

EnergyNet: The Grid of the Future



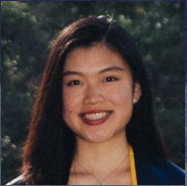
Marc Weiss

Chairman and CEO
Global Urban Development



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Global Urban Development



Layla Scott

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Global Urban Development



25th Annual
**CALIFORNIA
GREEN BUILDING
CONFERENCE**
& California Sustainability and Innovation Awards

GLOBAL URBAN DEVELOPMENT

- Non-profit organization founded in 2001
- **1000 urban leaders in 66 countries**
- Sustainable Innovation Zones: Porto Alegre, Brazil; Wheaton, US; Poznan, Poland; and Lund, Sweden, among others!



01

Introduction

What challenges does our electric grid face?

How are these challenges inhibiting green building efforts?

02

What is EnergyNet?

What is It?

How does it work?

What benefits can it provide?

03

Down the Tech Lane

Do you remember...

04

Case Studies: EnergyNet in Sweden

10 buildings, 270 units in Lund

Uppsala providing EnergyNet backbone for future development

05

Q&A

What inspiration does EnergyNet spark?

How can it enable greener building?



01 :

Introduction

Challenges Facing Our Electric Grid
Impact on Green Building Efforts



The U.S. electric grid is a glorious achievement of modern society



4,000

TWh distributed
annually



700K+

Miles of
transmission
lines



330M+

People served
across 3,000+
utilities

It's also...



OLD

100+ year-old
technology, under-
maintained



EXPENSIVE

\$1.3T+ spent in last
decade on infrastructure,
\$1.1T+ projected from
2025-2029



SLOW

80% of new generation
projects cancelled due
to interconnection
delays



VULNERABLE

Centralized system
with single points of
failure

...and it's facing more challenges



Increased demand from
electrification and data
centers



Intermittent energy
sources impacting fragile
supply / demand balance



Extreme weather
and heat only getting
worse

Current solutions are piecemeal and constrained by the limitations of the grid



Grid Hardening



Demand Response



Individual
Microgrids



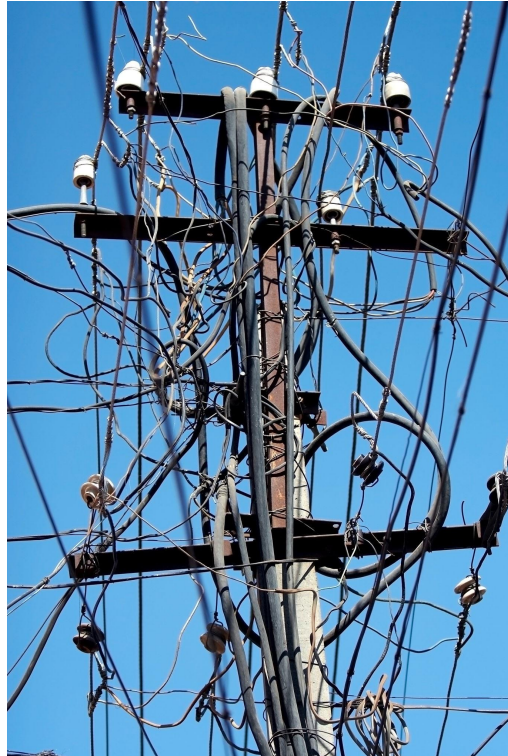
Resilience Planning
Policies

Grid security and reliability challenges are unlikely to ever be fully solved

“Achieving this vision represents an ambitious change to the existing power system and **will require sustained RD&D over multiple decades.**”

“Our current standard measures of reliability and accepted planning and operational practices **do not sufficiently address these threats.**”

U.S. DOE Grid Modernization Strategy (2024)



It's time to consider alternatives

EnergyNet can enable a world with...

- No Blackouts
- Safe integration of unlimited renewable energy generation
- A secure, decentralized energy distribution system



EnergyNet addresses grid limitations that are inhibiting LEED building principles

Electrification



Renewable Energy



- EAc1 & ECc2: Electrification / Decarbonization
- EAc4: Renewable Energy
- EAc5, EAp1, & EAp4: Data on Energy Use
- EAc6: Grid Interactive
- ECc6: Energy Resilience

02 :

EnergyNet Basics

What is it?

