

HyDelta 2

WP10 – Social acceptance for hydrogen transport and storage

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Executive summary

In HyDelta 2.0 WP10 we found through literature research, four local case studies and stakeholder interviews that the public perception of hydrogen developments in the Netherlands is now generally positive, nevertheless fragile. The knowledge level of the general public is not high: both concerning the technologies, vision and goals regarding hydrogen applications in the Netherlands. This lack of knowledge increases the risk of misinterpretation of information or change of perception with false information. The knowledge level can be increased with central communication about hydrogen developments, the vision and goals around hydrogen and policies. Improving central communication to the public raises the knowledge level and helps local implementation by unburdening local participation processes, which are currently extensive with first hydrogen developments and pilots. However, the fact that the entire energy system and policy framework concerning this in transition, makes communication about hydrogen developments to the public challenging. Roles and responsibilities in the sector are subject to change and there is uncertainty about what the energy system will look like in the future. This makes it challenging to provide unified information about the position of hydrogen in the future energy system. The current uncertain position of hydrogen applications in the future energy system, in combination with unclear roles and responsibilities and long lead times of permit procedures, contributes to a challenging climate for market parties to make investment decisions.

In task 10.1 we did a literature review about social acceptance of hydrogen. In task 10.2 we did interviews with stakeholders along the hydrogen value chain about the societal embeddedness of hydrogen in the Netherlands and in task 10.3 we did four (local) case studies, studying public support, communication and risk and safety perception. In task 10.4 we used the results of tasks 10.1, 10.2 and 10.3 to work towards three risk governance strategies for nine societal risks occurring in four main subjects: (1.) participation, (2.) communication, (3.) policies and regulations and (4.) decision making. These strategies focus on what participation processes could look like in the coming years, how communication to the public can be optimized and what role the government could take to accelerate the development of the hydrogen value chain in The Netherlands by enabling stakeholders. The risk governance strategies have been developed in a co-creation setting. The strategies can be enhanced and improved by working out a step-wise approach and testing them in use case scenarios'.

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1. Introduction

Hydrogen has the potential to play an important role in the future sustainable energy system of the Netherlands and in reducing greenhouse gas emissions. For the development and application of energy technologies, it is important to consider social aspects in addition to technical aspects. Within this context, we conducted literature research, interviews and field research to answer the main question:

What are the main societal challenges for deploying hydrogen distribution, storage, and application within the built environment in the Netherlands and how could these challenges be overcome as part of a development and implementation strategy?

In this synthesis, we will first shortly introduce the research that has been conducted in three different stages (literature review, local case studies and stakeholder interviews), and which are reported on in separate reports: see www.hydelta.nl. Then, we will integrate the findings in Chapter 2. In chapter 3 we elaborate on the co-creation workshop, in which the synthesis of WP10 is discussed. Chapter 4 contains recommendations, in which the main societal risks are displayed based on the synthesis of WP10 and three risk governance strategies are proposed based on the co-creation workshop and the findings of the overall research.

Summary 10.1: literature review

Social acceptance is an important aspect in the implementation and realization of various renewable energy technologies. In task 10.1 we did a literature review to provide insight into public support, social acceptance and societal readiness for new energy technologies in general, and hydrogen, both as an energy carrier and as an application in the built environment, in particular. 110 relevant articles were identified, of which 28 have been included in this literature review, based on relevance and year of publication (2012-2022). Generally, the findings show there is low awareness concerning hydrogen, as well as limited knowledge and familiarity with this new energy technology, especially concerning hydrogen storage. Despite this, there is overall moderate to high willingness to accept hydrogen, which decreases when it comes to the local implementation of hydrogen projects. Safety and affordability were two important characteristics of a hydrogen industry that would motivate people to support this industry, together with climate change mitigation. Safety concerns over the flammability of hydrogen are mostly expressed when used for household activities and storage, and less so when it concerns the use of hydrogen for transportation. Communication about safety and risks, transparent interaction between all parties and the community, as well as giving the community a voice in the decision-making process, are considered essential for hydrogen acceptance.

An updated search task (six months after the original literature review was conducted) revealed 8 new relevant articles. These emphasized the critical role of 'attitudinal and behavioral dimensions of hydrogen acceptance', referring to knowledge and awareness of the public, for instance, and the call for a more critical and multidimensional approach to study hydrogen acceptance [1]. Additionally, in these new articles, it is recognized that community engagement is necessary for getting from the development phase to the implementation phase [2]. The latter observation is also in line with our findings from 10.2 and 10.3.

Summary 10.2: stakeholder interviews

In task 10.2 we conducted interviews with 14 stakeholders along the hydrogen value chain in the Netherlands, focusing on four societal dimensions (impact on the environment, public and stakeholder

involvement, policy and regulations, market and financial resources) of hydrogen developments in the Netherlands.

At this moment, hydrogen seems to have a positive image among the general public in the Netherlands, although the level of knowledge regarding the different applications is still low. Public information needs focus around the topics of practical issues, safety and finance. Additionally, stakeholders involved in local hydrogen developments state that during participation processes they are asked to provide more general information about hydrogen, which they cannot provide or is out of their scope. Therefore respondents state that there is a need for communication from either the government or knowledge institutions to the general public, to inform the public about general information concerning hydrogen developments and to raise the knowledge level regarding the different aspects of hydrogen. If this general information to the public is provided by for example the government, organizations involved in local developments can focus on information provision about the project. Finally, respondents state that more communication about the vision and goals regarding hydrogen in the Netherlands would be beneficial for their involvement in hydrogen developments, for example in order to be able to make investment decisions.

In obtaining and maintaining public support, information and communication, trust and perceived justice play an important role. The policy framework regarding hydrogen is still evolving. New standards need to be set and roles of established and new parties are changing. For example: it is not self-evident that the grid operators of the natural gas network will have the same role when it concerns hydrogen distribution. Also supervision of hydrogen production, storage and transport facilities is not fully specified yet. Licensing procedures still have a long lead time, which is perceived as a challenge by parties involved. Nevertheless, there is proceeding development in this area, for example in the form of the Temporary Guidelines for Safety. The market for hydrogen has yet to be established or brought into being. There is still uncertainty in the development of supply and demand. The uncertainty of supply and demand combined with uncertainty in the policy framework and long-term vision from the government means that investing in hydrogen is often still perceived as a risk.

Summary 10.3: local case studies

In task 10.3, field research within four local cases that are in different stages (Rozenburg, Lochem, Wagenborgen, Stad aan 't Haringvliet) has been conducted. The central themes that we covered in this research are public support, (risk)communication, safety and the experience of safety, and an evaluation of the project. For each case, we interviewed local stakeholders (24 interviews in total) and contacted residents, including people living nearby the hydrogen pilot (17 interviews, 68 questionnaires and +- 90 shorter conversations). The results show mostly positive indications for public support (although this is not yet clear for Stad aan 't Haringvliet). In all cases, the importance of communication (between stakeholders and with participating households of the pilot) has been taken seriously, although there is less emphasis on the communication with residents living nearby the hydrogen pilot. As we observed, there can also be questions and worries in this group, for instance about the progress and decisions that have been made in the project. It seems important that there is a contact person whom people can reach for their questions and worries, and this applies both to participating households and their neighbors.

