

AMSTERDAM

CLEAN  
ENERGY  
CHALLENGE

WHAT  
DESIGN  
CAN DO

# AMSTERDAM BRIEFING PACK

GLOBAL PARTNER

IKEA Foundation  


ENDORSED BY



United Nations  
Climate Change

AMSTERDAM CITY PARTNERS

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regioamsterdam



UNIVERSITY OF AMSTERDAM



ABN-AMRO

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# THE GLOBAL CHALLENGE



## WHAT DESIGN CAN DO TO PROVIDE CLEAN ENERGY FOR ALL

Fossil fuels are the biggest cause of climate change and are still our primary source of energy. The world's cities emit 70 percent of the world's carbon dioxide — and that's likely higher when consumption emissions are included. That's why What Design Can Do focusses its second Climate Action Challenge on urban energy issues. Together with IKEA Foundation and many local partners we invite designers and creative entrepreneurs to rethink how we produce, distribute and use energy in our cities.

Everyone in the world should have access to enough energy to live a comfortable life, with access to clean water, nutritious food, shelter, healthcare, education and economic opportunities.

Many in the world have this, but at the cost of the climate. We need to end our reliance on fossil fuels, while also ending energy poverty by providing access to reliable and affordable energy to everyone.

To achieve this, we need to generate more energy overall, and it needs to be clean and green — meaning, renewable, passive, kinetic, or anything but fossil fuels. We will also need to use energy more wisely: more efficiently, and with less waste. We have to think differently about how we source our energy and how we use it.

# FIVE CITIES CHALLENGE YOU!



Cities, home to more than 50 percent of the global population, consume the majority of the global primary energy supply – and a lot of that still comes from fossil fuels. Cities emit 70 percent of the world’s carbon dioxide—and that’s likely higher when consumption emissions are accounted for.

Cities therefore offer us a huge opportunity to transform the way we generate and use energy: to end dependence on fossil fuels, radically expand usage of renewable energy, conserve energy and to secure clean energy for all.

We have worked closely with researchers, experts and designers in 5 globally influential cities to craft locally specific challenges informed by real stories, global key issues and local design capacity.

Across Sao Paulo, Mexico City, Delhi, Nairobi and Amsterdam we found that key elements of sustainable urban energy systems include clean and energy efficient transportation, waste management, building practices, food supply chains and public spaces.

We would like to mobilise the power of both local and global creative communities to take on the challenges in these 5 cities.

Designers and creative thinkers from all over the world are encouraged to apply. So if you don’t live in one of the 5 cities, you can still make a difference!

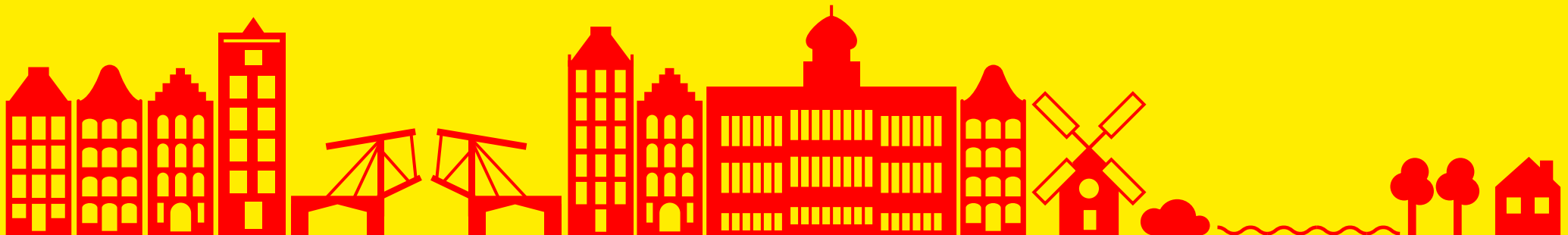


# THE DESIGN BRIEF

## HOW CAN WE EMBED CLEAN ENERGY IN THE AMSTERDAM CITYSCAPE?

Transitioning away from fossil fuels with today's technology means changing our cityscapes: retrofitting existing buildings to reduce energy consumption, and integrating energy infrastructure much more seamlessly across the metropolitan landscape, in our neighbourhoods, and in our homes. But strict regulations, a lack of space and the perceived ugliness of clean energy interventions has become a barrier to their adoption in Amsterdam's metropolitan region.