How does it work?

What benefits can it provide?

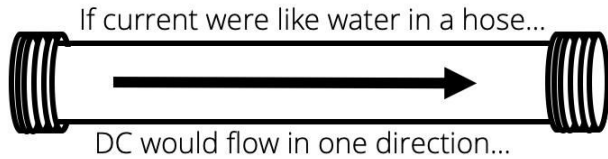


**Our very own
EnergyNet
animation!**

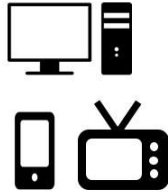
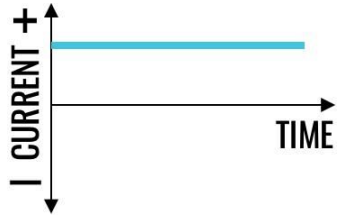
The logo for EnergyNet, featuring the word "ENERGY" in a light green, sans-serif font and the word "NET" in a light blue, sans-serif font, both in all caps. The text is centered on a white background with a subtle gradient.

AC vs DC

DC

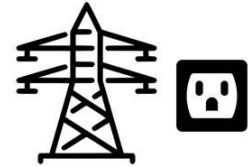
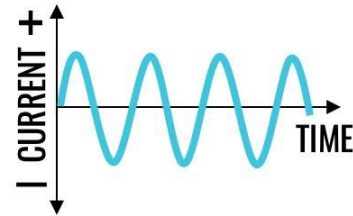
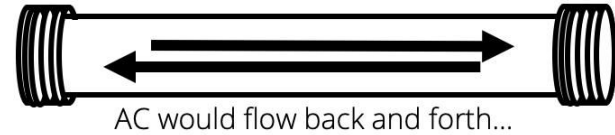


