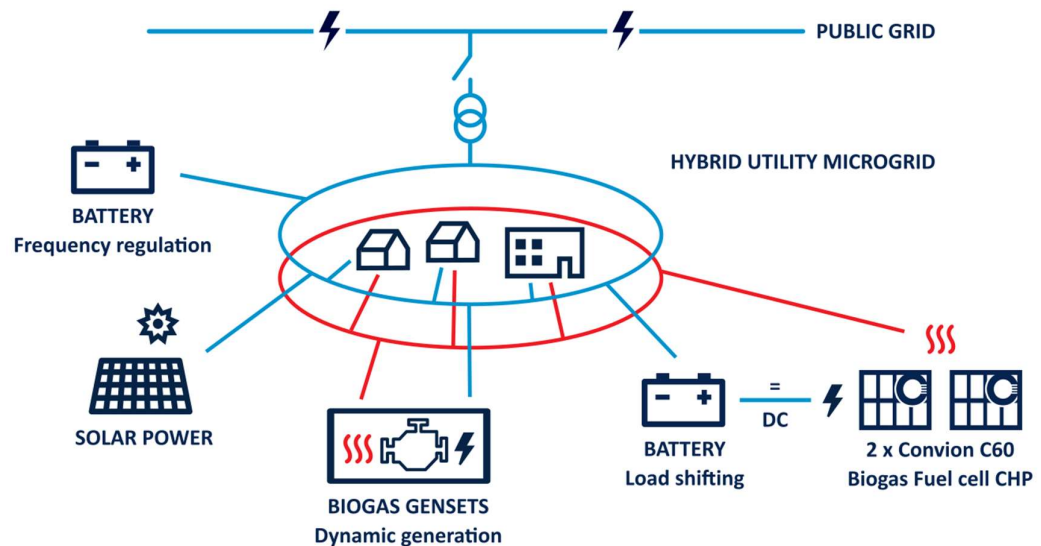


Fuel cell co-generation as a local energy solution

Dependency on secure supply of energy and an imperative of de-carbonizing power generation are behind a major transition from centralized, one-directional power system to de-centralized and distributed energy systems. Grid modernization by hybrid microgrids – miniature versions of power systems – can unlock the value of distributed energy resources based on a low carbon energy mix. In a hybrid microgrid a group of interconnected, distributed energy and storage resources are coupled and co-located with loads within clearly defined electrical boundaries. Assets such as solar PV's, batteries, building energy management systems and CHP generators play a role in forming a balanced, controllable entity, capable of grid tied operation or operation in an “island”, disconnected from the main grid.

Convion C60 is the world's most efficient mini-CHP system with electric power output of 60kW. It makes possible reliable and dependable power generation with non-existing emissions of NO_x, SO_x, PM, VOC or noise. 60% electrical efficiency and, by waste heat recovery, over 80% total efficiency, make Convion C60 an ideal, integrated and always-on generator in a micro grid. An ability to produce high voltage DC power facilitates direct integration with energy storage systems while avoiding intermediary steps of conversion.



Lempäälän Energia Ltd's LEMENE project aims to create a power independent business district. Located in the Marjamäki industrial area in Lempäälä, Finland, a hybrid utility microgrid is an example of power infrastructure modernization centered around city's area and economic development, providing resilient, uninterrupted and clean energy for a new area. Convion will deliver two C60 SOFC systems to Lempäälän energia, configured to supply DC power, and integrated with an energy storage system provide load shifting functionality.

The LEMENE project is a prime example of bottom-up approach of power infrastructure modernization where a combination of technologies facilitates local production of energy in ways that are economical, sustainable and improve systemic resilience. The direct economic benefits of microgrids result from improving overall energy efficiency by reducing primary energy consumption and by aligning consumption better with availability of zero marginal cost solar energy. Convion C60 fuel cell systems' role is to produce electricity and heat continuously. Base load operating mode maximizes benefits of high efficiency and low emissions of SOFC's. Modularity of SOFC's makes possible future capacity increases flexibly.

Indirect benefits of the approach include ability to defer or avoid costly investments in grid reinforcement as a result of load reduction on the main grid and avoidance of losses associated to power outages or insufficient power quality.

Integration of local assets at the distribution grid level helps in avoiding transmission and distribution losses of power and aggregation of flexibilities of small assets within the microgrid makes possible participation in ancillary services' market. In an event of main grid outage, the microgrid can disconnect from it and maintain high quality and continuation of service for commercial and industrial customers within the Marjamäki area. Proximity of power generation facilitates efficient recovery of waste heat from exhaust of SOFC systems and engine generators, making overall fuel economy very good.

Benefits of Convion C60 fuel cell CHP systems as a local power generation solution include

- **Premium efficiency:** Non-compromising electrical and co-generation efficiency
- **Low emissions:** Zero NO_x, SO_x, HC and PM emissions
- **Fuel flexibility:** Natural gas and biogas operation
- **Power security:** Reliable, grid-independent power generation
- **Economy:** Power generation with competitive life cycle costs
- **Integration:** DC power output option for integration with batteries



For further information and enquiries, please contact convion@convion.fi