

Unlocking the potential of the evolving Dutch energy market

Jan 2024



Executive summary

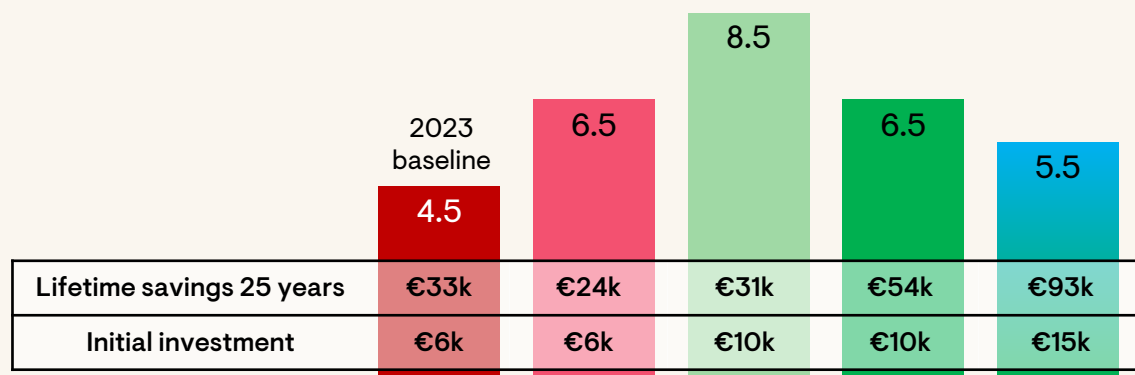
- Net metering (NEM) drove rapid adoption of solar in the Netherlands
- 2.5 million homes with solar cause over-generation, resulting in grid imbalance
- Cost to fix grid imbalance has increased more than 6x since 2020
- Energy providers are charging penalties for solar export
- The future of NEM is uncertain

A comprehensive solution of solar, batteries, and energy management software can help solve the imbalance problems and maintain payback at 7.5 years, even with NEM eliminated

By the numbers

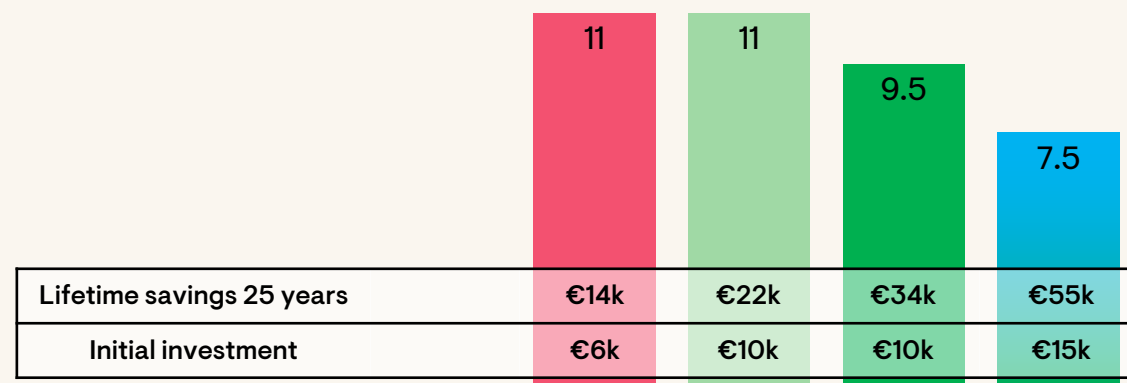
Current solar, regulatory uncertainty

25-year Enphase system, 100% NEM



Future proof, energy independent, savings & earnings

25-year Enphase system, 0% NEM



■ 2023 baseline
 ■ Solar only
 ■ Solar + battery
 ■ Solar + battery + dynamic tariffs
 ■ Solar + battery + dynamic tariffs + imbalance steering

- Solar only solution considers export penalty for 100% NEM and no export for 0% NEM
- Solutions including a battery consider battery replacement after 15 years
- Integration of electric vehicle and heat pump will reduce payback by 1 – 2.5 years for battery solutions

Problem statement

PROBLEM STATEMENT

Facts and figures - 2022

Dutch grid

17.5 GW
Peak load

19.6 GW
Installed
solar power

8.8 GW
Installed
wind power

108.9 TWh
Consumption

17.1 TWh
Solar energy

21.4 TWh
Wind energy

Electrification has started

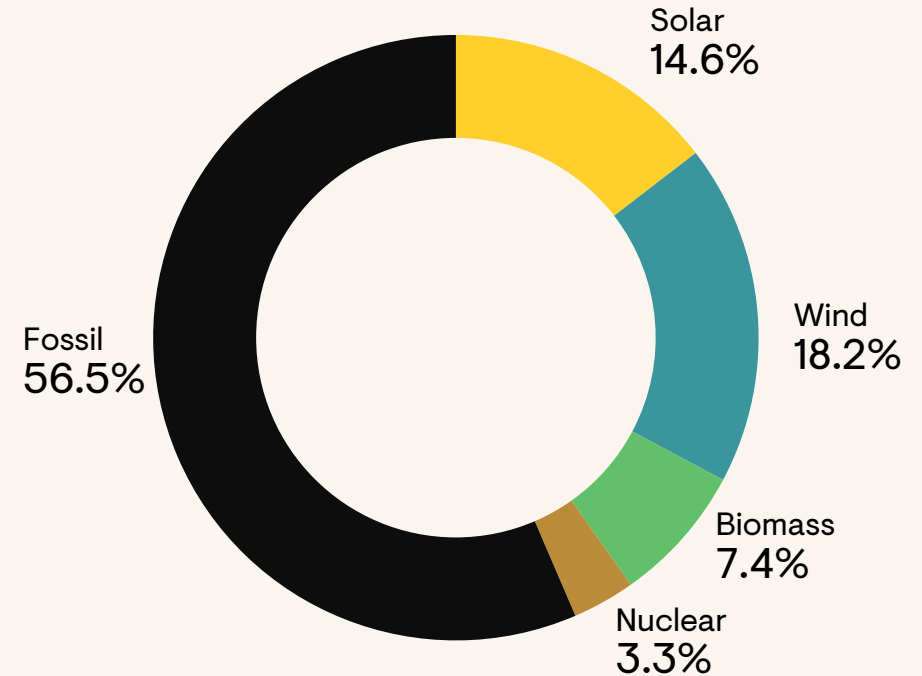
2.1 M
Households with
solar (2.5 M in 2023)

