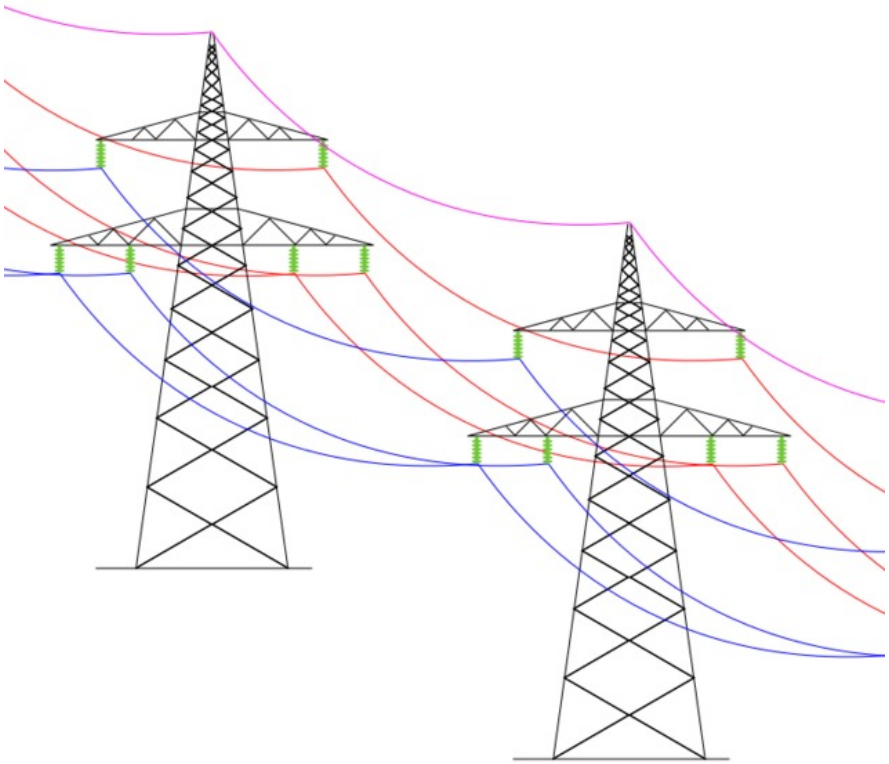
Electrotechique-II
MICRO-101: week 4



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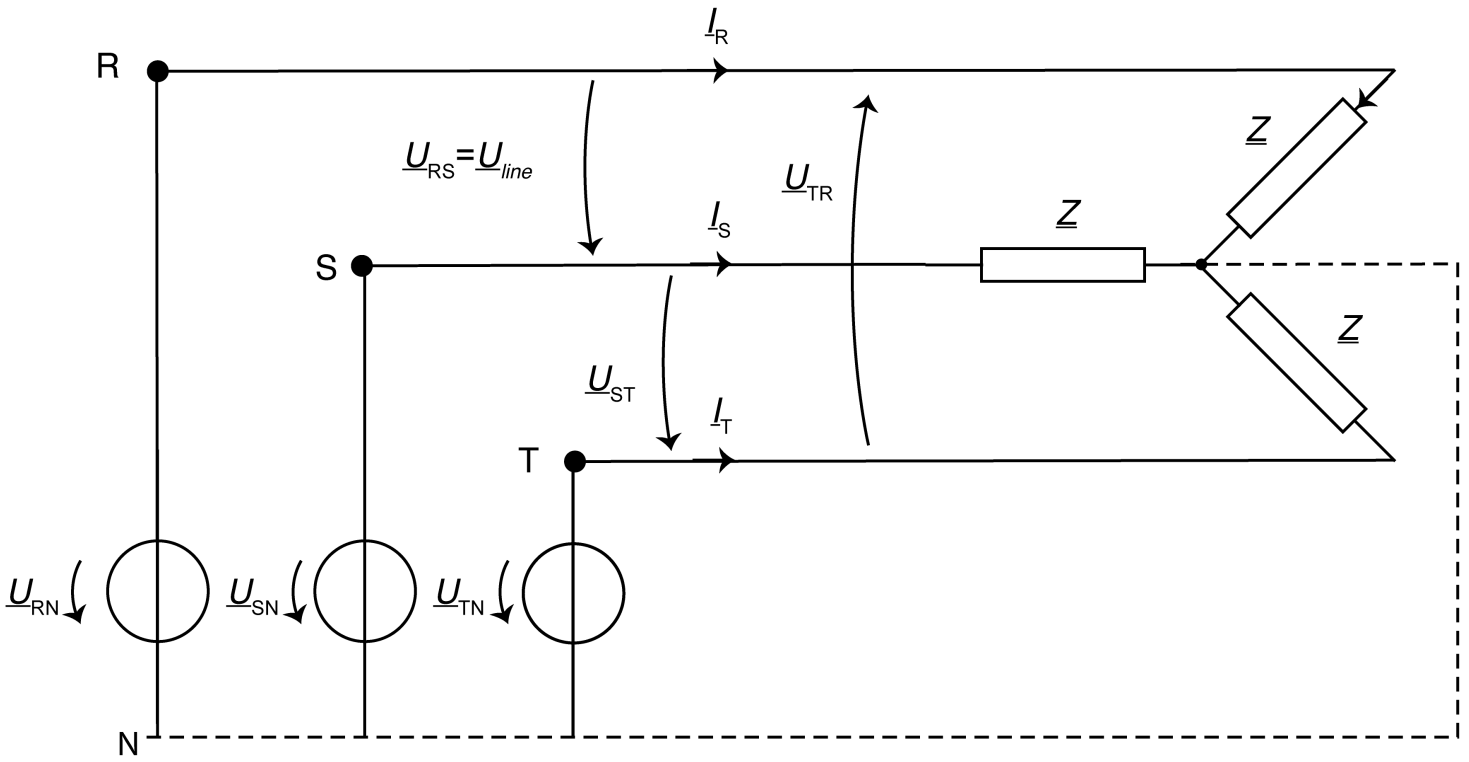
Today

