

SUCCESS CASE 10.2026

DLM

SECONDARY TRANSFORMER DYNAMIC LOAD MANAGEMENT

CHALLENGE

In order to ensure continuous compliance with maximum import/export limits, customers often deploy Dynamic Load Management (DLM) on their premises for BESS and EV charging stations. DLM continuously adjust the maximum charging or discharging power in real time at the connection point, but is network-agnostic.

SOLUTION

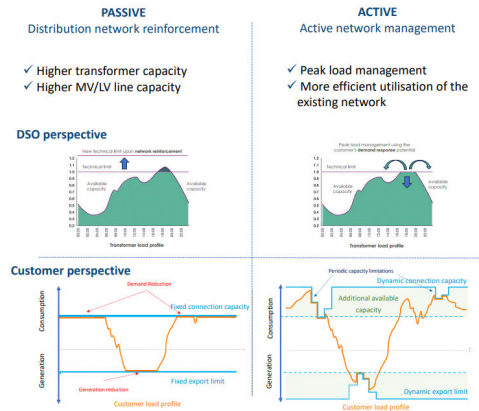
Within this project, a variation of the DLM solution is being tested and demonstrated for low-voltage network connections. Instead of controlling the power limit at the connection point, maximum charging or discharging power is adjusted according to **distribution transformer's** rated capacity.

Meanwhile, DSO relies on a customer-built **autonomous solution** without integration with the DSO SCADA system.

Why Autonomous Solution?

- ✓ Customer will find the most suitable and most cost-effective load management solution.
- ✓ Customer does not need to integrate their EMS with the system operator's SCADA system.
- ✓ Customer assumes full responsibility for the logic and effectiveness of the control algorithm, including the consequences in the event of a solution failure and low-voltage network outage.

Distribution Network Systems Management Models



Application Scenario

- ✓ There is insufficient available capacity at the distribution transformer.
- ✓ The customer enters into a bilateral agreement with DSO on the flexible use of available capacity, without affecting other customers' ability to use the permitted capacity 24/7.
- ✓ The customer ensures the technical implementation of transformer dynamic load management

Conditions

- ✓ Low-voltage connection
- ✓ Only one customer with a flexible connection agreement at the distribution transformer allowed

Limitations

- ✓ Available capacity over the course of a year can be assessed based on historical transformer load data. However, the actual load curve changes from year to year.
- ✓ Only one customer with autonomous DLM can be connected to a single distribution transformer – if several DLMs were connected, the autonomous systems would 'compete' for the available capacity

ACHIEVEMENTS

Engycell developed the required solution architecture to (1) perform real-time power measurement at the transformer and (2) manage the BESS system based on real-time commands.

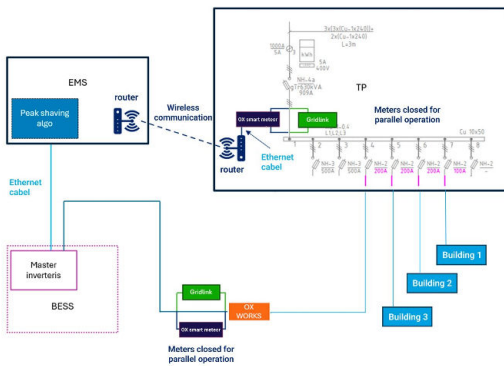
Distance to the distribution transformer: **25m**

Demonstrated technology:  +  AC

Communication: **Wi-Fi**

Results engycell

- ✓ In 95% of cases, the overload was eliminated within 6s.



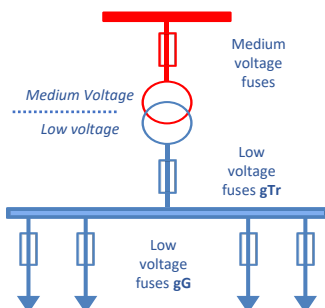
Transformer Protection

Distribution transformer overloading allowed up to 150% (IEC 60076-7).

Primary protection – thermal protection disconnects the MV use, if the permissible oil temperature is exceeded

Secondary protection – gTr-type LV fuses, in accordance with the time-current characteristic curve, withstand (1) 30% overload for up to 10 hours; (2) 50% overload for up to 2 hours.

Technical losses – fully loading an existing 250kVA transformer up to 40% of time is still economically more viable than upgrading transformer to 400kVA.

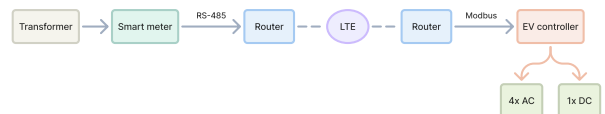


Elektrum Drive developed and demonstrated an EV charging power management solution that adjusts charging power based on the distribution transformer load, using remote communication with a measurement point located more than 100 m from the site.

Distance to the distribution transformer: **280m**

Demonstrated technology:  DC +  AC

Communication: **4G/LTE**



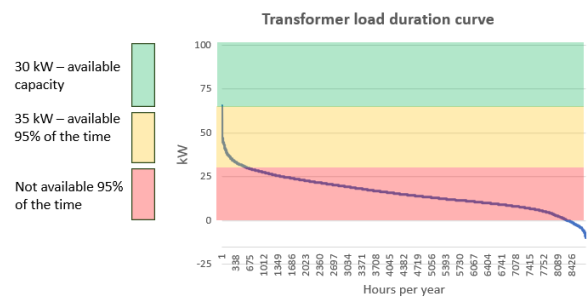
Results elektrum drive

- ✓ Overload eliminated within 10s
- ✓ Charging stopped after loss of comms: 8s
- ✓ Charging started after comms restored: 20s

BENEFITS

Two pilot projects demonstrated that traditional DLM can be extended for distribution transformer load management.

Customers could resolve transformer congestion within 10 seconds.



Assessment example, where customer could request 65kW instead of 30kW

WAY FORWARD

1. Develop methodology for calculating the duration (h) and volume (kWh) of limited capacity.
2. Develop technical guidelines for DLM connections with customer's autonomous solution.
3. Assess flexible connection tariff