Positive attitudes concerning the safety are partly attributed to the trust people have in the involved stakeholders. Additionally, within several cases there are positive practices with demonstration houses, where people can experience what it means when a house is heated with hydrogen. Thus, the findings emphasize the importance of broad and frequent communication, not only with the directly involved residents, but also with people who are living nearby and are more indirectly involved in the hydrogen pilot. Such communication is also important in pilots that are in the middle or at the end of

the implementation phase. Finally, it is recommended to share ownership of the project with all stakeholders from the beginning (including the participating households). This means to actually include all stakeholders in the planning phase to prevent delays in the project, for instance, due to lack of knowledge or resistance 'because not everyone is on the same page yet'.

The findings from the local cases have been discussed with 11 local stakeholders from the four hydrogen pilots in two cocreation sessions. Overall, the stakeholders recognized the results. The need for (personal) communication that is open and transparent was shared, although some stakeholders also questioned to what extent extensive communication is feasible when hydrogen will be applied on a larger scale in the Netherlands. In addition, it is important to take into account individual differences and preferences (for instance, concerning the frequency and the content of the communication). The stakeholders involved in communication with residents also seem to communicate about hydrogen (and, for instance, the potential hindrance from construction work in their street as well as explanation about relative safety) in similar ways that they would communicate about this when it was about natural gas. This comparison to natural gas in communication can contribute to support for hydrogen developments, as natural gas is a familiar and trusted technology. Nevertheless, some respondents state that it is important to take into account that the safety of hydrogen must be sufficiently explainable on its own and therefore the comparison to natural gas must be considered carefully.

The distinction between the current pilot phase and future phases in which hydrogen may be more frequently applied in the built environment, has been discussed, for example with regard to different roles. The initiators of a project are assigned to be responsible for the public support on a project level, and more pro-active communication about hydrogen to inform the public should be initiated by experts, as it is important to address misconceptions people have about hydrogen and to strengthen the positive general attitude with specific successful examples and a vision on hydrogen. Therefore, it is emphasized to share successes and learned lessons from the hydrogen pilots. We also discussed the specific role for the HyDelta consortium to share research results in an accessible and clear way. A report of the two cocreation sessions is included in the appendix (in Dutch).

Introduction 10.4: Synthesis - Towards societal risk governance strategies

In task 10.4 (synthesis) we bring the results of the literature review, interviews and local case studies together to take the first steps to societal risk governance strategies for hydrogen developments in the Netherlands. The results have been discussed within working sessions with HyDelta WP10 group members and three (online) knowledge sharing workshops with respondents, HyDelta participants and interested stakeholders. After this, the main themes and issues were identified, based on which an overall co-creation workshop was organized with the purpose to discuss the research results and share perspectives and experiences. In the workshop, areas of agreement and disagreement were identified and potential solutions to issues and concerns were explored. The findings will be elaborated on in the next chapter.

2. Synthesis of the results

This chapter summarizes the results of task 10.1, 10.2 and 10.3 in three main subjects: 1) public perception, 2) information needs, 3) participation processes, communication and 4) safety and risks: perception and policies.

Perception

Both the literature review, case studies and interviews indicate that public perception of hydrogen applications in the Netherlands is generally positive. However, this may change during local implementation when residents are directly affected by hydrogen developments in their area. Trust in

involved parties and technologies, knowledge level and (perceived) justice play a major role in public perception. Trust in grid managers and the natural gas network in the Netherlands is relatively high, whilst trust in subsurface activities and the parties involved in those activities is relatively low. The same applies to the level of knowledge: this is higher when it comes to the natural gas network, and lower when it comes to underground (storage) activities. This division of knowledge level and trust may indicate that applying hydrogen in the built environment using the natural gas network can count on more support than underground hydrogen storage.

The positive perception is confirmed in the case studies. In the local pilots that were studied, support among the residents involved is good. This is attributed to trust in the parties involved and a very careful participation process, in which residents are informed about the pilots and included in the decision making process. Although support for the local pilots was relatively high, there were also some critical sounds, especially from local residents who did not participate in the pilot themselves. Here there was a sense of injustice attributed to (1.) insufficient information provision to residents who live nearby but do not participate in the pilot, and (2.) large financial investments in a small pilot that benefits few people.

Other issues related to justice may stem from distribution of financial resources, e.g., (1.) subsidies that industry receives for hydrogen versus investments that households must make to become sustainable. (2.) The distribution of burdens and benefits. For example, when people living near a project where a network is being constructed are inconvenienced by the conversion in the street, but are not connected to the network themselves. Or when residents living near storage projects are inconvenienced by construction work, but are not compensated for this. (3.) When the participation process is perceived as insufficiently extensive or careful. The literature review revealed that the low level of knowledge among the general public, especially when it concerns hydrogen storage (subsurface and in tanks), May also be a cause of (future) negative perception concerning hydrogen storage facilities.

Information needs

One of the subjects that came up during the literature review, local case studies and stakeholder interviews was the information needs of the public and parties involved in developing hydrogen applications

From literature research, case studies and stakeholder interviews, we found that the information need of the public evolves around four main topics. (1.) Safety: People want to know whether hydrogen projects that are developed are safe, what the risks are and what mitigation measures are taken. This is important when it concerns heating projects that affect the household, but also when it concerns other projects, like production, transport and storage, which are implemented in the vicinity of nearby living areas. (2.) Practical information: residents want to know what implication the development of hydrogen projects will have on their (daily) life. For example when it concerns heating projects, questions as what will be needed in terms of renovation, what impact it may have on daily comfort (heating and cooking), what it means for energy security. When it concerns a hydrogen project in the neighborhood that does not directly affect the household, residents still want to be informed about practical issues, like roadblocks, and the duration of the project (3.) Financial aspects: Residents are concerned with the impact on their own energy bill, the investments they will have to do and how they can profit from or are compensated for hinder. Finally, (4.) it is important to substantiate how an energy solution will contribute to addressing climate change and why this solution fits best in a certain context. An example of information that addresses both a safety need as a need for practical information is information on which party will be the central point of contact. During the project but also during future operations people want to know which party is responsible and who they can

approach with questions and issues. This is a special concern for projects with possible safety risks: what if something goes wrong, how will people be compensated? Due to the current situation related to compensations for the earthquakes as a result of gas extraction in Groningen, the general public sometimes tends to compare their probable future situation to that of Groningen. They fear that if something goes wrong concerning hydrogen, caretaking of the damage done will lack. Therefore, clear guidelines and communication about these guidelines can reinforce the trust of the public in terms of safety.

From stakeholder interviews we found that the information need of stakeholders evolves around the current and long term (after 2030) national and international vision and goals. Information on this is needed to make investment decisions and to form a strategy around the development of hydrogen projects. How the hydrogen market will evolve is highly dependent on this information. Stakeholders also advocate for more organized information about hydrogen vision, goals and development from the government or knowledge institutes to residents. For residents, information is now organized from participation procedures in project development. Currently we see that participation is very carefully handled with local project developments. There are different methods used to reach and inform residents. However, not all questions residents have about the broad subject of hydrogen can be answered within a local project. For example, when it concerns a distribution project, questions about safety of hydrogen production and storage cannot be answered. When general information is provided to all residents, local projects can rely on and built onto that information, which can accelerate the participation process.

