



Transition Roadmap City of Rotterdam



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Transition Roadmap of Rotterdam

Introduction

“By 2050, Rotterdam wants to be climate neutral: we no longer want to contribute to climate change. Because the CO₂ emissions and other greenhouse gases are a major cause of climate change, we want to reduce them significantly. As a city in the delta, the consequences for Rotterdam cannot be foreseen if we don't act. One way to reduce emissions is to switch to alternatives to natural gas. This is also useful because in the future, much less natural gas will be produced in Groningen. In addition, we are preparing ourselves for the consequences of climate change, such as flooding and heat stress.”

The Heat Transition is a task from the national Climate Agreement.

On the basis of the Paris Agreement, European agreements and the Dutch Climate Act, the government has committed itself to reducing the Netherlands' CO₂ emissions over time. In the National Climate Agreement, companies, organisations and governments have indicated how they intend to reduce their emissions by 49% by 2030 compared to the reference year 1990. In this Climate Agreement, it was agreed that municipalities will take the lead in the heat transition of the built environment. To this end, every municipality is drawing up a Heat Transition Strategy. In this vision,



they inform the government which neighbourhoods and homes have the potential to become natural gas-free by 2030, or to prepare for this.

The municipality is a suitable director of the heat transition.

In Rotterdam, we believe it's important to manage the heat transition locally. After all, this transition will bring about major changes for Citizens of Rotterdam, not only in the outdoor areas and below ground, but also in people's homes. It is therefore essential that residents and property owners understand the importance of the transition and that there is support for it. The heat transition requires good coordination and alignment between many parties. This is the only way to achieve the most sustainable and reliable heat alternative at the lowest possible social costs. Municipalities are therefore the appropriate governmental level to take responsibility for this.

The heat transition also offers opportunities for other solutions.

In Rotterdam there are more challenges besides the energy and heat transition. Climate adaptation, greening and housing construction all require a place in our increasingly limited outdoor space.

Building owners also face many challenges, such as repairing foundations, removing asbestos and overdue maintenance. This raises the question of how we can make and maintain buildings which are more liveable and future-proof. And: how do we keep the solutions affordable and achievable for everyone?

The implementation of the heat transition offers opportunities for smart combinations, 'linking opportunities', with solutions for other challenges. In the district-oriented approach, we are therefore linking up as much as possible with other challenges in a

district, such as reducing flooding, improving the quality of life, tackling poverty and strengthening the local economy. We are also looking for linking opportunities in spatial solutions, construction works in outdoor area and planned renovations by large property owners. In doing so, we will provide tailor-made solutions as much as possible, because every district is unique. This also saves costs and reduces disruption. Together, we are not only making Rotterdam natural gas-free, but we are also working on a better future for all citizens of Rotterdam!

The Goal – Our Heating and Cooling Plan “WHAT-Map”

Currently, Rotterdam has 263,000 natural gas connections, which are mainly used for cooking, heating and hot running water. We must therefore start on time to ensure that all buildings in the city are natural gas-free before 2050. We will do this in phases, so that the city remains accessible during the heat transition, and we can make optimal use of resources and people. To be able to make sufficient headway towards 2050, a number of components are required. These will enable us to heat buildings with a clean heat alternative:

- ▶ The available technologies to provide a building with heat
- ▶ The necessary infrastructure and spatial possibilities
- ▶ The availability and development of sustainable heat sources
- ▶ The degree of energy saving required to save CO₂ and to make buildings suitable for a heat alternative.

The challenge of making Rotterdam natural gas free in numbers:

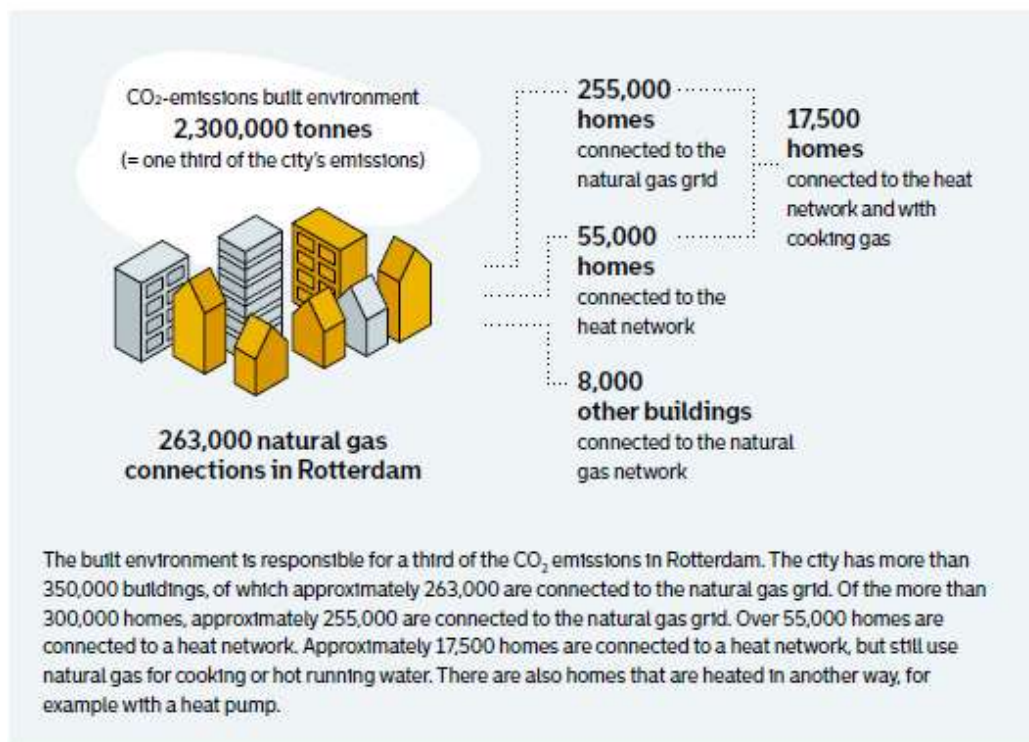


FIGURE 39: CHALLENGE OF MAKING ROTTERDAM NATURAL GAS FREE IN NUMBERS

Each alternative to natural gas requires different adjustments and investments. This has consequences for the efforts that users and heat and electricity suppliers must make. We aim to achieve the most suitable and affordable solution for all parties.

We are introducing the WHAT map, which will be used to determine the best heat alternative for each district.

An affordable heat alternative at the lowest social costs

We have calculated the cheapest alternative to natural gas for the existing buildings in Rotterdam. The results of this calculation are shown on the WHAT map. This map was published for the first time in 2018 and was improved in 2021 in line with the latest insights and technologies. The WHAT map shows the most affordable alternative to natural gas for each district. It also shows how much more advantageous this option is compared to the second choice in terms of a percentage.

To arrive at this WHAT map, we studied various alternatives to natural gas. These included variations of a collective heat network at low, medium or high temperature, as well as fully-electric heating per house, with heat pumps that extract heat from the air or soil. We added up the costs and benefits for each option, regardless of who pays the costs and who receives the benefits: investments in infrastructure, modifications to the home and energy costs. This allowed us to compare the social costs of different alternatives. Our goal was not to get a picture of the actual specific costs of implementation, but rather an indication. The actual costs are tailored and depend on the specific characteristics of the buildings.

By choosing the cheapest solution, we will be less reliant on national and local subsidies. However, this does not alter the fact that connecting to sustainable heat will not necessarily

be affordable for many citizens of Rotterdam. For this reason, we are also investing in funding energy-saving and home improvement measures to reduce energy consumption.

To determine which alternative to natural gas is a no-regret, we have compared the costs of various options. We paid particular attention to the difference in costs between the alternatives: the greater the difference, the more likely it is that a solution really is the cheapest in practice. We have also taken into account the composition and setup of a district: connecting a district with many gallery flats/multi-family houses is cheaper than connecting a district with many detached houses. Finally, there are always buildings that require custom solutions, such as monuments and properties with specific characteristics, like churches, theatres, museums and houseboats. For these buildings, it is difficult to determine the best alternative in advance.

The WHAT map presents the preferred alternative to natural gas at district level. We do not prescribe the alternative heat source. The WHAT map gives an indication of the relationship between the costs at district level of the various solutions and thus the likelihood of installing a collective heat system. Building owners are free to choose another alternative.

The WHAT map is an important tool for the municipality, as it provides insight into its role in various situations. The heat alternative largely determines the coordination and cost allocation that will be needed. In districts where a collective heat supply is to be installed, the municipality will most probably take the lead. In areas where building owners can independently realise an alternative, the municipality wishes to support this. An interactive version of the WHAT map²¹ will be made available on the website [Duurzaam010.nl](https://duurzaam010.nl)²².