384,000
EV Chargers

900,000
Heat-pumps

> 90%
Smart meter
penetration

Electric energy production NL
2022

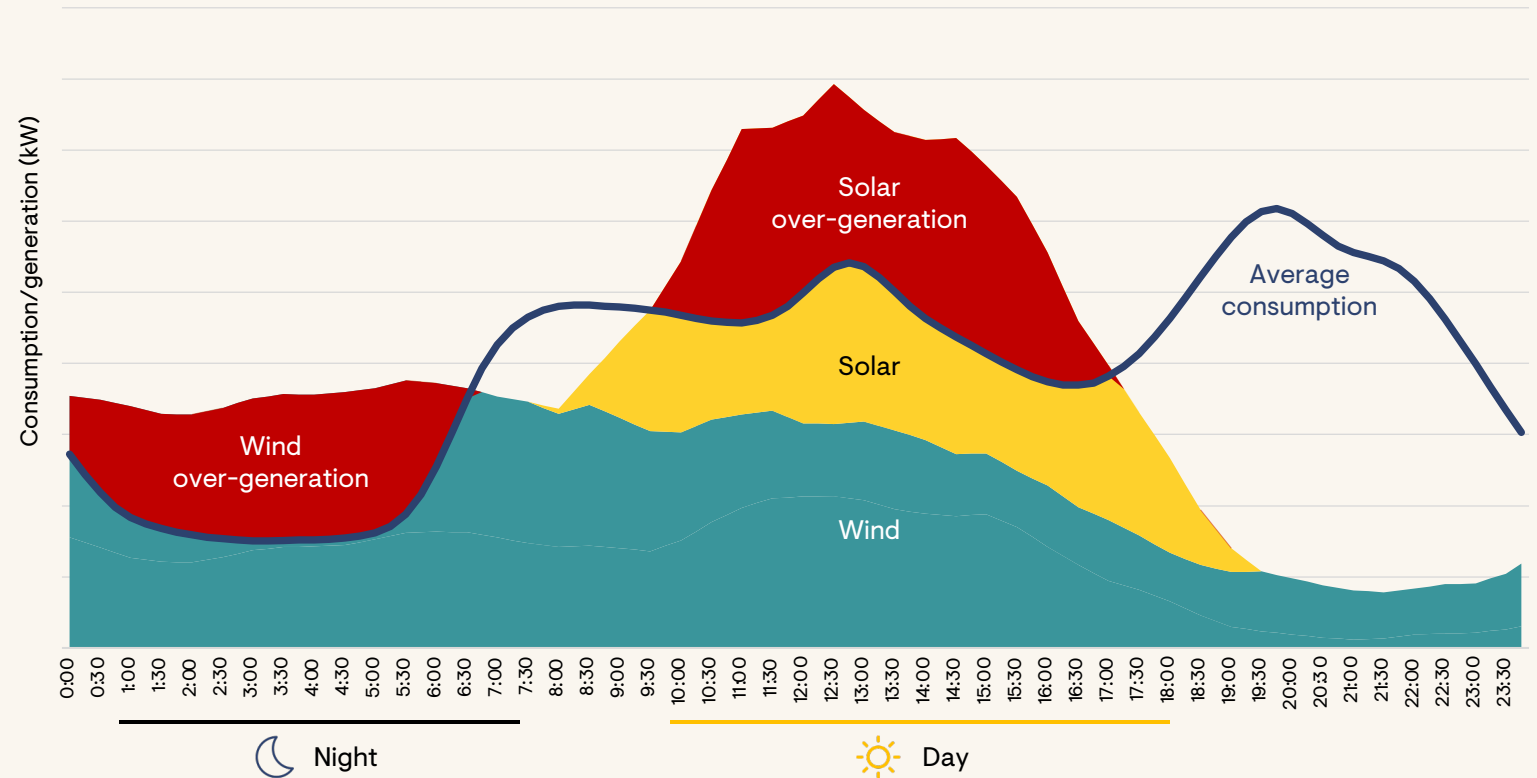


Source: CBS – Statistics Netherlands

Background

- NEM drove rapid adoption of renewable energies causing over-generation at certain times
- 50% of electricity generated by renewables in 2023
- Additional demand spikes due to EVs and heat pumps
- Over-generation and demand spikes cause grid imbalances

Over-generation of solar and wind



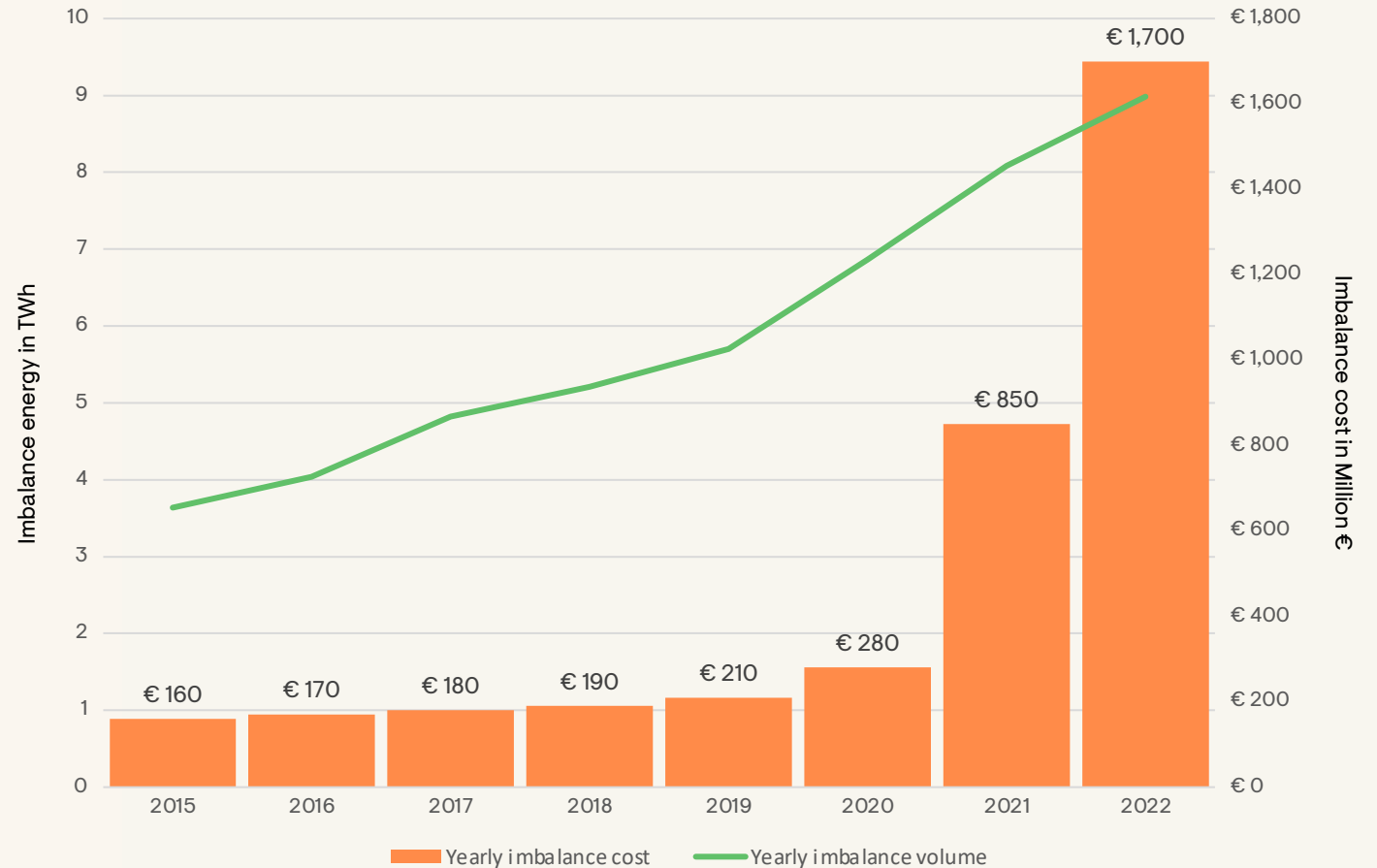
Source: Enphase

Consequence – Imbalance

- Balancing costs have increased 6x from €280M in 2020 to €1.7B in 2022.
- Further increase of imbalance expected in 2023 and beyond
- Yearly costs of approx. €105* passed on by the energy providers to all homeowners
- Balancing the grid is the responsibility of the Transmission system operator (TenneT)
- Energy Providers will be penalized if their own generation and consumption is not balanced

* Source: Enphase data based on certain assumptions

Evolution of imbalance in NL



Source: TenneT

Reactions

- Energy providers surcharging homeowners for solar export
- End of NEM promoted by energy providers, DSOs, and TSOs
- Resulting in uncertainty, fear, and loss of trust to invest in solar
- End-customer solar demand dropped by approx. 60% since August 2023

Charge solar owners to cover increasing imbalance cost

Solar panels

Vandebron customers will pay for the return of solar power



By means of **Michael Niewold**
August 15, 2023 08:35 • Modified August 15, 2023 09:21

According to the company, this is necessary to control costs, which have risen sharply in recent years. As more and more solar panels are added, it takes more time and money to process the returned power and keep the overloaded power grid in balance. Energy suppliers pass these costs on to customers, including those without panels. And according to Vandebron, that is not fair.

