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Grid congestion and mitigating measures

Frank Pon

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Start

Personal Introduction

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Association of grid opperators

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Stakeholders

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Netbeheer Nederland Strategy: Customer centricity, from design to management

Our customers and stakeholders know what to expect and are assisted as agreed. We are transparent about the impact of our activities on affordability, reliability, space, and our services.

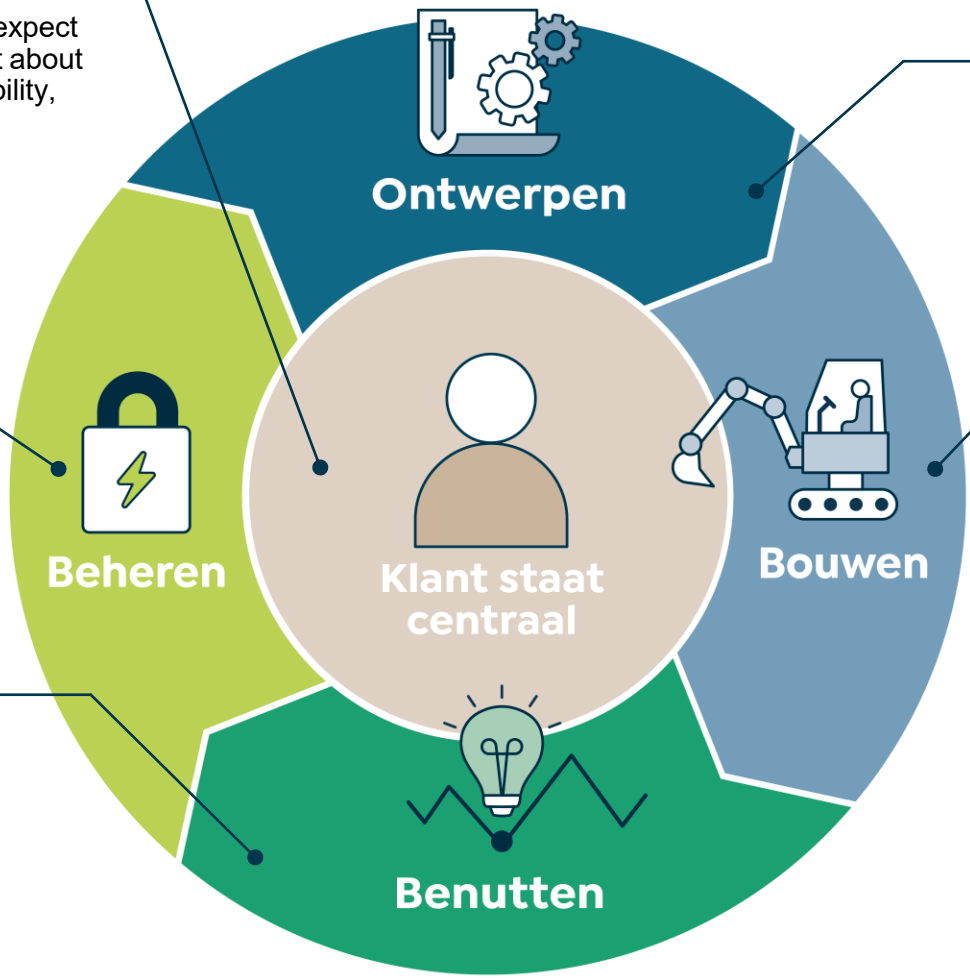
Customer

Even during the transition, our network remains both secure for customers and reliable for collaborators.

Management

We offer our customers a solution by better utilizing our existing infrastructure.

Utilization



We know what, where, and when to build with clarity for the client.

Design

We realize infrastructure faster and where it is needed most.

Build

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Facts and figures

Work is needed everywhere

50.000+

district stations

100.000+

km cable
(2.5 times the Earth's perimeter)

670+

High-voltage stations

Thousands

Km pipelines for sustainable gases

We need

>20.000

extra technicians until 2030

1 op 3

Streets will be opened

>11.000

football fields space in cities and villages

>7-8 mrd

euro investments per year in energy grids from 2025

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Agenda

Grid congestion

Congestion - Menti

How do we organize for succes?

Where do we focus?

