

# EUREC College of Members Kortrijk, Belgium

## Why LVDC can deliver notable efficiency benefits and what are the challenges

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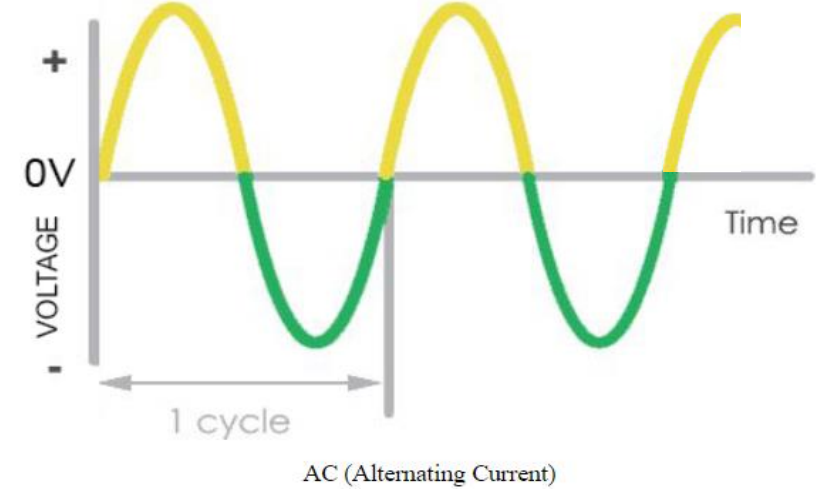
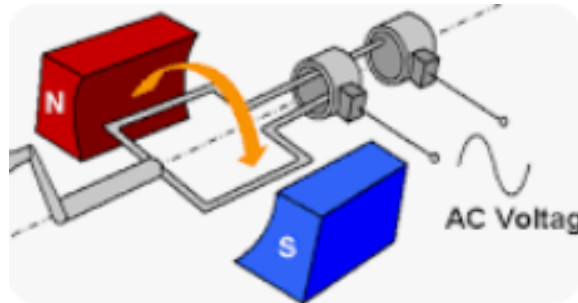
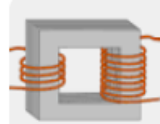
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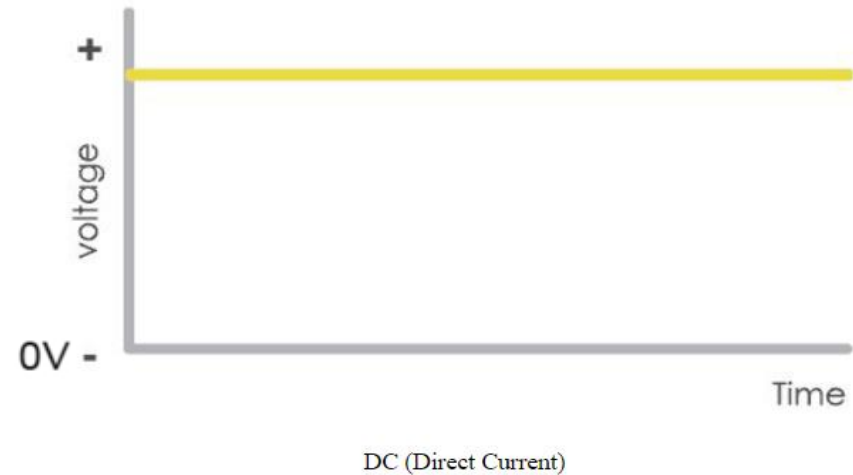
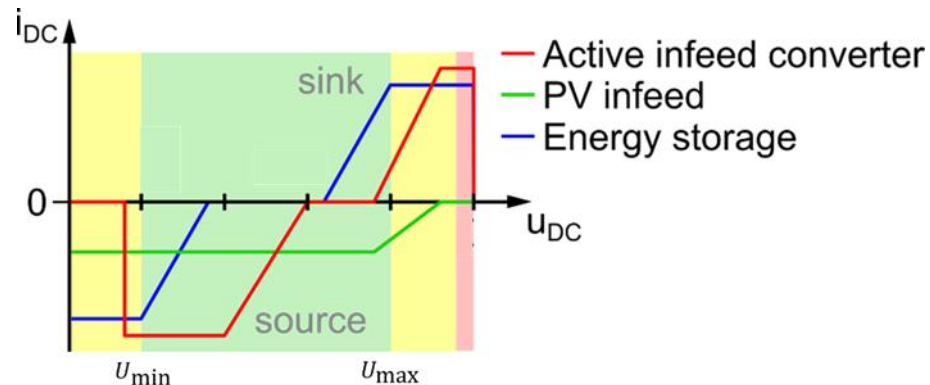
# What is the difference between AC and DC?