- Three-phase systems:
  - Delta and Y-networks
  - Dissipated power
- Real-life examples
- What you should know after the class:
  - Currents and voltages in Delta and Y-networks
  - Time-dependency of powers

Balanced Y-network



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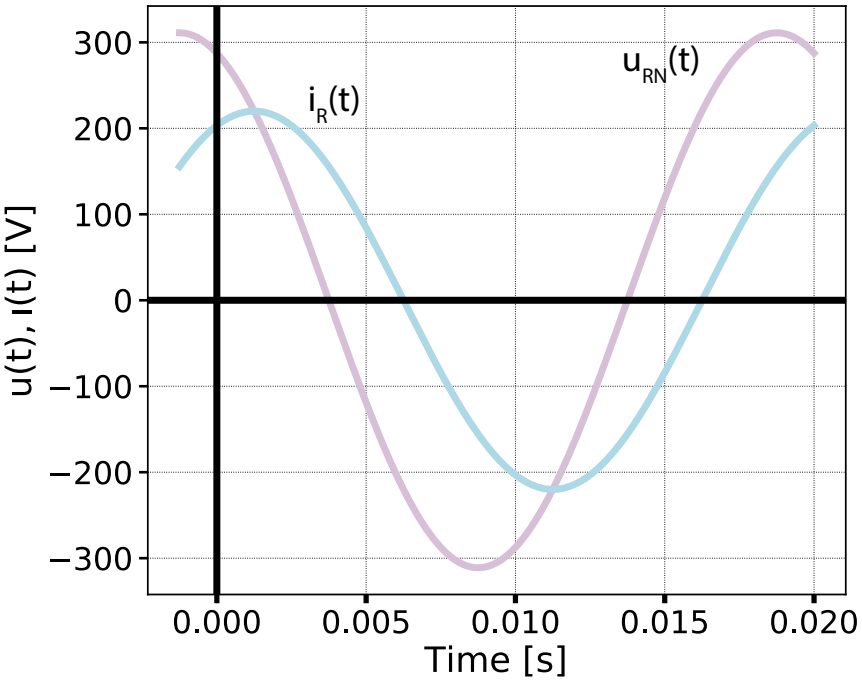
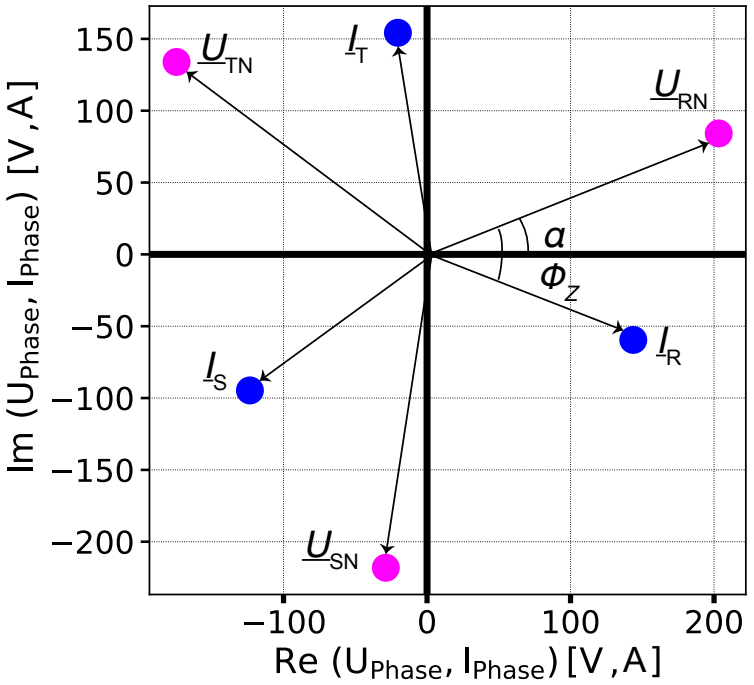
Balanced Y-network