FREEING
ENERGY



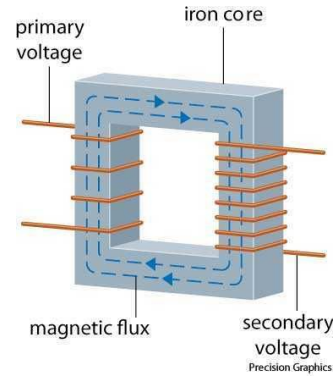
Things that use DC

AC



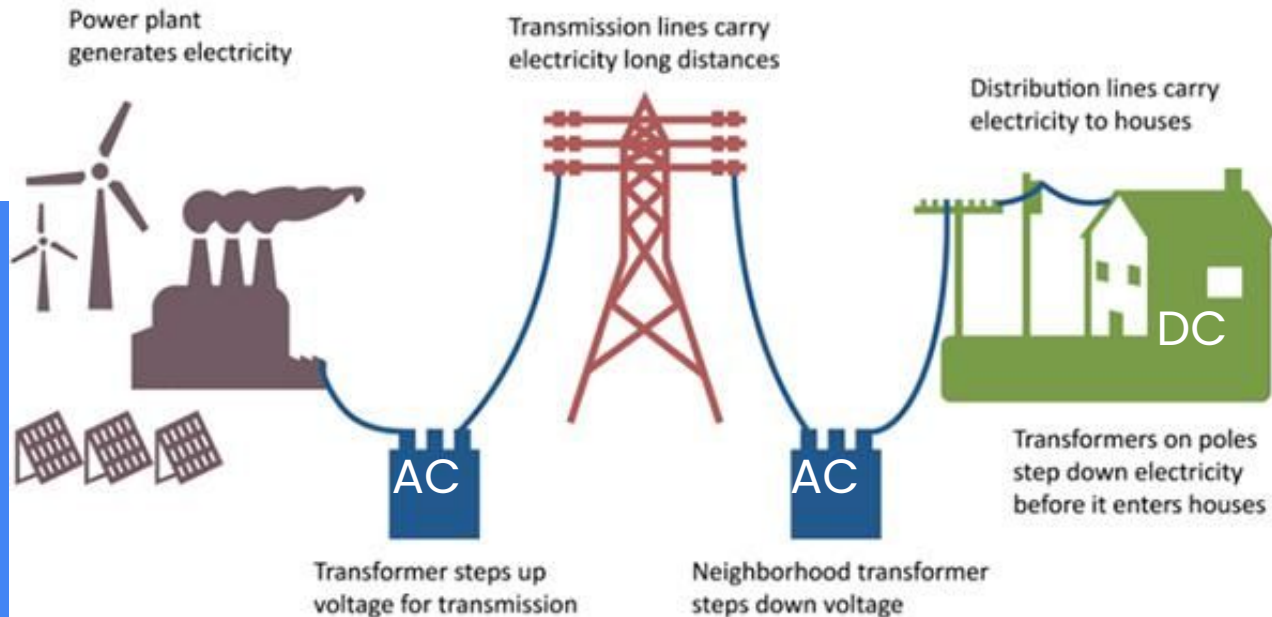
Things that use AC

Frequency
synchronization = 60
Hz



Plain Old Grid System (POGS)

$$P = V * I$$



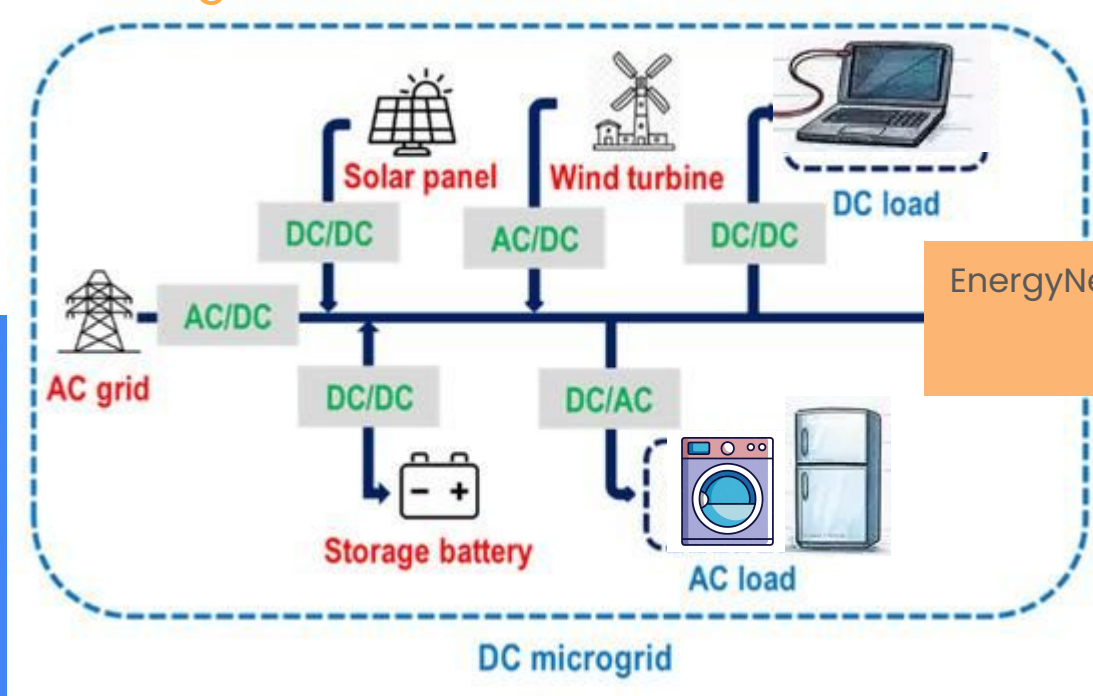
EnergyNet says...

keep the long-distance legacy AC grid where necessary,
but create local DC energy networks
and connect them using “Energy Routers.”



