

Highlights from the SES 2050 projects:

AquaFEED: Better utilization of sunlight, direct production of biofuels, and energy storage in the form of hydrogen production is achieved using aquatic microorganisms in solar-based power generation. These organisms may potentially also be grown in wastewater or seawater, and will therefore not compete with food production on land.

CO₂ Electrofuels: By adding additional hydrogen in the production of biofuels, the surplus CO₂ can be converted into biofuel. The proportion of biomass that can be converted can be more than doubled. By implementing these results industrially, the project may contribute substantially to global CO₂ reduction. In this way, Nordic companies can be pioneers in the production and use of future alternative fuels.

TOP-NEST: The project has analysed existing path dependencies and potential new value chains that arise at the intersection of energy and transport systems in the Nordic countries. The project results show that continued support is required for the development, dissemination and application of a wide range of innovation. There is a need for a greater degree of coordination between different policy areas and between the Nordic countries to achieve a transition to a sustainable energy and transport system in 2050.

NISFD: By using solar energy, one can convert CO₂ and water into renewable chemical fuels in a direct way. This technology is more energy efficient than electrolysis processes run on solar energy and synthesis of biofuels from biomass, simultaneously it can contribute to reducing CO₂ accumulation in the atmosphere.

HEISEC: The project has used several theoretical and experimental approaches to evaluate and demonstrate PETE, ie. Photon Enhanced thermionic emission, in energy production. Significant efforts to address challenges in device design, in connection with thermal stability and surface properties of the materials, are still needed before a competitive PETE device can be commercialized.

NORSTRAT: The project shows how the Nordic power system can avoid greenhouse gas emissions within 2050. The analyses show that this is achievable due to the Nordic countries' surplus of renewable energy resources.

STRONgrid: The project contributes to the improvement of the reliability of the electric power system through the development of new methods for monitoring and control. The Nordic and Baltic countries are seen as a holistic system in this project.

OFFWIND: The project has developed a forecasting tool that more accurately can predict power production from offshore wind farms by connecting different models for the factors that influence the windmills. This may make future wind farms more profitable and safer in operation, and thus more attractive.

Northsol: The project is a great showcase for solar energy in the north and PiteEnergi as a research facility. This facility has been Sweden's top solar plant in recent years, with an output of around 1500 kWh/kWp. This is an excellent result even on a south-European scale! The project has also resulted in considerable activity around solar energy in northern conditions.

ENERWOODS: The results show that wood and wood-based biomass is and will continue to be the main component of energy systems based on renewable resources. The potential for increasing wood production in a sustainable way is substantial - probably close to 100% with the current growth in the most common types of forests at present. The question is if our society and decision-makers are aware of these opportunities? Are they ready to exploit these opportunities to effectively reduce or eliminate our society's dependency on fossil fuels?