Source: rtlnieuws.nl

Not offering long-term contracts to solar owners to hedge risk of high cost

Solar panels? It is becoming increasingly difficult to conclude a multi-year permanent contract

MONEY • 05-09-2023 • reading time 4 minutes • 7203 views • save

Owners of solar panels are finding it increasingly difficult to enter into a permanent contract with a term of several years. At Essent and Eneco - two of the largest energy suppliers in the country - people with solar panels cannot currently opt for a permanent contract with a term of three years. An annual contract with fixed prices is still an option. Vattenfall has not yet decided, but is looking for a more proportionate way to divide the costs. Imposing a feed-in tariff on owners of solar panels is an obvious step.

Energy suppliers such as Energiedirect and Oxxio also currently do not offer the option for owners of solar panels to enter into a multi-year fixed contract: an annual contract with fixed prices is currently the highest achievable for this group of consumers.

Sustainability has a downside

Source: kassa.nl

Pushing government for ending net-metering

Cabinet plan: phasing out the solar panel netting scheme

The government wants to phase out the netting scheme from 2025 to 2031. Through the netting scheme, households and small businesses can supply self-produced electricity back to the electricity grid and offset it against their own consumption. The bill states that owners of solar panels will receive compensation for electricity that they cannot offset. The Senate has yet to decide on this. If the Senate approves, the phasing out of the netting scheme will take effect.

State of play of the bill

The House of Representatives has approved this bill. The Senate still has to vote on this.

Plan: gradually phase out the netting scheme

From 2025, households and small businesses will be able to gradually pay less. From 2031 onwards, netting will no longer be possible. Every year, households and small businesses can offset slightly less, up to 0% in 2031:

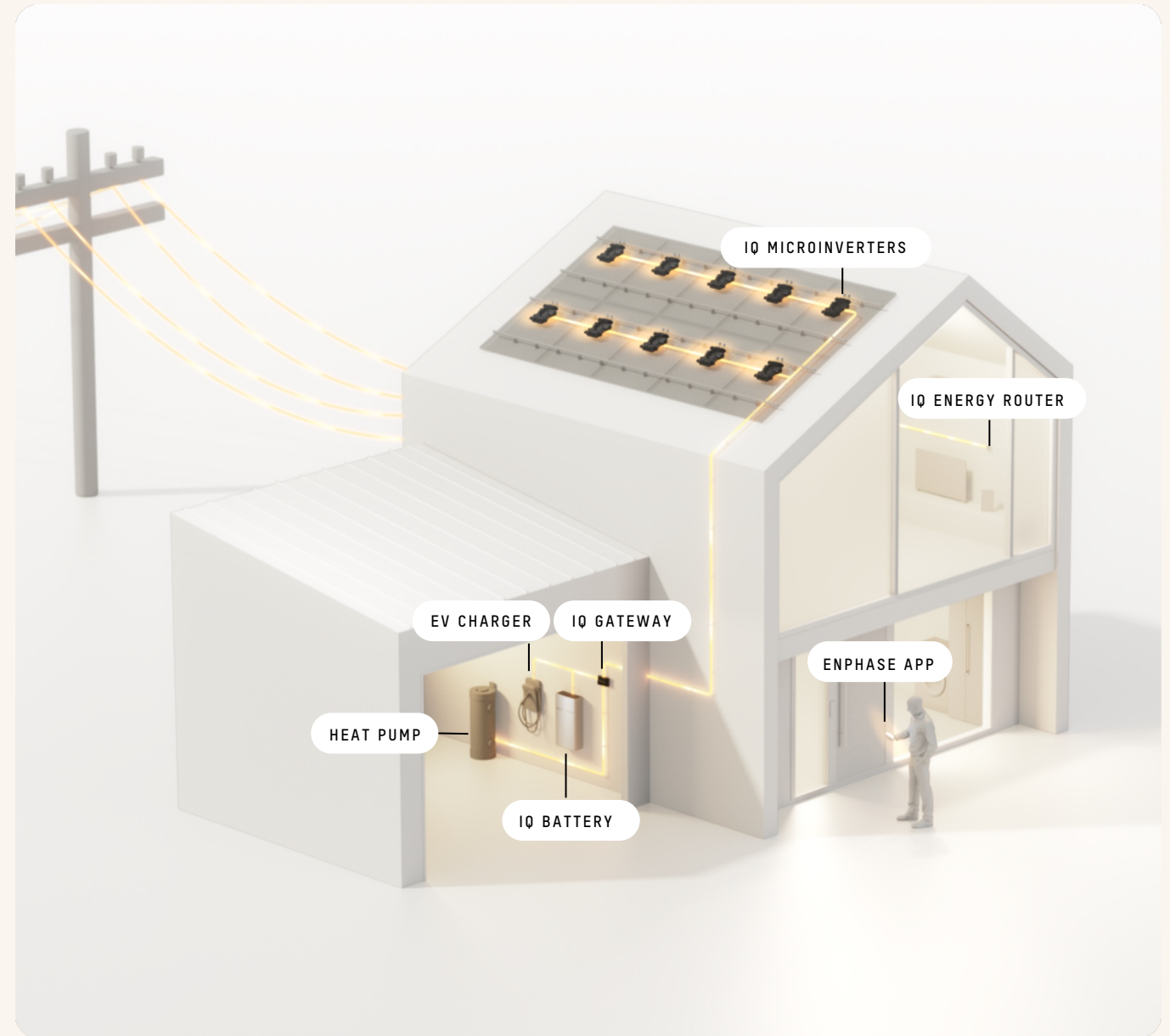
- 2023: 100%
- 2024: 100%
- 2025: 64%
- 2026: 64%
- 2027: 55%
- 2028: 46%
- 2029: 37%
- 2030: 28%
- 2031: 0%

Source: rijksoverheid.nl/

Enphase comprehensive solution

Comprehensive solution

1. Solar only
2. Solar + battery
3. Solar + battery + dynamic tariff
4. Solar + battery + dynamic tariff + imbalance steering
5. Solargraf design and proposal software