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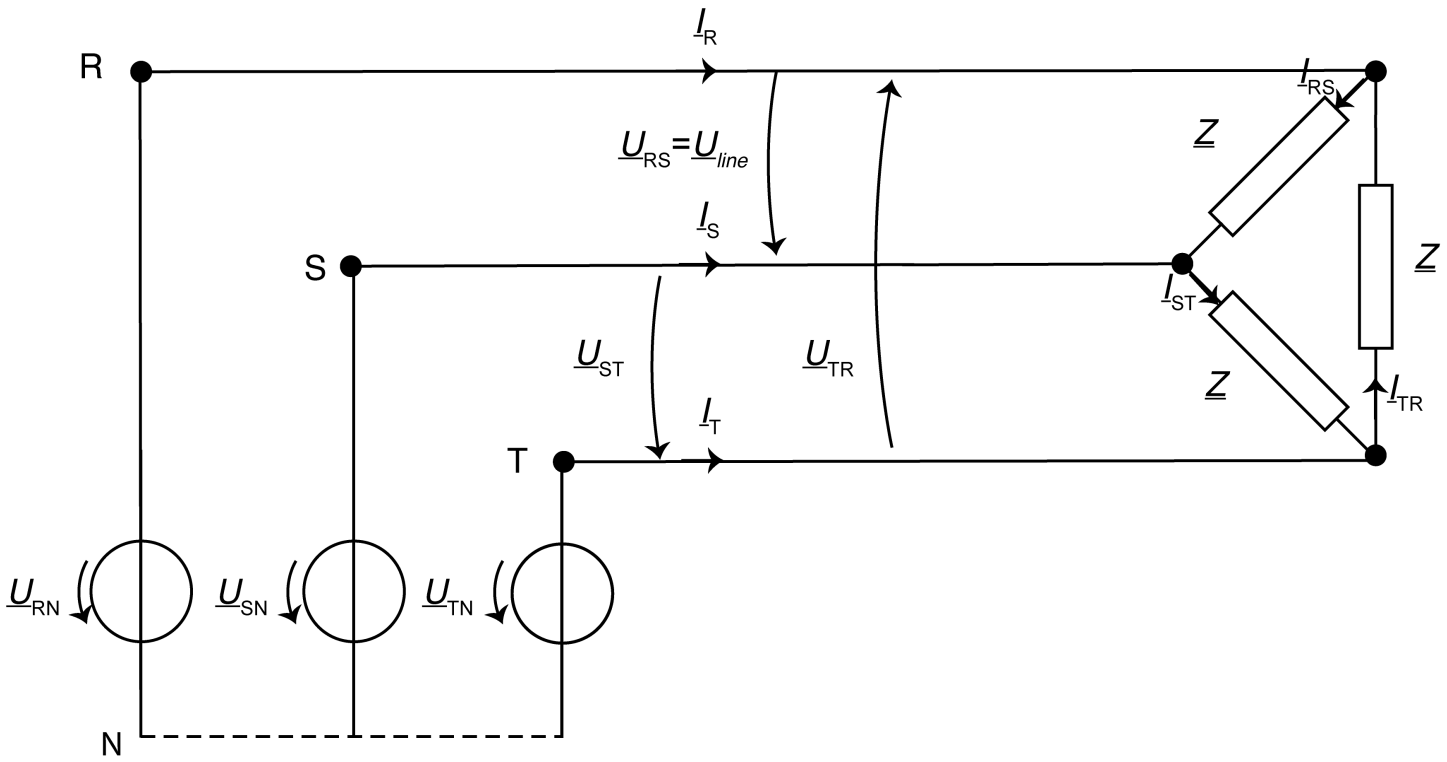
Balanced Δ-network



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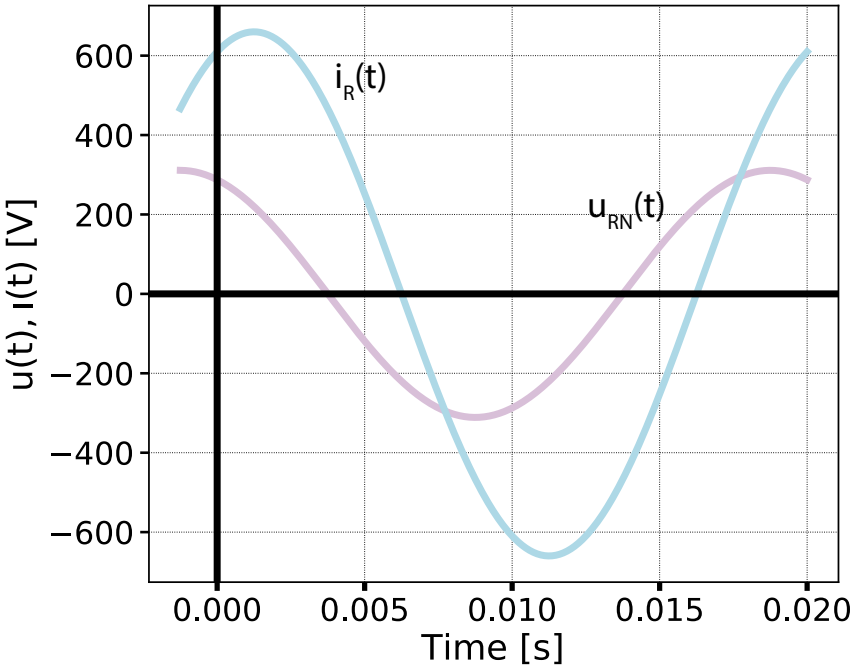
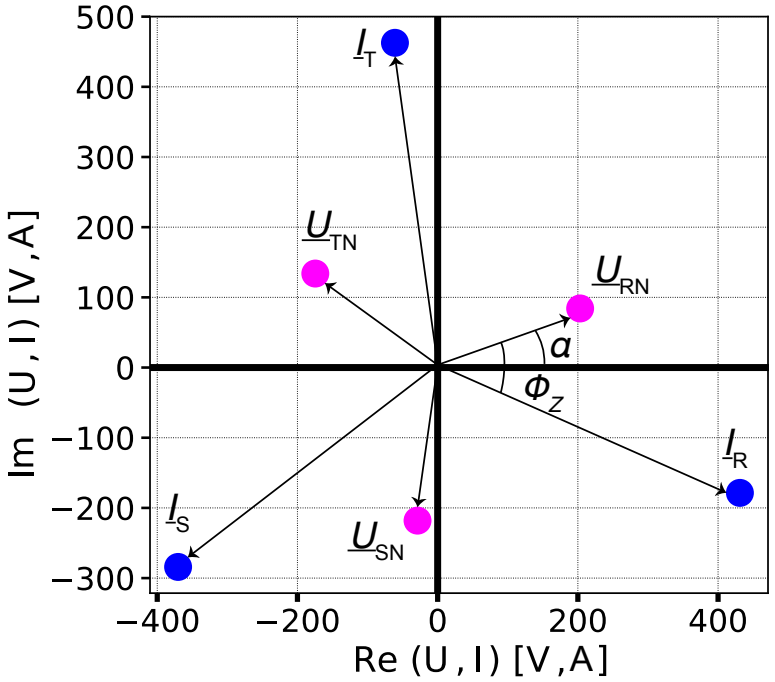
Balanced Δ-network