Amsterdammers have an opportunity to rethink how energy can be generated, transported and stored in a way that aligns with the cultural and historic values of the city and its surrounding landscape. That's why, for the metropolitan region of Amsterdam, we are calling for creative spatial interventions, products, services, systems and stories that reconcile livability with the need to transition to renewable energy.



INTRODUCTION

THE BRIEF

MAKE A DIFFERENCE

WHAT'S BEING DONE

KEEP IN MIND







# GLOBAL URBAN ENERGY ISSUES



Traditionally old cities depend on their surrounding areas for their energy supply, mostly large scale installations such as power plants. Looking at renewable energy sources however, in most cases there's simply not enough space within these wider metropolitan areas to fulfil the regional clean energy needs through locally produced wind, sun and geothermal heat. This means cities and metropolitan areas need to look for ways to integrate clean energy infrastructure with other pressing issues like growing housing needs, the preservation of cultural and natural heritage and the redesign the urban mobility system.

Many old cities are admired for their beauty. But few cities with a history were built with a post-fossil fuel future in mind. Historic cityscapes may be beautiful, but they are characterised by badly insulated buildings; narrow, picturesque streets struggle to accommodate heat pumps; and many roofs are not suitable for solar panels.

Combining energy efficient conservation with energy production using renewable sources is not just a technical challenge, it is also a cultural one. The future of urban planning in old cities needs to create new narratives and styles that bridge values of the past and the demands of the post-fossil future.

# AMSTERDAM'S CLEAN ENERGY PROBLEM



In Amsterdam's city centre, packed with monuments and protected buildings, there is little space for clean energy infrastructure. Solar panels and other visible interventions are not permitted on historic buildings. Other infrastructure necessary for the transition, such as electricity substations and transformers, are too big to fit in the narrow and dense urban plan.

Aesthetic concerns play a role in much of the wider metropolitan area, too. The IJmeer lake and on-land 'buffer' zones, are used for recreation or transport. Many feel that current visions of clean energy infrastructure development in these areas will make them less attractive or useful for other needs of urban dwellers.

An energy cooperative, Amsterdam Energie, had each of its plans for ten turbines in the Amsterdam harbour rejected by the North Holland region due to strict requirements. In nearby regions local governments have also supported the 'Free Horizon' lobby, which protests plans for wind turbines at sea because of concerns it might affect tourism.

A recent study concludes that there is not enough space on land nor water to meet the electricity demands for the future of the region through renewable sources. Experts call for an integrative spatial approach whereby clean energy demand is reconciled with other pressing urban needs, such as housing and preservation of cultural heritage and natural landscapes

# AMSTERDAM'S CLEAN ENERGY PROBLEM



Still, among the current renewable energy technologies, solar and wind are considered Amsterdam's best bet, since the Netherlands has no hills, which makes hydroelectricity difficult, and geothermal energy does not yet contribute a significant proportion amount of energy.

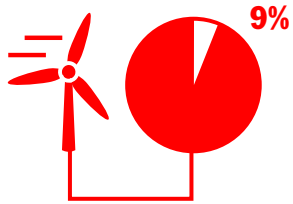
Only 9% of the energy Amsterdam generates now is classed as 'sustainable' (including fuel and heat), and most of that is from biomass. Biomass is considered less sustainable than solar and wind, since growing crops takes up a lot of space and resources and produces relatively little energy.

Almost a third of the city's emissions are from by gas, which fuels 90% of Amsterdam's heating needs. Almost 60% of energy consumption in buildings is for heat and hot water. The city's demand for heating is driven by poorly insulated buildings; with more than three-quarters built before 1990, most fall short of modern energy efficiency standards.

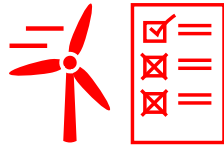
Of course, the energy transition is about a lot more than solar and wind, and will take cooperation from many different stakeholders. However, clean energy is not a central consideration in construction projects of new homes, future transport infrastructure, or corporate property development plans.