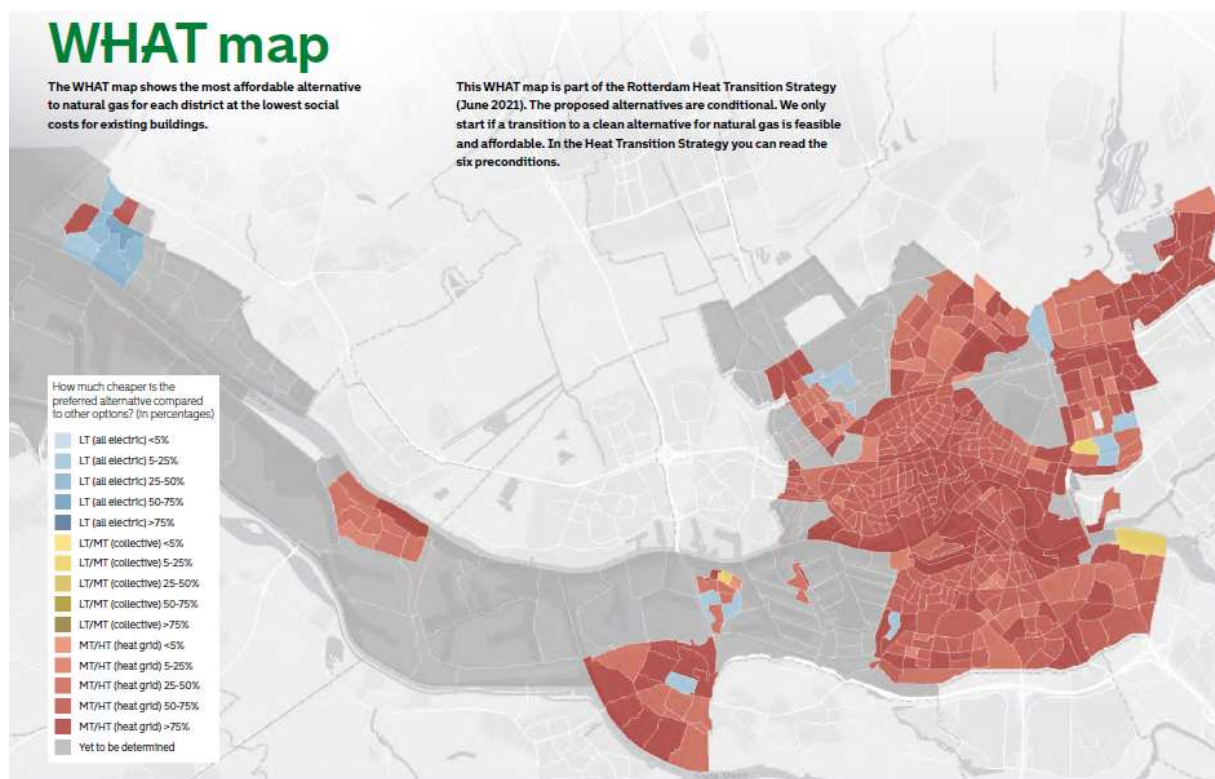


FIGURE 40: ROTTERDAM'S WHAT-MAP

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<https://rotterdam.maps.arcgis.com/apps/webappviewer/index.html?id=6e37b7b6c0df407f881edb007e819803>

22 <https://duurzaam010.nl/>

A heat network is the cheapest option

As the WHAT map indicates, in large parts of the city, collective heating solutions are an attractive alternative to natural gas in terms of affordability for residents, landlords and businesses. A medium or high temperature heat network is the cheapest alternative for the majority of Rotterdam's districts. The initial analysis by the Netherlands Environmental Assessment Agency and the Openingsbod (opening offer) from grid operator Stedin confirm this.

This in itself is not surprising. In an urban environment, collective systems are often the socially cheapest alternative to natural gas. About one-fifth of the buildings in Rotterdam are already connected to district heating; we have been using heat networks since the 1950s. Further economies of scale mean that costs are lower and also more fairly distributed. Heat would then be distributed to homes via a heat network. The advantage of a heat network is also that it is suitable for using other sources of heat in the future, making it a no-regret investment.

Another sustainable alternative to natural gas is electric heating (all-electric). This is an individual solution per house, which is relatively expensive. Most existing houses in Rotterdam must be heavily insulated for this type of heating, making this solution, on balance, often more expensive.

Energy saving

We are entering a (transition) period in which it will be a challenge to ensure the availability of sufficient clean, reliable and affordable energy for existing buildings in time so that we can stop using natural gas by 2050. It is also necessary to reduce the use of natural gas and make better use of available heat. New buildings are already being built without a natural gas supply. By reducing the demand for heat – think of (stimulating) energy-saving and home-improvement measures – and thus: reducing natural gas consumption, we directly contribute to the CO₂ target.

Energy-efficiency and home improvement

We are encouraging businesses, homeowners, tenants and landlords to be energy efficient in various ways. We do this by means of national regulations and offering subsidies and loans from the central government ("Warmtefonds") and the municipality, energy advice through VVE010 and information through our own channels (including the website Duurzaam010.nl). With energy coaches to improve heating behaviour, offering advice and help with small energy-saving measures and the purchase of energy-efficient appliances, we are taking various steps in Rotterdam to promote cost-effective energy saving in an easy-to-implement manner.

Insulation

The greatest gains can be achieved by ensuring that buildings have the right level of insulation to match the heat supply. Insulation lowers energy costs and reduces the pressure on the available sustainable heat sources. It is therefore an effective way of balancing the supply and demand for clean energy in 2050. The WHAT map therefore takes into account both investments in the heat system and in insulation. It may mean that buildings need extra insulation to be able to use of a certain alternative to natural gas, such as low-temperature heating.

