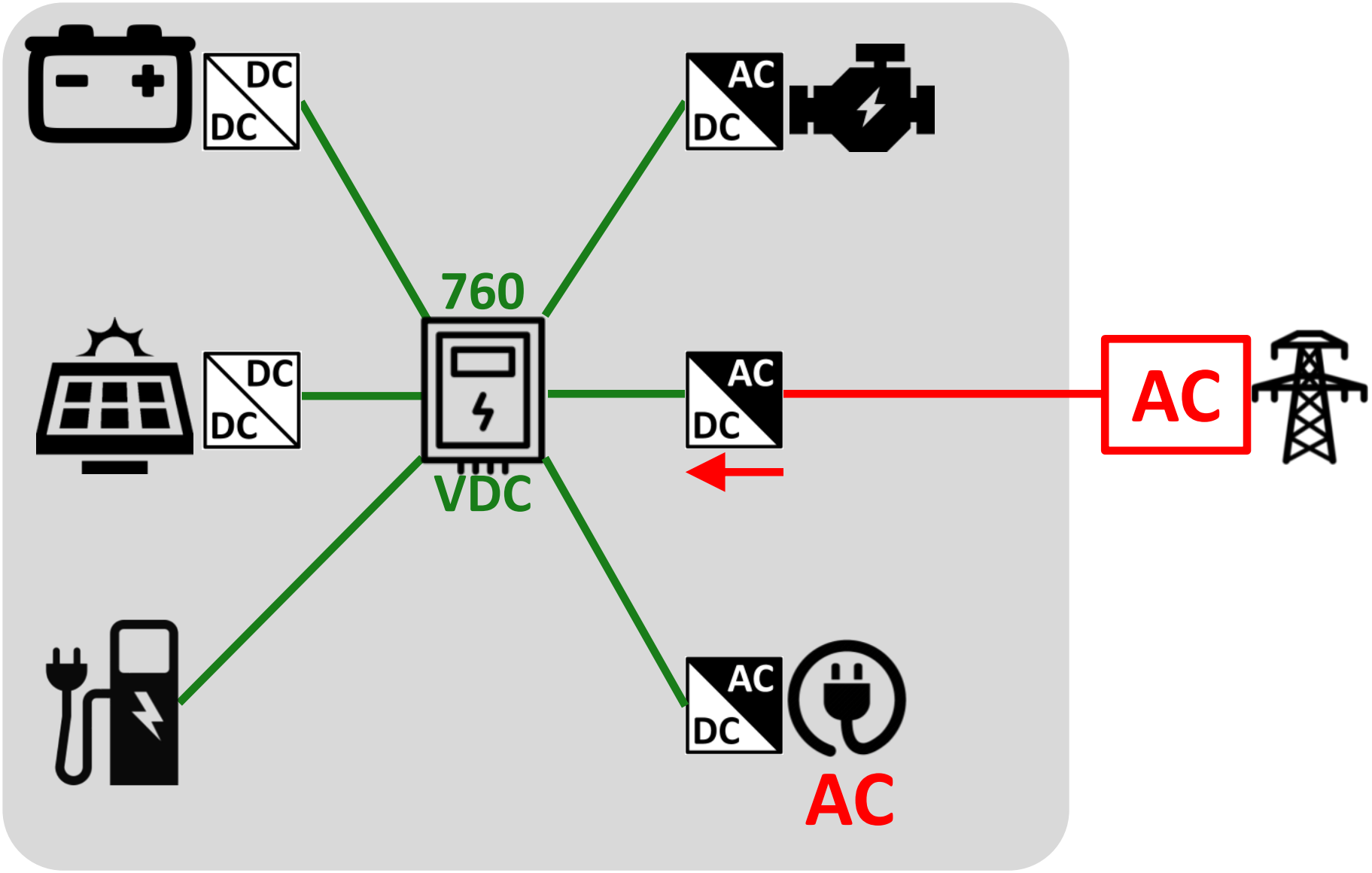
Case 6: add existing Backup Generator



