

SPROUT - System-Positive Replicable Optimized Urban-horticultural Transitions

Publieke samenvatting / Public summary

Aanleiding

Greenhouse horticulture contributes 7.9 billion € to the Dutch economy and, via its combined heat-and-power (CHP) plants used for electricity, heat and CO₂ demands, it provides 11% of the yearly national electricity supply and 10% of the dispatchable power capacity that balances the increasing variability of demand and renewables on the grid. However, the energy transition requires horticulture to shift from fossil CHPs to sources like geothermal and solar. If this occurs, the sector would turn from a flexible net electricity producer into an inflexible net electricity consumer. The grid would lose flexible CHPs and need new, ad-hoc dispatchable capacity investments, as already occurring in some areas. And yet, horticulture has the potential to solve and accelerate the Dutch energy transition by shifting to innovative Multi-Carrier Energy Hubs (MC-EHs), where many renewable generation, conversion and storage technologies across diverse carriers integrate smartly. MC-EHs can be designed to benefit not only local greenhouse needs but also to act as system buffers that support larg

Doelstelling

SPROUT's goal is to transform greenhouse horticulture from a carbon-intensive electricity supplier to a system-positive, carbon-neutral 'flexibility supplier'. Doing so, the project will accelerate the Dutch carbon-neutrality goals, limit the need for investments in new dispatchable capacity, foster renewables integration and aid

Projectinformatie / Project information

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MOOI25002

Subsidiebedrag / Grant amount
€ 3.240.238,00

Algemene informatie / General information

Penvoerder / Secretariat
Faculteit Techniek, Bestuur en
Management (TBM)

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congestion mitigation. The project contributes decisively to the ambitions of the MOOI call, in particular to the themes: 'Conversion and storage', with novel methods for the optimal combination and operational coordination of MC-EHs and practical guidelines for scale-up; and 'Large-scale use', with original tools and algorithms for the flexible use of energy and demand-side management. SPROUT also benefits indirectly the theme 'Transport and distribution', as the envisioned system-positive MC-EH operation mitigates grid congestion and facilitates renewable surplus integration. Moreover, SPROUT benefits the MOOI's broad ambition to improve overall system reliability by fostering supply diversification and flexibility maximisation.

Korte omschrijving

We achieve the above results across four work packages. First, the design, implementation and testing of a real-life pilot of an MC-EH for horticulture at the MW scale at the greenhouse facilities of Division Q in Melle. The pilot's combination of technologies and carriers will maximise potential for system positive behaviour and will serve as a blueprint for future pilots. Second, the development of a smart control system that maximises the operational flexibility enabled by the system-positive design, tested in Melle but devised for smooth adaptation to any other system. Third, the design of a web app allowing any horticulture company to quantify how to adapt the system-positive MC-EH concept to the specific technology options and constraints of their use case. Fourth and final, the co-design of practically actionable guidelines for horticulture companies to devise viable business cases based on their specific conditions, and for planners and horticulture as a whole to facilitate the scale-up of system positive MC-EHs to the entire sector and energy system.

Resultaat

By the end of the project, horticulture has a practically demonstrated capacity to transition to system positive MC-EHs - with a pilot at the MW scale - and the tools to scale up such a transition to the whole sector rapidly - including renewable

energy management systems and a web app to adapt the piloted design to other systems. The success of our project will have a wide range of disruptive positive societal impacts, including, in the first 10 years, a higher integration of renewables in the national energy system, the mitigation of grid congestion, the avoidance of unnecessary investments in new dispatchable capacity, the acceleration of the emission reductions expected from horticulture, which currently amount to about 4% of the total emissions of the Dutch economy, and a spill-over effect in sectors beyond horticulture, leading to an overall higher development of MC-EHs in the Netherlands.

De data in deze applicatie is afkomstig van de Rijksdienst voor Ondernemend Nederland (RVO) en wordt in samenwerking met de Topsector Energie ontsloten.

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