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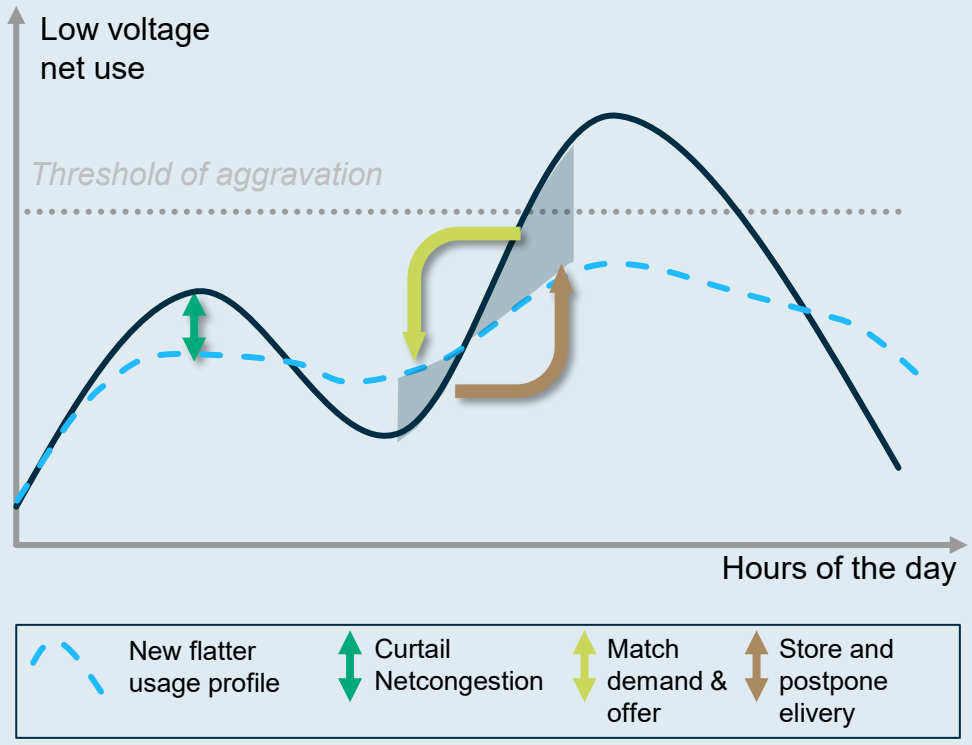
Grid congestsion

“Better utilizing our electricity grid”

Flexible and smart electricity usage alleviates pressure on the grids and provides structural societal value



Better Utilization involves encouraging, enticing, or requiring a more balanced consumption and generation profile, leading to a more efficient use of the electricity grid

This has (1) a preventive effect in avoiding a significant number of bottlenecks…

- As a result, fewer customers are affected by issues such as outages, and there are fewer waiting lists for our users

… and (2) offers more opportunities to reduce the impact on customers where bottlenecks do occur

- The possibilities to manage electricity more flexibly can also be applied in networks where a bottleneck occurs. This has a dampening to fully mitigating effect on the impact of the bottlenecks.
- Additionally, the smaller construction task, by preventing bottlenecks, can lead to the deployment of reinforcement capacity on the most urgent bottlenecks.