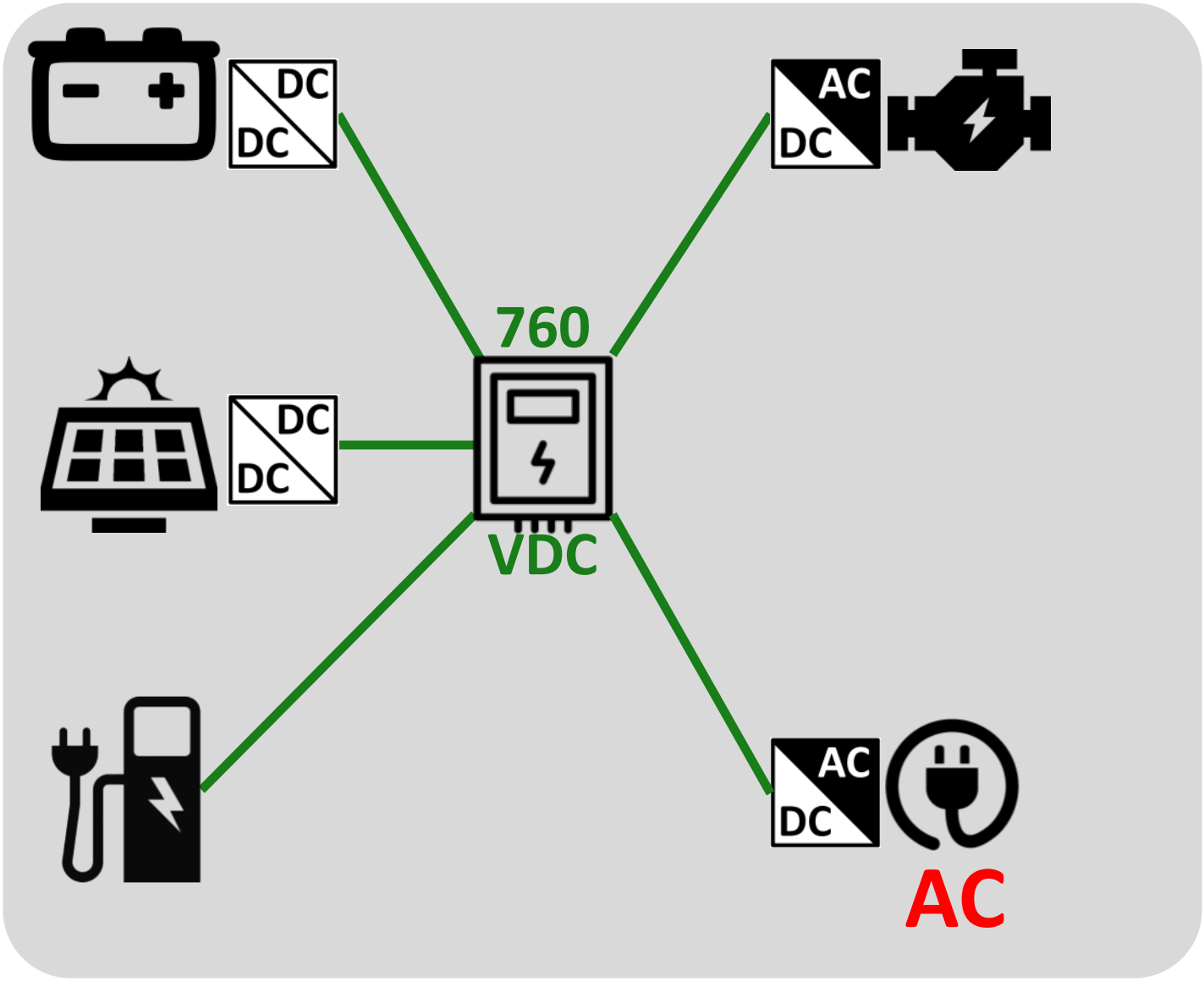
Case 7: serve AC Load without DER Permit



