

ENERGY SHAPES THE CITY

HOW DO WE DESIGN CLIMATE NEUTRAL CITIES?

INTRO

SAVING

CONNECTING

RENEWING

INFO

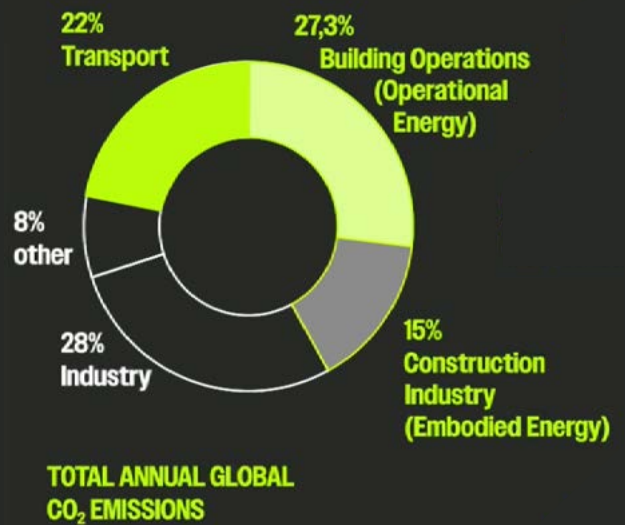
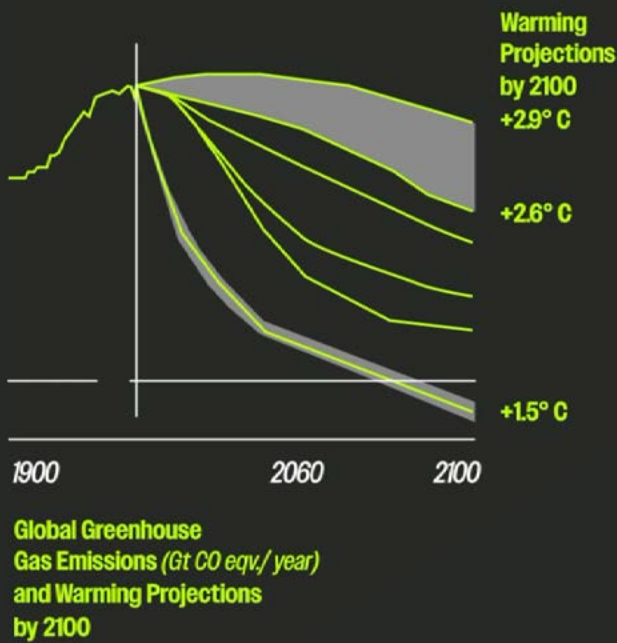
SEE THE VIDEO

ENERGY / CO₂ / CITIES



WE ARE FACING GLOBAL CHALLENGES

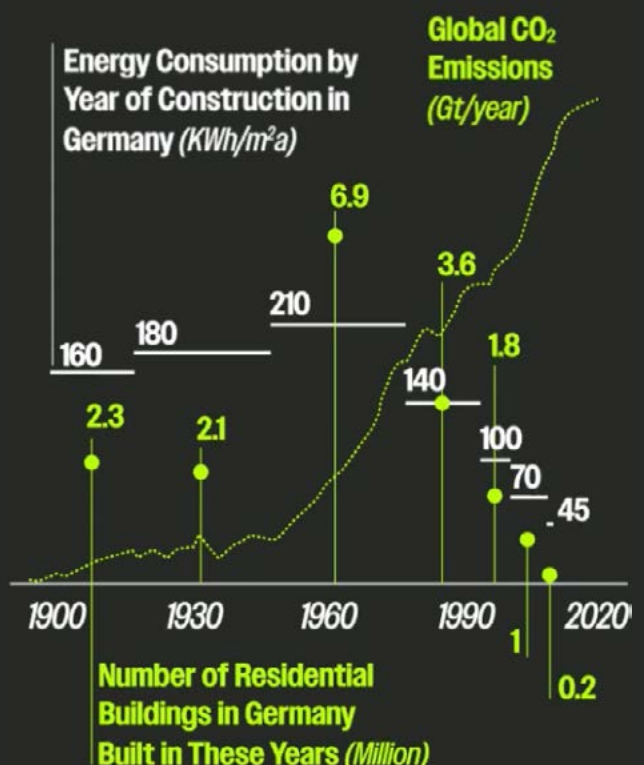
The consequences of the climate crisis are becoming increasingly severe. In order to contain the consequences and meet the 1.5°C target, we must act quickly now and reduce global CO₂ emissions. Energy plays a key role in this. In Germany, for example, 84% of CO₂ emissions are energy-related.