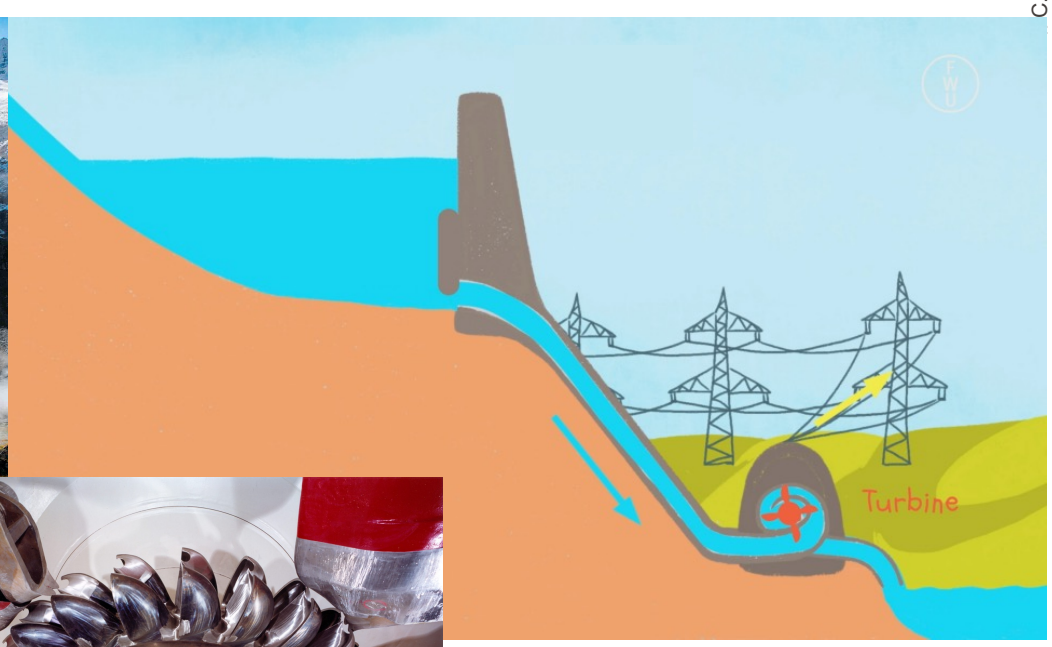
Students' questions

- Calculator during exam
  - Any calculator that does not have wifi connection.
- More exercises
  - See link on Moodle page.
  - We'll solve one past exam together in week 9.
- List of buzz words English-French.
- Typos etc are listed online.

More exercises can be found here.