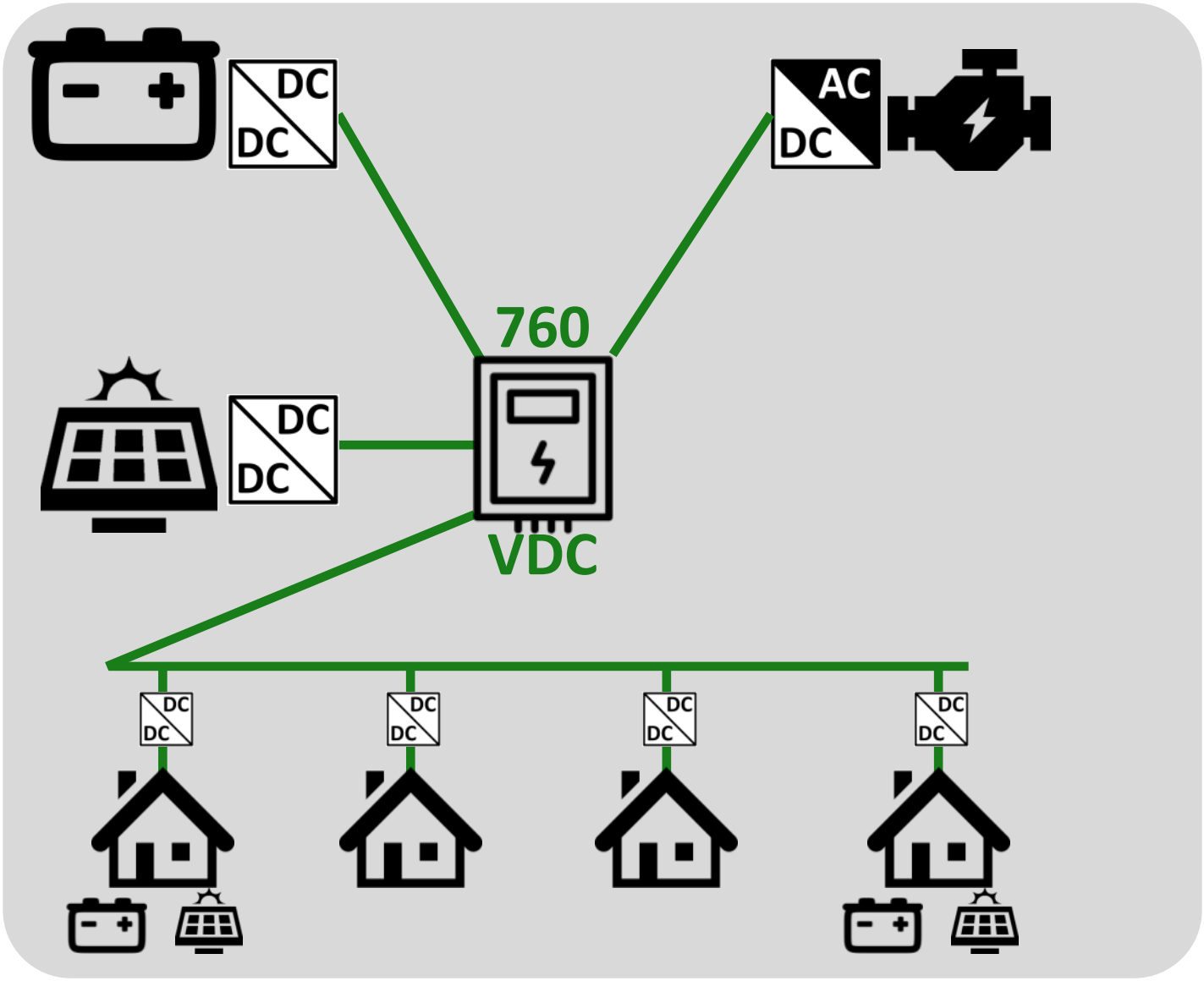
Case 8: AC Load on the DC side



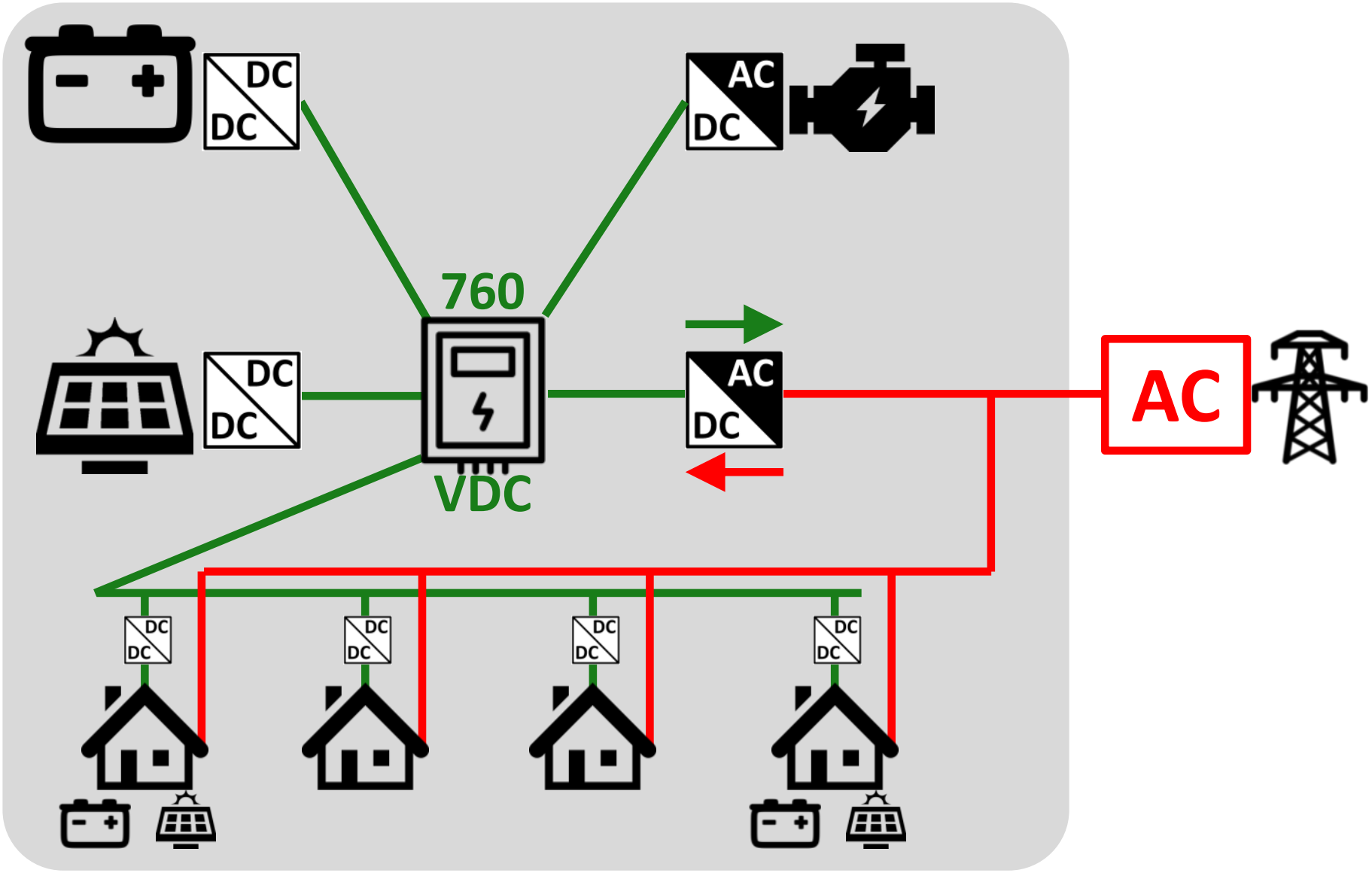
Case 9: Off Grid Application