# AMSTERDAM'S ENERGY PROBLEMS

ONLY 9% OF  
ENERGY GENERATED  
IN AMSTERDAM  
IS 'SUSTAINABLE'



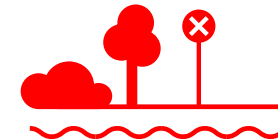
ALTHOUGH THE  
ENERGY TRANSITION  
REQUIRES 6000-9000  
WIND TURBINES,  
RECENT APPLICATIONS  
HAVE BEEN BLOCKED  
DUE TO STRICT  
REGULATIONS



AMSTERDAM IS HIGHLY  
DEPENDENT ON GAS  
AND NEEDS TO WEAN  
OFF OF IT BY 2050

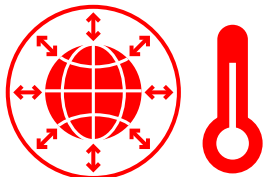
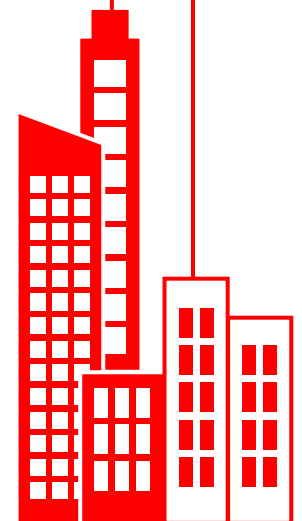


THERE IS A CONCERN  
THAT PICTURESQUE  
AREAS AROUND  
AMSTERDAM  
WILL LOSE THEIR  
ATTRACTIVENESS  
FOR RECREATION  
AND HOUSING IF  
CURRENT VISIONS  
FOR CLEAN ENERGY  
INFRASTRUCTURE  
CONTINUE



METROPOLITAN  
POPULATION:  
2.43 MILLION

POPULATION:  
854,316



CO<sub>2</sub> EMISSIONS ARE RISING DUE TO A GROWING POPULATION





**HOW CAN WE EQUIP THE HISTORIC CITY OF  
OF AMSTERDAM FOR A POST-FOSSIL FUTURE?**

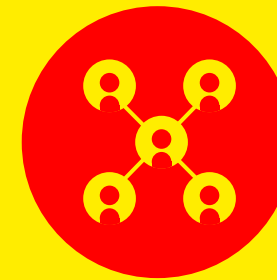


# WHERE DESIGN CAN MAKE A DIFFERENCE



Amsterdam's metropolitan region must cater to a number of growing demands like housing, preserving natural and cultural heritage and redesigning the urban mobility system. Rather than thinking of these as separate systems, design has the power to approach these demands more holistically with multipurpose concepts, products, services, spaces.

Consider how the energy transition needed can be combined with improved biodiversity, leisure, transport, water storage and agriculture. The degeneration of peat meadows contributes considerably to the CO2-problem and climate change, for instance. Can the energy transition help preserve nature we need in the metropolitan region? Can we design attractive landscapes and multipurpose 'urban edges' where clean energy solutions thrive?



Clean forms of electricity generation work well as decentralised, small-scale installations. Consider neighbourhood-level interventions to generate and supply energy in the form of electricity, heat or cooling, in beautiful, inspiring and educational ways.

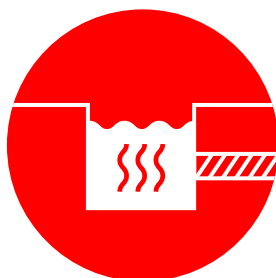


# WHERE DESIGN CAN MAKE A DIFFERENCE



## PRODUCTS, SERVICES OR INSTALLATIONS THAT INTEGRATE CLEAN ENERGY INFRASTRUCTURE IN THE METROPOLITAN LANDSCAPE

Think about how the energy transition can help preserve cultural and natural heritage, from historic buildings to cultural landscapes such as peat meadows, dikes and estates.