Erratum script and exercises

Three-phase systems in everyday life



Grande Dixence, Vallais

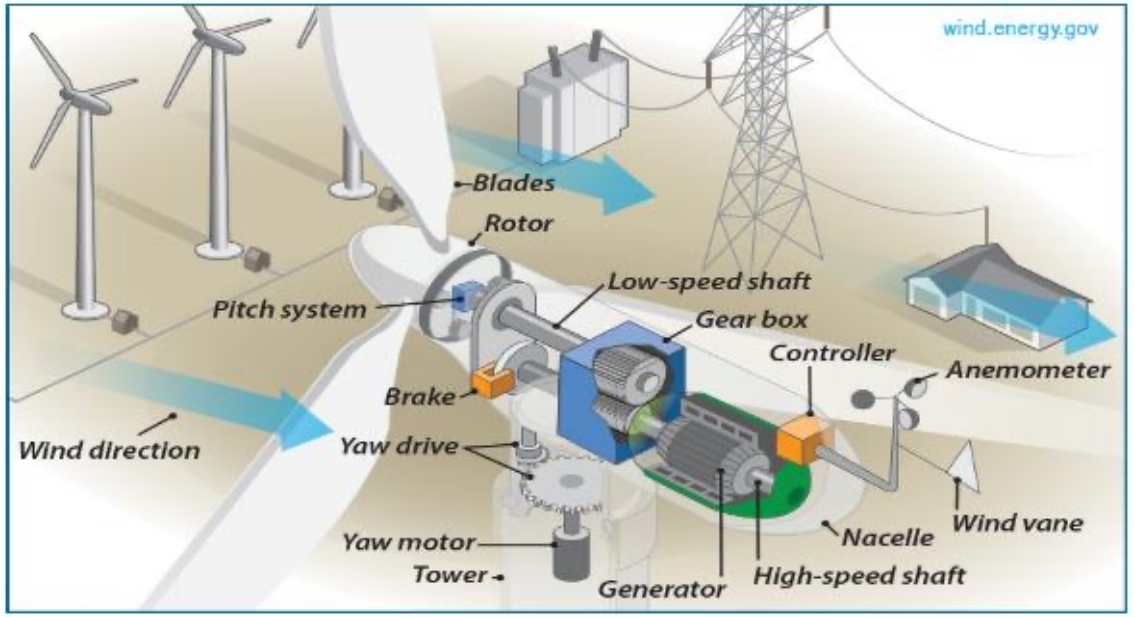
2000 MW total

C. Benea-Chelmus

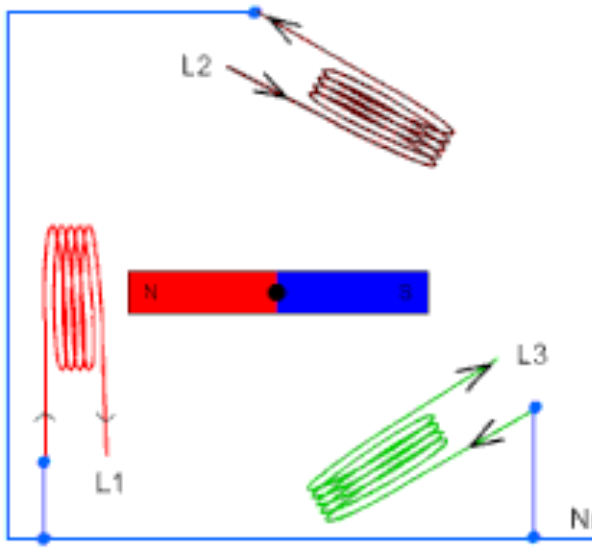
Three-phase systems in everyday life

Col du Mollendruz

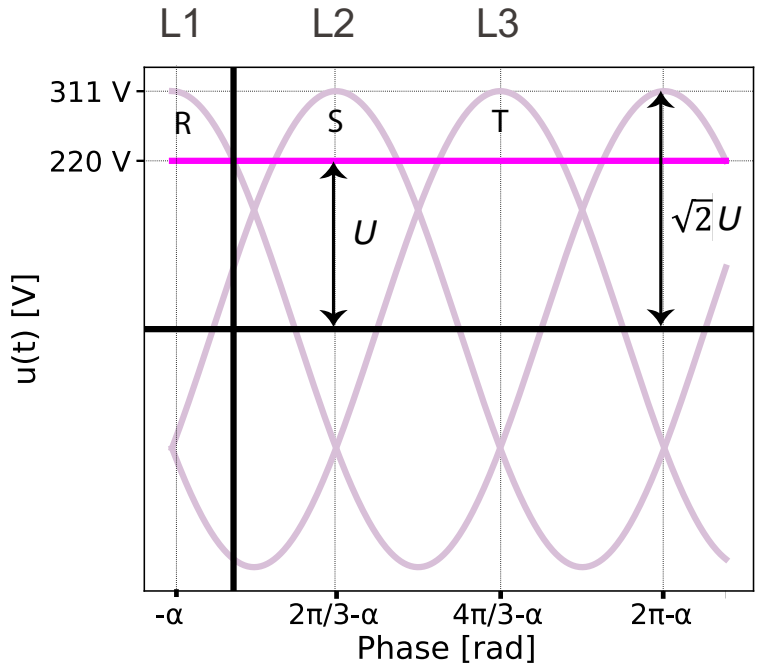
1-5 MW for each wind turbine



Three-phase systems in everyday life



wiki

