

DC AS FUTURE ENERGY CARRIER

Anyone who is familiar with the early history of the utility industry knows that a battle raged over whether the electric grid should be Direct Current (DC) or Alternating Current (AC). Thomas Edison and General Electric favoured DC while Nikola Tesla and Westinghouse thought AC would be best. Ultimately, AC power won out because of the ease of changing voltage levels with a transformer. So today, with few exceptions, the electric grid is predominately AC. However, it appears that DC may be on the verge of a comeback of sorts. Digital equipment, solar PV, batteries, electric vehicles and other end-use devices all require DC power.

DC grids can manage much longer distances than the current low-voltage on AC. A DC grid is less susceptible to interference and leads to less energy losses. DC grids can carry the same level of power over thinner lines, compared to the existing AC grid, making a DC grid more sustainable. Also, the DC grid is free of electrolytic capacitors, so that the lifetime of the DC drivers is longer than the AC drivers.

Next to the benefits above, many additional features can easily be implemented by making DC grids also Smart Grids. Embedded systems can control the energy demand and energy flow from source to consumers. Intelligent algorithms are able prevent hazards in case of short-circuits and open connections. External storage devices as electric vehicles can be integrated temporarily for charging or to deliver even more energy. These benefits will make DC grids and DC Smart Grids the preferable choice for the future.

Direct Current-technologies are rapidly gaining attention worldwide because of its efficiency and potential for sustainable solutions. In order to supply the country and its industry with adequately trained professionals in the field of electrical and electronics engineering, this project aims to develop and implement a new educational program, with new courses and materials on DC-technologies for South African universities (Electrical and Electronics Engineering).