COMPREHENSIVE SOLUTION

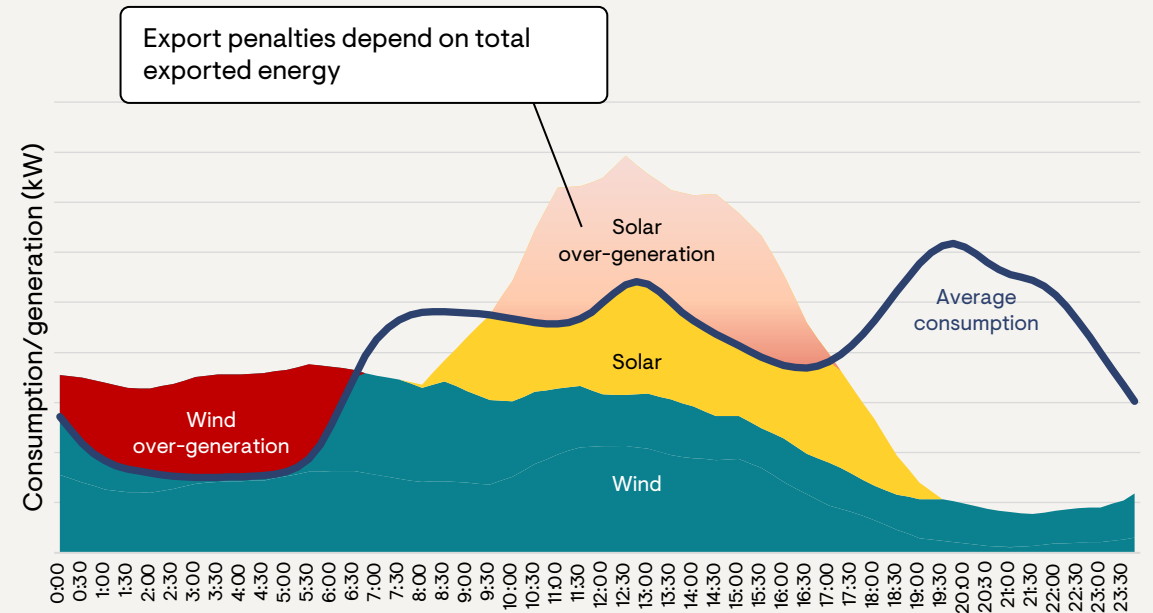
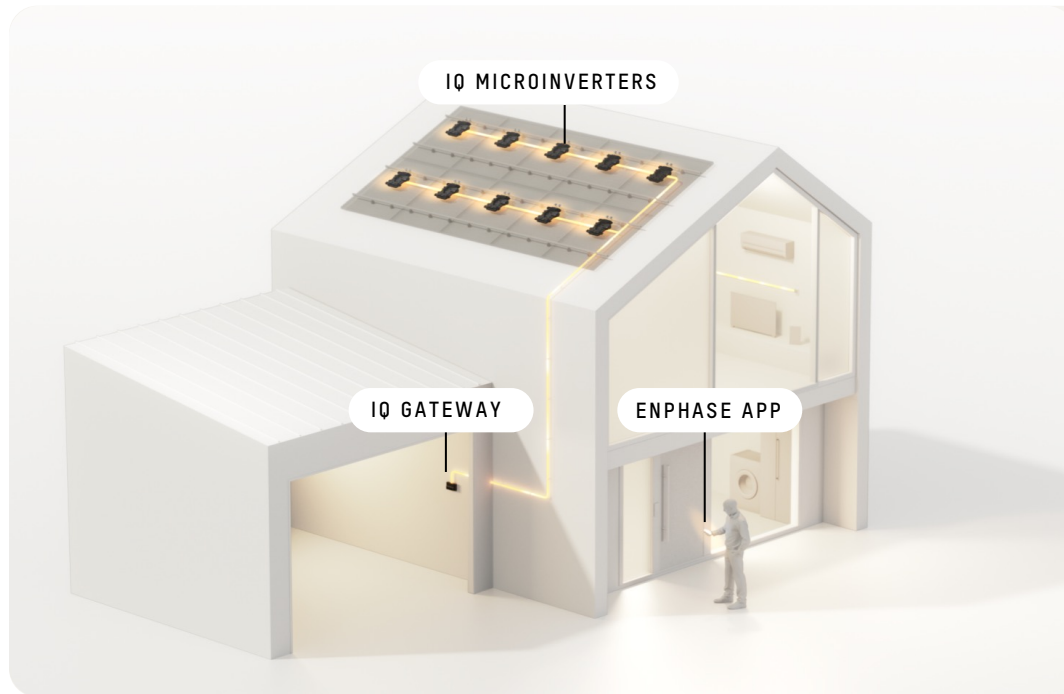
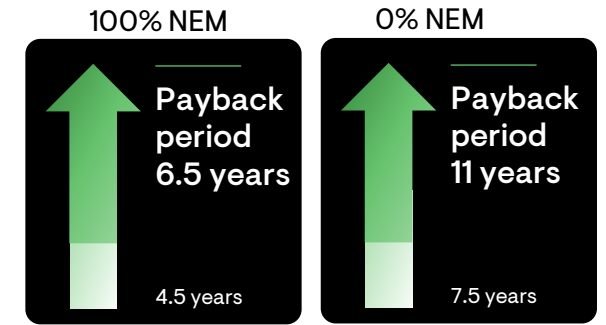
1. Solar only (with export penalties)

Viable solution with NEM, since benefits outweigh export penalties

Payback period increased

Enphase offers 25-year warranty

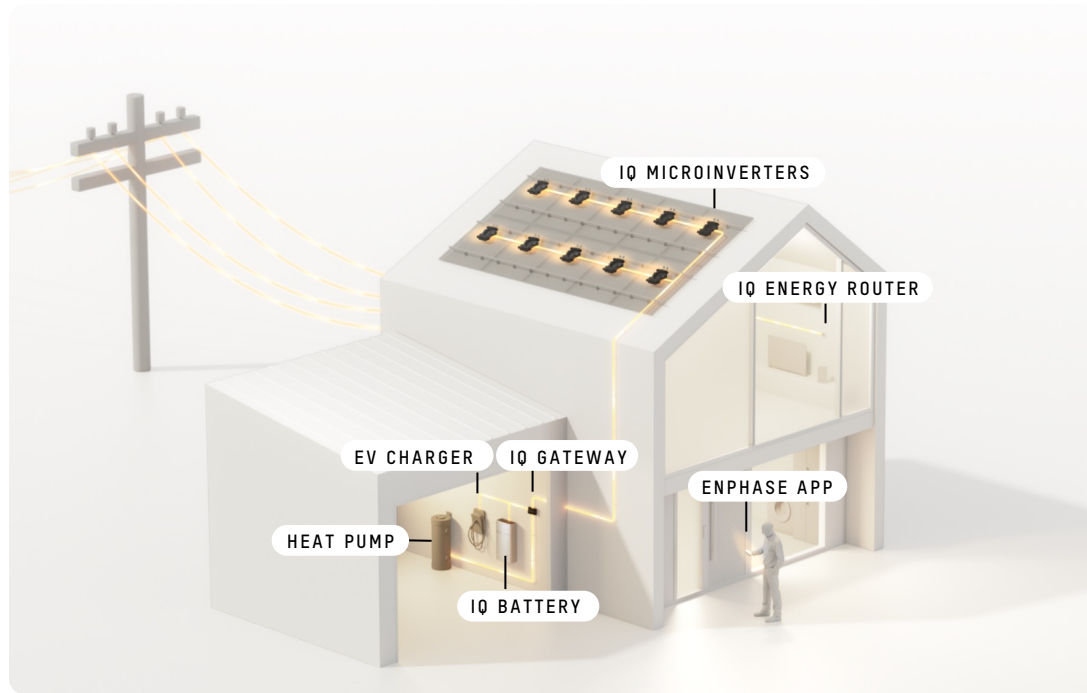
Savings more than double of initial investment, even without NEM