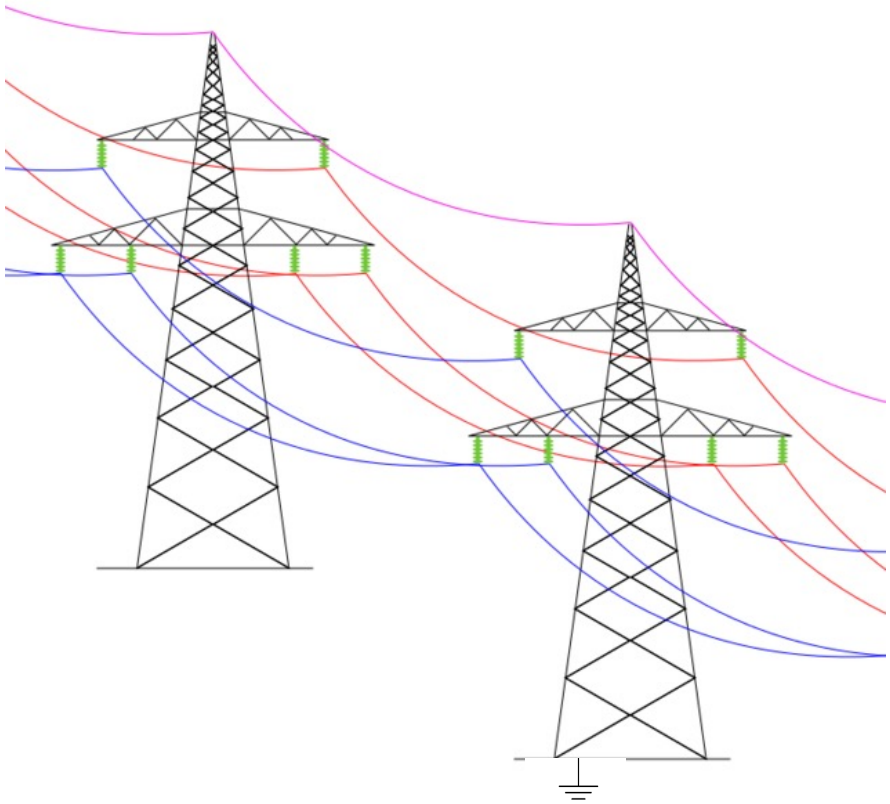


Col du Mollendruz

1-5 MW for each wind turbine

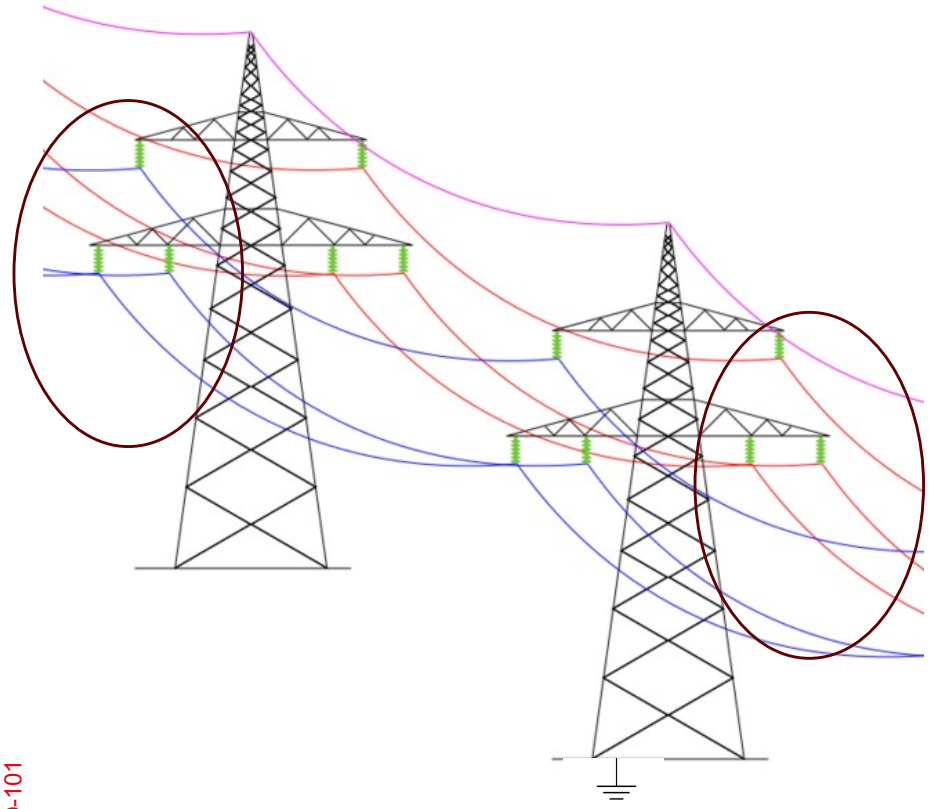
I.-C. Benea-Chelmus

Long-distance power transport



What are the various cables?

Long-distance power transport



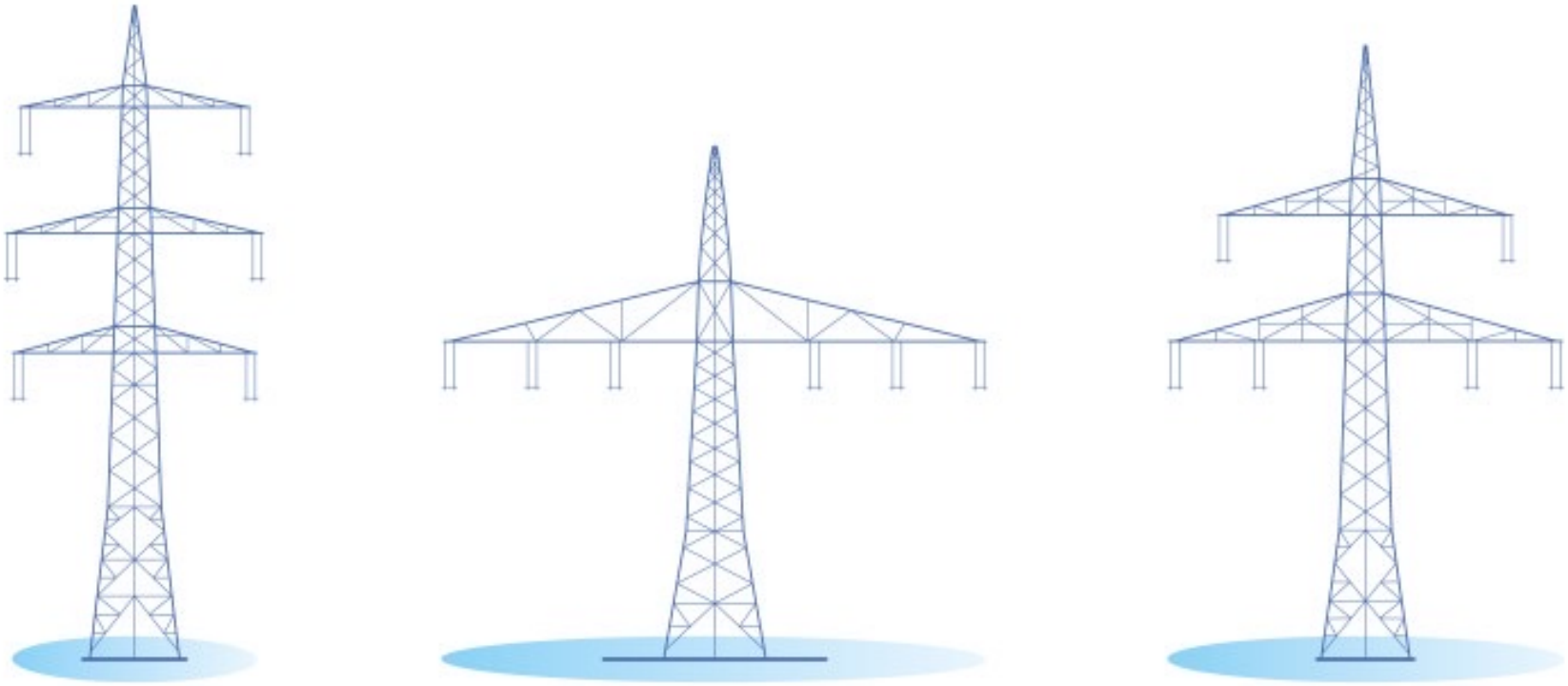
Blue: three-phase system 1
Red: three-phase system 2
Pink: earth (against lightening strike)

