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Active network management in LV networks: a case study in the UK

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LV networks and low-carbon technologies

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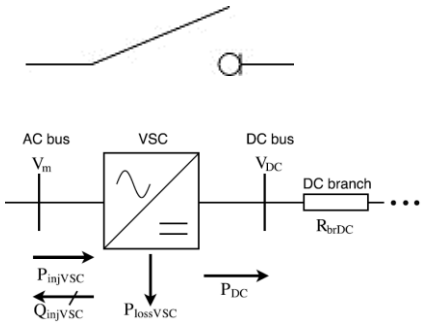
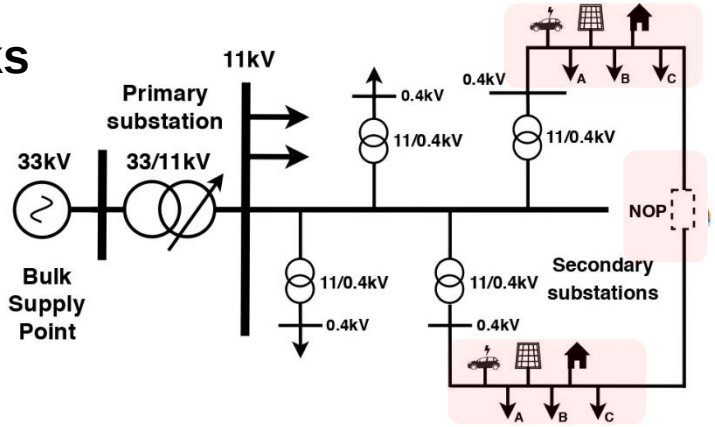
Active Network Management (ANM) in LV networks