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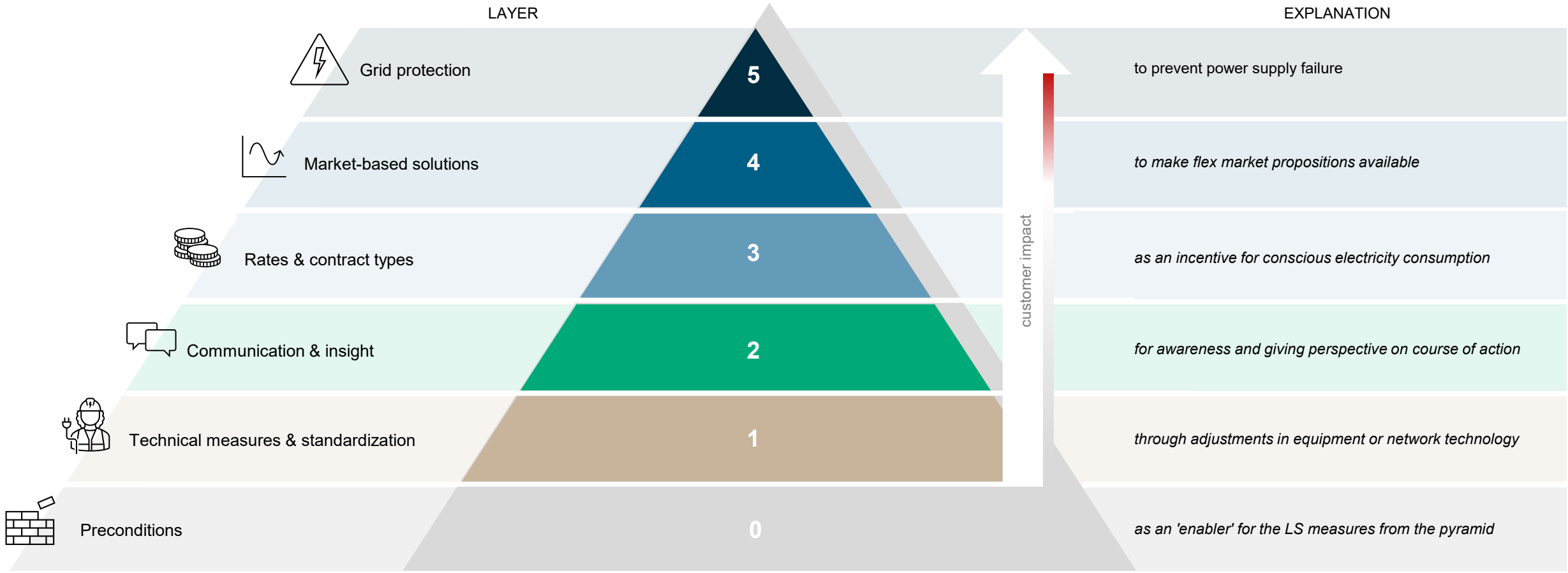
How do we organize for succes?

The Flex Pyramid contains 6 layers of measures to reduce transport scarcity, categorized based on their increasing impact on customers from bottom to top



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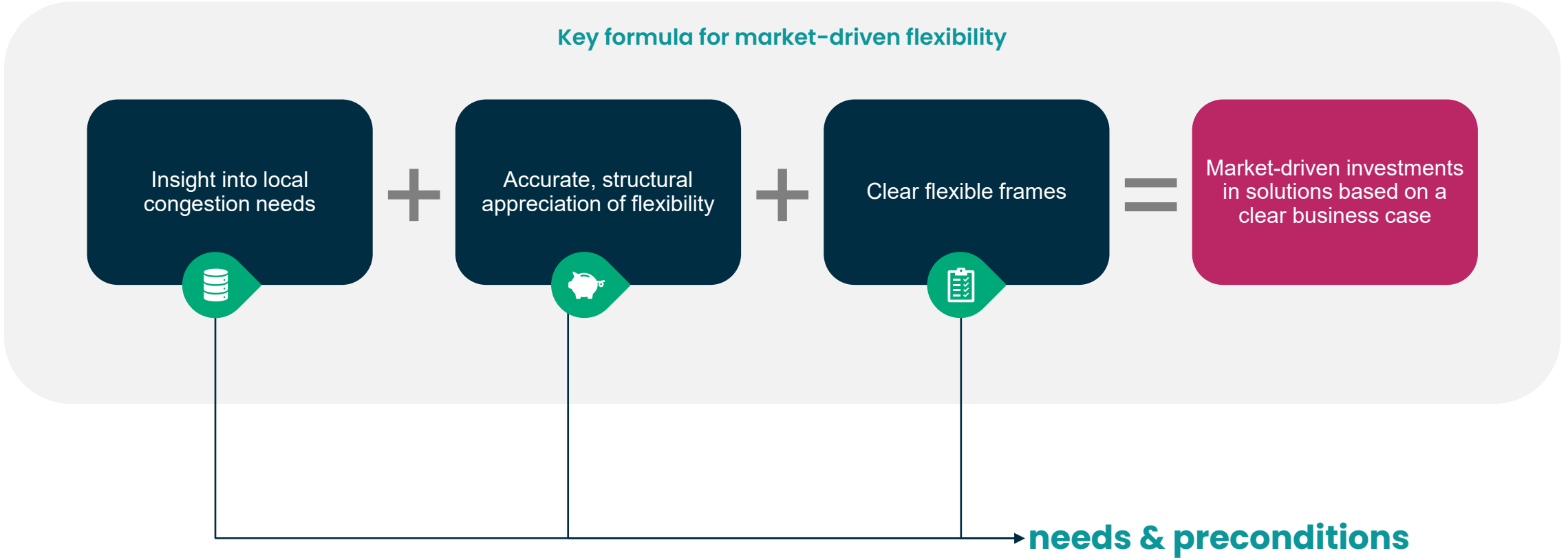
Market exploration reveals the key formula: three conditions for successful investments in KV flexibility from market participants



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Where do we focus?

