LV – NExT CHALLENGE

Manual

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INDEX

1. INTRODUCTION

The LV NExT Challenge invites companies of all sizes—from long-standing suppliers to fresh-faced startups—to contribute bold, innovative ideas that accelerate the construction of the low-voltage grid. As the energy transition gathers pace, we're looking for solutions that help us build faster, smarter, and more sustainably. Whether you're a familiar partner or a company we've never met, if you have a compelling concept to drive progress, we want to hear from you.

This manual is designed to help participants navigate the LV NExT Challenge with clarity and confidence. They outline the challenge's scope, eligibility criteria, submission process, and evaluation framework—ensuring that every company understands how to contribute effectively.

2.CONTEXT

The Netherlands is undergoing a major energy transition. As heat pumps, electric vehicles, and data centres become more widespread, electricity demand is rising sharply. Where households and businesses once relied on gas and petrol, they're now switching to electric systems—causing consumption peaks that strain the existing grid.

Many medium- and low-voltage networks were originally designed for one-way electricity flow. Today, with decentralised generation like solar panels, two-way flows are common, leading to transformer and cable overloads. In residential areas, substations are increasingly hitting their limits, resulting in voltage fluctuations, frequency issues, and even temporary outages.

Much of the infrastructure—cables, conduits, and transformers—dates to the 1960s and 1970s. Ageing components and outdated designs are ill-suited to modern charging and generation patterns, increasing the risk of failures. Reinforcement involves not just higher capacity cables, but also smarter systems for dynamic grid management.

Delays in upgrading the grid heighten the risk of power interruptions and hinder the energy transition. Individuals may face issues like PV systems switching off or insufficient power for EV charging. To prevent this, Dutch Distribution System Operators (DSO's) must expand the grid at an unprecedented scale: installing around 50,000 new substations and laying 100,000 kilometres of cables.

This effort also demands a significant workforce expansion—an estimated 18,000 additional technical FTEs—alongside investments in recruitment, training, and retention. With one in three streets needing excavation, the most vulnerable neighbourhoods must be prioritised and upgraded by 2030 to avoid severe congestion and social disruption.

3.AMBITION OF THE LV NEXT CHALLENGE

The LV NExT Challenge is driven by a bold ambition: to radically accelerate the reinforcement of the low-voltage grid and future-proof Dutch neighbourhoods for the energy system of 2050. We aim to go beyond incremental improvements and unlock transformative solutions that scale—technically, operationally, and socially.

Our goal is to enable Dutch DSOs to upgrade 1,000 neighbourhoods per year by 2030, a tenfold increase from today's pace. Achieving this requires smarter technologies, streamlined processes, and new ways of working. We believe innovation can come from anywhere—whether it's a long-time supplier, a startup with a fresh perspective, or a company we've never worked with before.

But we don't just want to hear your ideas—we want to help shape them. Participants will gain access to a supportive environment where concepts can be tested, refined, and improved. Throughout the challenge, we provide feedback, facilitate learning, and offer opportunities to pilot promising solutions in real-world settings.

4. WHAT DOES PARTICIPATION BRING YOU?

Testing solutions for the Dutch grid—Unlocking global and industry-wide potential

The Dutch electricity grid is facing increasing pressure due to the rapid pace of electrification and the energy transition. This project is designed to address that challenge by identifying, developing, and validating innovative solutions that can accelerate grid reinforcement—specifically within the Dutch context.

For you as a supplier, this is a unique opportunity to demonstrate the effectiveness of your solution(s) in a real-world, real-time environment. The project is rooted in the specific technical, regulatory, and spatial conditions of the Netherlands, making it highly relevant for the Dutch market.

A broader market than just the DSO's

While the project is initiated by the Dutch DSO's, we are not the only stakeholders with a strong interest in the outcomes. Contractors and engineering firms—both within the Netherlands and internationally—are also actively seeking proven, scalable solutions to similar challenges. These organizations represent a significant and growing market for validated technologies and approaches.

Global relevance through local validation

The challenges addressed in this project—such as grid congestion, capacity constraints, and the need for smarter infrastructure—are not unique to the Netherlands. Many electricity networks around the world face similar issues and share comparable characteristics. Solutions that prove effective here are likely to be transferable to DSO's worldwide.

What participants receive

- Operational validation: If selected, your solution will be tested in a living lab and potentially a live environment, providing insights that go beyond simulations or pilot setups.
- You will receive insights into our operations and meet our experts for feedback on your idea.
- (partial) funding of your idea to speed up development time.
- Market visibility: Collaboration with Dutch network operators through this challenge and exposure to contractors enhances your credibility and opens new business opportunities.
- Scalability: A successful track record in this project can serve as a reference for both domestic and international markets.

By participating, you contribute to a forward-looking national effort while positioning your solution for broader adoption—across sectors and across borders.

5.ABOUT US

The LV NExT Challenge is a joint initiative by Enexis, Stedin and Alliander—the three largest regional Distribution System Operators (DSOs) in the Netherlands. Each is responsible for the construction, maintenance, and operation of the electricity and gas networks in their respective regions, ensuring reliable energy delivery to homes, businesses, and public infrastructure.

While they do not generate or sell energy themselves, these DSOs play a crucial role in enabling the energy transition—integrating renewable sources, supporting electrification, and managing growing demand. By joining forces for this challenge, they aim to tackle shared infrastructure bottlenecks more effectively, pool expertise, and create solutions that benefit the entire sector.

A more detailed description of the organisations can be found on their websites:

Alliander
Stedin
Enexis

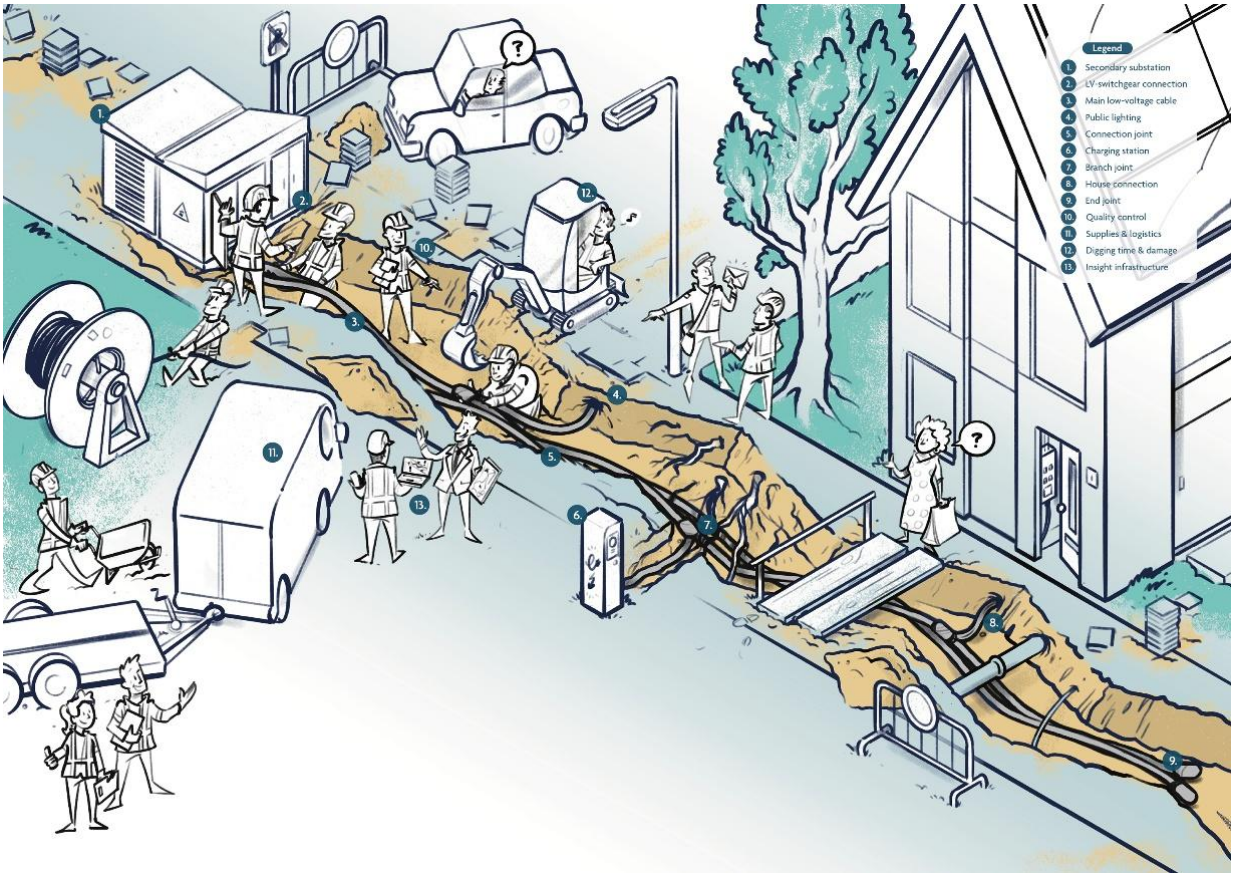
6.APPROACH

To ensure that proposed solutions are both scalable and grounded, the LV NExT Challenge is built around a reference neighbourhood—a typical Dutch residential area that reflects the infrastructure and energy demands seen across the country.

This reference neighbourhood consists of approximately 1,030 grid connections, including 700 homes and a growing number of EV charging points, spread over a maximum area of 125 hectares. It uses standard infrastructure components such as transformer substations, main and house connection cables, and cable joints. The scope of the LV-NExT challenge is everything between the low-voltage side of the secondary substation and the house connection. The setup is representative of the 14,000 neighbourhoods across the Netherlands, making it a practical basis for planning and implementation.

Renovating this neighbourhood using our neighbourhood-oriented approach requires an estimated 14,700 labour hours. Around 90% of this work is carried out by civil and electrical engineering teams, supported by work planners, foremen, project managers, and other partners. The work involves not only technical execution but also close coordination between DSOs, contractors, municipalities, housing associations, homeowners and other stakeholders. Appendix 3 provides further details on the neighbourhood approach, including the breakdown of hours per job type.

Both the scope, the components and the challenges faced are illustrated below:



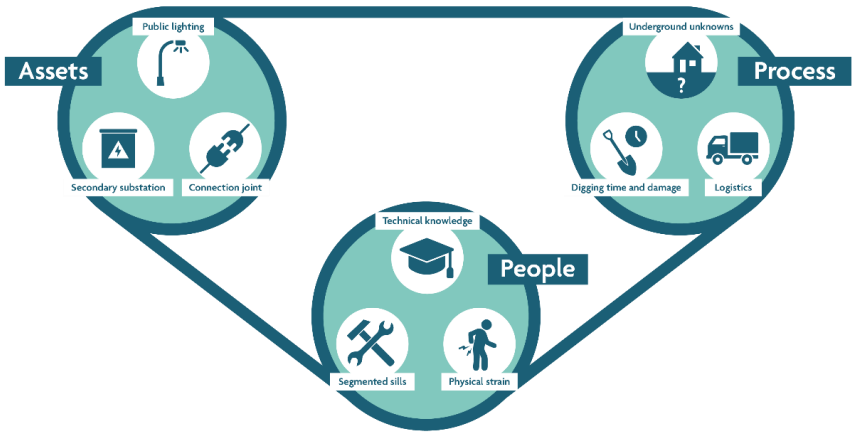
Participants are encouraged to design solutions that directly address the most pressing challenges in the current approach, including:

- **Planning complexity:** Coordinating multiple teams and stakeholders across densely populated areas.
- **Digging time:** Excavation is one of the most time-consuming and disruptive phases.
- **Limited underground visibility:** Lack of accurate data on existing infrastructure increases risk and delays.
- **Damage during excavation:** Unintentional hits to cables and pipes can cause outages and safety hazards.
- **Flooding of trenches:** Weather-related delays and water management issues impact progress.
- **Training time for mechanics:** A growing workforce needs rapid, effective onboarding to meet demand.

Focus

To make a real difference in the LV-Next Challenge, we focus on three key aspects: assets, people, and process. These elements are deeply interconnected. Assets represent the physical components of our low-voltage network—cables, connections, and equipment—that form the backbone of our energy infrastructure. People bring the expertise, creativity, and hands-on skills needed to design, build, and maintain this network. Processes define how we plan, coordinate, and execute work efficiently and safely.