Participation processes

At this moment with the first hydrogen developments taking place, participation procedures are very carefully considered. Participation processes are initiated when local developments are planned. Communication is often tailored to meet the needs of individual residents. While some residents prefer to be informed of every step of the project development, others prefer look for information themselves. Some residents wish to receive communication digitally, others in person. Yet there are also questions about how to reach a representative part of the community with the participation process, as participation evenings might, for example, only reach the same group of residents every time, and websites will not be visited and understood by everyone. This topic was also discussed during one of the co-creation sessions concerning the local cases (10.3, see Appendix 1). However, it also appears that a balance must be established in participation. Information needs must be carefully considered, to not overload residents with information and communication and at the same time reach everyone who wishes to be involved. This demands extensive local coordination. At the same time it is stated that such extensive participation processes is something that suits the first pilots and developments, but is not feasible when more pilot projects are initiated simultaneously or on a larger scale.

Safety and risks: perception and policies

Among the general public there is awareness of hydrogen being a more flammable and explosive substance than natural gas. However, currently there does not seem to be much concern about safety issues among the general public. This concern might arise as people encounter hydrogen developments more directly.

The literature review shows that communication about safety is important for public support. Local developments in pilots with hydrogen in houses and pipeline construction in living areas include comparisons between hydrogen and natural gas in their public communication. The positive image of the natural gas network and the grid operators helps in communication and makes that relative safety is explainable. In hydrogen storage developments, this comparison is harder to make. The level of

knowledge about storage technologies is lower than the knowledge level of natural gas distribution. When it concerns geological storage, trust in the technologies is lower among Dutch residents, related negative experiences with subsurface projects related to subsidence and seismicity issues.

The policy around safety standards of hydrogen developments is still evolving. This is still causing delays in all areas of Hydrogen developments in The Netherlands, long duration of permitting procedures are an example of this. Not all roles in the new energy system have been defined yet. The temporary safety guideline ('tijdelijk richtsnoer veiligheid'), initiated by a collaboration between governmental organizations, provides guidance for first hydrogen developments and pilots. However, there is a growing need for clarity on roles and responsibilities along the hydrogen value chain. At the same time the importance of collaboration among the value chain to develop a transition-proof policy framework is emphasized.

3. Co-creation workshop

This chapter summarizes the outcomes of the co-creation workshop in which the results and implications of task 10.1, 10.2 and 10.3 are discussed. Before the workshop took place, participants have been provided with the results. The content of the workshop is enclosed in attachments 1 and 2. Participants were asked to argue and contribute to the discussion based on their own knowledge and experiences. Input from the co-creation workshop both validates and adds to the results of the literature review, local case-studies and stakeholder interviews.

Public support and participation processes

Participants were asked about 1.) what they think the influence of the motivation behind projects is on the societal support for local hydrogen project development; 2.) challenges and dilemmas' concerning communication and participation with local implementation; and 3.) what a communication and participation strategy should look like in the future.

Participants state that the underlying narrative for the development and implementation for a local hydrogen project is important to gain public support. Participants experience that sustainability and financial aspects are two major subjects influencing public support for local hydrogen developments. A transparent explanation of why hydrogen is an efficient energy solution in a certain area, for example for heating, compared to financial aspects, will benefit public support. Financial burdens and benefits should be fairly distributed among the various actors (investors as well as end-users).

Participants state that unburdening citizens will be one of the challenges in participation strategies towards 2030. Developing a stable and continuous entity for information provision, which is easily accessible and that provides a clear vision on hydrogen developments is important. Providing clarity through a vision on the future is important and can be done on various topics. Giving insight in safety and how safety will be ensured is one example which needs clarity and transparency. However, since hydrogen developments are still part of a system in transition, which comes with various uncertainties, the storyline should be nuanced.

Participants propose to design an integral strategy for communication and participation towards 2030 to properly inform the general public and to indicate interrelationships and dependencies in the energy transition. This integral strategy should include aspects like:

- What energy solution fits in what local and environmental context.
Hydrogen may be a solution to heat houses in some cases, but will not be the best solution for every house. For example: When a house can be insulated and prepared for electric heating, this might be more beneficial on financial and environmental aspects. When a residential area has easy access to a heating network, this may be a financially and environmentally better option than hydrogen.
- What is the impact of certain decisions.
When the decision is made to use hydrogen as energy solution, this will have implications for other local developments as well. For example: production, transport and storage facilities will have to be created.
- Best practices and lessons learned.
Best practices will provide insight in past hydrogen developments and their outcome and implications. This may be beneficial for trust and support. Lessons learned on the other hand can show what went wrong in earlier developments and how these lessons are integrated in new developments. This may provide insight in how, for example, safety issues are handled.

The overall societal attitude should be taken into account during the local implementation of hydrogen solutions. This concerns the direction of the overall hydrogen developments. Participants stated that the national vision concerning hydrogen developments needs to provide a clear line of reasoning, which should be accessible to the public. A steering role of the government(s) is essential in this, as through central 'guidance' a clear vision on hydrogen can be developed, which provides insight in the way forward, which is also giving more clarity on the need for and use of local implementation of hydrogen. The steering role of the government also requires political support.

As political support is essential for the upscaling of and vision-forming for hydrogen developments, both societal and political support are essential during local implementation of hydrogen applications. Although they are both important during the whole process, there is a shift within the prominence of both types of support over the course of time. In the first phases of an innovative process – as is currently the case with hydrogen developments – knowledge is still low, making information needs more extensive, enabling a learning process. As trust in new technologies may be lower, participation processes are ideally more extensive. Once this learning process provided enough knowledge on local implementation, participation and information may decrease, creating a shift towards a more indirect way of participation, via democratic processes. On the main lines, the chosen governments will keep using their steering role in making decisions on the route taken for hydrogen developments, and their local implementation. Public participation processes may become less extensive as the knowledge level and trust will raise when the technology becomes more mainstream.

Decision-making

Participants were asked what they need to make decisions about hydrogen developments in the coming year, and how policy decision will influence their work.

In terms of decision-making, participants put forward that a more steering role from the government would benefit decision-making of other stakeholders in the hydrogen value chain. From this steering role, a central vision on hydrogen developments can be drawn, supported by specific and feasible milestones to reach 2030 and 2050 sustainability goals. Through political choices, this vision can be translated into national, regional and local policies and regulations. Participants state to be highly dependent on national and local policy decisions. A more mature policy and regulatory framework will provide more certainty about future developments and therefore positively influence business case possibilities and make investment decisions less (financially) risky. Additionally, from its steering role the governments can provide insight and guidance in the division of roles and responsibilities in the hydrogen value chain, for example concerning hydrogen transport, construction, management and supervision of pipelines and storage.

Finally, having a better overview of the hydrogen value chain is not the only aspect benefitting hydrogen developments in The Netherlands. Finding the right balance between being at the forefront of global hydrogen developments while also stepwise going through the developments, thereby not overlooking or hastening safety aspects, is stated to be important. Respondents of the workshops mentioned that being at the forefront does not have to exclude that developments can be undertaken step by step, or vice versa.

Communication

We asked participants about 1.) how public information needs can be met, whilst it is still unclear what the role of hydrogen will be in the future energy system; 2.) what central information provision to the public should look like and 3.) what communication about safety risks and measures should look like.