This form of heating places high demands on insulation and the tightness of gaps (draughts) in the building. A national model of ‘standard and target values’ has recently been developed for this. This model helps building owners to determine what level of insulation is most appropriate in the long term. The meaning and consequences of these ‘standard and target values’ will be incorporated in the periodic update of the WHAT map based on the latest insights.

Cooking gas

Besides heating, natural gas is also used for cooking or heating tap water. There are still many homeowners who use a clean heat alternative for heating, but still use gas for cooking and/or hot water. This also applies to many buildings that are already connected to a heat network. By better promotion of electric cooking, these can become completely natural gas-free. This has the financial advantage that when the gas connection is removed, the standing charge for natural gas is also eliminated. In Rotterdam some 17,500 households would qualify for this.

Transition Roadmap – “WHEN MAP”

In this section, we describe how buildings and areas can be connected to a natural gas alternative in time for Rotterdam to become natural gas-free by 2050. As discussed already, the construction of a collective, sustainable heat system is the best alternative for most of Rotterdam. Therefore, the municipality, together with building owners and suppliers of heat, must play an active role in the realisation of these collective systems. In this way, we can provide an affordable alternative to natural gas. This is already being done with the district-oriented approaches. The overall planning of promising district oriented-specific approaches is established in the WHEN map. Building owners are given plenty of time to make the switch, until it is no longer socially responsible to maintain the gas network for a select group. This is not yet the case.

The WHEN map shows a conditional planning of the promising districts. There are six preconditions that can influence this planning (Figure 41):

- 1** Compensation for implementation costs and sufficient implementation capacity of the municipality;
- 2** Sufficient investment and implementation funds as well as sufficient implementation capacity of housing corporations;
- 3** Solutions for the unprofitable portion and pre-financing of the construction of collective heat solutions;
- 4** Additional financing and subsidies for private individuals, tenants and home owners associations;
- 5** Sufficient powers for municipalities in terms of legislation and regulations; and
- 6** (Im)possibilities in spatial planning.

FIGURE 41: PRECONDITIONS FOR PLANNING

Based on the selection of promising districts, we will discuss with the central government what is needed to meet these preconditions so that we can actually start working in these districts. In doing so, we will work together with the other G4 cities and the Association of Dutch Municipalities (VNG). A final decision will only be taken if we can realise this ambition with the available powers and financial means. This may necessitate an adjustment of the ambition if they are insufficient. We will already start working in the meantime if there are opportunities to make use of no-regret developments and if we can make the switch feasible and affordable.

Promising areas for an integrated gas-free approach

In 2018, we started a district-oriented approach to natural gas-free heating in five districts. Based on our experiences in these, we drew up the first version of the WHEN map in early 2020. On this map, we have designated fourteen districts where we believe a subsequent district-oriented approach to natural gas-free energy is possible. We call these districts the exploration districts.