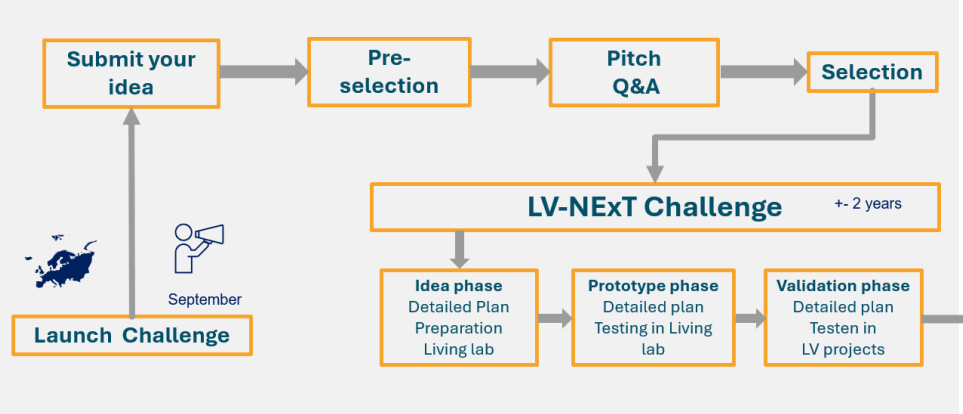
We encourage participants to think beyond a single dimension. The most impactful solutions often address more than one of these aspects, creating synergies that deliver real, scalable change. For example, a new component might not only improve asset reliability but also simplify workflows and reduce the burden on field teams. By combining improvements in assets, people, and processes, we can accelerate the energy transition and build a future-proof network together.



7.LV NEXT PROCES

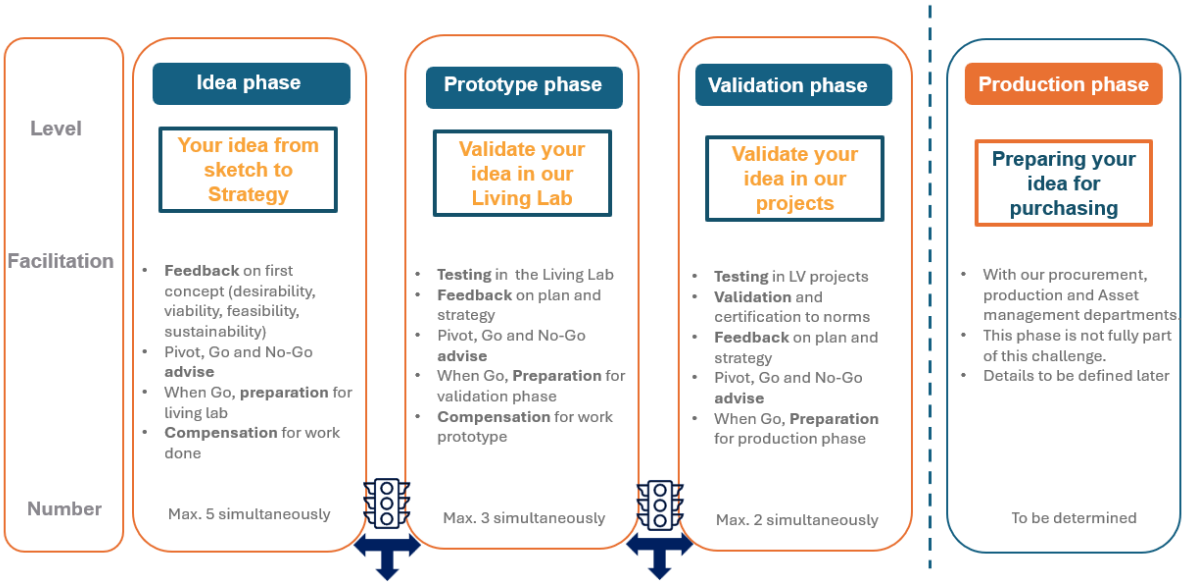
The LV-NExT innovation process is a structured journey designed to guide raw ideas into impactful, scalable solutions for the low voltage network.

The challenge starts in September 2025 and will be open for ideas for approx. two years.



It consists of four key phases: **Idea**, **Prototype** and **Project Validation.** The next phase is **Production** for which a procurement procedure will be initiated outside this challenge.

The LV-Next Challenge is an ongoing initiative, allowing interested parties to register from 16 September 2025 until the provisional deadline of 1 July 2027. However, this end date may be adjusted depending on whether the goals of LV-NExT have been achieved. Please mind that the production phase, and the corresponding time needed for this phase, is outside the challenge.



We anticipate accommodating (simultaneously) 5 ideas in the Idea phase, 3 in the Prototype phase, and 2 in the Project Validation phase. These numbers are indicative and may be adjusted depending on the nature of the ideas and the time required from the project team.

8. IDEA PHASE

In the Idea phase, we validate whether the proposed idea aligns with the LV-NExT challenge and contributes to solving the problems we face in the low-voltage network. We also assess how much the idea supports our ambition to perform 10 times more LV work by 2030.

Equally important in this phase is the intention to understand each other better and share information accordingly. This early dialogue helps build trust, align expectations, and lays the foundation for effective co-creation throughout the innovation process.

Participants identify a specific challenge or opportunity within the low-voltage network domain. (Please mind that it should contribute significantly to our ambition: expanding the low-voltage grid 10-fold.) Creative thinking is encouraged to generate innovative concepts that address our real-world problems. The ideas might be radical, consist of multiple innovations and collaborations that are currently not existing. In this phase we like bold statements and vision with short – and long-term goals.

Individual ideas are welcome and can offer valuable contributions to the challenge. At the same time, this phase is a great opportunity to explore potential collaborations with other companies that support the LV-NExT ambition. We encourage applicants to create partnerships that align with their idea and could help increase its impact in addition the DSO's can support by finding these partnerships.

While LV-NExT may help facilitate connections where relevant, the primary responsibility for initiating collaboration lies with the applicant. By proactively building alliances, participants increase the chances of developing integrated, scalable solutions that align with the broader goals of the energy transition.

9.PROTOTYPE PHASE

Once promising ideas have a Go-decision, they move into the Prototype phase, where concepts are developed into a more detailed level.

Rapid testing in practice is essential for innovation because it bridges the gap between theory and reality. By quickly bringing ideas into real-world environments, teams can validate assumptions, uncover unexpected challenges, and gather direct feedback from users and stakeholders. This accelerates learning and helps refine the solutions before investing heavily in development.

It also reduces risk by identifying flaws early, allowing for timely pivots or improvements. Moreover, it builds confidence among partners and decision-makers, showing that an idea can work not just on paper, but in practice.