## Why AC has been dominating ?

- Easy voltage step-up / down using transformers
- Rotating machines generate AC current/voltage



But ....



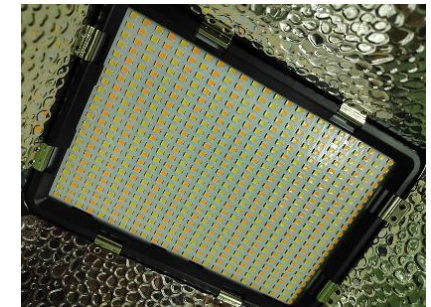
*Example of voltage droop curves*

## Most applications are DC-based or DC-ready

- **Renewable energy:** Solar PV, Wind, ocean energy,
- **Storage:** electrical battery (stationary and E-Vehicles)
- **Electronics:** LED-lighting, IT/office equipment,
- **Variable speed motor drives** in: motors, robots, heat pumps, washing machines, dishwasher, vacuum cleaner ... **include DC-link** in frequency converters: AC->DC->AC
- **Resistive heating:** stove, oven, water boiler can work on both AC as DC



Sources: [https://commons.wikimedia.org/wiki/File:Mennoki\\_Wind\\_Power\\_station.jpg](https://commons.wikimedia.org/wiki/File:Mennoki_Wind_Power_station.jpg),  
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## Power electronics development

- 1947 bipolar transistor, 1974 MOSFET, 1982 IGBT
- Enable **DC voltage step-up/down, switching ...**