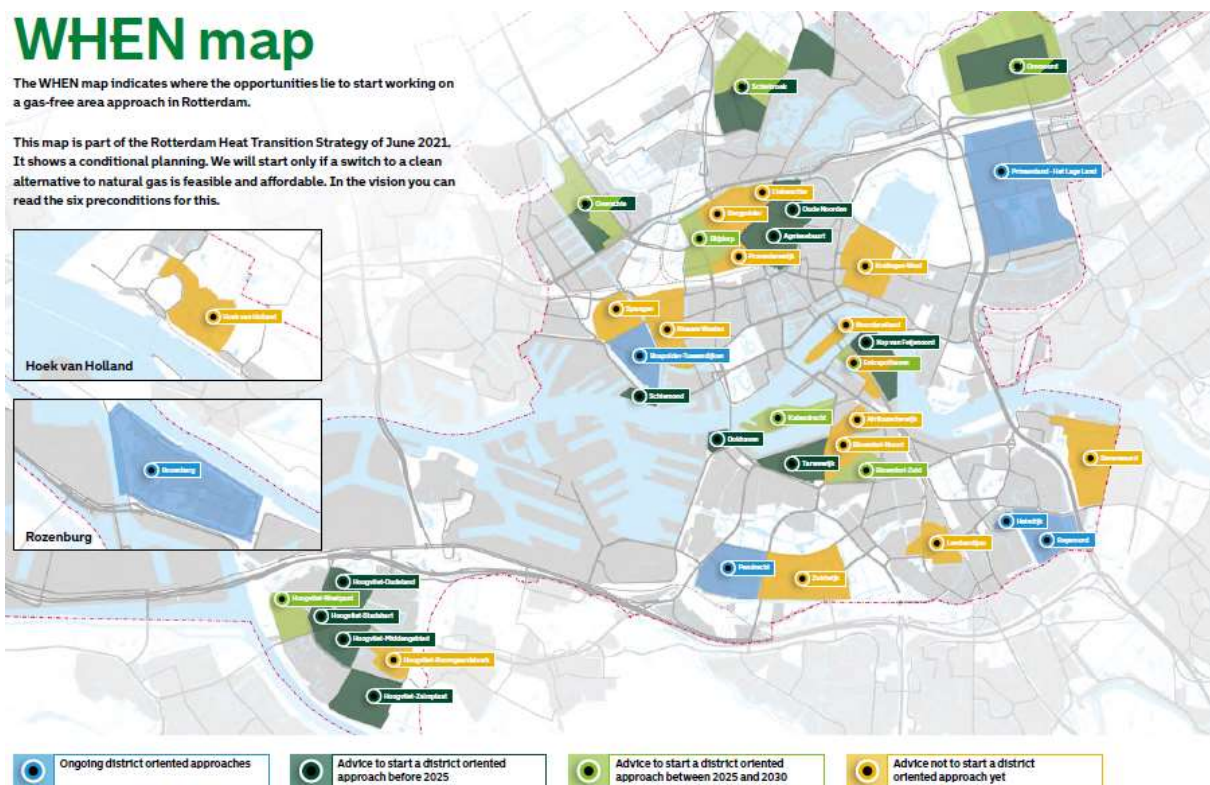


FIGURE 42: ROTTERDAM'S WHEN-MAP

In 2020, we further investigated these exploratory districts (see box). We collected information on various subjects, such as:

- **Linking opportunities:** Where can we join forces with partners? We looked at planned work on the sewer and gas pipelines. In this way, we can 'make work with work'. We also investigated whether the heat supply is spatially feasible. Finally, we discussed the maintenance plans of large property owners, such as housing corporations. This enabled us to discover where mutual gains could be achieved.
- **Feasibility and affordability:** In which districts is the transition to a gas-free model most feasible and affordable? We anticipate that the districts with many high-rise buildings will score well, due to their high densities of living units. The WHAT map

also indicates that a collective heat system is the most affordable solution in these districts.

- **Socio-economic benefits:** In which districts is there sufficient support and capacity to implement a gas-free system? Where can major steps be taken quickly or where can we link up with other social issues? Are there already residents or market initiatives in the district that can be linked to the heat transition?

The fourteen exploratory studies revolved around the question: does the district have a chance to start an integral district oriented approach to natural gas-free energy between 2022 and 2030? We examined the feasibility (technical, social and economic), affordability or financing (for the building owners and residents) and priority and desirability (in relation to other tasks in the areas and the maintenance plans of partners). This was in line with the principles of the Council Agreement on Energy Transition.

The exploratory studies consisted of:

- District analysis: local characteristics and relevant tasks;
- Technical analysis: insights into the heat system;
- Business cases: insights into costs and benefits;
- Planning: coordinating the work in buildings, in the topsoil and in the subsoil.

FIGURE 43: PROCESS OF CONDUCTING THE EXPLORATORY STUDIES FOR THE DISTRICT-ORIENTED APPROACH

Where do we start before 2030?

Based on the exploratory studies, we have proposed where and when we can best start with new district-oriented approaches. The results have been recorded on the WHEN map. In all these districts, the greatest opportunities lie in a collective alternative to natural gas (see What?). Appendix 1 explains why these districts were chosen. The proposal was made in consultation with parties both within and outside the municipality. It has also been reviewed by the district committees to which the exploratory districts are assigned.

The WHEN map

On the WHEN map we differentiate between:

- The current district-oriented approaches:
Groot-IJsselmonde (Heindijk and Reyerood), Pendrecht, Rozenburg, Bospolder-Tussendijken and Prinsenland-Het Lage Land;
- Promising districts to start a district-oriented approach before 2025: Agniesebuurt, Dokhaven, Hoogvliet (Middengebied, Oudeland, Stadshart & Zalmplaat), Kop van Feijenoord, Ommoord, Oude Noorden, Overschie, Schiebroek, Schiemonnd and Tarwewijk;
- Promising districts to start a district-oriented approach between 2025 and 2030: Blijdorp, Bloemhof-Zuid, Entrepothaven, Katendrecht and Hoogvliet (Westpunt);
- Districts where we will only start with a district-oriented approach after 2030: Afrikaanderwijk, Bergpolder, Beverwaard, Bloemhof-Noord, Boomgaardshoek, Hoek van Holland, Kralingen-West, Liskwartier, Lombardijen, Nieuwe-Westen, Noordereiland, Provenierswijk, Spangen and Zuidwijk.

With the selection of these districts (including the current district-oriented approaches and agreements in the Rotterdam Climate Agreement), we arrive at a total of 85,000 homes and buildings that are connected to the natural gas network and where we believe it is realistic to switch to a clean energy source before 2030. This puts us on track to meet the target for 2030 and 2050.