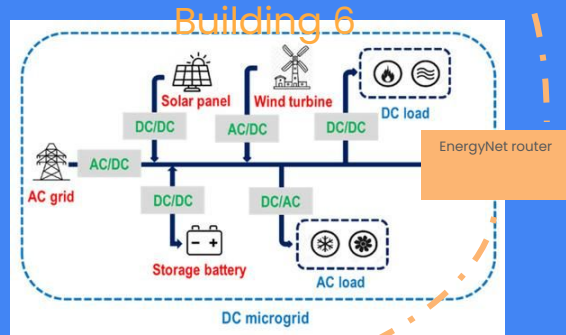
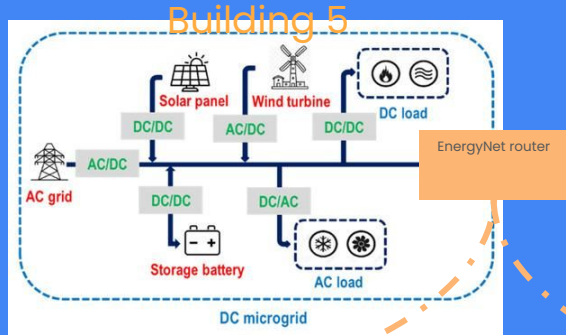
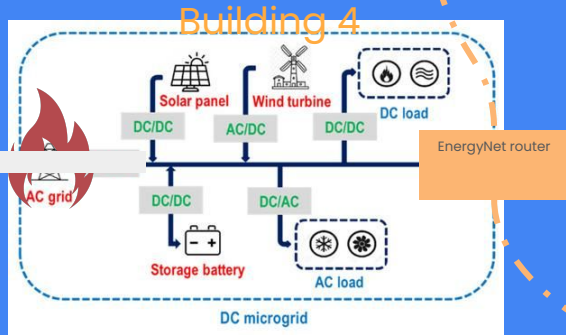
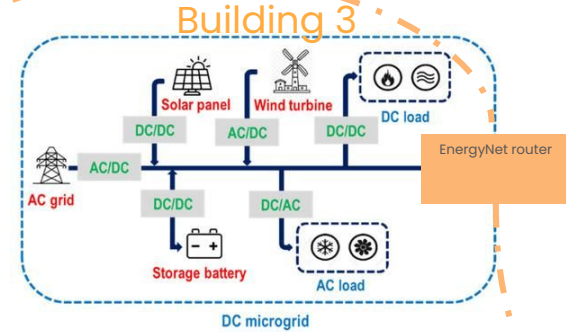
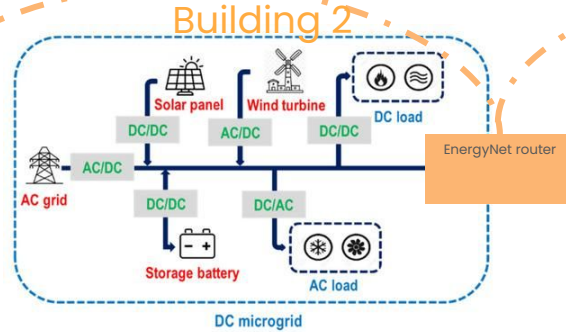
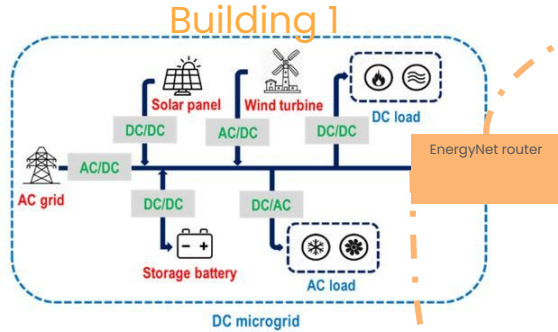
EnergyNet router = brain

Building 1



- ✓ Coordinates
- ✓ Prioritizes
- ✓ Converts
- ✓ Balances
- ✓ Communicates
- ✓ Protects

EnergyNet: network of networks



Energy Protocol (EP) = language

Set of **communication standards** that allows different types of devices to **request and exchange amounts of energy**, based on software rules; published April 2025:

A screenshot of the GitHub repository page for energyetf/energynet. The repository is public and has 2 forks and 34 stars. The main branch is 'main'. The repository contains several files, including LICENSE, README.md, entf-energynet.md, entf-ep-framing-transport.md, and entf-ep-message.md. The repository was created 10 months ago and has 13 commits. The repository is described as 'EnergyNet Energy Protocol (EP)' and has a website link to www.energynettaskforce.org. The repository is licensed under CC0-1.0 license and has 12 watchers and 2 forks.