Participants state that currently, public communication and information provision is not sufficient. Information concerning hydrogen developments is insufficiently available, accessible and comprehensible. Communication should be:

Accessible and inclusive

Participants state that information should be accessible and inclusive, taking into account the knowledge level, cultural background, contextual background, legal status of the receiver of the information. It is essential to consider the difference in knowledge base between the public and experts when providing information. The information need among the general public might be more extensive than expected by experts with a strong knowledge base. It is recommendable to find the right balance between communicating enough but not overdoing it by overloading people with information. It should be carefully considered which actor will be responsible as central party in the information provision. Preferably this actor should be trusted, and/or functions as an authority (e.g., the fire department when it comes to several safety aspects). To meet the information need of the public, careful listening to questions and concerns of the public is essential. Communication should start as early as possible in the process.

Complete, correct and transparent

The storyline surrounding hydrogen developments should be provided in an open, transparent and correct way. The advantages and disadvantages of the various options and choices should be provided. Displaying advantages and disadvantages compared to other energy solutions and elaborating on why different solutions fit better in different contexts, helps to involve the public in the decision making process. In this communication, the position of hydrogen in the future energy system should be made comprehensible. Finally participants state that showing not only success stories, but also lessons learned about failed projects and how problems and risks will be mitigated in the future might raise trust and contribute to the general knowledge level.

4. Recommendations: towards risk governance strategies

In this chapter risks and risk governance strategies are introduced along three main themes: participation, communication and decision making. The risks are derived from the synthesis of task 10.1, 10.2 and 10.3. The risk governance strategies are a result of discussions and suggestions from the co-creation workshop and interviews.

Participation

Risk 1: Societal support decreases with local implementation.

At this moment the public perception for hydrogen developments in the Netherlands is positive. However, literature research and stakeholder interviews indicate that this can lower when hydrogen applications are locally implemented. A recent case in England [3], where a large scale hydrogen heating pilot could not count on public support, emphasizes the need to carefully consider participation procedures.

Risk 2: Extensive participation procedures are not viable when hydrogen applications are implemented on larger scale.

In the case studies we see very careful participation procedures, leading to social embeddedness of the pilots on a local scale. It is debated whether these procedures can stay as extensive as they are when hydrogen applications are implemented on a larger scale.

Risk 3: Conventional participation procedures do not reach a representative group of residents.

In current hydrogen pilots in The Netherlands, participation procedures are extensive and adapted to the individual needs of residents. When these procedures become less extensive in the future, it may become more challenging to reach a representative group of residents.

Risk governance strategy - integrated communication and participation

An integrated communication and participation strategy to inform and involve residents. This can be focused on energy transition in general, in which hydrogen applications may have a role. This integrated strategy provides insight into various alternatives and situation specific solutions. In this participation strategy, attention can be given to:

- Options for energy and heating solutions per location: Hydrogen is only one aspect of the future energy system. Explaining and weighting other alternative solutions contributes to the general knowledge level. Giving residents a voice in which alternative will ultimately be implemented contributes to the justice of the process.
- How residents would like to be involved and if necessary compensated. Sometimes there is a need for compensation or possibilities for financial participation. Attuned to the local characteristics, decisions should be made about how residents can be involved best in the decision making and participation process. Various options for participation are provided in the Dutch 'participatiewaaijer'[4] or on rri-tools.eu [5].
- The impact of the different solutions: Changing energy or heating solution will have impact on the (living) environment and financial aspects. Transparent information about this impact should be provided.
- Showcasing examples, like lessons learned and pilot results, can be supportive to inform residents and include them in the participation process.
- Information needs: at this moment the main information needs lie in practical impact, financial impact, safety aspects and sustainability . These information needs may change over time.

In the early stages of hydrogen developments, more extensive participation processes will be of unabated importance. When the knowledge level of the public rises, lessons and experiences of earlier developments and applications are broadly distributed and trust in the technology and involved actors are established, participation processes can become less extensive but should still be attuned to the local context.

Communication

Risk 4: Negative perception due to false or misinterpreted (media) communication and low knowledge level.

Currently, the amount of information and communication provided to the general public about hydrogen developments and goals in The Netherlands is not sufficient. Although much information is available when properly searched for, the accessibility and general comprehensibility is poor. The knowledge level of the public regarding different aspects of hydrogen related technologies is still low. Recently, various news articles and opinion articles came out with negative information about hydrogen applications and developments. This could potentially have a negative influence on public perceptions.

Risk 5: False expectations the public when hydrogen will first be implemented in industries instead of households.

The knowledge level regarding vision and goals hydrogen developments and applications in The Netherlands is still low. There is no clear vision on hydrogen developments yet. There are some experiments in the built environment where hydrogen is used to heat houses. These experiments are more reported on in common media outlets than hydrogen applications for industrial means. This could potentially raise expectations at the general public regarding that hydrogen will be a generally available heating solution in the near future, and that investments in insulation and electrification will not be necessary. However, there is no consensus yet about whether, when and to what extent hydrogen will be a realistic household heating solution on large scale. False expectations may cause feelings of injustice and the future public perception to become more negative.

Risk 6: Concerns about safety.

Currently there does not seem to be much concern about safety among the general public. However, this might grow as people encounter it more directly, for example with hydrogen gas stations, transport, storage or applications in or nearby houses. Concerns about safety can also arise due to (false or misinterpreted) media information. An example of this is a recent news article about safety risks with transport of hydrogen [6]. The content of these articles does not necessarily have to be false, but may be incomplete or not representative. This example, that is about large scale transport of ammoniac, can be interpreted as risks for hydrogen in general.

Risk governance strategy: More centrally provided and accessible information and communication to inform the public.

Centrally provided and accessible information the public can enhance the knowledge level and therefore enable the public to form an informed opinion about hydrogen developments. This prevents from misinterpreting information and forming false expectations. This communication should:

- Be provided by trusted actors. For example a neutral organization or an actor that functions as an authority or expert.
- Be accessible, factual, balanced and well substantiated.
- Offer a complete storyline about hydrogen developments in an open and transparent way.

- Take into account questions, concerns and wishes of the public. Information needs can change over time. Information can be staged.
- Provide information about the position of hydrogen in the energy system and comparisons with other energy carriers or technologies, for example in environmental impact, financial impact and possibilities.
- Be inclusive: keeping in mind contextual differences (i.e. culture, knowledge level, age).

Policy, regulations and decision making

Risk 7: Decision making is hindered by lack of clarity about long term goals.

The information need of stakeholders evolves around the current and long term (after 2030) national and international vision and goals. Information on this is needed to make investment decisions and to form a strategy around the development of hydrogen projects.

Risk 8: Developments are slowed down due to long permitting procedures.

Permitting procedures can take up to 4 to 8 years. This is caused by the fact that the regulatory framework is still under development and low availability of knowledge and expertise in the field.

Risk 9: Developments are slowed down because roles have not been defined yet.

In the transition to a sustainable energy system, roles and responsibilities change over time. In the development of the hydrogen value chain, new roles and responsibilities will have to be defined, and others shift. These defining and shifting of roles and responsibilities often require regulatory changes, which requires coordination and time.

Risk governance strategy: A strong leading government provides transparency about and guides long term visions and strategies

The government should take a steering role in hydrogen developments and set transparent goals, supported by specific and feasible milestones to reach 2030 and 2050 sustainability goals. Political choices should flow into national and regional policies and regulations, which give guidance to the allocation of hydrogen developments and business cases. This gives guidance in the action perspective for stakeholders, supporting investment decisions.