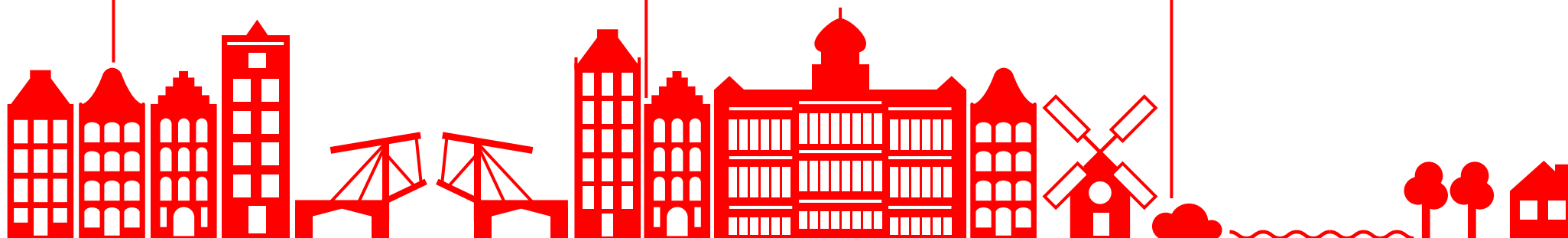
## SPATIAL INTERVENTIONS, PRODUCTS, SYSTEMS OR SERVICES THAT CAN LOWER TEMPERATURES IN THE CITY WHILE SAVING ENERGY FOR HEATING AND COOLING

Amsterdam is getting hotter in the summers and becoming a so called 'heat island'. Gas and district heating aren't the only ways to heat buildings. Learn from recent research into how heat can be captured or generated locally: for example, from surface water, air or soil.



## CLEAN ENERGY INSTALLATIONS AND SYSTEMS THAT ARE EMBEDDED IN THE 'URBAN EDGES'

Consider the transition areas between city and country side, where business parks, storage, recreation, and residential areas collide, as a fruitful breeding ground for clean energy solutions from which both businesses and citizens can benefit.

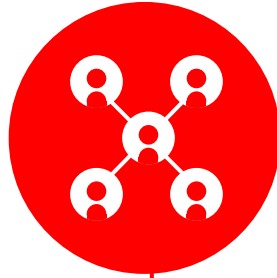


# WHERE DESIGN CAN MAKE A DIFFERENCE



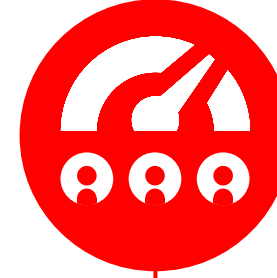
## A CAMPAIGN OR NARRATIVE THAT REFRAMES THE CONVERSATIONS AROUND CLEAN ENERGY

Consider ways to help people (citizens, companies, policy makers) realise that the energy transition need not be costly, complicated, or unsightly. Help them imagine clean energy futures.



## A SERVICE OR CAMPAIGN TO SCALE AND CONNECT NEIGHBORHOOD CLEAN ENERGY INITIATIVES TO SET EXAMPLES FOR THE REST OF THE CITY

What would an inspirational catalogue of possible interventions look like?



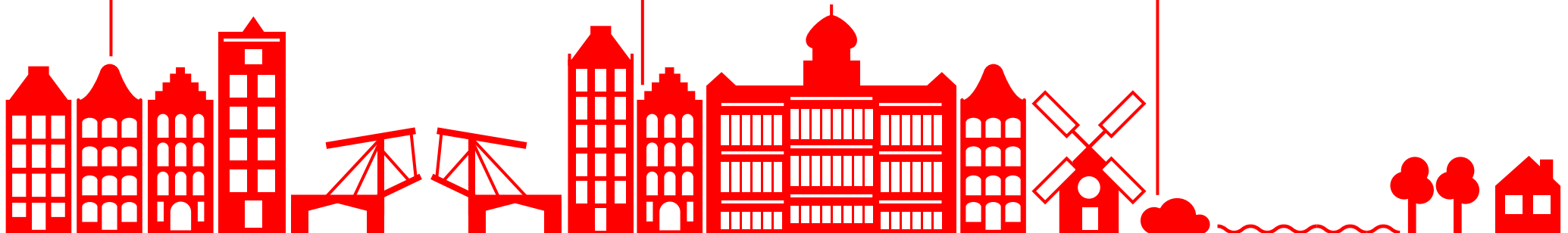
## A PROGRAMME OR SERVICE THAT HELPS LOCAL AUTHORITIES ACCELERATE THE IMPLEMENTATION OF CLEAN ENERGY POLICIES

Consider how this can be done in co-creation with citizens and companies.