energyetf / energynet Public

Notifications Fork 2 Star 34

Code Issues 1 Pull requests Actions Projects Security and quality Insights

main 1 Branch 0 Tags

Go to file Code

energyetf Add files via upload b4c9456 · 10 months ago 13 Commits

LICENSE	Initial commit	last year
README.md	Create README.md	last year
entf-energynet.md	Add files via upload	10 months ago
entf-ep-framing-transport.md	Add files via upload	10 months ago
entf-ep-message.md	Add files via upload	10 months ago

About

EnergyNet Energy Protocol (EP)

www.energynettaskforce.org/

Readme

CC0-1.0 license

Activity

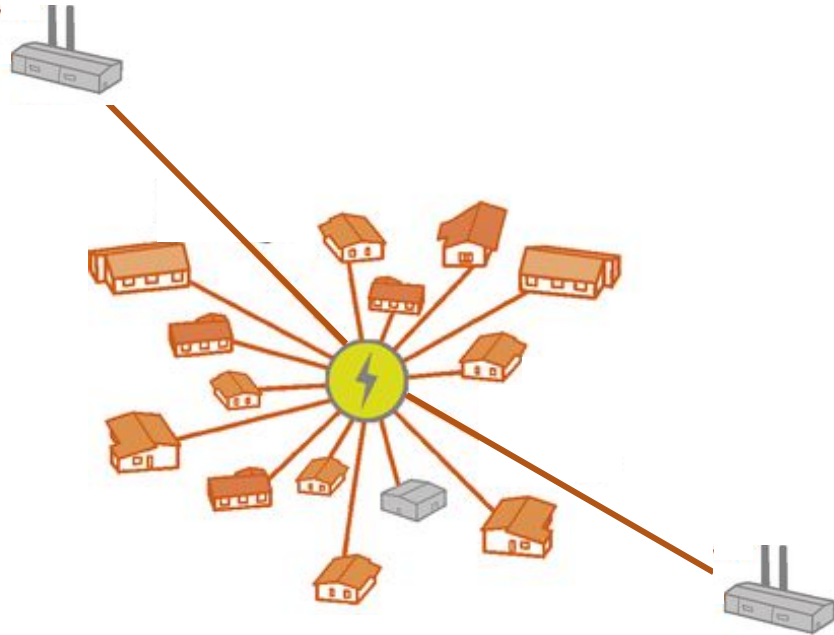
34 stars

12 watching

2 forks



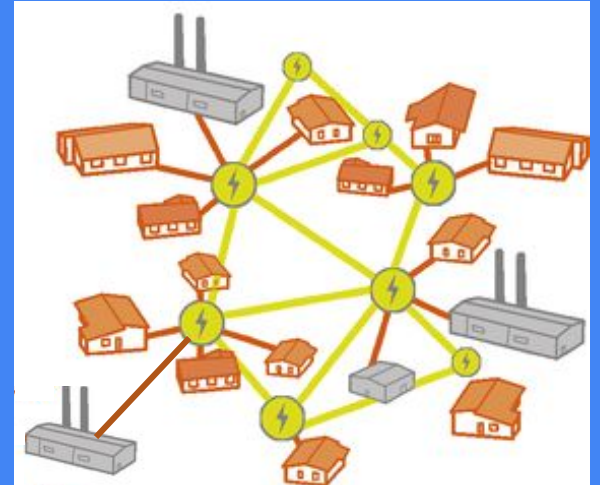
POGS



Few, large, expensive, bidirectional energy providers → many miles → home

***slow and inefficient**

ENERGYNET



Many, modern, cheap, multidirectional EnergyNet routers ↔ nearby energy sources (including battery) ↔ nearby appliances

***fast and efficient**

POGS

Real-time physical connection of energy resources to a centralized grid

Centralized load balancing of supply and demand across the full grid

Cascading systems: faults in one part of the grid can cause a power surge that **destabilizes neighboring sections** of the grid – Iberian Blackout 2025

***vulnerable**

ENERGYNET

Flexible, permission-based connection to the grid using galvanic separation & software rules

Local load balancing, with interconnection to the main grid for net supply / demand needs only

Self-healing through energy routers that can use multiple connection paths, similar to how data is routed through the internet

***resilient**

03 :

Down the Tech Lane

aka Age Determiner!