2. Solar + battery

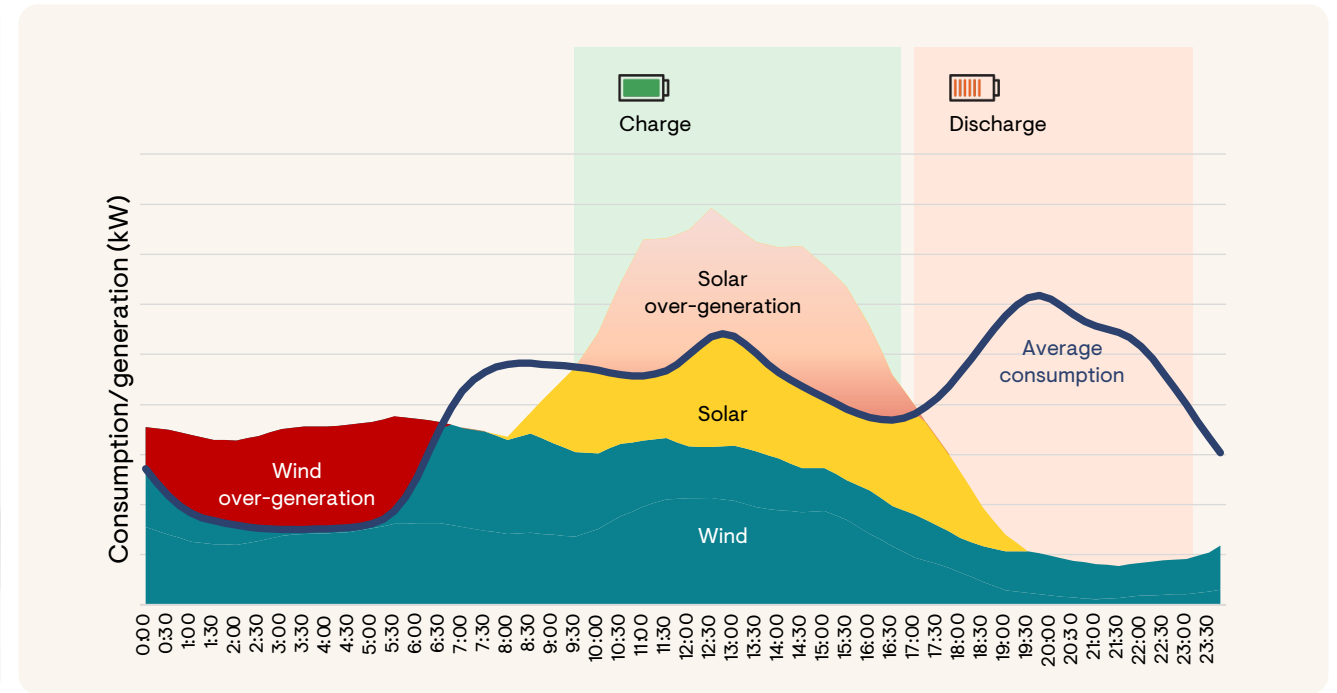
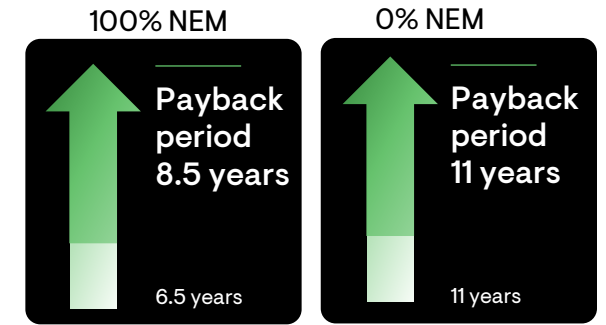
Adding battery increases self-consumption from 45% to 65% based on real-world Enphase data; 85% with EV and heat pump

Reduces export penalties



Minimizes import of energy from the grid

Protection against future increase in export penalties



What is a dynamic tariff?

Hourly contract for buying and selling energy

Different prices every hour, published one day prior

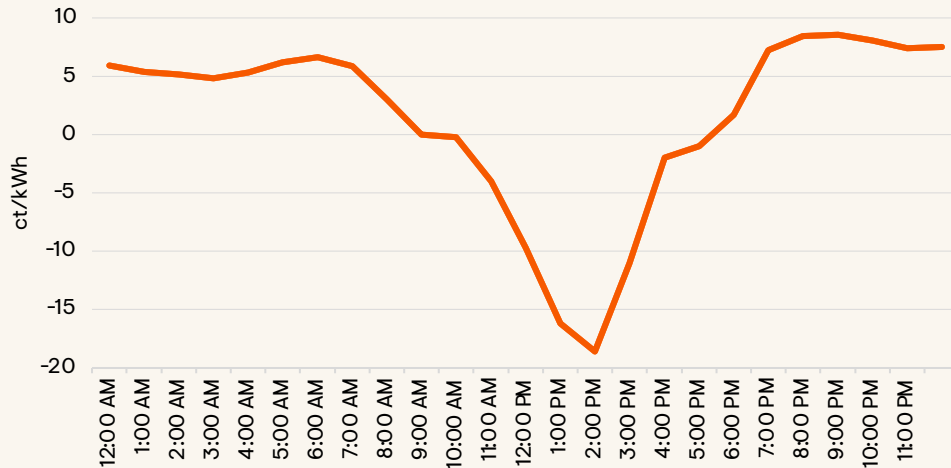
Prices can be negative, meaning homeowners are paid to consume



Summer

Netherlands net hourly prices (€)

Monday, May 29, 2023



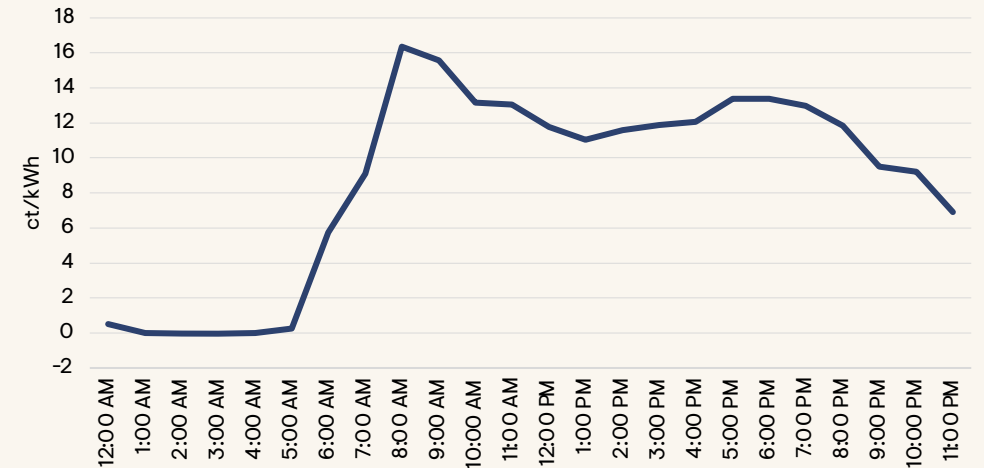
Source: epexspot.com



Winter

Netherlands net hourly prices (€)