We enable prototype testing in our LV-NExT living lab (Simulation street) where ideas can be tested in a realistic environment including:

- Secondary Substation
- Low voltage underground cables
- Household connections
- EV-Chargers
- Public lighting
- Pavements

Details on our living lab can be found in appendix 1

10. PROJECT VALIDATION PHASE

The third phase, **Project Validation**, focuses on testing the prototype in realistic conditions. Feedback is gathered from stakeholders and technical experts to refine the solution. This iterative process ensures that the innovation is both practical and effective and meets the requirements for the potential implementation on our projects. We offer the opportunity to test and validate your solution within actual low-voltage network (LV-net) projects. Depending on the nature of your solution, this phase may also include third party certification according to applicable standards. Testing of components or tools is only permitted if safety can be guaranteed and all relevant conditions are met.

11. PRODUCTION PHASE

Finally, in the Production phase, validated solutions are prepared for implementation. This includes scaling the innovation, integrating it into existing systems, and ensuring long-term viability. Collaboration with DSOs is essential to embed the solution sustainably.

It's important to note that the Production phase falls outside the scope of LV-NExT. Each idea that reaches this stage will follow its own implementation trajectory, tailored to its specific context and stakeholders based on the plan that has been made within LV-NExT.

Contracting working and appropriate solutions during the challenge

Expanding the LV grid is an urgent problem, hence we need to accelerate now. One of the ways we want to do this is by using solutions that have already proven themselves during this challenge. It is up to the individual DSOs to determine whether the impact is large enough and whether the interim implementation is feasible.
These intermediate contracts will never last longer than the duration of the challenge + the necessary preparation time for the next procurement processes.

Who are the clients?

Now it is not yet clear who the ultimate clients will be if the challenge shows that there are working and suitable solutions that can help us with the necessary acceleration. The clients can be the individual DSOs, but the commissioning can also lie with the contractors tied to the network companies.

If the network companies are the buyers, the procurement process will follow the Public Procurement Act 2012.

12. HOW DO I GET FROM ONE PHASE TO ANOTHER?

To move from one phase to the next, pre-described deliverables must always be delivered. For registration, these are the answers to the 7 questions and for the pitch this is the presentation. The deliverables requested during the idea, prototype and validation phase are discussed in the guidance for the assessment chapter. The deliverables are assessed by an assessment team based on predetermined assessment criteria.

The assessment can have different outcomes. These outcomes are listed below. There will be no further correspondence about the outcome of the assessment.

Decisions at the end of every phase:

Go Decision

A *go decision* means the idea or prototype is strong enough to move forward to the next phase. It meets the criteria for desirability, viability, feasibility, and sustainability, and shows clear potential for impact. This decision signals confidence in the concept and commitment to further development.

No-Go Decision

A *no-go decision* indicates that the idea will not proceed. This may be due to technical limitations, lack of alignment with strategic goals, or an unfavorable cost-benefit analysis. It's a necessary step to focus resources on the most promising innovations and avoid investing in solutions that are unlikely to succeed.

Pivot Decision

A *pivot decision* is made when an idea shows potential but needs significant adjustment. Instead of stopping, the concept is redirected—changing its scope, target audience, or technical approach. Pivoting allows teams to learn from feedback and adapt creatively, keeping the innovation process alive and responsive.

The participants are not allowed to linger in a phase endlessly. Fixed lead times have been set. Extensions to fixed lead times are only granted with solid justification and if enough time remains, considering the consequences for other parties involved. A pause is possible; based on the new pitch, LV NExT will determine whether the process can continue. You can find the fixed lead times in section 19 Planning.

The assessment team is structured for each phase as follows:

Function	Company	Questions	Pitch	Idea	Prototype	Validate
Senior innovator	Alliander	√	√	√	√	√
Senior innovator	Stedin	√	√	√	√	√
Senior innovator	Enexis	√	√	√	√	√
Technical expert (s)	Alliander			√	√	√
Technical expert (s)	Stedin			√	√	√
Technical expert (s)	Enexis			√	√	√
Contractor (s)	To be determined				√	√

What happens if I can't complete a phase?

If you don't get through a phase, you are free to take another chance. If you think you have a suitable solution after adjustments, you can participate again. If you want to participate again, the process starts again when you register by answering the seven questions on our website.

What happens if the ranking changes during the process

When another party is faster in the development or grows faster in terms of maturity of the solution, we are free to move a solution with a higher ranking to the next phase earlier. This does not mean that the party that must wait is no longer eligible for the next phase, it is only a delay.

13. GUIDANCE FOR THE ASSESSMENT

Assessment criteria used in the different phases

During the **idea**, **prototype**, and **validation** phases, all concepts will be evaluated based on four key criteria:

- **Desirability**
- **Viability**
- **Feasibility**
- **Sustainability**

Each criterion is explained below.

Desirability

Desirability assesses how well the idea aligns with the needs, ambitions, and strategic goals of the **LV-NExT initiative**. It focuses on the human and organizational relevance of the solution. A desirable idea:

- Resonates with stakeholders
- Addresses real pain points in the installation of the low-voltage network
- Contributes meaningfully to the ambition of achieving **10x more LV work**
- Is intuitive, valuable, and compelling for users and implementers

Viability

Viability examines the potential of the idea to become a sustainable business case. This includes:

- Balancing costs and benefits
- Creating long-term value
- Demonstrating potential for procurement or adoption

A viable solution should be economically sound, scalable, and capable of delivering measurable impact within budgetary and policy constraints.

Feasibility

Feasibility focuses on the technical and operational practicality of the idea. It considers:

- Development and implementation with current resources and technologies
- Compatibility with existing systems
- Time to deploy and complexity
- Availability of required expertise

A feasible idea can be built and tested without encountering major barriers.

Sustainability

Sustainability evaluates the environmental and social impact of the idea over time. It considers:

- Contribution to long-term resilience
- Reduction of ecological footprint
- Support for responsible resource use

A sustainable innovation should align with climate goals, promote circularity, and minimize negative externalities. Ensuring that today's progress does not compromise future needs.

Deliverables per phase

Deliverables must support the idea and be tailored to its nature. Below is an overview of expected outputs per phase.

Participants are requested to provide a planning overview indicating when each deliverable will be discussed with the LV-NExT project team during the respective phase.

Idea Phase

- Basic report on how your idea solves our problem
- Market and competition analysis
- Business Model Canvas
- Problem exploration from the user's perspective
- Stakeholder and user analysis
- Proof of concept on TRL-3
- Pitch or one-pager that shows your view on sustainability and how it affects your solution.
- Plan for prototype phase including the use of the Living lab. Pitch Decks or One-Pagers: Summarizing the idea, its value, and user relevance.