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Appendices

Appendix 1: reporting on online co-creation sessions (in Dutch)

In het kader van WP10 van HyDelta zijn er twee (online) co-creatie sessies georganiseerd om de bevindingen van het stakeholders- en bewonersonderzoek in vier lokale cases (D10.3) te delen met de lokale stakeholders. Het doel was vervolgens om met elkaar in gesprek te gaan over a) de herkenbaarheid van de resultaten, b) de bruikbaarheid van deze resultaten in de pilot waar de stakeholders nu bij betrokken zijn, en c) hoe deze vertaald kunnen worden naar een aanpak om in de toekomst maatschappelijk draagvlak te verkrijgen of te vergroten. Tijdens beide sessies is er gewerkt aan de vraag hoe we met elkaar de transitie naar een meer duurzame samenleving (in dit geval door middel van waterstof) handen en voeten kunnen gaan geven, en wat er hierbij van de verschillende partijen geleerd kan worden.

Er waren op beide momenten 5 á 6 stakeholders aanwezig vanuit verschillende waterstofpilots die zich momenteel in de planningsfase (Wagenborgen, Stad aan 't Haringvliet – Stad Aardgasvrij) of implementatiefase (Lochem) bevinden. Tijdens de eerste cocreatie-sessie waren de volgende partijen vertegenwoordigd: netbeheerders (zowel Stedin als Enexis), een ketelproducent, een lokale waterstofproducent en een nationale producent en leverancier van waterstof. Tijdens de tweede cocreatie-sessie waren (regionale en landelijke) netbeheerders (Enexis, Alliander, Gasunie), een veiligheidsregio, de Energiewacht (voor service en onderhoud van de installaties in de woning), en een installatiebedrijf van waterstofketels vertegenwoordigd.

De thema's die tijdens de sessies aan bod zijn gekomen, gaan over samenwerking en communicatie, het toekomstige energiesysteem, en veiligheid en veiligheidscommunicatie. De belangrijkste resultaten worden hieronder besproken.

Samenwerking en communicatie

Na het delen van de resultaten die zijn opgedaan binnen de waterstofpilots (D10.3) geven alle stakeholders aan deze resultaten te herkennen. Een voorbeeld is het belang van goede samenwerking tussen de verschillende partijen (zoals veiligheidsregio, gemeente, provincie) waarbij iedereen op hetzelfde niveau aangehaakt is. Er wordt benoemd dat het voor een volgende keer belangrijk is om vanuit de initiatiefnemer, zoals een netbeheerder, de regionale overheden er vanaf het begin bij te betrekken. Dan is de kans kleiner dat er een kennisachterstand optreedt en kan er, zodra dat nodig is, gericht gekeken worden naar relevante beleidskaders, aangezien wet- en regelgeving nu vaak nog ontbreekt. Het zorgt daarnaast voor vertrouwen als experts op het gebied van veiligheid aan zijn gesloten.

Ook het belang van het contact met bewoners en andere betrokkenen wordt herkend, waarbij open en transparante communicatie voorop staat, bijvoorbeeld over het gegeven dat in Lochem waterstof nu nog grijs is en wat de reden ervan en de visie erop is. Blijven evalueren met de deelnemers is daarnaast belangrijk, waarna er over de uitkomsten breder kan worden gecommuniceerd met omwonenden. Bewonersavonden worden door alle betrokkenen gezien als een goede en passende manier om informatie te geven aan bewoners. Er wordt erkend dat niet iedereen naar bewonersavonden komt: daarom is het niet de enige manier waarop communicatie met bewoners plaats moet vinden. Ook is het soms lastig om tijdens een bewonersavond te focussen op enkel en alleen de waterstofpilot, met name wanneer er partijen zijn aangehaakt waar bewoners andere zaken

mee willen bespreken (denk aan een woningcorporatie). Hier kan in de toekomst rekening mee worden gehouden.

Het belang van persoonlijke communicatie wordt door de stakeholders als herkenbaar ervaren: het is relevant om de communicatie af te stemmen op de individuele bewoner / deelnemer aan de pilot. Soms blijkt het bovendien belangrijk om met meerdere personen in het huishouden te spreken, om de betrokkenheid van alle gezinsleden te garanderen. Hierbij dient aangesloten te worden bij de behoefte aan contact van de bewoners: sommige bewoners hebben hier meer behoefte aan dan anderen. Het is binnen de verschillende pilots zoeken naar een balans: Hoe kan je ervoor zorgen dat iedereen geïnformeerd is, zonder te zorgen voor een overkill aan informatie? De doelgroep (bewoners) kennen, lijkt hierbij belangrijk. Alleen dan kan de communicatie goed afgestemd worden op de behoeften en bovendien strategisch ingezet worden (om zo bijvoorbeeld kernpersonen/groepen eerst aan te spreken met als doel een grotere groep mee te krijgen).

Tijdens een van de sessies vroegen enkele deelnemers zich wel af in hoeverre de zorgvuldige communicatie over waterstof er juist voor zorgt dat je waterstof 'groter maakt' dan het is (vooral richting niet-deelnemers aan de pilot en omwonenden) en daarbij, bijvoorbeeld, onnodig een verschil maakt met aardgas. Informatie over werkzaamheden voor omwonenden hoeft bijvoorbeeld niet altijd expliciet te worden gekoppeld aan waterstof, aldus één van de aanwezigen. Er spelen namelijk vaak dezelfde vragen, onafhankelijk van de techniek, zowel voor betrokken stakeholders als bewoners, bijvoorbeeld in de eerste fase van de kennismaking ("Wat betekent het voor mij als bewoner?" en "Wat gaat mij overkomen als uitvoerende partij?"). Nu is er echter nog wel een verschil in beleving tussen het verwarmen van je huis met aardgas of waterstof, aangezien waterstof nog relatief nieuw en onbekend is. Als mensen in een volgende fase meer bekend zijn met waterstof (bijvoorbeeld door de waterstofpilots), kan de communicatie over waterstof wellicht volledig worden vergeleken met communicatie over aardgas, waar iedereen inmiddels aan gewend is.

Er wordt opgemerkt dat niet-deelnemers interesse kunnen krijgen in waterstof nadat de eerste resultaten na een aantal maanden bekend zijn, of wanneer deelnemers daadwerkelijk eerste ervaringen hebben op kunnen doen met waterstof in hun huis. Dit kan een afzonderlijk proces zijn dat helpt bij de acceptatie van waterstof bij het bredere publiek. Een voorbeeld is dat binnen meerdere pilots wordt geconstateerd dat omwonenden zich afvragen of ze mee kunnen doen en dit bijvoorbeeld aan een bewonersvereniging of gemeente kenbaar maken.

Er wordt ten slotte benoemd dat het voor dergelijke bottom-up initiatieven belangrijk is om een groep te vinden die enthousiast is over het project en die het verhaal kan vertellen, bijvoorbeeld aan hun burens. Als het onderlinge vertrouwen tussen buurtgenoten aanwezig is, dan kan dit ervoor zorgen dat de burens mee willen doen. Ook ervaren urgentie (bijvoorbeeld onafhankelijk worden van aardgas in verband met aardbevingen) speelt een belangrijke rol in het succesvol opzetten van een project, net als het grotendeels dekken van de kosten (bijvoorbeeld omdat een woningcorporatie de investering doet). Het is daarnaast echter belangrijk om met mensen in gesprek te gaan over het besparen van energie: het kan bijvoorbeeld een belangrijke voorwaarde zijn om eerst de vraag te beperken, om daarna pas over te kunnen stappen naar waterstof.

