



WP10: Zero Carbon Footprint

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Objective is to "Propose a plan for making the three installation sites of KM3NeT carbon neutral facilities. Investigate the possible technological solutions, legal issues, collaboration opportunities and funding schemes."



Is it feasible?



- The ultimate goal foresees each installation site equipped with 2 building blocks of detectors. With 115 DUs, each containing 18 DOMs, the energy requirement for each block is around 27kW.
- For each installation site, the energy requirement, including 2 building blocks, and the shore station is below 150kW. For 24 hours operation, 7 days a week, this translates to 1,3GWh per year. This amount of energy, can be easily supplied by either wind turbines or solar panels, which means that **KM3NeT can easily become the first large scale infrastructure with zero-carbon footprint.**



Wind power



- The average wind profile for all 3 installation sites is quite favourable for electric power generation from the wind. The wind speed in the 3 sites varies throughout the year, and the average speed is between 7-10m/s.
- The required power can be easily delivered by turbines rated at 600kW in each site, which at average market values corresponds to an investment of about 1200k€ per site, including estimates for the related infrastructure and installation space.
- Novel turbine architectures for smaller physical footprint, better integration to the local landscape, easier acceptance by the local communities.
- Definitely feasible!!



Solar panels could be an alternative solution

- Sunshine ranges from 4 hours in the winter to 12 hours in the summer, which averages to around 8 hours of sunshine/day.
- Solar panels rated at 150W which are common and cheap, would provide 1,2kWh / day over the year. Downscaling to 1kWh, this would translate to around 4500 m² of solar panels per site to provide the necessary 1,3GWh per year. With 1.2–2€ per watt, each site would need an investment of 800–1200k€ for the solar panels, plus the cost of the installation site.
- **AGAIN, feasible!!!**



- Novel approaches to tidal and wave energy generation can be a complementary option, with several groups peripheral to KM3NeT able and interested to contribute.
- The opportunistic energy output of all considered energy sources forces us to plan for energy storage to maintain 24/7 operation, with the added benefit of establishing a reliable power supply through appropriate power banks.



- The costs are quite reasonable and manageable, taking into account that they correspond to a few percent of the total cost of KM3NeT.
- With infrastructure lifetimes greater than 20 years and the wide availability of different options and solutions in the market, it is a financially attractive solution for the energy needs of the experiment.
- The proliferation of wind and solar panel energy parks in all 3 countries in question, means that there is a distinct possibility to liaise with existing such facilities and/or collaborate with local and regional authorities to enlarge the scope of such a facility for the benefit of the broader community/region.



- As separate sites are involved, parallel activities will have to be planned.
- Exploration, negotiations and identification of partners
- Investigation of legal issues
- Feasibility study
- Preparation of funding requests