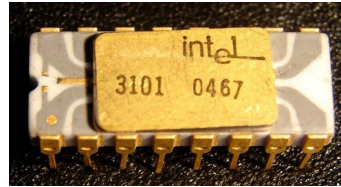
Who remembers...?

copper wire



1960s-90s

Landline phone



1969

Intel's first
microchip +
ARPANET



1970

fiber optics
invented



1985

CRAY 2
Most powerful
supercomputer then!

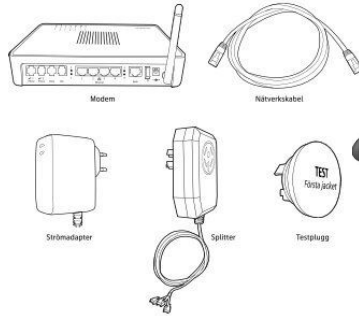


Who remembers...?



1983 - 90s

Internet Protocol (IP)
becomes standard



1998

Jonas Birgersson launches first
global commercial *broadband*
service in Lund, Sweden



2003

Skype launches



Who remembers...?



2007

1st iPhone launches



2026

iPhone 17

≥5,000 times *faster*
than CRAY-2 while
being several
magnitudes
smaller in size!

Plan Old Telecom System (POTS)

1 call
= 1 dedicated
copper wire

controlled by 1
centralized telecom
company

Internet

1 fiber optic cable =
several calls in high
speed!

controlled through
several,
decentralized routers

Plain Old Grid System (POGS)

1 energy flow
= 1 power line
= 1 frequency

controlled by 1 centralized energy
provider (ie. PG&E)

EnergyNet

1 power line = several energy
flows = variable frequencies

controlled through several,
decentralized routers

Internet Protocol (IP)

Common language that allows several devices to exchange **data**

Your phone today can communicate with:

- a server in another country
- a Windows PC
- a smart TV

Energy Protocol (EP)

Common language that allows several devices to exchange **energy**

Your solar panel today can communicate with:

- Your fridge
- Neighbor's solar panel
- Neighbor's EV battery

Standard Microgrids

Isolated single sites: don't talk to each other and therefore do not act as backup to each other when one goes down

Proprietary software: Proprietary microgrid management software limits interoperability

Fragmented and custom: microgrid projects are engineered separately, slows down scaling

ENERGYNET

Resilient network: turns microgrids from stand-alone islands to interconnected nodes just like Internet turns single computers to global network

Energy Protocol is open source, enabling interconnection

Plug-and-play scaling: Routers have interchangeable bidirectional ports →
modular = scalable

04 :

Case Study: EnergyNet in Sweden

Proof of Concept underway



EnergyNet launched in April 2025



Two building pilot in Lund, Sweden



One building contains **offices, housing, a gym**

The other hosts a **grocery store, mobility center for parking cars and bikes (Including EVs and ebikes)**