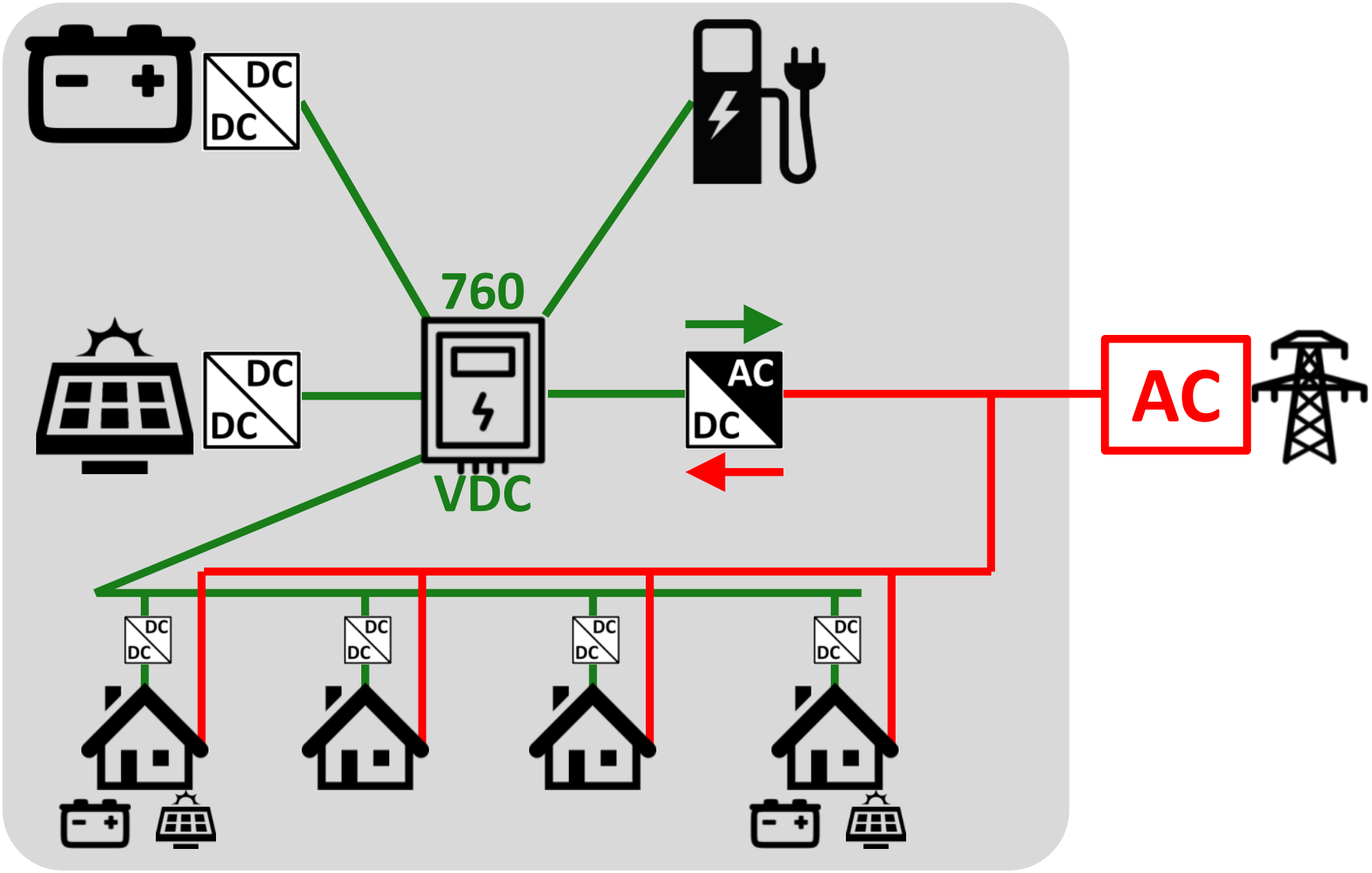
Case 10: Off Grid Residential Community



Case 11: On Grid Residential Community



Case 12: On Grid EV/Residential Community



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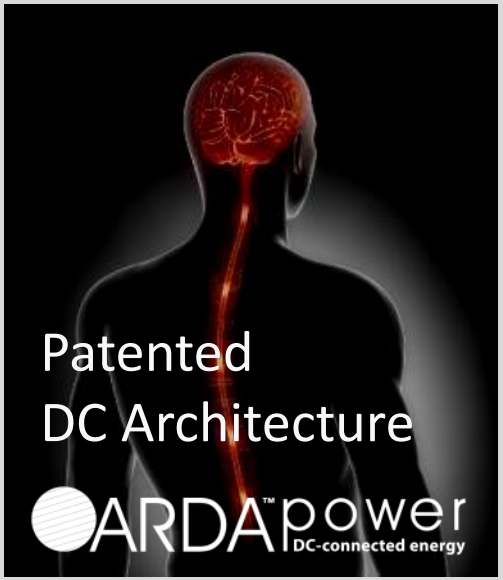
BACK UP SILDES