Prototype Phase

- Detailed report on validation of the problem, the idea, its value and user relevance in a test environment.
- Plan to prevent vendor lock-in for DSO's
- Prototype test results on TRL-6 with feedback from users (lab environment)
- Problem-solution validation
- Evidence of user-centred concept development and testing
- Plan for sustainable operation with continuous improvement and social added value.
- Plan for Project validation phase including the use of the LV-Projects. Pitch Decks or One-Pagers: Summarizing the idea, its value, and user relevance.

Validation Phase

- Detailed report on validation of the problem, the idea, its value and user relevance in a relevant project environment.
- Report on prototype demonstration in operational environment on TRL-7
- Report on complete and operational product/service functionality
- Plan for production scale-up
- User experience validation and market acceptance evidence
- Monitoring and reporting of sustainability performance
- Plan for Procurement phase (details to be defined later). Pitch Decks or One-Pagers: Summarizing the idea, its value, and user relevance.

*Documents required to enter the living lab, or actual projects are excluded from this list.

14. FINANCIAL COMPENSATION

Will I be compensated financially?

We are aware that there are costs associated with the idea, development and validation phase and want to make a partial budget available for this. Regarding financial compensation, we have the following resources available:

Phase	Available amount
Idea phase	maximum amount € 10.000
Development phase	maximum amount € 60.000

To be able to claim the financial resources, you must specify the expected cost for each phase, for which you use our template. Based on this calculation, it is determined to which amount you can claim. This amount can never exceed 50% of the costs to be incurred.

For non-profit participants in the Challenge — such as schools and research institutes — the 50% cost limit does not apply. In return, any intellectual property developed during the Challenge will be owned by the DSOs. We will agree on the details together and capture them in a collaboration agreement before the idea and prototype phases (phases 2 and 3) kick off.

At the end of the phase, you provide insight into the actual costs incurred. If it turns out that the Costs were lower than expected in advance, the amount to which you were entitled will be recalculated, the difference will be settled. The same applies if the actual Costs are higher than expected.

You will not receive any financial support for answering the questions, the pitch and the validation phase.

The network companies have reserved € 750,000 for this project. Based on the maximum compensation outline above at least 10 parties can go through the entire process with the maximum available funding.

In addition to the financial compensation described here, the network companies offer valuable support by making a large pool of knowledge available and the opportunity to test the ideas in a safe way in the living lab and in practical situations.

15. ADDITIONAL CONTEXT

The domain of low-voltage energy grids is complex and constantly evolving. To provide you, as a potential participant, with better insight and to help align your solution with our needs, we share our objectives below. We emphasize that the path to innovation is entirely open: we actively welcome creative and unconventional ideas that help us move forward.

Safety first	**Making the best use of technical staff**
• Connecting the LV cables at least as safely as in the current situation. • Working as de-energized as possible by moving complex technological operations to 1 place instead of in the trench as much as possible. • Simplifying the work so that it is less error-prone.	• Reducing the number of check-ups by work planner staff • Simplification of connections so that a less competent or certified person can do the job. • Increasing ergonomics for the mechanics. • Reduce the number of actions in the field where possible • Sufficient support from contractors
Production growth	**Flexibility**
• Realistic lifespan (40 years) appropriate to the application of this innovation (feasibility)	• No vendor lock-in • Working towards an open standard • In the event of malfunctions, (partial) replacement(s) is possible
Partnership	**Affordability**
• Transparent: choices must be explainable, and relevant information must be shared mutually • Co-creation: by contributing everyone's specific knowledge, arriving at a joint concept and determining the final specifications • Direct communication/open collaboration culture, challenging and holding each other accountable is the basis • Confidentiality	• Achievable business case (viability) • Total Cost of ownership ("TCO"): we look beyond just procurement and implementation, but also at personnel costs, maintenance, lifespan, social costs, etc.

16. SUBMITTING YOUR IDEA

Anyone with a good idea and the capacity and knowledge to translate this idea into practice can apply. If you go to the website and press the Submit your idea' button, you will be taken to a registration form where you can find and answer the seven questions. By clicking on 'send' you have registered.

We invite you as a potential participant to think freely; All ideas are welcome.

17. EXAMPLES OF POTENTIAL INNOVATIONS

Below you'll find examples of the types of innovations we are looking for as part of the LV-NExT challenge:

What we are looking for is innovations that bring significant production speed:

- **Organizational innovations** – Solutions that accelerate complex and often labor-intensive organizational processes (e.g., by reducing steps or making them more efficient).
- **Technological innovations** – Solutions that have a direct impact on speeding up the execution of work.
- **Social innovations** – Approaches where, for example, alternative deployment of people or social structures results acceleration of the execution.

What we are not looking for:

- Technical innovations that bring incremental improvements, for example a new low voltage joint that can be installed slightly faster.
- Ideas that solely focus on preventing expansion of the low voltage network, such as congestion management solutions.

18. PRICING MODELS AND INTERLECTUAL PROPERTY

Affordability is also an important topic. It is important to keep an eye on affordability during development. To create clarity on the price component, we are very curious which pricing model participants will use and why.

We expect to come across the following pricing models:

- Fixed sales price per component/ Graduated price, Price per component decreases with larger quantities.
- Price per project / bundle price, components are offered as a package for a specific project.
- License for use/integration, Component comes with license for use in a system.
- Licensing model through producer, Component is produced and sold through a producer who integrates it into its own offering.

Specific to process optimization:

- Consultancy model / project price, the solution is offered as an advisory process or implementation project.
- Training or education model Process optimization is transferred through training, workshops or e-learning.
- Performance-based pricing, Payment is linked to the result of the process optimization (e.g. shorter lead time, less failure costs).
- Licensing model, the method or tool is sold through another party (e.g., software vendor).

By asking during the prototype phase in the challenge which pricing models will be used and reflecting on this choice, we gain more insight into the economic and practical applicability of the solutions. When filling in this information, you may also choose multiple pricing models or propose your own model if they are well substantiated.

What does it give us?

- Market orientation: Have you thought about who will pay for your solution and why?
- Economic feasibility: Is your pricing model realistic and scalable?
- Comparability: Can we compare your solution well with other proposals?
- Business model maturity: How well prepared is your solution for implementation?
- Innovation in revenue models: What new or smart pricing strategies are emerging?