Sun Day 2025

Innovation Showcase:
EnergyNet

EPBD Encouraging Green Building in Europe

More energy efficient

A+

A 0-25

B 26-50

C 51-75

D 76-100

E 101-125

F 126-150

G Over 150

Less energy efficient

Not zero CO₂ emissions

Minimum Energy Performance Certificate (EPC) rating from 1 April 2020



EPBD





EnergyNet Pilots

10 buildings, 270 units retrofitted in Lund

- 1,000,000 KWh/y in demand
- Wanted to build solar, told no by grid operator



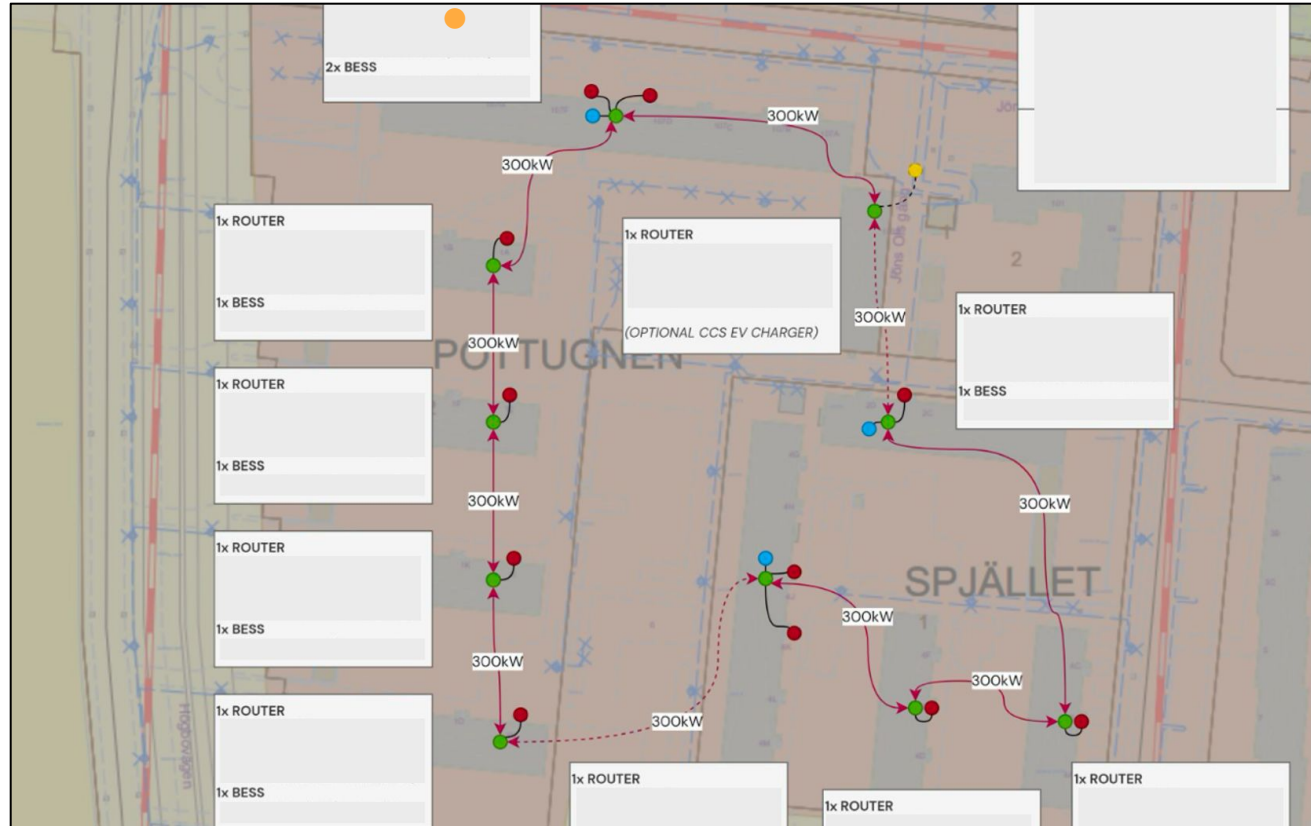
Unblocked green energy

- ✓ Solar, battery & EnergyNet (Routers & local grid) reduce grid power with 60% annual
- ✓ For 6 month no old grid is needed
- ✓ Add wind, old grid is only needed 14 days/year
- ✓ Add H2 fuel-cell and no old grid is needed

