Ambitions and Challenges in the Energy Transition

The knowledge event on aquathermal energy brought together various experts, practical examples, and policy developments. The audience primarily consisted of collective energy initiatives, ensuring that practical and relevant questions were raised. Contributions from various speakers highlighted that the energy transition requires **collaboration, innovation, and customization, as well as further research.**

Kimberley Tjon-Ka-Jie (Ministry of Climate and Green Growth) Explained the Latest Developments in the National Energy Sources Strategy

Kimberley kicked off the afternoon by outlining the ambitions the Netherlands has set:

- **By 2050:** 15-45% of the built environment connected to collective heat systems.
- **By 2030:** Achieve an additional 500,000 district heating connections.
- **Climate goals:** 55% reduction in greenhouse gas emissions by 2030, increasing to 95% by 2050.

She highlighted the benefits and challenges of district heating systems, emphasizing that the heat source can vary, for instance: Waste incineration plants, aquathermal energy, geothermal energy, residual heat, and solar thermal energy. However, implementing district heating systems has significant implications for the soil and surrounding environment. For example, at least two pipelines (supply and return) are always required, along with energy plants, transfer stations, and substations. While district heating systems offer lower societal costs and collective maintenance, their financial operation remains challenging.

Key Points Discussed:

Choice Between Collective Heat Networks and Individual Heat Pumps

- Heat pumps demand more space and maintenance but provide flexibility in energy supply.
- District heating systems require fewer modifications to homes and guarantee supply security under the Heat law.

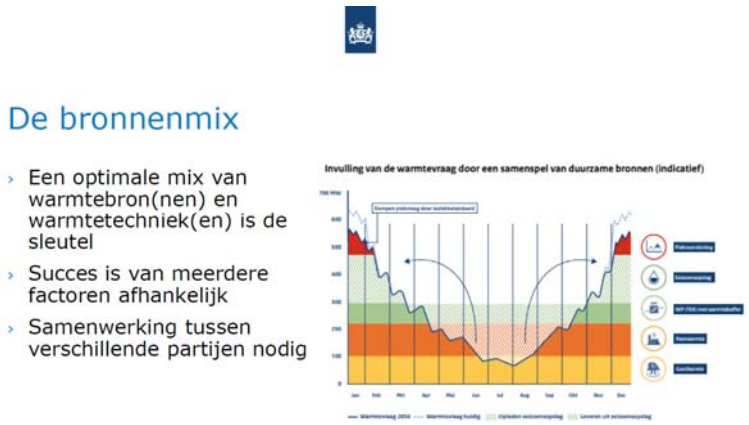
The Heat Source Mix

- Ideally, an optimal combination of heat sources and techniques is key to success.

- However, achieving success depends on various factors, including collaboration between multiple parties.
- The potential of the heat source mix lies in advancing the 2050 climate goals, though external factors like market dynamics and technological developments play a critical role.
- The national government does not set quantitative policy goals for this topic. Instead, municipalities and provinces remain responsible for choosing heat sources, such as geothermal energy.

Audience Question

"Why does the national government prefer to leave this decision-making at the local level instead of taking partial control, especially concerning cost distribution across the country? When considering costs and socialization, national organization could sometimes be easier than municipal or regional efforts. Given that regional decisions often incur higher costs, why has this approach been chosen? Couldn't we establish a national heating company instead?"



Looking Beyond Provincial Borders, but the Optimum Is Not Yet Achieved

"When we look at the map of the Netherlands, we can identify areas where the soil is suitable for geothermal energy. For instance, certain locations appear well-suited for geothermal sources. However, it is not up to the national government to dictate: 'Geothermal energy will be developed here.' That decision is up to municipalities and provinces. This is why we refrain from setting strict policy goals in this area, as we want local decision-making to reflect the needs and preferences of residents. This approach has also been embedded in the Heat Act.

Establishing a national heating company is not feasible in one go; that step is simply too big. The question is understandable, particularly regarding cost socialization, but we have focused on a plot-based approach. These plots can extend across municipal and provincial borders, and some plots can be very large. Additionally, the market has developed to the point where a nationwide approach is no longer viable."