Wednesday, January 11, 2023

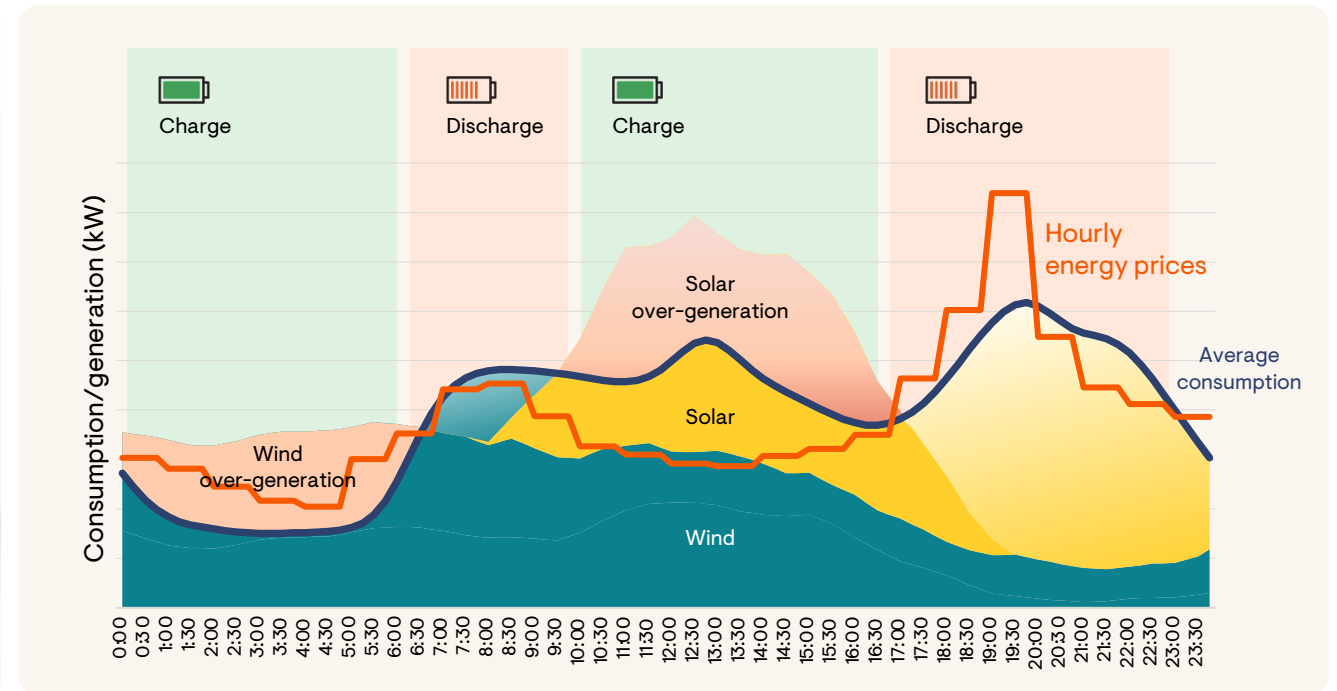
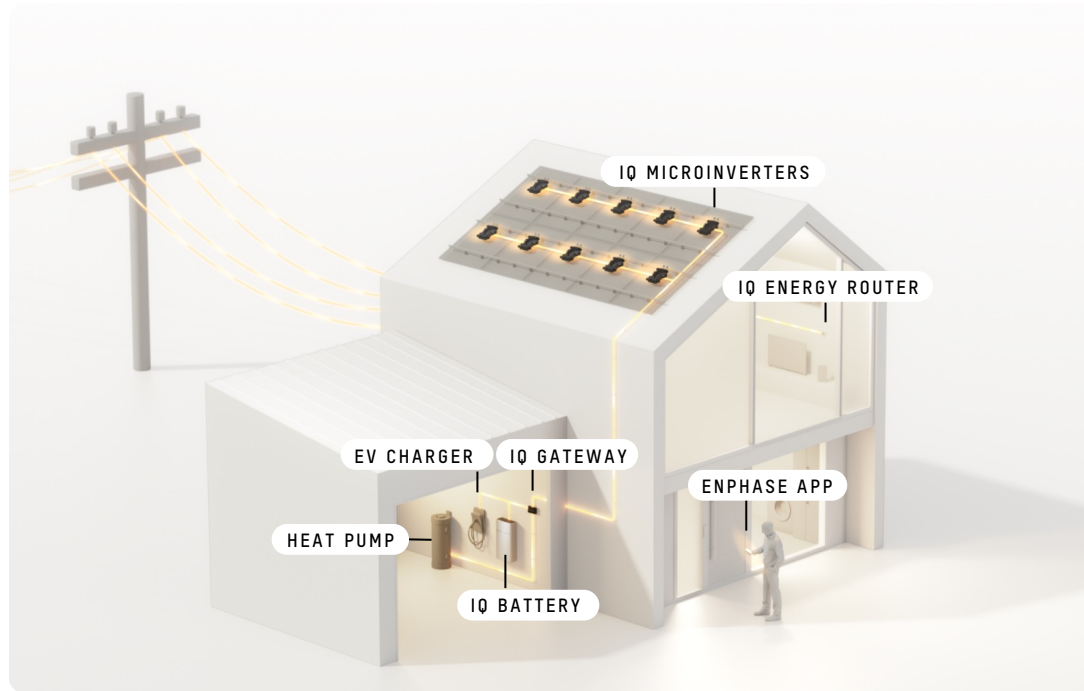
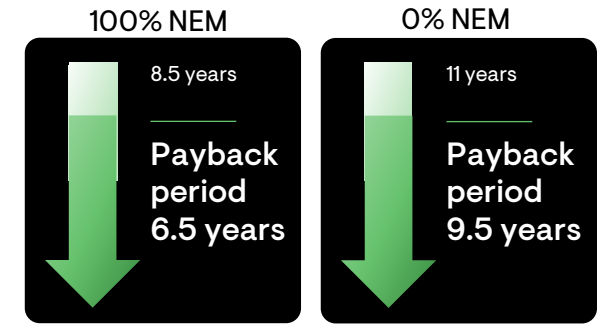


Source: epexspot.com

3. Solar + battery + dynamic tariff

Optimizes use of battery to minimize payback
Increases yearly savings and balances grid

Further improves payback when used
with an EV charger and heat pump
Homeowners opt in via Enphase App



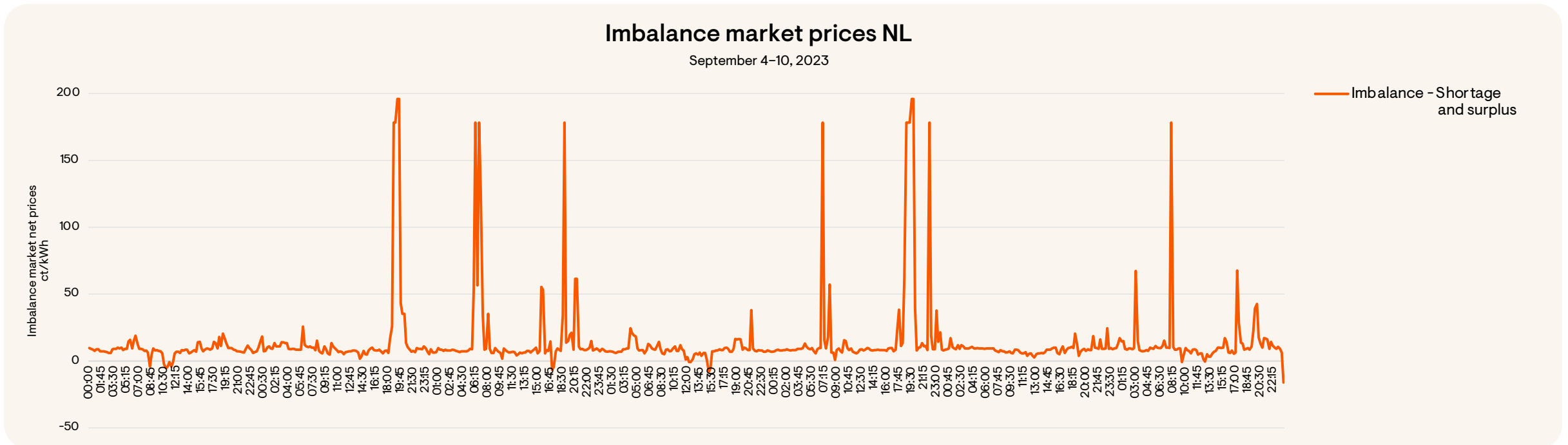
What is the imbalance market?

