

KSTAR Case Study NETHERLANDS

The Green Pump Paradox:
A Petrol Station's Journey to
Solar Dominance

with KSTAR BluePluse Energy Storage Solutions



Introduction

Minitopia Valkenswaard successfully developed 13 fully electric tiny houses using only a single 3x25A (17 kW) grid connection—normally sufficient for just one average household in the Netherlands. Through the use of a 50 kW / 107.5 kWh neighborhood battery, rooftop solar panels, and a smart Energy Management System (Eniris), the community enjoys reliable peak power, backup supply, and fair individual metering. The entire project was realized in less than six months: sustainable, affordable, and a pioneering example of how to build despite grid congestion.

Summary

Minitopia Valkenswaard is a tiny house community that turned a major grid limitation into an opportunity for innovation. With only one 3x25A connection available from grid operator Enexis—typically enough for a single household—13 families needed to live, cook, and heat entirely on electricity.

Solar Crew engineered a complete energy solution in under six months: a central neighborhood battery (50 kW / 107.5 kWh, K-Star) connected to decentralized solar installations (4–8 panels per home) and controlled by Eniris' smart EMS. The system supplies additional power during high-demand moments, recharges during off-peak hours, and provides backup energy in case of outages. Two Easee charging stations were integrated, and each home was fitted with its own kWh meter for fair energy allocation.

This project demonstrates how innovative technology and collaboration can make sustainable housing feasible even under grid constraints. It highlights how tiny house concepts can alleviate the housing crisis while serving as scalable blueprints for future energy-resilient communities.

Background and Mission

The Dutch housing shortage demands new, creative housing solutions. In Valkenswaard, a group received permission to build 13 tiny houses but faced a nearly impossible challenge: only one small 3x25A grid connection. With no gas available, all households had to rely fully on electricity for heating, cooking, and daily living. Without innovation, the project could not move forward.

The mission: create 13 sustainable and affordable homes within existing grid limits—proving that living and energy transition can go hand in hand.

Technical Solution

- **Central Neighborhood Battery:** 50 kW power, 107.5 kWh capacity (K-Star), delivering peak power and backup electricity.
- **Solar Panels:** 4–8 panels per home connected via Huawei inverters, contributing to self-sufficiency and battery charging.
- **Smart EMS (Eniris):** Optimizes battery charge and discharge moments based on dynamic EPEX hourly prices, solar irradiation, and forecasted consumption. PV inverters and chargers are intelligently curtailed and managed for maximum efficiency.
- **Charging Infrastructure:** Two 11 kW Easee chargers available only when sufficient grid or battery capacity is present.
- **Backup Power:** The battery provides emergency power during outages; for extreme conditions, a generator can be connected to guarantee heating and supply continuity.
- **Individual Meters:** Each home has its own meter cabinet and kWh meter for internal settlement, all under one shared energy contract.

Partners and Collaboration

Key contributors included Solar Crew, the Municipality of Valkenswaard, Rabobank as investor and subsidy partner, local groundwork contractors, and multiple installation and technology suppliers. The joint effort enabled full project delivery from concept to completion within just six months.

Project Name :	Sustainable Valkenswaard Community Microgrid
Country :	The Netherlands
Year:	2025
Project Scale:	50 kW / 107.5 kWh
System	Shared 3x25A (17 kW) Grid Connection with
Configuration	Central Battery & Decentralized PV
Application:	Overcoming Grid Congestion for a fully electric, gas-free residential community (13 homes). Includes peak shaving, backup power, and EV charging.



Innovation and Complexity

- Realized 13 homes on the capacity of a single standard household connection.
- Fully integrated system combining neighborhood battery, PV, EMS, EV charging, and backup functionality.
- Showcases that grid congestion does not have to halt development—it can inspire smart solutions.
- Achieved in record time, despite complex permits and technical integration.

Impact and Social Value

- 13 new sustainable homes built during a nationwide housing shortage.
- Residents benefit from affordable, gas-free, and largely self-sufficient living.
- The system ensures a reliable power supply and keeps development possible even with limited grid capacity.
- Demonstrates to municipalities, housing associations, and energy cooperatives how innovative energy systems can unlock new housing potential.
- Contributes to the energy transition through renewable integration, smart control, and collective optimization.

Future and Scalability

Minitopia proves that small communities can thrive even under severe grid constraints. The concept can be scaled to social housing, co-living projects, or temporary housing developments. By combining neighborhood batteries, EMS management, and integrated charging infrastructure, this model offers a replicable framework that accelerates both the energy transition and sustainable housing expansion.

