

Fig. 12. Results from final scenario.

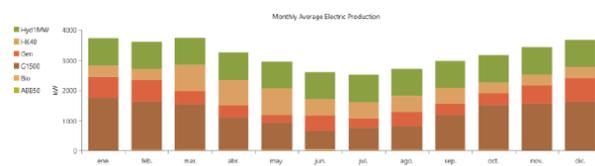


Fig. 13. Monthly electrical generation by the microgrid.

Table 2. Distribution of electrical generation by the microgrid.

Production	Type	Installed capacity [kW]	kWh/año	%
ABB Trio-50.0 with Generic PV	Photovoltaic Solar	123	123,578	0.442
Generic 500 kW Biogas Genset	Internal Combustion Engine (biogás)	500	183,438	0.656
Autosize Genset	Diesel generator	11,000	4,314,937	15.400
Generic 1.5 MW	Wind generator	3,000	10,711,557	38.300
Generic Hydrokinetic [40 kW]	Hydrokinetic generator	1,200	4,753,042	17.000
Hydro	Hydroelectric generator	1,059	7,888,888	28.200
Total		16,882	27,975,440	100.000

## 7. Conclusion

In weak networks, such as microgrids located in isolated areas, the penetration of variable source generation implies a challenge both in terms of the impact of generators on the network and the impact of the network on generators. In this sense, the power supply quality may be affected and the generators must face resonance problems in extensive weak networks, large variations of frequency and propagation of voltage drops in small isolated networks, control conflicts, low power supply quality due to the flicker effect, unbalances and harmonics, as well as voltages outside the levels.

In order to solve this dilemma, a microgrid has been designed located in the islands of the Hordaland region, in the southwest of Norway. The first step was to carry out a resource study deep enough, which has defined both the typology and availability of the resources throughout Norway, and more specifically in the Hordaland region and its islands. This investigation has concluded that the water resource is predominant both in the country and in the area of study. The availability of wind and biomass resources has also been determined. On the contrary, the solar resource is really scarce and wave energy has been discarded for being not a mature technology.

Homer software tool has been used to design the microgrid. During the simulations, it has been verified that it is relatively easy to achieve a high fraction of renewable generation in the Nordic islands, considering the actual

hydric and wind resources. No danger on network stability has been detected to be caused by the proposed design, thanks to the storage defined in the proposed system. Finally, it has to be highlighted that microgrids are becoming a reality in Europe. Although they are currently in the development stage, the first installations of this type have been installed for a few years now. Nowadays the future of electricity grids is uncertain, but many predict that within a few years the main element of the European electricity network will be the so-called "European Supergrid" and the end users out of reach of this network will be fed by microgrids.

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