Prices extremely positive and negative
“Trigger to immediately (dis)charge battery”

Help the energy provider balance the grid by
(dis)charging the battery and get paid for it

Partnering with energy provider needed for trading on
imbalance market; form of Virtual Power Plant (VPP)

Different prices every minute, published instantly



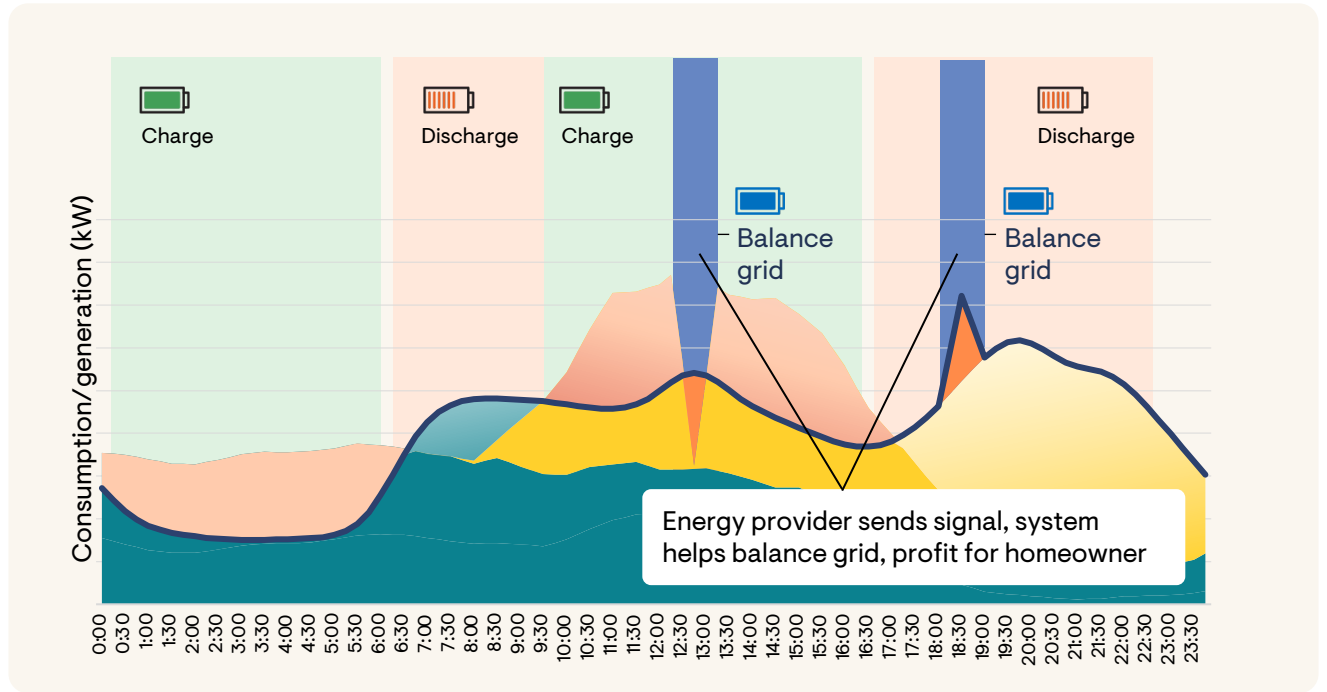
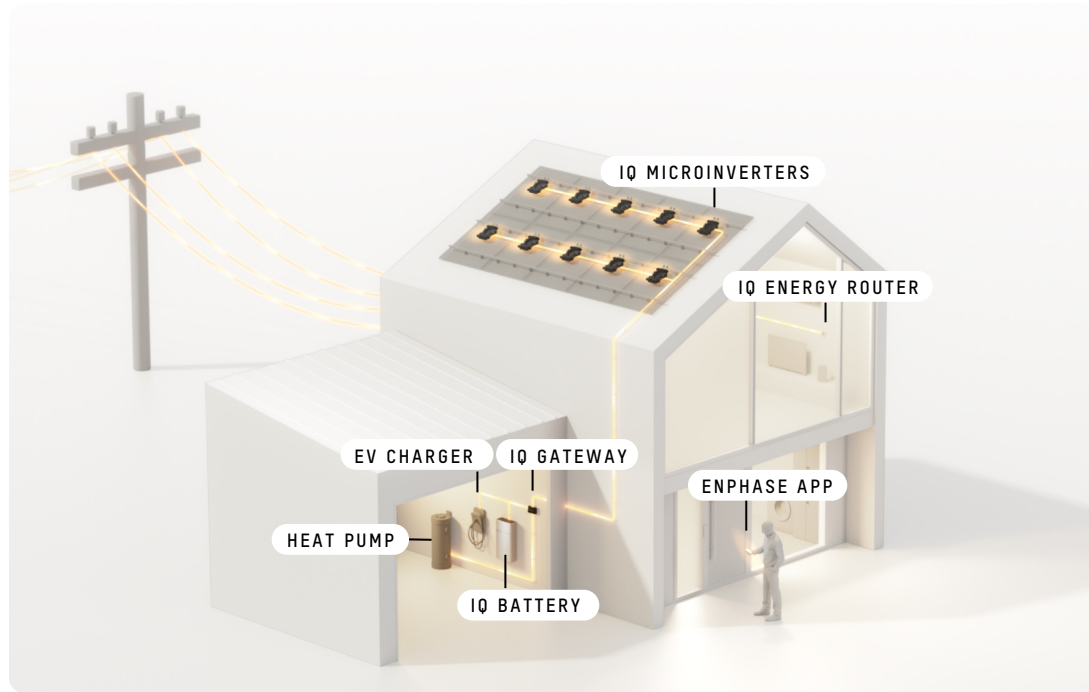
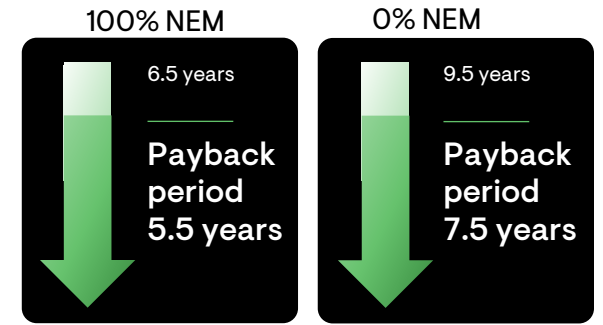
Source: TenneT