A. Network reconfiguration **through switching**

B. Using **power electronic converters**





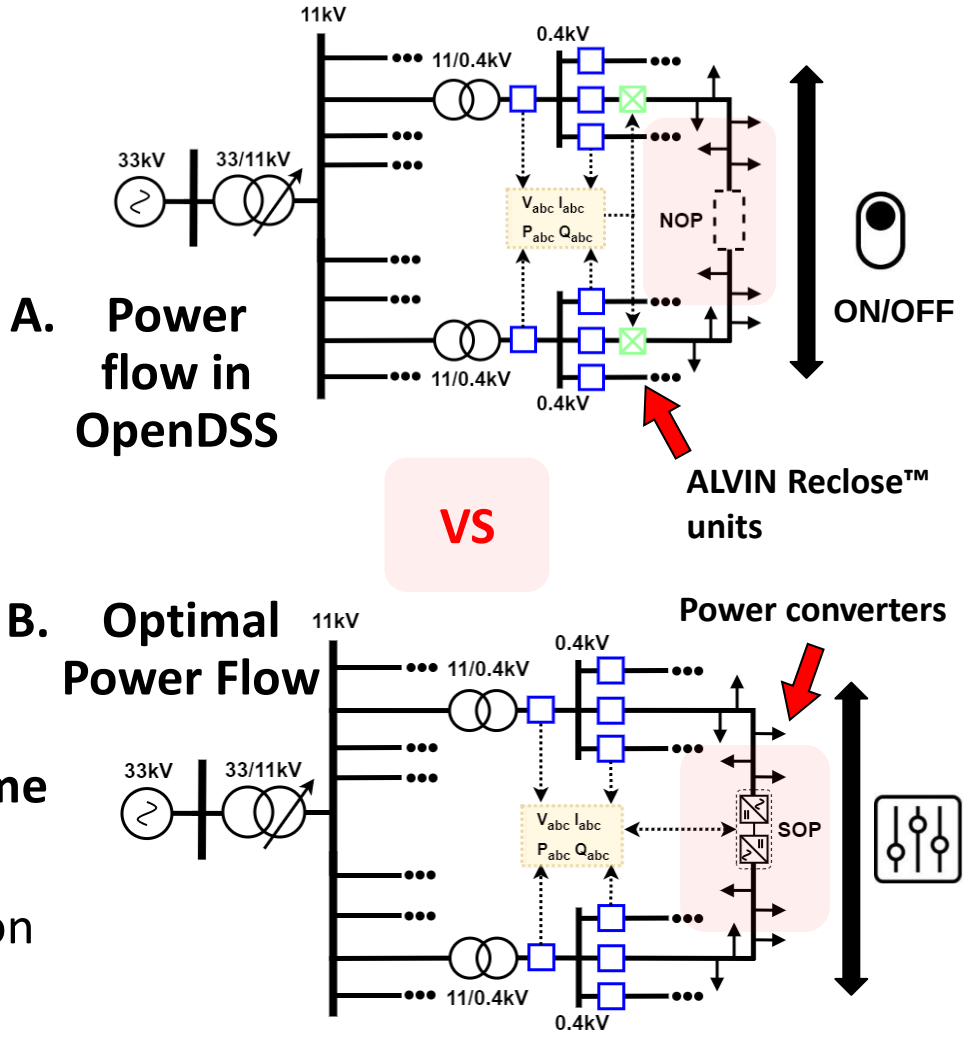
ANM schemes

A. Network reconfiguration through switching (ALVIN)

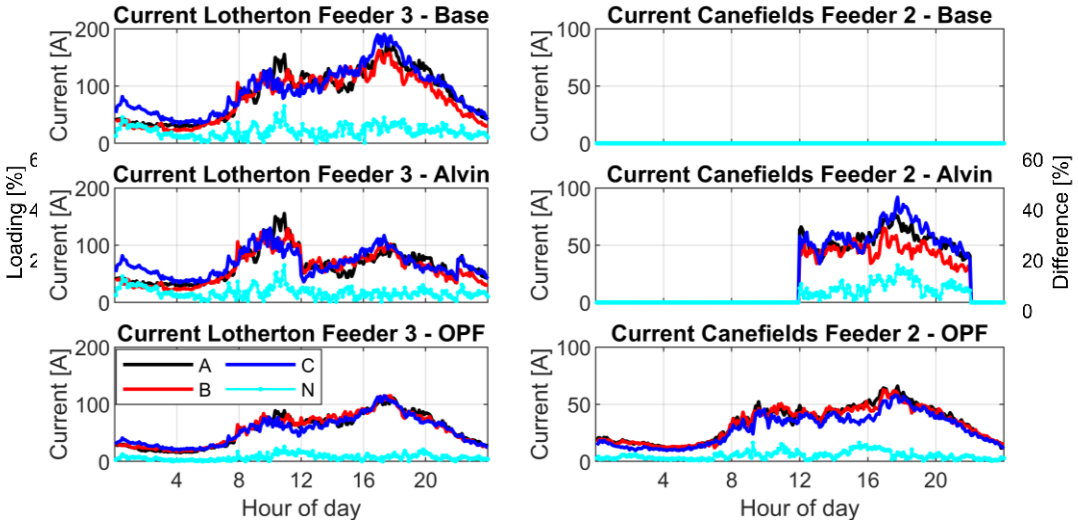
- **Simple control** strategy (on/off)
- **Cannot regulate power flow**
- Changes to **fault levels**

B. Using power electronic converters

- The **power flow can be regulated** at all times
- Requires a **complex control scheme**
- **AC-DC-AC** connection provides electrical **isolation,** no contribution to fault levels

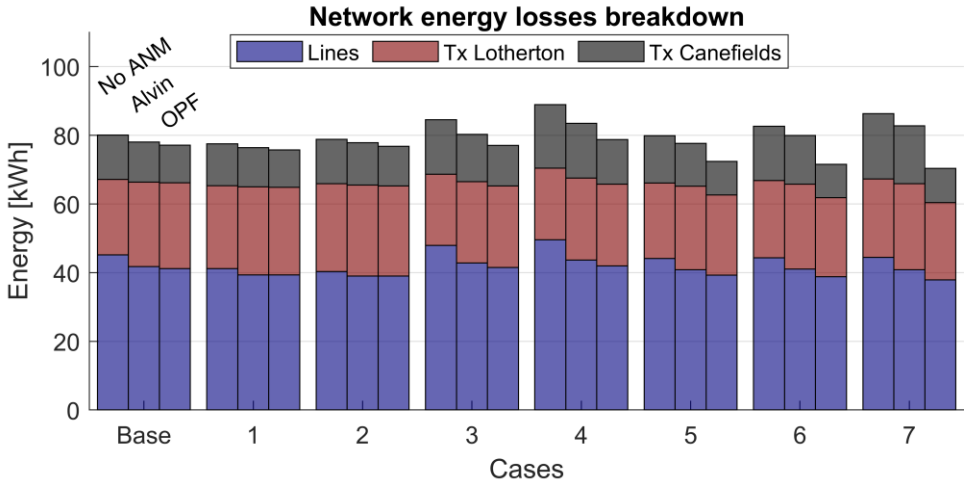


Comparative study



- **Load is transferred from Lotherton to Canefields,** lowering the peak loading of Lotherton.
- The converters can regulate the power going into each of phases. The **power transfer and the overall current profile are more balanced**

- The **ANM with converters** result in the **lowest overall loading for both transformers**
- The overall **power losses are affected by the specific location** of the LCTs.



Conclusions

- ❑ **LV networks will become congested at particular substations and feeders**
- ❑ **Active management of the power flows** will become essential **for DNOs**

A. ANM using via switching

- ❑ **Simple control strategy** allows autonomous operation.
- ❑ Limited flexibility due to a **reduced number of possible open/close** switch commands.
- ❑ The ALVIN Reclose™ units **do not suffer additional power losses.**
- ❑ Might not result in **optimal distribution of the powers.**

B. ANM using power converters

- ❑ Requires a **complex control scheme** to calculate set points, **such the OPF.**
- ❑ The converters allow **a full control over the power flows**, they can **reduce phase imbalance.**
- ❑ The **power converters incur in additional power losses**
- ❑ **Adaptability to network constraints** even as the amount of **LCTs increases**

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More information: OpenLV.net