What's in it for you?

- You sharpen your own market strategy.
- You will receive feedback on the applicability of your solution.
- You increase the chance of follow-up processes, collaboration or upscaling.

Why do we ask about intellectual property?

In this development process, we work together on innovative solutions that contribute to the energy transition. It is important to look not only at technical and practical feasibility, but also at the legal and commercial applicability of a solution.

By collecting information about intellectual property (IP), we as an organization gain insight into:

- Who owns the solution and whether it can be freely used within the sector.
- Which forms of protection have been chosen (e.g. patent, design right, confidentiality) and what that means for cooperation and upscaling.
- Whether there are any restrictions on using or sharing the solution stand alone and/or integrated with solutions of other participants and/or third parties, such as licensing or shared ownership.
- How well the solution is prepared for market introduction, including agreements on usage rights and portability.
- What risks or bottlenecks may arise during implementation in practice.

This information helps us to:

- To determine which solutions are widely applicable within network companies and contractors.
- Facilitate collaborations without legal obstacles.
- Accelerate scale-up and market access, while respecting the rights of developers.
- We therefore ask participants to briefly describe their vision and approach to IP. This is not a legal test, but a way to create clarity together about ownership, license rights, use and cooperation.

19. PLANNING

Submitted ideas proceed through the LV-NExT process as described in chapter 7. An indicative plan outlines typical lead times for each phase. Participants are required to submit a planning document at the start of every phase, and any delays or deviations must be communicated.

To ensure adequate support, there is a maximum number of ideas allowed per phase: five idea, three prototypes, and two validations. The estimated lead time for each phase is as follows:

- Idea: 1–2 months
- Prototype: 3–9 months
- Validation: 6–12 months

20. RULES OF THE CHALLENGE

- Register by answering the questions on the LV NExT website
- Your registration will be automatically confirmed by LV NExT
- Communication is done via info@lvnext.nl
- Ideas only move on to the next phase if you receive an invitation from LV NExT project team.
- If you do not proceed to the next phase, you will receive a message including motivation why.
- Once a month, the collected applications of that month are assessed, and selection takes place.
- Once a month pitches and Q&A take place for the selected ideas.
- If there is insufficient time to process all applications or pitches in the time reserved for this, the ideas and pitches that are not offered will be postponed to the next month.
- Ideas are assessed in order of application
- Pitches are judged in order of ranking based on the score in the assessment of the questions.
- The idea phase starts with a kick-off meeting, the participant come prepared for the kick-off based on the documentation received with the invitation.
- The kick-off will take place in Utrecht, a tour in the living lab is part of this.
- LV NExT may communicate questions about the Challenge and mention the names of the participants without prior approval, except for sharing images or information about specific ideas. This is only allowed if there is written approval from the participant in question.
- Rules and guidelines corresponding to the living lab will be provided separately

21. NATIONAL SECURITY

The DSO's attaches the utmost importance to national security. For participation in this challenge, in which we test innovative solutions for reinforcing and constructing the low-voltage network. Clear and non-negotiable requirements apply in this area.

All participants must be established and registered in a country that has signed the Government Procurement Agreement (GPA). This applies to all parties within a consortium, as well as relevant third parties. The same applies to the Ultimate Beneficial Owners (UBOs) of participating organizations.

Solutions may under no circumstances endanger national security. Specifically, this means that participants:

- may not be established in countries that the Dutch government has determined to have an offensive cyber program targeting the Netherlands, the EU, or NATO allies;
- must comply with the principles and objectives set out in the most recent "National Security Strategy for the Kingdom of the Netherlands" and the "Dutch Cybersecurity Strategy 2022-2028";
- must provide a declaration of GPA status and a UBO declaration.

If there are doubts about compliance with the national security requirements, the organization reserves the right to conduct additional checks—potentially in consultation with the Dutch government and relevant security services—and to deny or terminate participation in the challenge if risks to national security are identified.

With this approach, we ensure that solutions within the low-voltage network is tested responsibly and securely.

22. APPENDICES

Appendix 1 – Living lab

Appendix 2 – Price

Appendix 3 – How do we work now

Appendix 4 – Concept Collaboration Agreement

APPENDIX 1 – LIVING LAB

Living Lab for Innovations in the Low Voltage Grid

As part of our goal to scale up production and strengthen the low voltage (LV) grid, we are committed to testing new innovations in practice. To facilitate this, the Dutch Distribution System Operators (DSOs) have developed a living lab that simulates a typical residential street in the Netherlands. This chapter outlines the key aspects of the lab.

At the time of writing the street is still under construction. The actual layout and setup will be provided in a later stage.

Purpose of the Living Lab

The lab is designed to evaluate innovations that are still at a low Technology Readiness Level (TRL 5 or 6). It provides a realistic yet controlled environment to assess their potential contribution to our objectives.

Location and Setup

The lab is located next to the entrance of the Stedin building on Nijverheidsweg in Utrecht. It includes a grid station equipped with a low voltage rack, a Ring Main Unit (RMU), and a transformer cabinet. The station is surrounded by grass pavers, and the front side is excavated and secured with a metal grate.

Low voltage cables are routed from the grid station to the opposite side of the main (safety) road using a conduit (mantel tube) beneath the road. The main road must always remain unobstructed.

On the side closest to the Stedin office, a mock residential street is being constructed. This street includes typical above ground and underground infrastructure found in any Dutch neighbourhood. The assets listed below may be found in the street.

Typical relevant assets above ground:

- Public lighting
- EV charging stations
- Various types of pavements
- Parking spaces
- Green areas and trees
- Residential houses and high-rise buildings

Typical relevant assets below ground:

- Rainwater drainage
- Sewer pipes
- Water supply lines
- Fiber optic data cables
- District heating pipes
- Gas pipes
- Conduits
- Electrical cables

Subsurface Infrastructure

In addition to the infrastructure built specifically for the lab, existing infrastructure is present in the surrounding area. All necessary procedures, including a KLIC request, have been followed. The results of this request are shown in Figure 1.

Due to the assets also no digging zones will be appointed minimizing the risk of damaging active infrastructures.