4. Solar + battery + dynamic tariff + imbalance steering

System participating in imbalance market to reduce payback

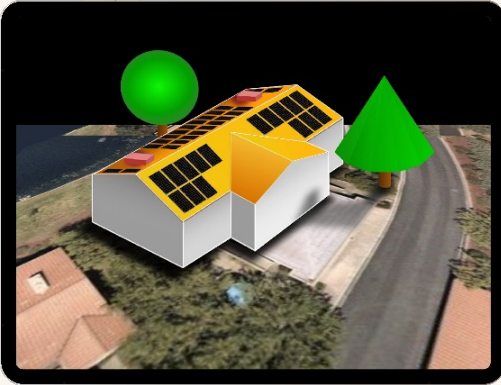
Further optimizes battery usage, creating profit

Homeowners opt in via partnering energy provider to enable this solution



5. Solargraf design and proposal software

Design your roof



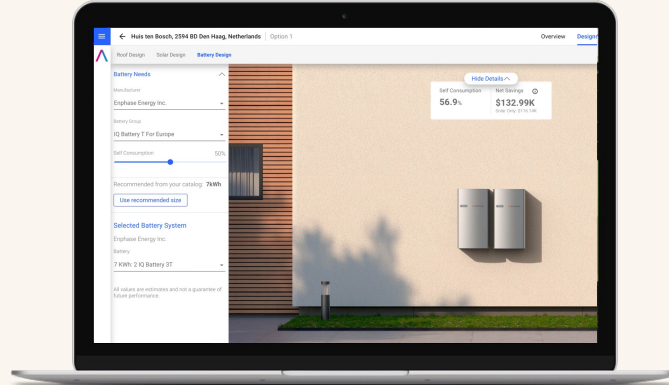
Rooftop 3D modelling for convincing visualization

AI-based auto-detection of obstructions, trees, azimuth, walls

Intelligent & optimized panel placement

Accurate shade analysis – with only one click

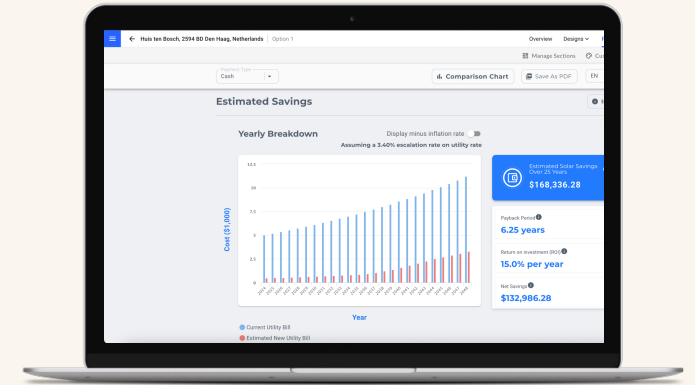
Add your battery



Individual battery sizing recommendations based on household consumption and production

Compare battery sizes and get a transparent view of their impact, e.g., on self-consumption

Select electricity tariff and participate in imbalance market



Preview savings and payback from selecting the best-fit electricity contract

Opt-in to participate in imbalance market via virtual powerplant (VPP) to make money

Benefits

We all benefit. We do not wait, but take control

Homeowners



- Increase self-empowerment
- No penalty from energy provider
- More savings, better payback
- Saving the planet

Energy providers



- Lower imbalance cost
- More assets in energy market
- Minimize customer churn

Installers



- Increase revenue
- Provide certainty
- Stabilize market
- Solid partnership with customers

Next steps

Roadmap and Call to action

| Roadmap | Beta | Launch |
|--|---------------|---------------|
| Energy management with dynamic tariff | February 2024 | May 2024 |
| Solargraf design and proposal software | February 2024 | May 2024 |
| Imbalance steering (VPP) | October 2024 | December 2024 |

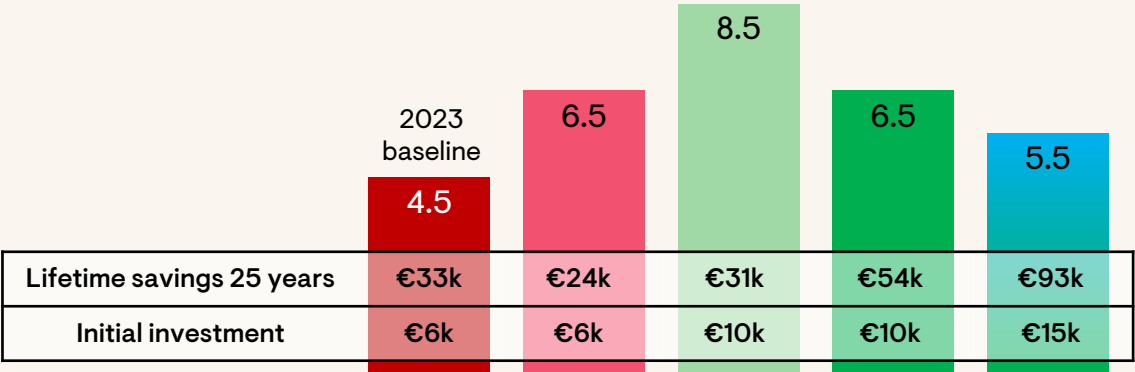
| Call to action | Date | Comments |
|------------------------|--|-------------------------|
| Follow-on Webinar | January 18 th , 2024 | Follow-on to this event |
| Weekly Sales Webinar | Starting January 22 nd , 2024 | Sign-up on website |
| Weekly Install Webinar | Starting January 23 rd , 2024 | Sign-up on website |
| Weekly Solargraf Demo | Starting February 5 th , 2024 | Sign-up on website |

Conclusions

By the numbers

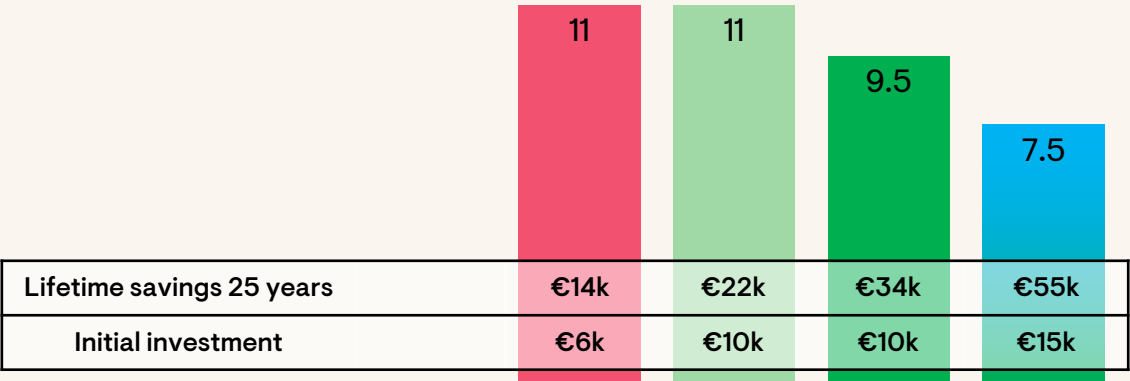
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The Dutch solar market can continue its phenomenal growth, independent of NEM, by adopting solar, battery, and energy management and thereby remain the driving force of the energy transition.

This is a win for homeowners, installers, energy providers, and grid operators.



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