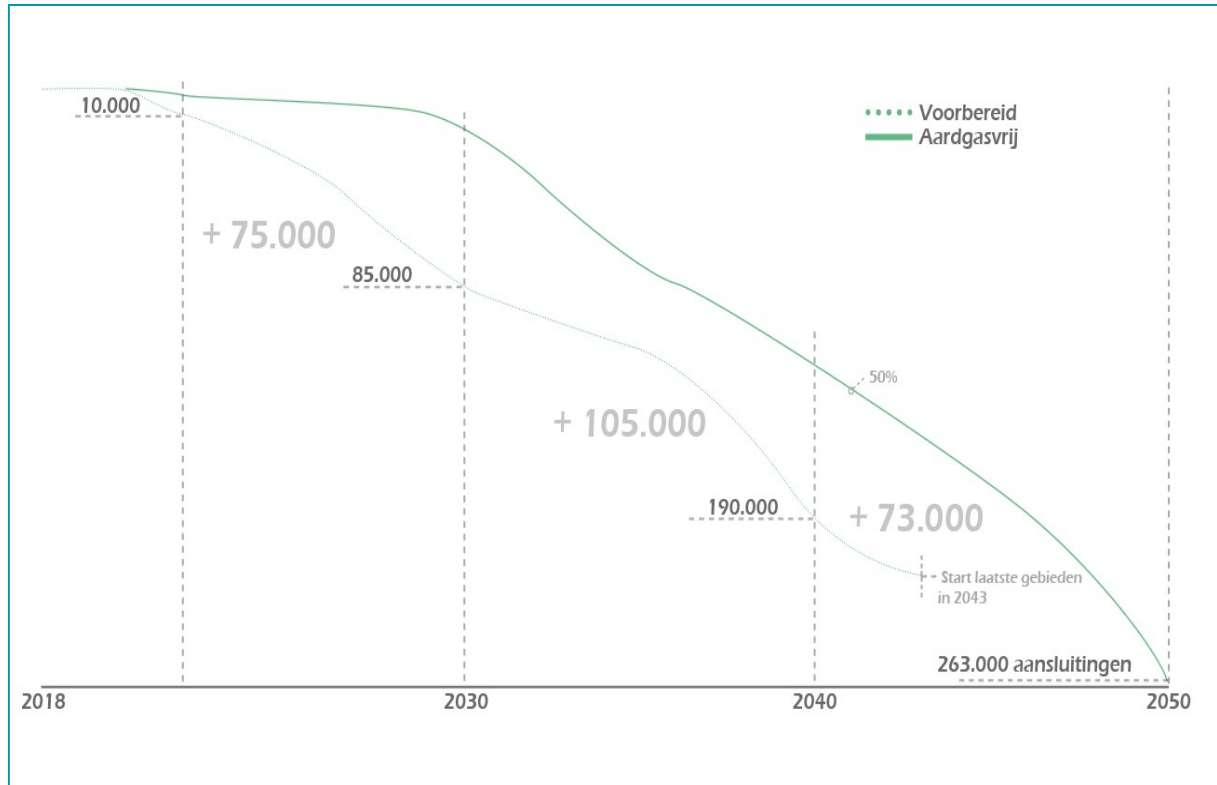


FIGURE 44: NUMBER OF BUILDINGS AND HOMES SWITCHED FROM THE NATURAL GAS GRID TO A CLEAN ENERGY SOURCE BY 2050

We have taken the following factors into account:

1. Distribution in space and time in the implementation with a view to liveability and accessibility;
2. Distribution in terms of investment costs and time for collective property owners;
3. The opportunities and consequences for the further development of the heat system;
4. The risk of delay.

In the districts that have not been designated as promising for a natural gas-free area approach before 2030 (yellow on the map), building owners can take steps in the right direction themselves. For example, by insulating their home or by individually switching to a natural gas-free alternative. An interactive version of the WHEN map will be made available on the [Duurzaam010.nl](https://duurzaam010.nl) website.

A provisional timetable

The planning indicated on the WHEN map is based on current knowledge. The decision regarding whether and when to start with new district-oriented approaches is up to the next Rotterdam council of mayor and alderman (2022-2026). This council will assess whether all preconditions are in place to make districts feasible and affordable free of natural gas. For

all Citizens of Rotterdam, it is now recommended to save on energy, to insulate their homes and to start cooking electrically, for example at obvious maintenance or replacement moments. The municipality will stimulate this with information and various forms of subsidies and loans.

Communication about the Heat Transition

As a municipality, we communicate actively about the Heat Transition. The focus is on the actions to be taken by residents. We make it clear that the plans are not yet fixed: before we can implement them, the necessary preconditions must be in place. Also, the new council has to first make a decision. Each time a new step in the decision-making process is taken, we will communicate about it. When the Heat Transition Strategy is adopted, we will communicate this through the usual channels.

Through online and offline channels (free local paper, district communication, social media, the [duurzaam010](https://duurzaam010.nl) website), we will explain what it means to live in a promising district or not promising district where a natural gas-free approach can start before 2030. The online calculation tool will also soon be available on the website, which will give residents an indication of what a switch to a district heating network would mean for their energy bills. In addition, we are organising (online) question hours and workshops in cooperation with the home, environment and energy coaches from the Sustainability Shop (“Duurzaamheidswinkel”), the Houses of the neighborhood (“Huizen van de wijk”) and the Living Room Natural Gas Free in Pendrecht (“Huiskamer Aardgasvrij in Pendrecht”).