## CLEAN ENERGY PRODUCTS, INSTALLATIONS AND SPATIAL INTERVENTIONS THAT 'HACK' PUBLIC SPACES

Think about how footpaths, squares, bicycle parking, tram stops, public gardens, parks and community centres can be modified to generate or store clean energy.







**“PRECISELY BECAUSE WE ARE SHARING PUBLIC SPACE WITH MORE AND MORE PEOPLE IN AMSTERDAM, IT MUST BE GREEN AND HEALTHY... ENTREPRENEURSHIP, TECHNOLOGY, AND CREATIVITY MAKE IT ACCESSIBLE; PARTICIPATION AND CUSTOMISATION MAKE IT FEASIBLE; SOLIDARITY MAKES IT AFFORDABLE FOR EVERYONE.”**

**— AMSTERDAM COALITION AGREEMENT, MAY 2018**



# WHAT IS BEING DONE?



Amsterdam has pledged that 25% of its electricity will be sustainably generated by 2025, and aims to get off gas by 2050. That goal has become more urgent since the extraction of gas in Groningen began triggering constant earthquakes, leading the government to commit to closing the country's largest gas field. Even before that announcement, the Netherlands was set to become a net importer of gas by 2025, instead of a net exporter. The city's first step towards going gas-free is by building new homes without a gas connection installed.

To cut emissions, the city is moving to shift homes to district heating, where heat is created at a central facility and supplied by a pipeline. That saves energy thanks to efficiencies of scale, because fuel is only burned at a single generating point, rather than in each home

or apartment block. In 2014, 60,000 homes had district heating. By 2020, 102,000 homes in Amsterdam are expected to have been switched over, and the goal is to connect as many as 230,000 homes, or 40% of residences, by 2040.

AEB, a company fully owned by Amsterdam's local government, converts some of the city's waste to energy by incinerating it, currently fulfilling the heating and hot water needs of 12,000 households, and generating enough electricity for 300,000 households. Although AEB has developed the most efficient way of generating energy from waste, some critics say that waste-to-energy schemes quite literally wastes resources: incineration means they can no longer be used, whereas recycling can retrieve valuable materials and use them over and over again.

# GET INSPIRED



**LEARN FROM SOME INSPIRING LOCAL AND GLOBAL INNOVATORS WHO HAVE USED THE POWER OF DESIGN AND CREATIVITY TO HARNESS THE POTENTIAL OF PUBLIC SPACE IN GENERATING AND CONSERVING ENERGY...**

## **ENERGY GENERATION/SAVING IN PUBLIC SPACE**

- Dreamtime is a colourful field of energy-generating flags for Melbourne.
- Solar graffiti project makes a rundown park accessible after dark.
- French company New Wind has created the Tree Vent, a collection of micro wind turbines that look like a tree.
- Tom van Heeswijk envisages a future full of spaces roofed with solar panels.
- Solaroad design bike lanes that produce solar energy.
- De Ceutel, a renovated shipping yard in Amsterdam Noord which experiments and innovates with circular systems to decontaminate the land and become 100% self-sufficient in energy.
- Stadshaard Enschede: A power plant (named 'city hearth') renovated with a traditional Delft tile pattern. It doesn't run off clean energy, but demonstrates how urban energy infrastructure can be beautiful.
- Almere heat transfer station: An attention-grabbing design for a building that transfer residual heat from industry to houses for heating and warm water.
- Buurtbatterij: A 'neighbourhood battery' to store solar power generated by local residents.
- Holy Warming: Server underneath a church for heating.



PHOTO: SOLARROAD



PHOTO: MARJAN VAN AUBEL, POWERPLANT, 2018

## ALTERNATIVES TO FAMILIAR FORMS OF RENEWABLE ENERGY

- Kris De Decker and Melle Smets created the Human Power Plant concept for Utrecht University, powering a campus solely with human energy (from the gym to climbing the stairs).
- Pavegen Systems is a technology company that has developed paving slabs to convert energy from people's footsteps into small amounts of electrical power.