Main focus - utilization

- From waiting list to actionable perspective: a scalable and grid-secure offering, supported by DSOs and TenneT
- Customers receive financial rewards for peak reduction through new tariff systems
- Unlocking flexibility of small consumers via the market and standardization
- Responsible increased loading of the grids and strengthening collaboration in System Operations
- Smarter insights for making better use of the grid
- Societal prioritization, reservation, and implementation challenges

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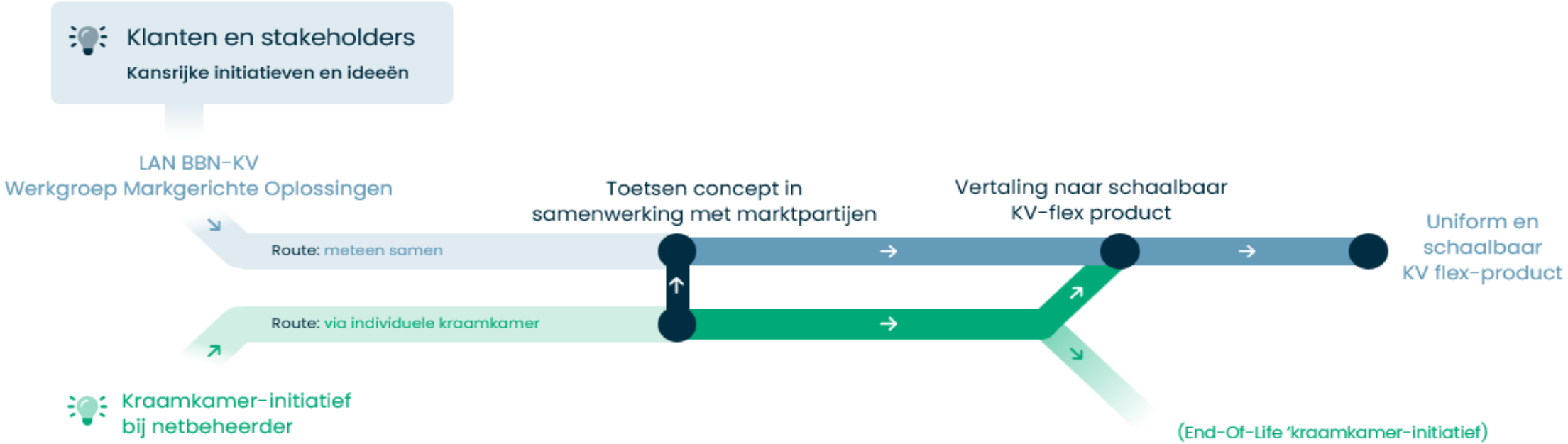
We focus on 5 segments for households and SME

... to fulfill the promise, the queues for customers have been resolved

	Insight & course of action	Time of use tariff	Net-conscious Public Charging	HEMS & Smart appliances	Built environment
	All customers in the queue can receive a connection through an appropriate and uniform offer.	Customers receive financial rewards for reducing peaks through new tariff system	We better align with customer needs by developing appropriate customer propositions with market parties.	We create a future-proof network by making Flex the new standard for new and existing customers.	Net-conscious construction is the standard
	1.Implement prioritization framework 2.Problem analysis 2.0 & Calculation tool 3. Capacity map & Neighborhood app	1. 2026 Consultation ACM ToU KV	1. Net-conscious Public Charging winter 26/27	1. Pilot controllable devices & home charging 2. NTA standards 3. Grid protection	Developing a joint vision and standards for network-conscious construction at both building and area levels

Exploring market-based KV flex more and more together

- Previously, network operators explored market-based solutions they considered promising **mainly separately** from each other.
- Testing assumptions individually in collaboration with market parties has the advantage that it is often organized more quickly and aligns with the timelines, learning questions, and **preferences of the individual network operator organization**.
- Market parties have indicated that **there is a need for a more uniform approach** to prevent fragmentation in the types of KV flex solutions and flex frameworks per network operator.