Audience Question

"The government favors district heating because it offers the lowest societal costs. Network companies wouldn't need to reinforce power cables or build additional infrastructure. However, operating a heating company is not profitable. We've already seen several heating companies withdraw from the market for this reason. Investments can be made with subsidies, but after that, these heating companies must operate—yet their operations yield negative returns. What really needs to happen is for the savings that network

companies achieve to somehow be passed on to residents. That would solve the issue. Without this, it won't be feasible to establish district heating networks."

Kimberley's Response

"We are in discussions with network companies. I can't specify which companies exactly, but these conversations are ongoing. Gas and electricity are already socialized. In principle, a district heating network is also a public good—a utility, I would argue. These discussions are indeed taking place."

Case Study: District Heating Network at Terbekehof Business Park by Paul Robbrecht

Paul Robbrecht, an energy broker, presented the project at Terbekehof business park. The role of an energy broker is to connect (residual) energy from businesses with potential energy clients. Acting as a public intermediary, the energy broker facilitates the exchange of residual energy flows by connecting stakeholders and guiding them in developing an economically, ecologically, and socially responsible business model.

Paul works on implementing the economic policy of the Province of Antwerp and serves as a public developer for business parks. The policy focuses on the energy transition within business parks, ensuring they are supplied with low-carbon and CO2-free energy at competitive prices.

Use of an Energy Hub

By sharing energy flows, a business park becomes a hub where renewable energy is generated, consumed, stored, and shared—creating a highly circular system.

The Terbekehof Project

Paul presented the Terbekehof business park project:

- **Size:** 167 hectares.
- **Developed:** In the 1960s, with a mix of large and small companies and an engaged business association (HIW).

- **Challenges:** The park faced several issues, including outdated or missing infrastructure, waterlogging, poor visual quality, vacancies, parking problems (both for passenger and freight vehicles), and cut-through traffic.

A comprehensive overhaul of the entire site was required. The restructuring began in 2009, and by 2021, the preliminary district heating network was completed. A significant portion of the heat is sourced from residual heat from waste processing.

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Key Lessons from the Project:

Opportunities for Integration: Combining infrastructure construction with district heating installation saves costs and time. After lengthy discussions, POM decided to include these integration opportunities in the specifications. However, this requires a long-term planning framework.

Anchors for the Energy Transition: In this case, the redevelopment of the business park and the reconstruction of infrastructure served as key drivers.

Continuity of Energy Sources is Essential: Stable delivery of residual heat is a prerequisite for success.

Collaboration with Active Partners: Working closely with active stakeholders, such as business associations and local governments, proved to be a game-changer.

Paul also highlighted unexpected challenges, such as issues with pipe welding. Multiple welds were rejected, and finding skilled professionals turned out to be more difficult than anticipated.

Audience Comment:

A participant pointed out a potential drawback: "If you wait to align with other (ground)works, your project may face delays. The pace of laying, for example, cables can vary significantly, which poses a risk. However, when it works, the benefits are undeniable."

Aquathermal energy: Potentials and Challenges by Henk Looijen

Henk Looijen from the consulting firm *Waterprof* specializes in transition issues related to water, climate, and energy. Henk provided a historical perspective to explain that aquathermal energy is not a new concept:

- **1938, Switzerland:** One of the world's first heat pumps was installed in Zurich's Rathaus, using the Limmat River as the heat source. This success led to further water-based energy (TEO) projects in Zurich.
- **1946, Amsterdam:** There were plans to use the canals to heat the built environment.
- **1958:** The discovery of natural gas in Slochteren shifted the Netherlands towards natural gas use.

During the recent energy transition:

- **2016:** Water management authorities explored their potential contributions to the energy transition, conducting TEO and TEA potential studies.
- **2018:** Aquathermal energy (TEO, TEA, TED) was included in the Dutch Climate Agreement, leading to the establishment of the Aquathermal energy Network (*Netwerk Aquathermie*).
- **2024:** After 4.5 years of gathering extensive knowledge and information, the network will transfer its activities to NPLW.