## RETROFITTING BUILDINGS

- Groene Grachten is an initiative that helps owners of old and historic buildings in Amsterdam save energy and generate energy (Dutch).
- WarmBouwen is a company that offers a way to retrofit existing buildings and even monuments through a new way of heating and insulating that offers an alternative to gas, 'eco-friendly' boilers, internal insulation and inefficient electrical heating.
- Marjan van Aubel works to integrate solar technology into our everyday lives with Current Window and Current Table.
- Stint, an electric vehicle that was originally designed to pick up children from school and reduce the number of cars on the streets, is now branching out into other areas, such as urban logistics and public works.
- Two cultural institutes in Amsterdam: Hortus Botanicus (botanic garden) and Museum Hermitage share access heating through 420 meters underground tubes (Dutch).



# KEEP IN MIND



## MAKE IT FAIR

Amsterdam may look like a wealthy city, and compared to the other four cities in this challenge, average income and quality of life is high. But averages only tell half the story: there are many people in Amsterdam who live in poverty, and many who are far from wealthy. Anyone whose energy bill is more than 6% of their income, or who cuts their energy consumption below what is necessary for a decent life, is considered to live in energy poverty. An estimated 1 million people in the Netherlands live in energy poverty.

At the moment, making your home carbon neutral and using cleaner energy is more expensive than using 'conventional' energy and fuel, at least in the short-term. Many can't afford the initial investment. The concern is that the energy transition will only benefit a lucky few, rather than everyone.

What's more, achieving energy justice is not only about ensuring everyone has sufficient supply of energy: it's also about fairly distributing the burdens and costs. Fossil fuel infrastructure has always been placed near poorer members of society (or in poorer nations), inflicting pollution and the consequences of ecosystem damage on them.

Clean energy infrastructure by nature is not pollutive or destructive. However, it is perceived as ugly at the moment. We need to make sure that it's both aesthetically pleasing and fairly distributed in public space, so that some people don't feel that they've been unfairly burdened with it while others are 'free' from it.

**“In the energy transition, we’re running the risk of increasing the discrepancy between the haves and have-nots, making inequality worse instead of fixing it. Of course there’s a huge overuse of energy in the city. But there’s a big discrepancy between how much people use. Relative poverty is a real thing.”**

– Chandar van der Zander, project manager and consultant at Metabolic

# KEEP IN MIND

## THINK LOCAL

Compared to other cities in the challenge, Amsterdam's local government is reasonably powerful. It has also set many ambitious targets for sustainability and clean energy, as shown here. But it also needs help to achieve its own objectives. Big goals, such as being gas-free by 2040, have no concrete roadmap yet. Reaching them will take ingenuity, cooperation, new habits and new ways of thinking. Of course, these are all skills in which designers excel!

There are also many active partners in Amsterdam working to accelerate the energy transition. These are:

- Metropole Region Amsterdam (challenge partner)
- Gemeente Amsterdam (challenge partner)
- Amsterdam University of Amsterdam (challenge partner)

The University of Amsterdam aims to realise an energy neutral University Quarter in Amsterdam's historic city centre by 2024. The University challenges participants to take them up on this challenge and help them to achieve this.

- ABN AMRO (challenge partner)
- Alliander (energy grid company of the Amsterdam region)
- Nuon, Eneco, Essent – the largest energy companies of Amsterdam
- Amsterdamse Federatie van Woningcorporaties  
(federation of Amsterdam housing corporations)

**“Historic city centers are a big challenge for the energy transition, but also offer unique opportunities. Very different needs and values have to be weighed intelligently, related to living, working, transportation, recreation, culture, and, last but not least, sustainability. This requires optimum use of the many, sometimes surprising options offered by technology and creative design.”**

– Wim Sinke, Professor Solar Energy, University of Amsterdam



# DIVE DEEPER



## ● **POWERING PLACES**

An essay by Elizabeth Monoian and Robert Ferry, co-founders of the Land Art Generator Initiative, which aims to accelerate the transition to post-carbon economics by providing models of renewable energy infrastructure that add value to public space.

## ● **AMSTERDAM'S SUSTAINABILITY AGENDA**

The local government's official plan. Although it will be updated by the new coalition, also take a look at Amsterdam's 2040 Energy Strategy, produced in 2010.

## ● **SUSTAINABLE AMSTERDAM: AN AMBITIOUS AGENDA**

A Huffington Post series on Amsterdam's energy issues and initiatives.