Controllable devices on demand (NL-FLEX)

Trajectory
Controllable devices on demand (NL-FLEX)

Participating Parties
Enexis, Liander, Stedin: grid operators
Eneco, Essent, Vattenfall, Zonneplan: energy suppliers

Main research question pilot
What is required to deploy groups of controllable devices at customers of multiple market parties to prevent consumption congestion at 21 local bottlenecks in the power grid?

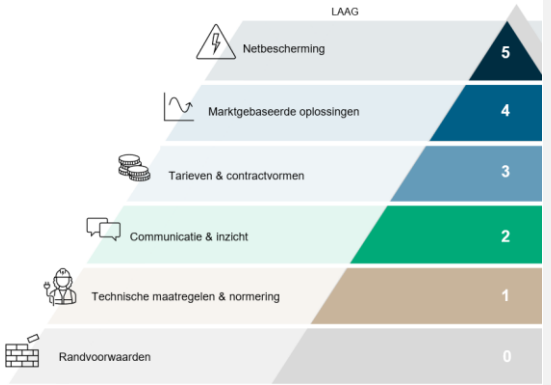
Planning and progress

Idea	run	end
Nov '24	Okt '25 – Feb '26	Feb '26 – April '26

Huidige fase
Vorige fase

Type of solution
Layer 4. Market-based solutions

Dynamic day-ahead call per group of connections with flexible devices behind a bottleneck, where the proposition is most aligned with a group CBC on call with KV-connected parties via a CSP.



Pilot Description
Using an approach involving the customer population of four energy suppliers behind 21 grid bottlenecks, it is explored how overload caused by the deployment of controllable devices can be prevented.

This is achieved through the control of home batteries, EVs, and additional customer communication to influence the remaining household grid usage.

By means of automatic grouped control of flexible devices, where coordination between the grid operator and the market party takes place via call-off messages in .csv files prior to 8:30 AM on the day before.

Key Learning Experiences
- What is needed to realize a sufficient number of controllable devices in households and deploy them to prevent overloading at local bottlenecks in the power grid?
- What information exchange is necessary to deploy groups of controllable devices on demand to prevent local congestion issues and to verify afterwards that this has occurred?
- What compensation methodology is feasible for market parties to use devices for congestion purposes?

Projectleads
Frans van der Steen (Enexis), Jaap Brouwers (Liander), Marloes Koenraads (Stedin), Dave van Westing (Eneco), Mirjam Davidson (Essent), Cor Poesiat-Kuijper (Vattenfall), Koen Altena (Zonneplan)

Next Steps
- Communication and recruitment period for market parties starting from July.
- Steering period to begin in Q4 2025.
- Data analysis and evaluation in Q2 2026.

Links
- Announcement: Netbeheerders en energieleveranciers pakken samen volle elektriciteitsnet in woonwijk aan | Netbeheer Nederland

Utilization working group: Smart Appliances - Regulating

Legenda deliverables

- no issues
- Issues manageable within working group
- Deliverable escaleren naar Kernteam BBN KV

Goal 2028
Customers and business stakeholders have implemented/applied/utilized smart devices, whether or not through the HEMS framework: SMART goal is to have 200 MW accessible via (H)EMS controllable by an aggregator/CSP – assuming a 14% (H)EMS adoption rate

Contactperson: Paulus Karremans

Q1 2026	Q2 2026	Q3 2026	Q4 2026
NEN HEMS, slimme warmtepompen, slimme inverter en slimme thuis batterij			
NEN specs afgestemd op internationale bodies (BSI, EC, OpenADR, Eebus, CSA)			
Motiveren OEM's commit aan NEN en Europese standaarden			

Highlights

- NEN-trajectories HEMS, smart Inverter and smart Battery started

Lowlights

- XXX

Afhankelijkheden WG	Toelichting
Unknown WG briefing on DSO-signal	DSO LS-congestion signal is a prerequisite for NEN-specification HEMS

Status	Risico's	Mitigatie
	Limited number of parties are implementing NEN-specs	Contact the biggest manufactureres
	NEN-specs differ from Europese specs	Align wih CoC en BSI

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Thank You