Green: isolators

✓ Often times no neutral in long-distance transmission

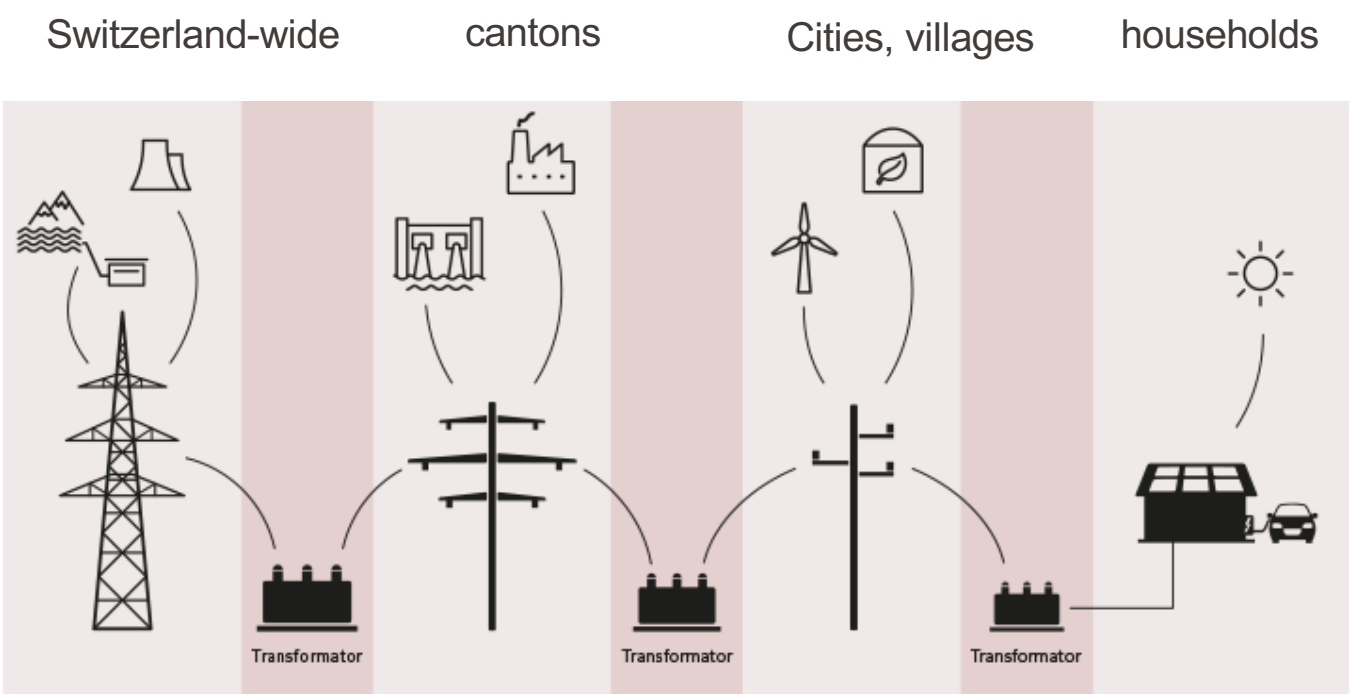
Implication: save neutral conductor over 100s of km

Long-distance power transport



- ✓ Various models, dependent on landscapes and animal habitats
- ✓ Transport several three-phase systems in parallel: less infrastructure, more power, better risk management in case of failure