We will be posting general information about the heat transition on duurzaam010.nl. A more user-friendly version of the Transition Vision Heat and an interactive WHEN map will also be placed here. The map will show at street level whether or not you live in one of the districts that are likely to benefit from the start of a natural gas-free district-oriented approach before 2030. An extensive list of practical questions and answers can already be found on duurzaam010.nl. Such as: what do I do with my central heating boiler? This is in addition to the existing information, tips and financial opportunities that are available on [duurzaam010](https://duurzaam010.nl).

Participation of stakeholders, residents and property owners

Many stakeholders were involved in the exploratory studies in the districts and in drawing up the WHEN map; parties from both inside and outside the municipality. This includes housing corporations, network operators, heat providers and district committees that have contributed to the process. Appendix 2 contains a complete list of the stakeholders involved. As soon as the next council takes a decision on the start of new district-oriented approaches, we will organise participation with residents and property owners in these areas. The best way to organise this will be determined together with the area committee, the district council or the district committee. Representatives of residents’ associations may also be involved here.

Appendix 1:

Ongoing district oriented approaches

Area	District/neighbourhood
Bospolder-Tussendijken	
Groot IJsselmonde	Helmdijk Rijenoord
Pondrecht	
Prinsenland-Het Lage Land	
Rozenburg	

Promising areas to start a natural gas-free district oriented approach before 2025

Area	District/neighbourhood	Motivation
Charlote	Oud-Charlote (Dokhaven)	Many opportunities for joint action with collective property owners and work in outdoor space and underground
	Tannewijk	Many opportunities to work together with work in outdoor space and underground
Delfshaven	Schiedam	Opportunities for joint action with collective property owners
Hoogvliet	Hoogvliet-Noord (Oudeland)	Opportunities for joint action with collective property owners and work in outdoor space and underground
	Hoogvliet-Zuid (Middengebied, Stadhart & Zalmplaat)	Opportunities for joint action with collective property owners and work in outdoor space and underground
Fetjanoord	Fetjanoord	Many opportunities for joint action with collective property owners and work in outdoor space and underground
Noord	Agnesebuurt	Many opportunities for joint action with collective property owners and work in outdoor space and underground
	Oude Noorden	Many opportunities for joint action with collective property owners and work in outdoor space and underground
Prins Alexander	Ommoord	Opportunities for joint action with collective property owners and work in outdoor space and underground
Overschie	Kleinpolder	Opportunities for joint action with collective property owners and work in outdoor space and underground
	Overschie	
Hillegersberg-Schiebroek	Hillegersberg-Noord (110 Morgen)	Many opportunities for joint action with collective property owners and work in outdoor space and underground & market initiatives

Promising areas to start a natural gas-free district oriented approach before 2030

Area	District/neighbourhood	Motivation
Fetjensnoord	Bloemhof-Zuid	Many opportunities for joint action with work in outdoor space and underground
	Katendrecht	Opportunities for joint action with work in outdoor space and underground
	Kop van Zuid – Entrepot	Residents' initiative and opportunities for joint action with collective property owners and work in outdoor space and underground
Hoogvliet	Hoogvliet Noord (Westpunt)	Opportunities for joint action with collective property owners
Noord	Blijdorp	Residents' initiative and opportunities for joint action with work in underground

Areas that were investigated in the exploratory studies, but which do not yet have a chance of starting a natural gas-free district oriented approach before 2030

Area	District/neighbourhood	Motivation
Charlote	Zuidwijk	No opportunities for joint action with collective property owners and work in outdoor space and underground
Delfshaven	Nieuwe-Westen	Few opportunities for joint action with collective property owners and work in outdoor space and underground
	Spangen	No opportunities for joint action with collective property owners and work in outdoor space and underground
Fetjensnoord	Airkaanderwijk	No opportunities for joint action with collective property owners and work in outdoor space and underground
	Bloemhof-Noord	No opportunities for joint action with collective property owners and work in outdoor space and underground
	Noorderstrand	Few opportunities for joint action with collective property owners and work in outdoor space and underground
Disselmonde	Beverwaard	Uncertainty about opportunities for joint ventures with collective property owners and work in outdoor space and underground & affordability
	Lombardijen	Few opportunities for joint action with collective property owners and work in outdoor space and underground
Hoogvliet	Hoogvliet Zuid (Boomgaardshoek)	Few opportunities for joint action with collective property owners and work in outdoor space and underground & social-economic factors
Hoek van Holland		Uncertainty about feasibility and affordability of alternatives to natural gas