Toekomstige waterstofpilots en het toekomstige energiesysteem

Wanneer het gaat over de bruikbaarheid van de resultaten in huidige en toekomstige pilots, wordt er een duidelijk onderscheid gemaakt tussen het leertraject in de huidige pilotfase en de volgende fase waarin waterstof mogelijk op grotere schaal in de gebouwde omgeving toegepast gaat worden. De pilotfase is voor alle partijen een tijdsintensieve fase, waarin leren van en met elkaar centraal staat, en waarbij partijen over deze grenzen van hun eigen organisatie heen werken (mede door het ontbreken van wet- en regelgeving), om zo gezamenlijk zorg te dragen voor bijvoorbeeld de veiligheid. Een illustratie hiervan is een leverancier van waterstof die nu een koplopersrol heeft en is daardoor

betrokken bij het gehele project. Echter, in de toekomst zal de rol van deze leverancier beperkter zijn. De leverancier houdt zich dan bijvoorbeeld alleen nog bezig met het leveren van waterstofmoleculen, en niet met het totale project van A-Z, waarin ook zaken als ontwikkeling, montage, follow-up (controle, onderhoud en het geven van rondleidingen op het terrein) bij komen kijken. Het afbakenen van de taken zal dus in vervolgetrajecten meer optreden. Dit houdt in dat er in de toekomst meer partners bij de projecten betrokken zullen worden. Het tijdig nadenken over rollen en verantwoordelijkheden in de keten, is belangrijk en kan problemen voorkomen.

Er wordt in dit kader een vergelijking gemaakt tussen waterstofketels en cv-ketels en hoe de rolverdeling er in het toekomstige energiesysteem idealiter uit zou kunnen komen te zien. Cv-ketels worden gebouwd door de ketelproducent en daarna nemen installateurs het werk over. Dit zou in de toekomst ook zo kunnen zijn voor waterstofketels (waar de ketelproducent nu nog bij het gehele project betrokken is). Installateurs ontbreken momenteel echter nog in de waterstofketen (ze zijn alleen aanwezig als onderaannemer), mede doordat er nu nog geen commerciële markt is. Hieruit volgt dat het belangrijk is dat de opgedane kennis binnen de waterstofpilots tijdig aanwezig is bij de partijen die in de toekomst aan dienen te sluiten.

Er wordt al met al de wens uitgesproken om meer richting het systeem te gaan zoals dat er voor aardgas is. Rolverdelingen zouden dan hetzelfde kunnen zijn: In het geval van storingen zou bijvoorbeeld een installateur langs moeten komen, en als er een storing is in het systeem dan is de netbeheerder verantwoordelijk. Binnen één pilot is er nu een partij aangesloten die verantwoordelijk is voor zowel de installatie van de ketel als het onderhoud ervan, waarbij monteurs worden opgeleid om te kunnen ondersteunen bij storingen aan de ketels. Zo wordt getracht om het zoveel mogelijk hetzelfde te doen als bij het aardgassysteem.

Een verschil ten opzichte van aardgas is dat er decentrale producenten van waterstof aan de keten worden toegevoegd. Er wordt door de aanwezigen geconcludeerd dat er aan de productiekant de grootste veranderingen gaan plaatsvinden. Wanneer er wordt gevraagd naar de rol die lokale producenten kunnen hebben in het systeem, wordt de analogie gemaakt met groengas op industriële schaal. In plaats van de NAM zou een particulier dan gasproducent kunnen zijn.

Er wordt door de aanwezigen benoemd dat het ingrijpend is om de ombouw naar een waterstofsysteem te maken, maar dat het minstens net zo ingrijpend is wanneer het gaat om de overstap naar alternatieve energieoplossingen. Er spelen daarnaast dezelfde processen en dezelfde voorbereidende stappen zijn nodig. Leveringszekerheid, productie en opslag van waterstof zijn aspecten waar nog veel vragen over bestaan wanneer het gaat om de inrichting van het toekomstige energiesysteem. Een aantal jaren geleden leefde bij veel partijen nog het idee dat er weinig moeite te gebeuren om over te stappen op waterstof, dat het een relatief eenvoudige manier was om van aardgas af te gaan. Inmiddels is er geleerd dat dat – ook ten opzichte van andere alternatieven - niet zo is. Het is voor de perceptie van mensen belangrijk om deze misvatting te ondervangen, en mede voor het keuzeprocess van gemeenten is het relevant om kennis te delen over de toepasbaarheid van waterstof (en andere alternatieven). Ten slotte wordt benoemd dat waterstof niet “een heilige graal” is, maar dat er op zoek wordt gegaan naar de best toepasbare oplossing per specifieke lokale context (waarbij kan worden aangegeven dat waterstof waarschijnlijk niet op korte termijn op een grootschalige manier toegepast kan worden in woonwijken).

Veiligheid en veiligheidscommunicatie

Er wordt door de aanwezigen beaamd dat het belangrijk is om de doelgroep (directe betrokkenen en omwonenden) te leren kennen, om zo een gerichtere aanpak te gebruiken. Het blijft dan belangrijk om te letten op personen die sceptische geluiden laten horen, zodat misvattingen over waterstof geen eigen leven gaan leiden. Het kan dan nodig zijn om hier extra aandacht aan te besteden. Een voorbeeld wordt benoemd: toen er een gerucht rondging dat de lokale brandweer niet goed uitgerust zou zijn

om een waterstofbrand te blussen heeft de commandant dit persoonlijk opgehelderd. Het helpt als de brandweer of SODM (Staatstoezicht op de Mijnen) als toezichthouder betrokken zijn bij de veiligheidscommunicatie. Veiligheidsrisico's en lokale brandweer kunnen dus richting bewoners een belangrijke rol spelen. Op de vraag welke partij(en) verantwoordelijk zijn voor draagvlak of hoe risico's of weerstand voorkomen kunnen worden, wordt benoemd dat de initiatiefnemer uiteindelijk verantwoordelijk is. Als de initiatiefnemer een collectief betreft, dan is er collectieve verantwoordelijkheid. HyDelta zou ook een positieve bijdrage kunnen leveren aan breed draagvlak en het verspreiden van kennis over risico's. Experts, waaronder netbeheer Nederland kunnen volgens de aanwezigen een belangrijke rol spelen in het communiceren van verzamelde kennis als het gaat over de visie op de grootschalige uitrol van waterstof.

Uit de resultaten van het onderzoek (D10.3) is daarnaast gebleken dat er bij de bevolking weinig grote zorgen zijn over de veiligheid van waterstof. Tijdens één van de sessies wordt echter het onderscheid gemaakt tussen zorgen op huishoudniveau en op grotere schaal (bijvoorbeeld aangaande transport (o.a. via trailers) en leveringszekerheid). In het laatste geval zouden grotere veiligheidsaspecten moeten spelen waarop ook toekomstige keuzes vanuit de rijksoverheid gebaseerd kunnen worden (bijvoorbeeld over de productie en opslag van waterstof). Door het initiëren van de waterstofpilots zijn er nu veiligheidseisen opgesteld en vindt er toezicht plaats, waardoor de vraag en het aanbod op elkaar kunnen worden afgestemd. Er wordt echter ook geconstateerd dat er in de gebouwde omgeving een diversiteit aan veiligheidsissues bestaat (bijvoorbeeld wanneer mensen zelf in de achtertuin gasflessen hebben staan of via Internet een thuisbatterij gaan kopen), waar vanuit de overheid regie op zou moeten worden gevoerd.

