Energy solution: Holoni

Piloting in: Copenhagen

Introduction

HOLONI enables municipalities, local sustainable brands and energy retailers to assess the true potential of city solar, exchange local green energy and, at the same time, reinvent their community and commercial relationships to prosumers towards collective sustainable impact. HOLONI leverages Artificial Intelligence (AI) to predict and analyze solar surplus potential across the city and Distributed Ledger Technologies (DLT) to automate result-based reward and incentive schemes for urban solar prosumers. HOLONI also integrates ORIGIN, a prototype solution developed by Energinet to verify the origins of electricity by the hour.

HOLONI builds AI, Blockchain and IoT solutions at the crossroads of clean energy, fintech and smart cities. With inputs from local prosumers and enterprises in Copenhagen, the HOLONI solution will act as a catalytic tool towards positive energy districts, renewable energy communities and, in the future, local energy markets. Based on this first AI4Cities experience, HOLONI aims at growing a wider portfolio of digital solutions to empower prosumers, democratize asset ownership and financing, and accelerate the deployment and efficient use of shared Distributed Energy Resources (DER).

The challenge

What if the city could produce a significant share of its energy consumption from solar rooftops? What if citizens could invest in shared solar PV and batteries on better terms? What if prosumers could sell their solar surplus within the city at a premium price? What if local companies and institutions could turn energy bills into a competitive advantage? Noting that It has never been more urgent to confront the global climate crisis and accelerate the transition to reliable, accessible, and affordable carbon free energy. Holoni argues that large electricity systems – including cities – must transition from centralised, fossil-fuel reliant power grids to more flexible, decentralised systems that are entirely powered by carbon-free energy assets. In this context, Holoni has developed Solar Surplus Predictor (SSP), an AI-powered Cloud-based platform helping municipalities, energy companies and energy consumers to assess the potential for solar production and surplus throughout the city, and simulate alternative deployment scenarios and their impact on CO2 emissions.

The solution

Holoni is a solution framework aimed at massively scaling solar deployment in cities and accelerating their transition to a net zero future. It seeks to provide urban solar ecosystems of prosumers, offtakers, energy retailers and municipalities innovative tools to assess the potential for solar energy generation, catalyse larger investments in rooftop solar PVs and facilitate the trustworthy sharing and trading of solar surplus across the city.

The solution consists of three components:

1. AI Solar Surplus Predictor uses Artificial Intelligence to predict the solar surplus potential of a given community/district and provide advanced analytics to support financial and energy management decisions
2. Green Surplus Marketplace, a Distributed Ledger Technology (DLT) enabled digital marketplace platform to enable prosumers to sell their collective solar surplus value to local offtakers.

3. ORIGIN is an open source digital solution connected to the national Data Hub developed by Eenerginet, the Danish Transmission System Operator, to enable green sourcing verification in near real time

Holoni contributes to reductions by catalysing investments in urban solar, thereby replacing net energy inflow in the city with local carbon-neutral generation. Indirect impact on carbon emission reduction will be triggered as the planned positive energy districts, local energy markets and energy communities further optimise collective self consumption.

The AI is built upon several key methodologies within machine learning to predict and forecast energy consumption of buildings, potential and actual energy production from solar rooftops, and combine these to predict and forecast the solar surplus - electricity available for other consumers in the city use. The AI module can be used on city level, on district level and in building level. It also adds the option to filter on building types etc, according to the users preferences and needs. The AI model serves as a powerful analytic tool for cities and it will radically change the opportunity for cities to draft strategies for energy Positive District, Energy Communities, maximizing collective self consumption in the city etc. Furthermore, it is a key enabler of many other high value innovations with high carbon reduction emission potential to be successfully deployed in the cities. The most obvious one is the launch of a local market for solar surplus, but thanks to the AI and its DLT-based approach Holoni will quickly evolve towards shared batteries, virtual net metering, P2P-energy, large scale data sharing concepts for further use of AI etc.

Holoni & Ai4Cities

Joining AI4Cities allowed the HOLONI partnership to innovate with a strong climate impact purpose and iterate its solution design and business model to ensure shorter-term adoption. Emerging technologies such as AI and DLT/Blockchain have a large theoretical potential but, in practice, it is often difficult to overcome technical, legal, economic and or business model challenges towards scalable short-term impact. AI4Cities helped Holoni to experiment quickly, based on real world data, and by leveraging the Copenhagen city as a trustworthy channel for local engagement.

Ai4Cities has furthermore given Holoni a better understanding of the many different use cases for its framework. Cities can use it in many different ways. The Solar Surplus Predictor allows cities to act as urban planner by assessing the potential for solar production and surplus throughout the city- Holoni also provides a digitally enabled public incentive scheme for city solar prosumers allowing cities to act as market catalysts. The solution furthermore helps procurement managers source and certify local green energy from nearby prosumers, turning the city into a sustainable energy consumer. At the same time, the city can also act as a prosumer itself, by helping public building managers design and invest in rooftop solar beyond self consumption.

The consortium:

Holoni is a European digital cleantech startup being shaped through the AI4Cities program. It builds AI, Blockchain and IoT solutions at the crossroads of clean energy, fintech and smart cities. The team is currently developing a first suite of products to massively scale solar rooftops in cities. Through AI4Cities, Alpha Venturi, an independent Norwegian venture studio, is incubating Holoni as a new venture and develops its solution with the support of Energinet, the Danish Transmission System Operator. Through iterative design, development and testing, the partners explore an innovative digital solution framework which will help cities reduce their CO2 emissions. In cooperation with the University in Oslo and its Blockchain Research Lab, HOLONI explores the security and privacy challenges associated with the use of DLT and shapes its future R&D roadmap.

- Alpha Venturi (https://www.alpha-venturi.com/)
- Energinet (https://energinet.dk/)

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