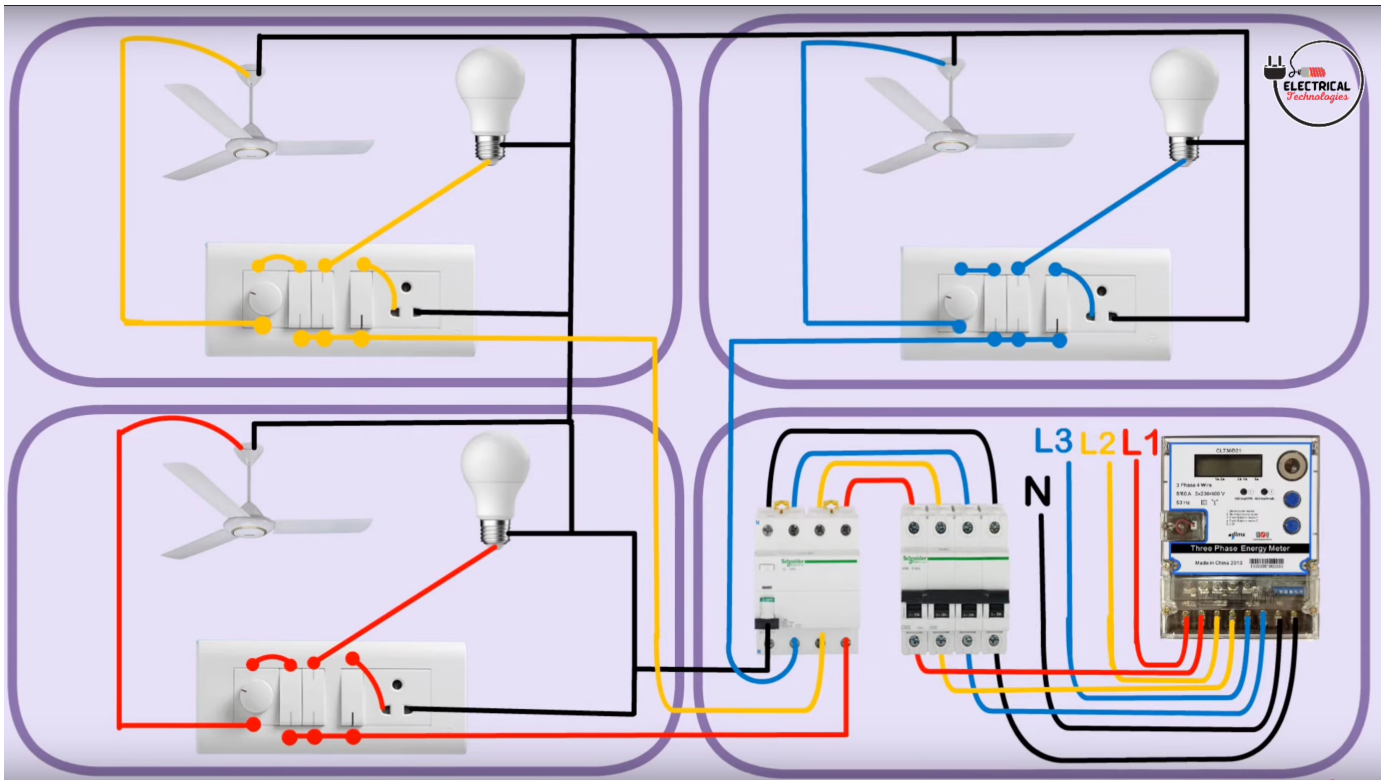
Distribution close to home



380 – 220 kV transmission	36 kV - 150 kV	1 kV - 36 kV	< 1 kV

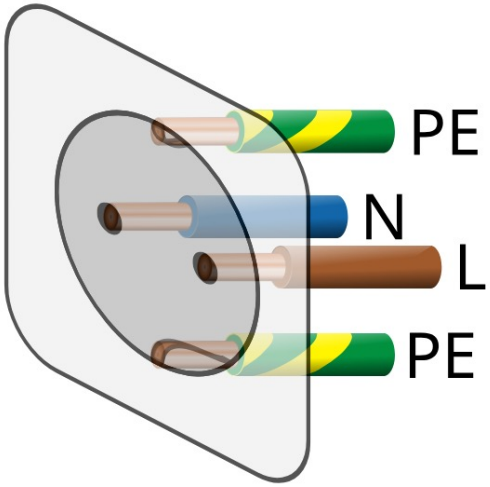
Distribution close to home

Older/smaller apartments with low energy consumption: single-phase network
Newer apartment buildings with AC/ ventilation/ solar energy: three-phase network

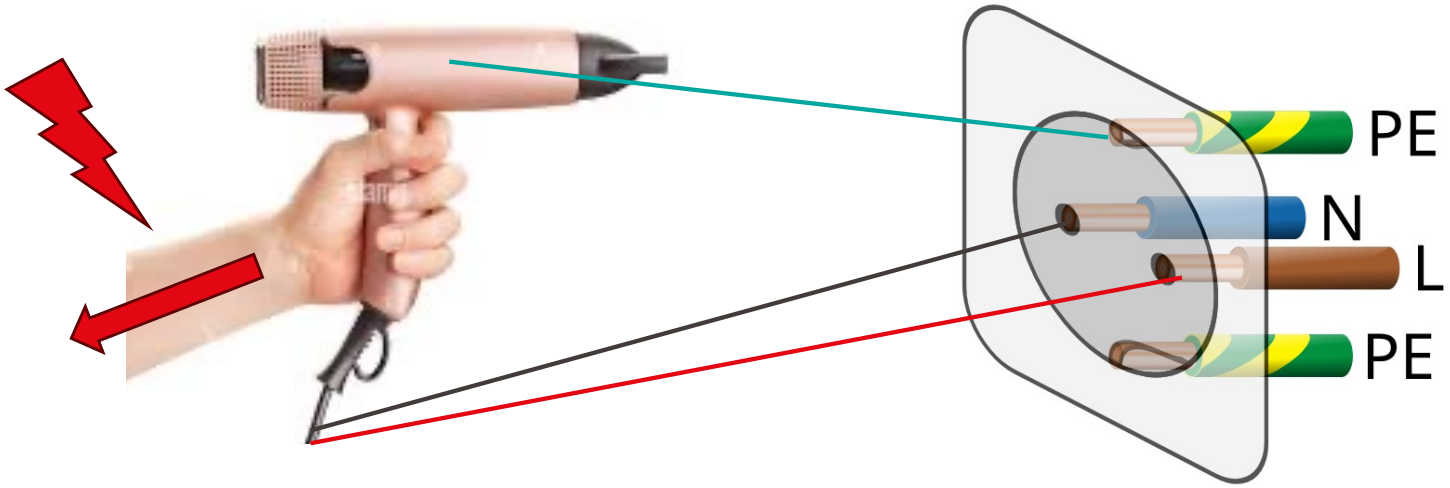


✓ BUT a neutral in the distribution (close to home, since it requires balanced use, which is more difficult to ensure at all times over smaller networks)

At home



At home



N = neutral, blue
L = live conductor (phase), brown
PE = protective conductor, directly connected to earth, prohibits current flowing through the arm in case of faulty connection of high-voltage line with equipment housing when this is metallic (e.g. metallic kettle, hairdryer, microwave etc)

At home

e.g. laundry machine

3 phases, neutral and protective earth