Potential and Challenges

Henk emphasized the potential of extracting heat from water sources (TEO, TEA, TED) while highlighting the uncertainties surrounding its ecological impact. For example, discharging cold water after heat extraction could plausibly have effects on aquatic ecosystems, but further research is needed to understand its longte-term implications.

Audience Question:
What about the ecological impact? How do water boards view this?

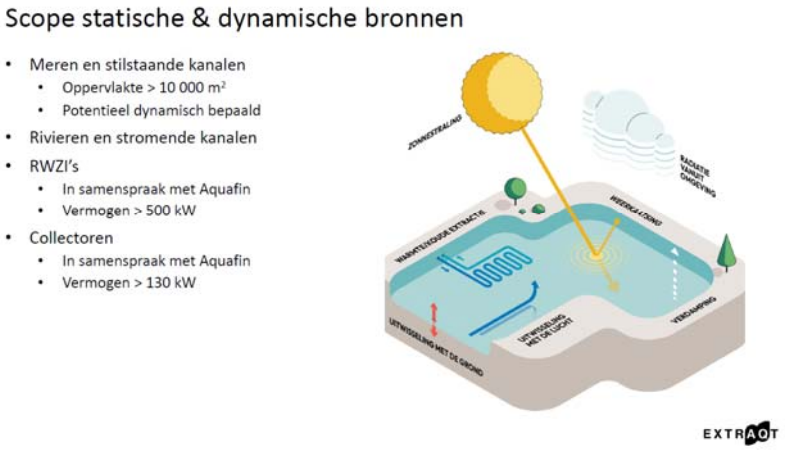
Representatives from water boards were present in the room, providing a swift response:
"We don't know yet. Many assumptions are being made, but the truth is that research will need to determine whether these assumptions are accurate. Much more and longer-term research is required to understand the

impact of extracting heat from water and the effects of the cold plume. Until then, we simply don't know. It's still too early to draw conclusions."

Determining the Feasible Aquathermal energy Potential of Water Bodies, by Stijn de Jonge

Stijn de Jonge, founder of EXTRAQT, focuses exclusively on aquathermal energy as a heat pump technology. The company specializes in developing thermal models to assess the potential of rivers, lakes, and canals, translating this potential into operational installations. Within EXTRAQT, Stijn primarily oversees strategic developments.

EXTRAQT conducted research into the potential of water bodies for aquathermal energy in Belgium and Friesland.



Panel Discussion on Collectives in Practice by Goffe Venema and Ruben Vanneste

Both Goffe Venema and Ruben Vanneste are passionate about their roles in establishing collective district heating networks based on aquathermal energy, though they are at different stages of development.

Ruben is working in the city of Kortrijk on the new development of "Buda Island." This area will feature new buildings heated by aquathermal energy from the River Leie and is one of the large-scale pilots within the WaterWarmth project.

Goffe Venema: Project Leader of Eigen Warmte Balk

Goffe Venema, project leader of Eigen Warmte Balk, drew inspiration from the Warm Heeg initiative: *"If they can do it in Heeg, we can do it in Balk too."*

The project is currently in the design phase, with many studies still to be conducted. However, the village is enthusiastic, and strong collaboration with partners such as the housing corporation, the business association, and AVK Plastics (which supplies residual heat) makes it a plan with potential. If all goes well, construction will begin in 2027.

"The importance of government support, knowledge sharing, and citizen participation became clear during the conversations with Goffe and Ruben. The public asked many questions and could directly learn from the practice in which the projects Buda island and Eigen warmte Balk are located."

Conclusion

The seminar highlighted the complexity of the energy transition and the need for tailored solutions, innovation, and collaboration. Case studies like Terbekehof demonstrate that sustainable heating projects can be successful with the right approach and partners. However, the balance between local autonomy and national coordination remains a challenge for policymakers.