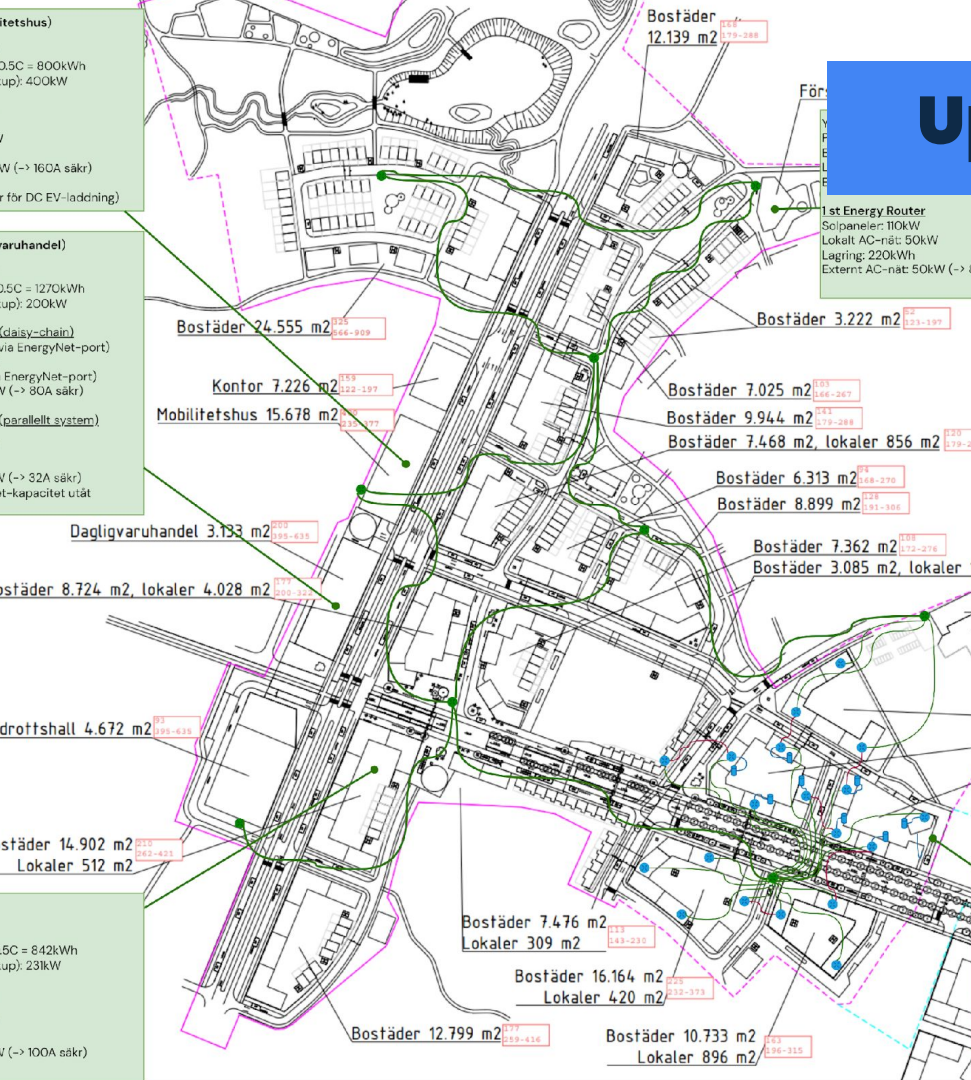
Investment is made by the real estate company and is profitable. ViaEuropa develops the project together with LKF and provide the long term EnergyNet operations.

Lund Retrofit Specifications

- 2 grid connections
- 10 Energy Routers
- Ring topology
- DC microgrid, 900V
- 800 kW Solar PV
- 10 x 100 kWh Batteries (1 MWh)



Uppsala Southern District



Uppsala, Southern District will see 60,000 new homes in the coming years. To facilitate sustainable and local production, the city will provide an EnergyNet backbone. Schematic shows phase 1, Sävja.

This enables:

- Grid operator can reduce area capacity/investment
- No-limit PV and Battery for property developers and owners
- Ready-to-go area-wide energy sharing from day 1
- Higher ROI/NOI for each property
- Lower cost-of-living for residents

05 :

Q&A



QUESTIONS FOR YOU!

When does energy enter your building design process?

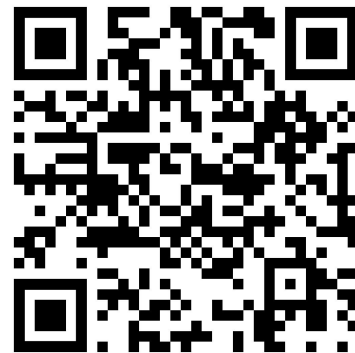
Does EnergyNet open up your toolbox?



**SCAN THESE
QR CODES
TO LEARN
MORE
ABOUT
ENERGYNET**



website



animation



Github



THANK YOU !

Do you have any questions?

Email louriordan@globalurban.org for more information!