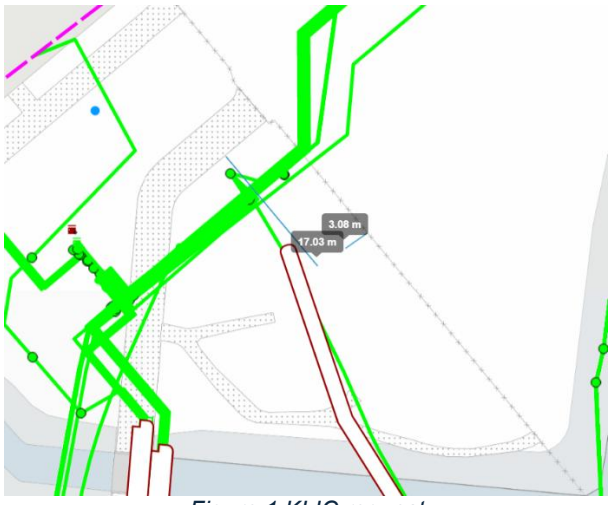


Figure 1 KLIC request

Lab design

Taking into account all considerations above, the plan presented in Figure 2 and Figure 3 has been developed. It consists -of a street with the following elements:

- 8-10 houses, some equipped with prefabricated distribution boards
- 4 parking spaces, including 2 EV charging stations
- A variety of pavements: concrete paving stones in the street, and on the sidewalks 30x30 concrete tiles and Dutch clay pavers (Waal format)
- Landscaping and trees

Figure 2 Schematic top view

The lab will support various configurations, such as homes with both primary and secondary grid connections (see figure), public lighting connected to auxiliary veins of a low voltage cable, and lighting connected to a separate grid.

Figure 3 Schematic isometric view

Safety and Work Procedures

To conduct demonstrations in the lab, work plans must be submitted in the same manner as for regular operations. The same safety protocols and preparations apply.

The applicable rules and guidelines corresponding to the living lab will be provided separately.

APPENDIX 2 - PRICE

Reflection model price

Question	Answer (filled in by participant)
Who is the intended payer of the solution?	Grid operator, contractor, other party?
What is the expected value for this party?	Cost savings, efficiency, sustainability, compliance?
When is payment made?	Before, per use, with proven results?
How scalable is the chosen pricing model?	What happens when scaling up from 10 to 1000 units?
Why is this model suitable for your solution and organization?	For example, because of product type, development phase, market strategy?
Are there any risks or points of attention with this model?	For example, reliance on volume, measurability of performance, long sales cycles?)

APPENDIX 3 – HOW DO WE WORK NOW?

How do we work now?

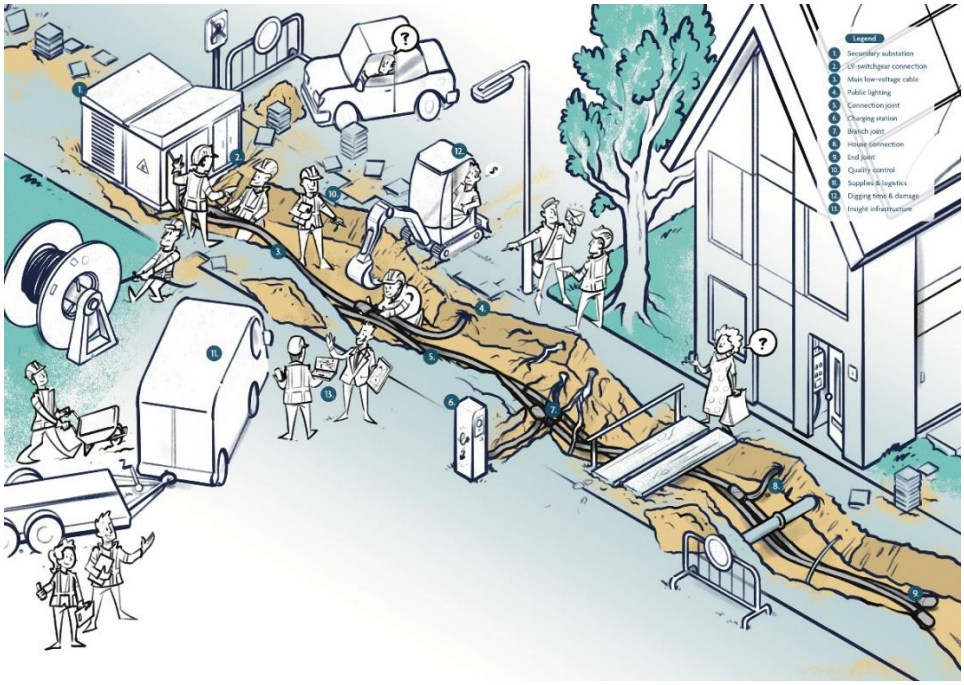


Figure 1 LV-NExT challenge visualised

The "typical" Dutch Neighbourhood

To navigate the complexity of the low voltage networks it is essential to work from a shared reference point. This section introduces the aspects of a Dutch residential neighbourhood with common characteristics found in most urban and suburban areas, rural areas excluded (Figure 2). While no two neighbourhoods are identical, this representative framework enables scalable planning, design, and execution of the upgrade of the low voltage grid across the country.

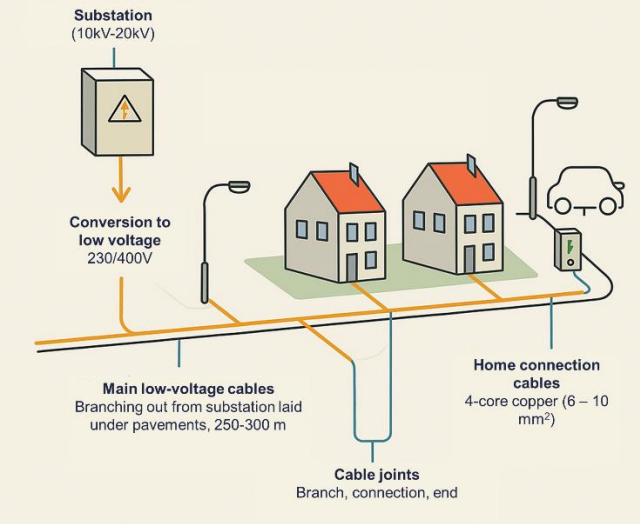


Figure 2 graphical representation of a neighbourhood

Neighbourhood-Based Grid Transformation

The transformation of the Dutch low voltage electricity grid is largely carried out by contractors working on behalf of the DSOs. To manage this enormous task, the Netherlands has been divided into 14,421 neighbourhoods, based on the official classification by CBS (Statistics Netherlands).