<i>Area</i>	<i>District/neighbourhood</i>	<i>Motivation</i>
Kralingen-Crooswijk	Kralingen-West	Few opportunities for joint action with collective property owners and work in outdoor space and underground & social-economic factors
Noord	Bergpolder	Few opportunities for joint action with collective property owners and work in outdoor space and underground
	Liskwartier	Few opportunities for joint action with collective property owners and work in outdoor space and underground & social-economic factors
	Provenierswijk	Few opportunities for joint action with collective property owners and work in outdoor space and underground

Appendix 2:

Area	Type	Exploratory study/district oriented approach	Involvement
City Centre	Area committee	None	Informed in writing
Charlots	Area committee	Exploratory study	Presentation
Charlots Pandrecht	District committee	District oriented approach	Involved in ongoing district oriented approach
Charlots Tarwewijk	District committee	Exploratory study	Presentation
Delfshaven	Area committee	Area approach/exploratory study	Presentation on exploratory study and involvement in current district oriented approach
Delfshaven Middelland	District committee	None	Informed in writing
Delfshaven Oud Mathenesse - Wittie Dorp	District committee	None	Informed in writing
Fetjenswaard Afrikaanderwijk	District Council	Exploratory study	Informed in writing
Fetjenswaard Bloemhof	District Council	Exploratory study	Presentation
Fetjenswaard Hillesluis	District Council	None	Informed in writing
Fetjenswaard Katendrecht Wilhelminalier	District Council	Exploratory study	Presentation
Fetjenswaard Kop van Zuid-Entrepot	District Council	Exploratory study	Presentation
Fetjenswaard Noorderland	District Council	Exploratory study	Presentation
Fetjenswaard Vreewijk	District Council	None	Informed in writing
Fetjenswaard wijk Fetjenswaard	District Council	Exploratory study	Presentation
Hillegersberg-Schiebroek	Area committee	Exploratory study	Presentation
Hoek van Holland	Area committee	Exploratory study	Presentation
Hoogvliet	Area committee	Exploratory study	Presentation
IJsselmonde	Area committee	Area approach/exploratory study	Presentation on exploratory study and involvement in ongoing district oriented approach
Kralingen-Crooswijk	Area committee	Exploratory study	Presentation
Noord Agnatesbuurt	District Council	Exploratory study	Presentation
Noord Bergpolder	District Council	Exploratory study	Presentation
Noord Blisjorp	District Council	Exploratory study	Presentation
Noord Liskwartier	District Council	Exploratory study	Presentation
Noord Oude Noorden	District Council	Exploratory study	Presentation
Noord Provenierswijk	District Council	Exploratory study	Presentation
Overschie	Area committee	Exploratory study	Presentation
Panits	Area committee	None	Informed in writing
Prins Alexander	Area committee	District oriented approach/exploratory study	Presentation on exploratory study and involvement in ongoing district oriented approach
Prins Alexander Nesseland	District committee	None	Informed in writing
Prins Alexander Zevenkamp	District committee	None	Informed in writing
Rozenburg	Area committee	District oriented approach	Involved in ongoing area approach

<i>Stakeholder</i>	<i>Type of organisation</i>
Woonstad	Housing corporation
Woonbron	Housing corporation
Havensteder	Housing corporation
Vestia	Housing corporation
Habton	Housing corporation
Laurens Wonen	Housing corporation
MaasWonen	Housing corporation
SOR	Housing corporation
Woningbouwvereniging Hoek van Holland (WVH)	Housing corporation
Sportbedrijf Rotterdam	Operator of sports properties
Amvest	Real estate investor
Bouwinvest	Real estate investor
Helmsteden	Real estate investor
Manhave	Real estate investor
Vesteda	Real estate investor
Woonhave	Real estate investor
IVBN (club institutionele beleggers)	Real estate investor
Stedin	Grid operator
Vattenfall	Concession holder
Eneco	Concession holder/ geothermal permit holder/ party involved with aquathermia
Warmtebedrijf Rotterdam	Heating company
Energie van Rotterdam	Energy cooperatives umbrella organisation
Hydroco Geomac	Geothermal operator
Engie	Geothermal operator
Shell Geothermie	Geothermal operator
Enertrans/Schiebroek Warmte	Residual heat consortium
Waterschap Hollandse Delta	Water authority/ party involved with aquathermia
Hoogheemraadschap van Delfland	Water authority/ party involved with aquathermia
Buro Loo	Party involved with aquathermia
DWA	Party involved with aquathermia
TNO	Party involved with aquathermia
Jules Dock	Party involved with aquathermia
UHRIG Group	Party involved with aquathermia
VvE 010	HOAs collective
VvE Netwerk Rotterdam	HOAs umbrella organisation
NetVerder	Network party
Burgerpanel Rotterdam	Citizen panel
The Municipality of Westland <i>In connection with exploratory study Hook of Holland</i>	Municipality
The Municipality of Ridderkerk <i>In connection with exploratory study Bovenwaard</i>	Municipality



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