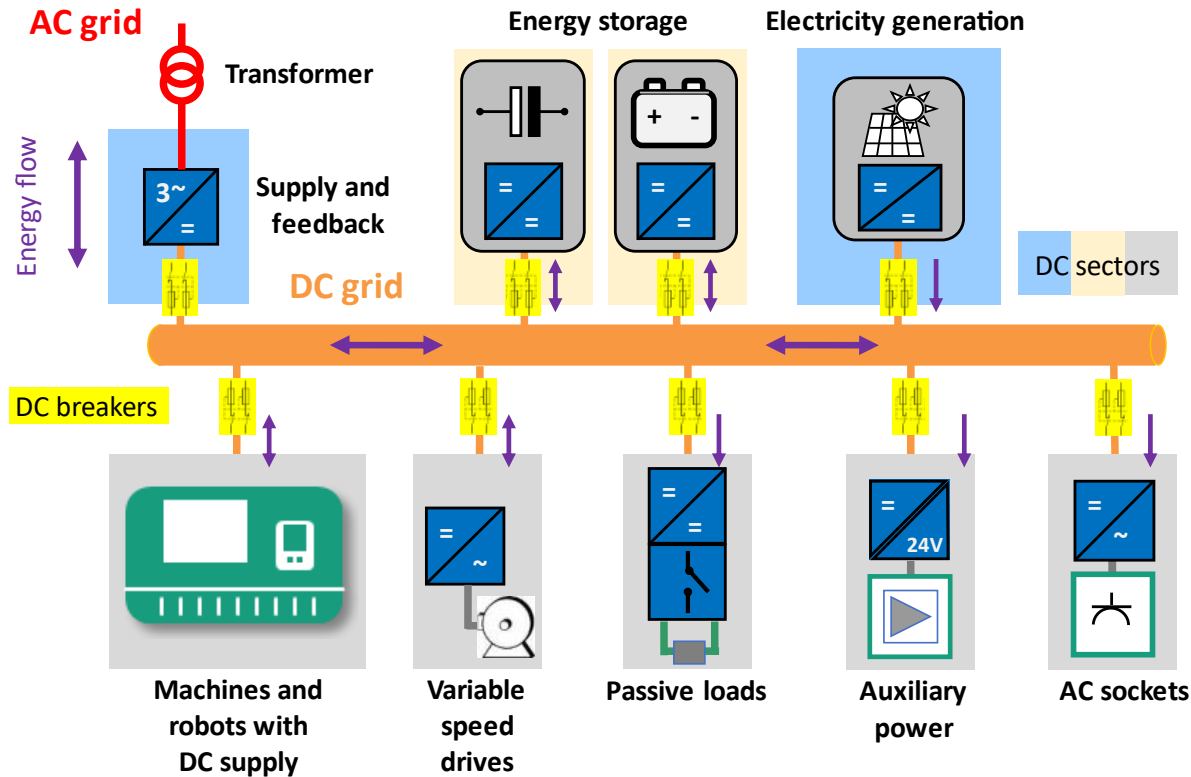
- **EU energy policies**

- EU energy Policies calling for necessary measures for investment in clean energy & efficiency
- Increasing the use of DC technologies will be beneficial to the electricity system delivering higher efficiencies for equal energy final use

- **EU energy policies**

- Energy Efficiency (EED, EPBD)
- Renewables (RED), EU Solar Energy Strategy
- Flexibility (Strategy for Energy System Integration, Electricity Market Design)

# Benefits of DC (in buildings)



## Converters, cabling:

- Higher conversion efficiency
- Resource efficient: need less, simpler converters, less cabling

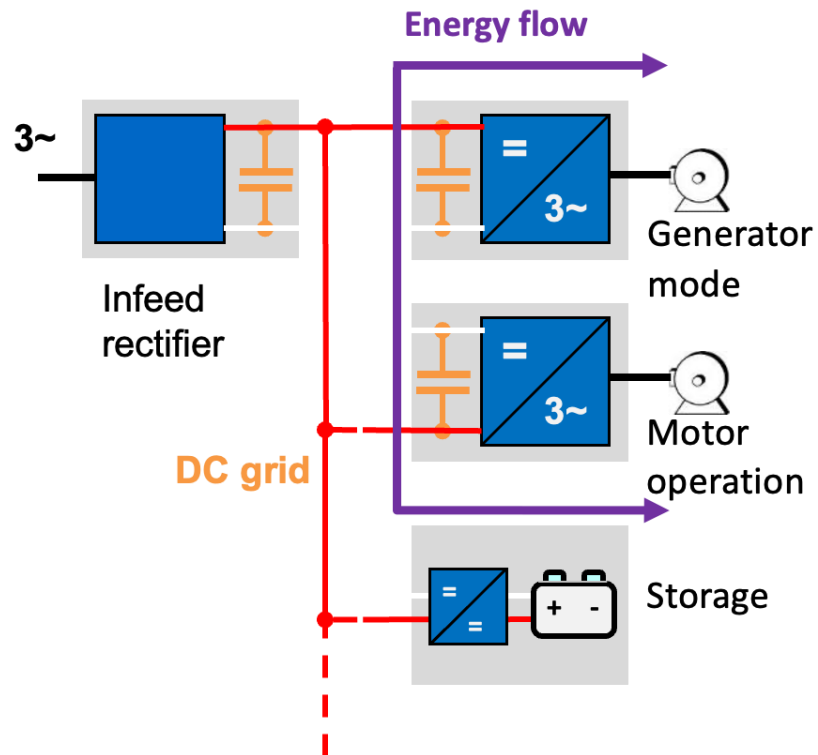
## Simple integration of renewables & storage and demand response

- Direct integration at DC-level
- Yields higher self-consumption

## Peak power shaving

- reduced connection capacity by 40 to 70%

# Benefits of DC (in industry)



## Decreased cabling needs

- less copper and/or less power loss

## Simple integration of renewables, storage and demand response

## Motors' braking energy recovery

- Complete recovery motional energy
- No waste into heat of braking resistors

## Peak power shaving

- reduced connection capacity by up to 85%



# Thank You

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