This geographical segmentation forms the basis for organizing the work into manageable units known as 'Buurtaanpak' or neighbourhood approaches. After extensive preparation by both DSOs and contractors, the actual execution of the work can begin.

Although this approach may seem straightforward, significant geographical and structural differences between neighbourhoods require customized designs for each area. For example, the number of residences or residence density per neighbourhood can vary greatly, influencing the complexity and scope of the work.

Typical Residential Neighbourhood

To effectively plan and upgrade of the low voltage grid at scale, a standardized model of a Dutch residential neighbourhood has been developed. While neighbourhoods across the Netherlands vary in size, layout, and infrastructure, this typical profile represents approximately 70% of all residential areas. It serves as a practical reference for designing and implementing grid upgrades under the 'Buurtaanpak' approach. This typical neighbourhood includes:

- 1,030 total connections, consisting of:
  - 700 homes
  - 200 public lighting
  - 50 unmanned connections (e.g., utility boxes, telecom cabinets)
  - An increase in public EV charging stations from 20 to 80
- The maximum area of such a neighbourhood is approximately 125 hectares.

Design of a Neighbourhood

The design process for a neighbourhood begins with defining its overall composition, including the types of housing, the nature of the electrical connections, and the expected load profiles. This is followed by an analysis of the existing infrastructure, identifying any potential obstructions and assessing the available substations capacity.

Based on these findings, the desired design parameters are established, such as the design current for both consumption and generation. A feasibility study is then carried out to determine whether additional substations are required, or if reinforcing the existing substations will suffice. In some cases, existing cables can be segmented and supplemented with an additional feeder cable, avoiding the need for extensive replacements.

Finally, the design stage includes calculating cable lengths, determining the number of houses connected per cable, and verifying the selectivity of protective devices to ensure safe and reliable operation of the network.

Assets Involved in the Neighbourhood Approach (Buurtaanpak)

The 'Buurtaanpak' typically involves the deployment of the following key electrical infrastructure assets:

- Substation
    - A neighbourhood may contain multiple substations, each supplying power to homes, small businesses, or light industry.
    - Each station is connected to the medium-voltage grid via a medium-voltage cable (typically 10kV–20kV).
    - The station converts medium voltage to low voltage (230/400V) for local distribution.
- Main low-voltage cable
    - Each transformer station feeds several main low-voltage cables, which distribute electricity to groups of connections within the neighbourhood.
    - These cables are typically installed beneath sidewalks or pavements.
    - A typical cable length is 250–300 meters.
    - Standard construction: 4-core aluminium cable, 150 mm^2.
- Public lighting connection
    - The public lighting network consists of a main cable (4x6mm^2 Cu) or the main distribution cable with auxiliary wires (4x6mm^2 Cu) to connected the public lighting columns.
- Home Connection Cable
    - This cable connects the main low-voltage cable to the household electrical panel.
    - The connection is made via a cable joint.
    - Standard construction: 4-core copper cable, 6 or 10 mm^2.
- Cable Joint
    - The cable joint forms the physical and electrical connection between the main low-voltage cable and the home connection cable.
    - These joints are currently installed manually by certified electricians.
    - The joints are the most labour-intensive activity for electricians in the 'Buurtaanpak'.

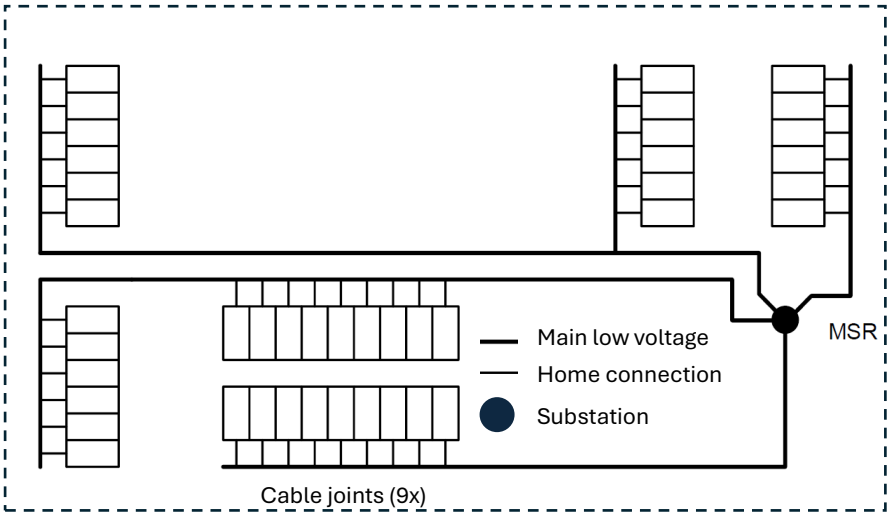


Figure 4 Schematic overview of a neighbourhood with a single substation

Execution Capacity and Workforce Deployment

The successful implementation of the 'Buurtaanpak' relies heavily on the availability and coordination of skilled labour. While the design and planning phases are led by DSOs and engineering partners, the execution on the ground is largely carried out by the civil and technical workforce.

Approximately 90% of the work in residential neighbourhoods—including excavation, cable laying, substation installation, and connection work—is performed by civil crews (60%) and electrical technicians (30%). These professionals are essential for translating plans into physical infrastructure, often working under tight spatial and temporal constraints.

The other 10% consists of staff supporting the execution of the activities

- Construction planners – Translate designs into executable plans and coordinate logistics.
- Work planners (werkvoorbereiders) – Prepare materials, drawings, and schedules.
- Field supervisors (uitvoerders) – Oversee daily operations on-site and manage crews.
- Project leaders – Coordinate between stakeholders and ensure project milestones are met.
- Secondary workforce – Includes subcontractors, temporary labour, and support staff.
- Supply chain partners – Ensure timely delivery of materials and equipment.
- Management & safety officers – Monitor quality, compliance, and worker safety.

Ecosystem stakeholders

- DSO's
- Regulators (ACM,
- National Government / ministries (KGG, provinces)
- Knowledge institutions
- Municipalities
- Contractors
- EV infrastructure providers
- Other underground providers
- Housing corporations
- Homeowners

Once neighbourhoods are finalised, they are designed to remain fit for purpose at least until 2050. This effort involves the entire chain of stakeholders working together on the largest infrastructure project the Netherlands has ever undertaken. During the challenge, we can provide detailed background information on specific topics within the operational landscape, based on the ideas submitted.

APPENDIX 4 - CONCEPT COLLABORATION AGREEMENT