Conclusie

Er werd tijdens de sessies door de aanwezigen veel herkenning gevonden in de resultaten van het gedane onderzoek binnen de waterstofpilots, bijvoorbeeld over het belang van goede samenwerking tussen de verschillende partijen. Er werd geconcludeerd dat het in deze pilot fase belangrijk is om een individuele benadering te behouden (bijvoorbeeld door keukentafelgesprekken en het schouwen van woningen), aangezien het niet enkel een kwestie van overzetten naar waterstof is, en het daarnaast vertrouwen wekt richting de deelnemers. Opgedane eerste ervaringen met waterstof zoals in Lochem (bijvoorbeeld over het verbruik en de kosten) vormen relevante input voor open en transparante communicatie, onder andere binnen toekomstige pilots. Naast communicatie vanuit experts over de opgedane ervaringen met waterstof, is het van belang dat bewoners van pilots een podium krijgen om hun verhaal te vertellen. Het helpt bijvoorbeeld dat we nu meer weten over de doorlooptijd en de activiteiten die plaats moeten vinden (bijvoorbeeld het verkrijgen van vergunningen). Er kan hierdoor beter aan verwachtingsmanagement worden gedaan. Hierbij is het voor toekomstige pilots belangrijk om tijdig na te denken over rollen en verantwoordelijkheden in de keten, aangezien werd benoemd dat er in de pilot-fase vaak over de grenzen van de eigen expertise wordt gewerkt. Dit is tijdsintensief en zal in de toekomst niet meer haalbaar blijken.

Met betrekking tot communicatie over waterstof naar het bredere publiek is het belangrijk om misvattingen over waterstof te ondervangen, bijvoorbeeld dat het "de heilige graal" kan zijn en dat het gemakkelijk in te passen is in het energiesysteem. Geleerde lessen kunnen hierbij worden gedeeld (bijvoorbeeld vanuit HyDelta en de praktijkervaringen uit de pilots), op een toegankelijke en laagdrempelige manier (bijvoorbeeld met visualisaties). Uit eerder onderzoek [7] is gebleken dat het belangrijk is om positieve voorbeelden vindbaar te maken. Mensen die worden geconfronteerd met waterstof of er iets over lezen in de krant, gaan bijvoorbeeld online op zoek naar informatie. Het zou dan goed zijn om goede, betrouwbare en laagdrempelige informatie te kunnen vinden.

Er is daarnaast de wens dat het toekomstige energiesysteem (waarin waterstof een rol speelt) gaat lijken op het huidige aardgassysteem, waarbij dezelfde rollen kunnen worden aangenomen door de verschillende stakeholders. Het is voor dit toekomstige systeem belangrijk dat veiligheid een belangrijk

issue is en blijft, dat installateurs worden bijgeschoold en dat iedere partij zich er van bewust is dat waterstof iets anders is dan aardgas en dat het voor veel mensen (nog) onbekend is, zonder het daarbij onnodig zwaar aan te zetten. In deze communicatie blijft het zoeken naar een balans (zowel binnen de pilots als met het bredere publiek), maar al met al gaat het helpen als er -vanuit een centrale positie en vanuit experts- meer bekend wordt gemaakt over waterstof. Over de risico's, wat en hoe het kan bijdragen aan de energietransitie, en de mogelijke uitrol van waterstof binnen het energiesysteem, inclusief alle onzekerheden die daarmee momenteel nog gepaard gaan.

Appendix 2: Co-creation workshop approach

Theses

A.) In the Netherlands, we must go through hydrogen developments step by step even if we do not reach the climate goals then.

B.) The Netherlands must become and remain a leader in hydrogen developments.

A.) More central communication (government to public) is needed through government or knowledge institutions

B.) There is plenty of information available if you just look for it

A.) To maintain public support, participation procedures must be permanently expanded.

B.) In the future, during large-scale roll-out, participation procedures must be less extensive

A.) Better to provide too much information to the public than too little in order to create and maintain public support

B.) An overkill of information is counterproductive

Questions subject 1: Support for local implementation

Question 1: How do you think underlying motivations of projects affect support? Example Lochem: bottom up organization, enthusiastic residents. Example England: mandatory off the gas, no support.

Question 2: What challenges and dilemmas in the field of communication and participation do you foresee during local implementation in the next 7 years?

Question 3: What should a communication and participation strategy look like in 7 years compared to now? What should not be missing? What should be different? What form?

Questions subject 2: Communication

Question 1: How do you meet public information needs now when it is still unclear what role hydrogen will play in the energy system?

Question 2: What do you think central information provision (government to public) should look like?

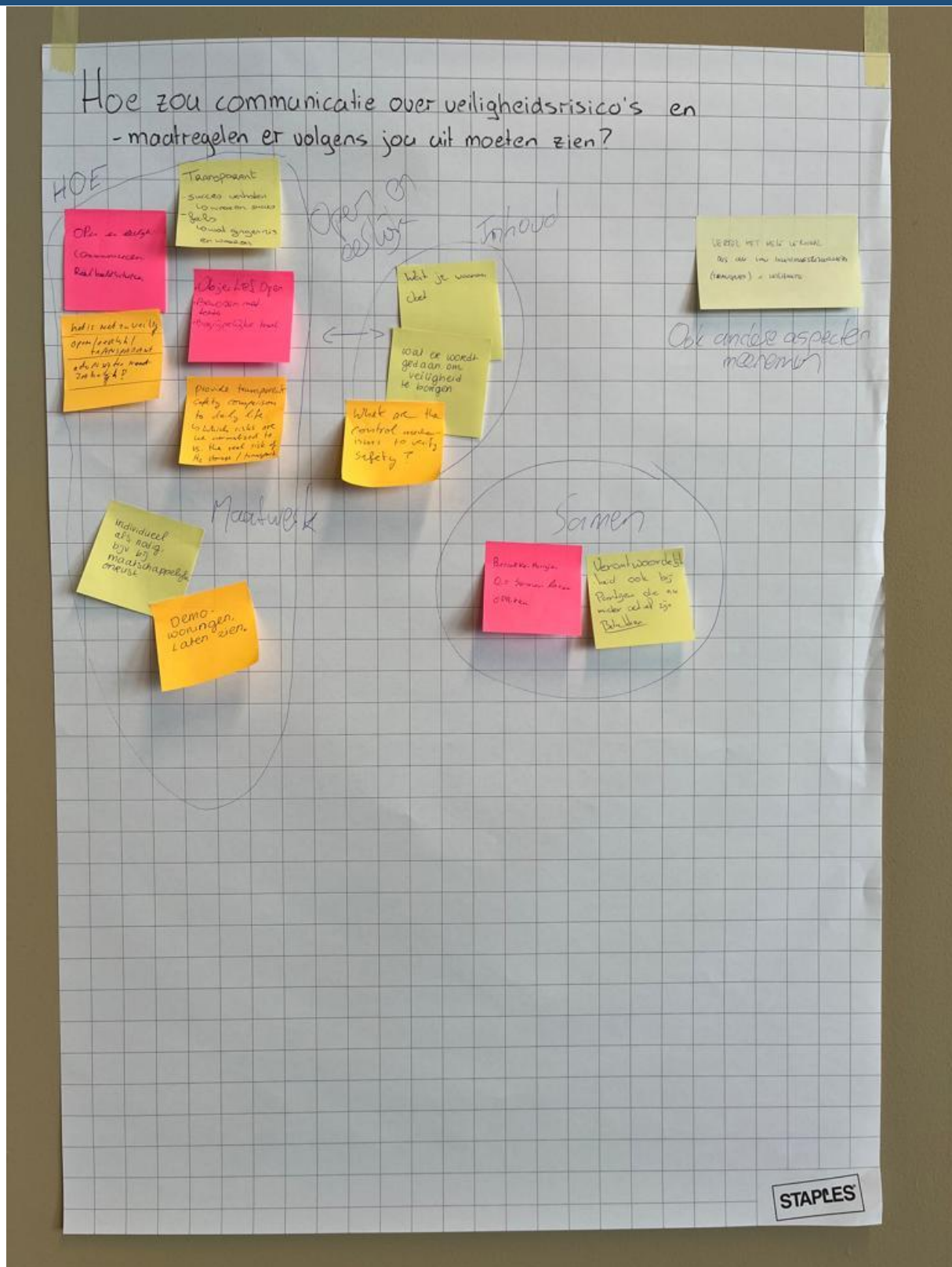
Question 3: What do you think communication about safety risks and measures should look like?