SYSTEM AND COMPONENTS

ARDA Integrated DC Solution



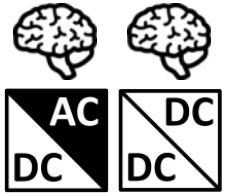
ARDA Master Controller

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

3rd Party ESS

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

3rd Party Power Converters

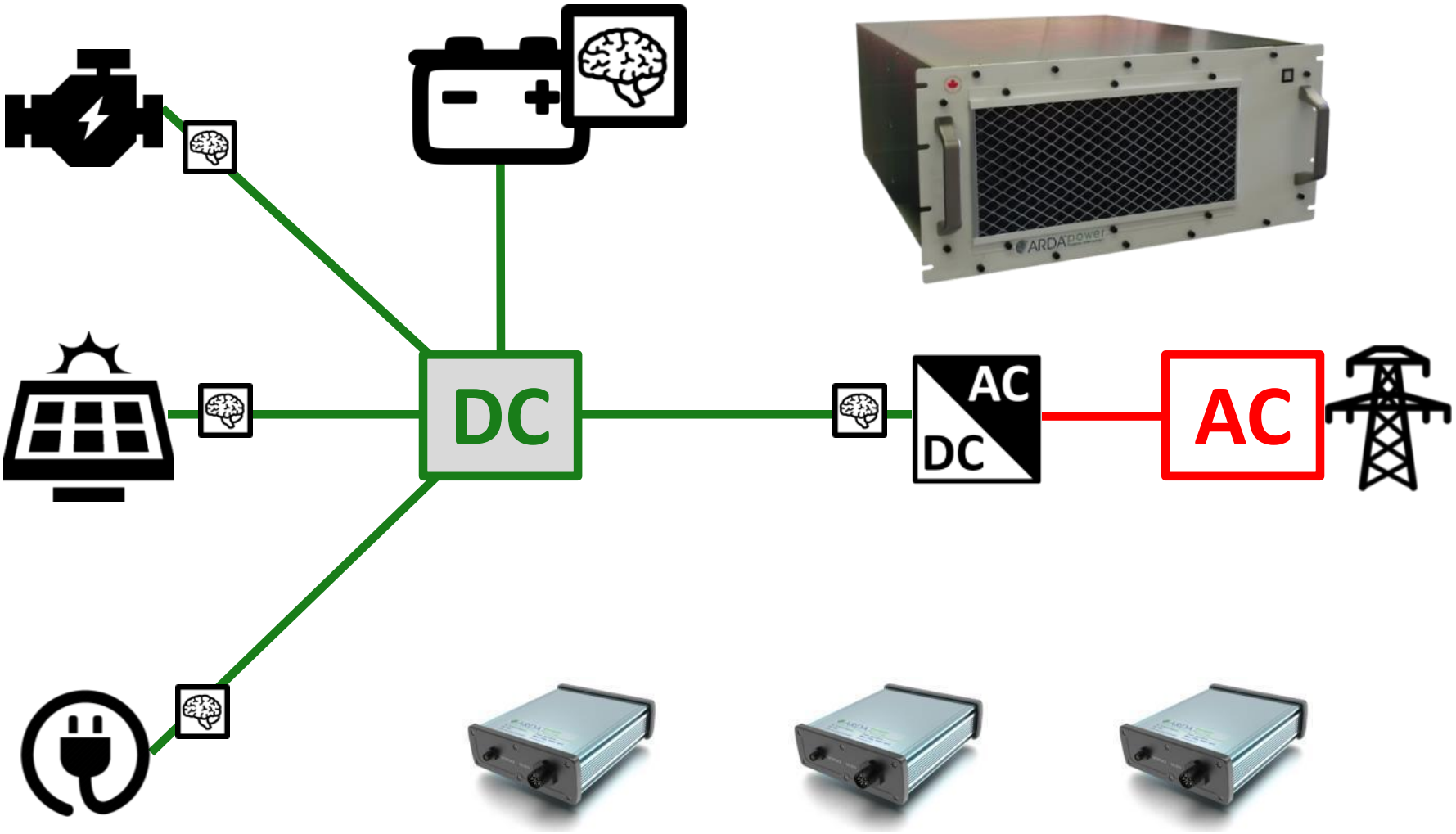


- ✓ off-the-shelf Modular Converters / Inverters
- ✓ interfacing Utility Grid, Sources and Loads
- ✓ accompanied by ARDA Response Controllers

3rd 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 3rd party PCS Components

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Sinexcel

AC
DC

AC
DC

socomec
Innovative Power Solutions

TABUCHI ELECTRIC

VAR Partnership with ESS integrator

EV Fast Charger with DC output & input

andromeda power