## ● **INTERACTIVE MAPS CREATED BY THE CITY OF AMSTERDAM.**

Visualisations of the city's energy usage and the location of wind turbines and solar panels.

## ● **HTTPS://02025.NL/** (in Dutch)

A platform for a movement to make Amsterdam a leader in the energy transition.

## ● **KLIMAATAKKORD**

The national government's proposal for the outline of the national climate accord (in Dutch).

## ● **A SPATIAL EXPLORATION OF THE ENERGY TRANSITION** (In Dutch).

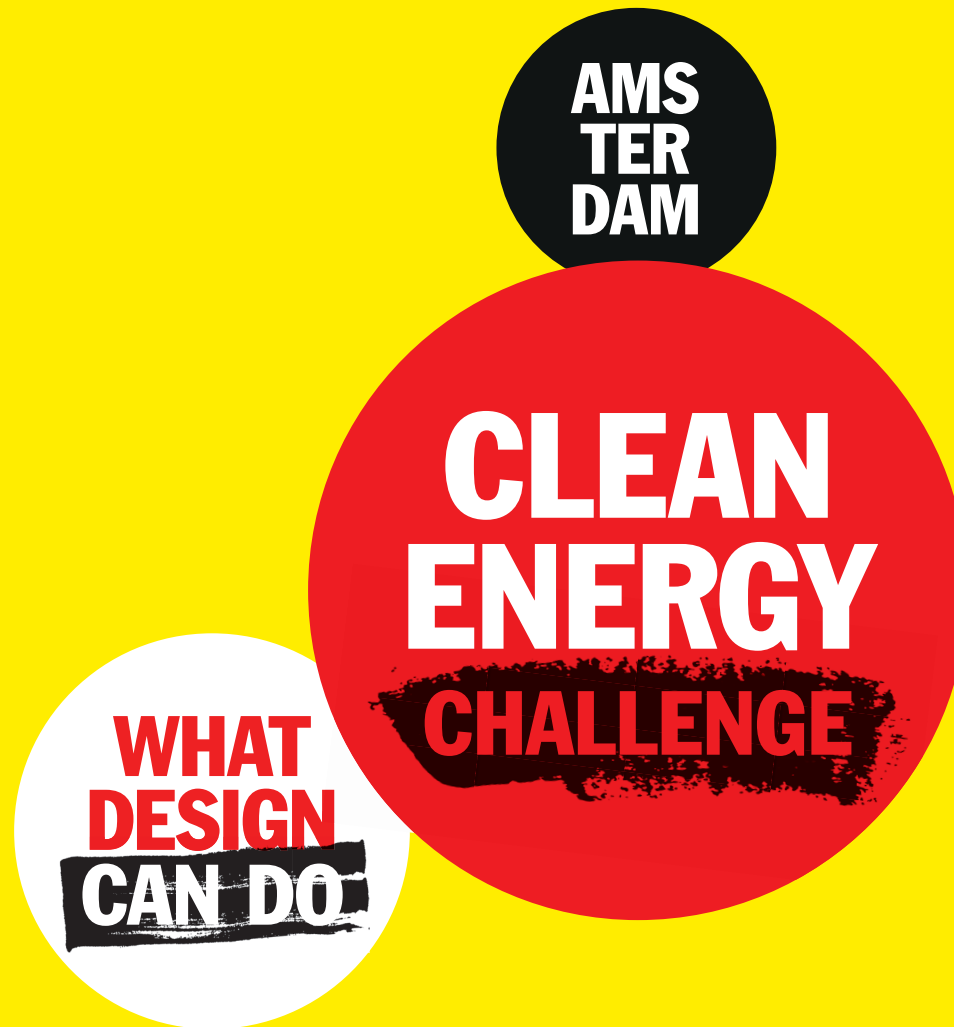
A report by the Ministry of Infrastructure and the Environment and Province of North Holland in collaboration with Province of Flevoland and Amsterdam Metropolitan Area (MRA)

## ● **BENG DEMANDS**

In 2020 all new buildings in the Netherlands have to comply to BENG demands, which means they have to be almost energy neutral.

**JOIN THE #CLEANENERGYCHALLENGE**  
**WHATDESIGNCANDO.COM/CHALLENGE**

**DEADLINE FOR SUBMISSIONS:**  
**15 NOVEMBER 2018**



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