Questions subject 3: Decision making

Question 1: What decisions about communication and participation do you need to make in the next few years?

Question 2: What do you need in the next two years to make these decisions?

Question 3: What (policy) decisions that will be made in the next 2 years will affect your work?





Hoe voorziet je nu in publieke informatiebehoefte terwijl het nog onduidelijk is welke rol waterstof gaat spelen in het energiesysteem?

Het grotere
verhaal, maar
niet alleen
zenden!

Stappenplan
schetsen
wat weet je
wat er niet is
andere

BMD
de overgang
totaal?

Als alleen
Sauramo's er
zijn (rookruim)
dan is zekeren
alleen een product

Er moet een
aankomst
na een overgang
en financieel tijdstip

Pactoren
van veiligheid
die in andere
wege dagen

Wetgeving/
informatie input
kansen die klant
markt

Gevolgen voor
de ontvanger

HOE

Verklaren
dat het niet
niet de tijd is
Er is een!

Er is een
- waterstof
- kennisovername

Er is een
- waterstof
- kennisovername

Er is een
- waterstof
- kennisovername

Gewoon zoveel
mogelijk vertellen

STAPLES

Welke (beleidsmatige) besluiten die de komende 25 jaar worden genomen zijn van invloed op jouw werk

Wie wordt
toezicht houden
t.b. in LD
net?

Plan RPS
waterstof op
transporteren /
beheeren

Doelstellingen
RPS voor
concrete plannen

Onbepaaldheid
op de toezicht
aan toezicht
wordt gekwalificeerd
niet

Naam de RPS
direct de regule
waterstof op
kwaliteit van de
waterstof op
waterstof?

Komen er speciale
regels voor
H₂-opslag?

Plan de RPS
waterstof op
waterstof?

Regulator stroom
op waterstof
H₂ storage
toeestaan voor
RPS and apply to
RPS

Subsidie / wet
in lijn met
elkaar op het
waterstof te drinken

De positie van
waterstof op
waterstof

WAT HAT WARE KUNEN ??

In welke mate
wordt waterstof op
waterstof?

Verdeling van
waterstof op
waterstof

Wat heb jij de komende 2-5 jaar nodig om deze besluiten te nemen?

Duidelijkheid
over bodeningsprocedures

Maak de
business case
in de domein
die uitdrukking
kan vinden

Business case
of how H₂ storage
should be managed
in NL: if regulatory
framework, financing
etc.?

Wie willen mijn collectie?

Wie is 'de baas'?

Mogelijk
schadelijke
vrij

Regulerend
en
financieel
kader

Rd verdeling
Wie doet wat

Believe keuzes
over distributie H₂

"Keten ethica"
wie zal waar
aan hoe often 25
in de file

Electro (Kase)
vs.
gas
(Clean/cheap)

Geen directie
in het elektriciteits-
net

- OVERHEID MOET REGIE PAKKEN
- LOGICA OVER DE KETEN (INITIATIEF - VERGUNNING)
- ORGANISEER DE KETEN(S) (WIE/WAT/WAAR)
- ZET "BEST PRACTICES" BETER IN

Welke besluiten omtrent communicatie en participatie moet jij de komende jaren nemen?

Wanneer communicatie
vanuit de RAB
zou consistent als
zeker zijn

Informatie RAB
overheid, in
RES, omgeving, etc.

Wat zijn de
- externe (L&E)
- fysieke veiligheid
- sociale over:
- en is er nog te maken plaatsen
aan het domein?

Wat zijn de
kosten?

Wat is de
vanaf "de" veiligheid

Wat neem je
de organisatie
aan in de
nederstaf-activiteit
"Kennisplatform"

Wat heeft welke
informatie
wanneer nodig

Ketenpartners
meemaken

Eigenaar
activiteit en
andere projecten ->
wat is de
wat is de
wat is de

De afwijking
tussen de
en de
in relatie tot
netwerk

Wanneer hebben/
nemen wij (S&M)
een rol bij de
participatie?

Wat is de
van de

STAPLES

Hoe moet een communicatie- en participatiestrategie er over 7 jaar uitzien dan nu? Wat mag niet ontbreken?

WHAT HADNEN WE BELIEVED
VALUITY HISTORIC!!

Adrianus van der
Aalst
vande

Sporene
Liz
Sauerbrun-
nen alle erkrankt
an

Intermittent
Exotropia, an abnormal
alignment, squint
due to a weak
eye muscle.

Veel geleende
leze helder
maken en de
(conclusies)

Transpaant
- wat hebben we
geleerd
- een duiding

kennis delen,
ook toegankelijk
voor niet-expert
gemiddelde
bezoeker

Continuous
horizontal fibers
mono-specific
isotactic

HOE
VOOR IEDEREEN
WIJ DOET DAT?

kurze Geschichte
abzählen

Therapie
Schlingen $\rightarrow$ viel baul
- geodäten aus di
honne (Lund)
- lassen $\rightarrow$ di. Linsen
unter

STAPLES®

Wat is volgens jou de invloed van achterliggende motivaties van projecten op draagvlak?

Klimaatwet is
belemmerend voor
andere projecten in
het gebied van
waterstof, zoals
waterstof-transport

Financiële bijdrage
aan de
opbouw van de
waterstof-transport
infrastructuur

Klimaatwet
belemmerend
voor andere
projecten in
het gebied van
waterstof

Waterstof-transport
is het
"hoofd"

Energie-transport
is belangrijk
voor de
opbouw van de
waterstof-transport
infrastructuur

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Motivatie moet
helpen klaar op
tabel liggen. Het
transport is
belangrijk

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Verkeerskosten
↑
↓
e

Wie wordt
het wel/niet
gebruikt?

STAPLES