Energy determines where and how we live and do business. The focus on fossil fuels has shaped the form of our cities so decisively that today there are structural dependencies and we also require a lot of energy: cities consume 75% of global primary energy - especially in the areas of construction and mobility.

Our cities and regions are built in such a way that they consume a lot of energy: Car-oriented and with buildings that were largely built without energy standards.

HOW CAN WE DESIGN THE CLIMATE-NEUTRAL CITY UNDER THESE FRAMEWORK CONDITIONS?

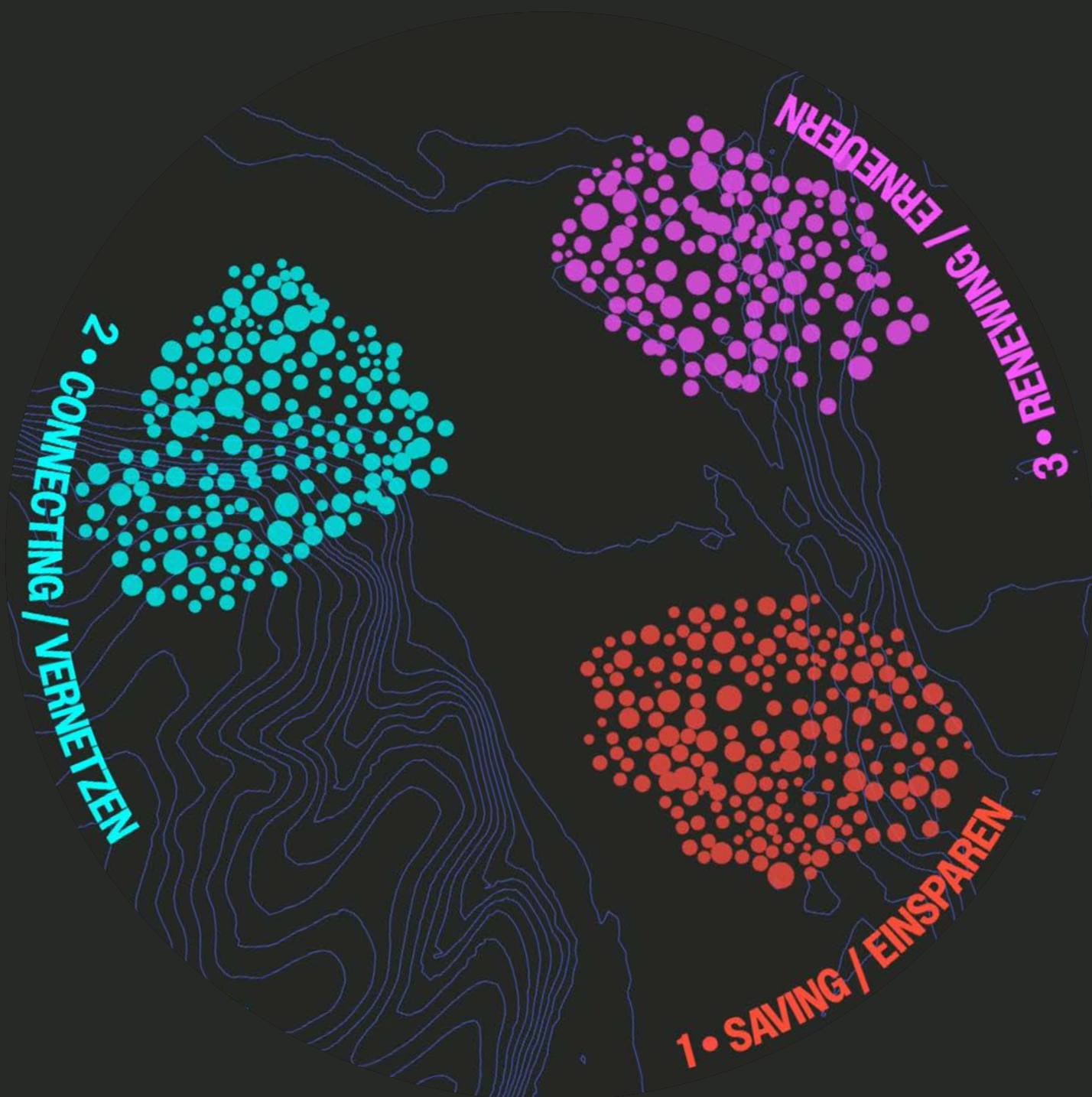


3 STEPS TO THE GOAL



WE NEED A HOLISTIC APPROACH

Cities are complex and energy can be found in all areas of life. Making coffee and taking a hot shower in the morning. So that the train runs and the computer runs. Also in all the materials we use - because energy was used to process them and bring them here. This is why we need to think holistically about the many areas of life. The three steps on the way to a climate-neutral and energy-efficient city are: save, connect, renew.

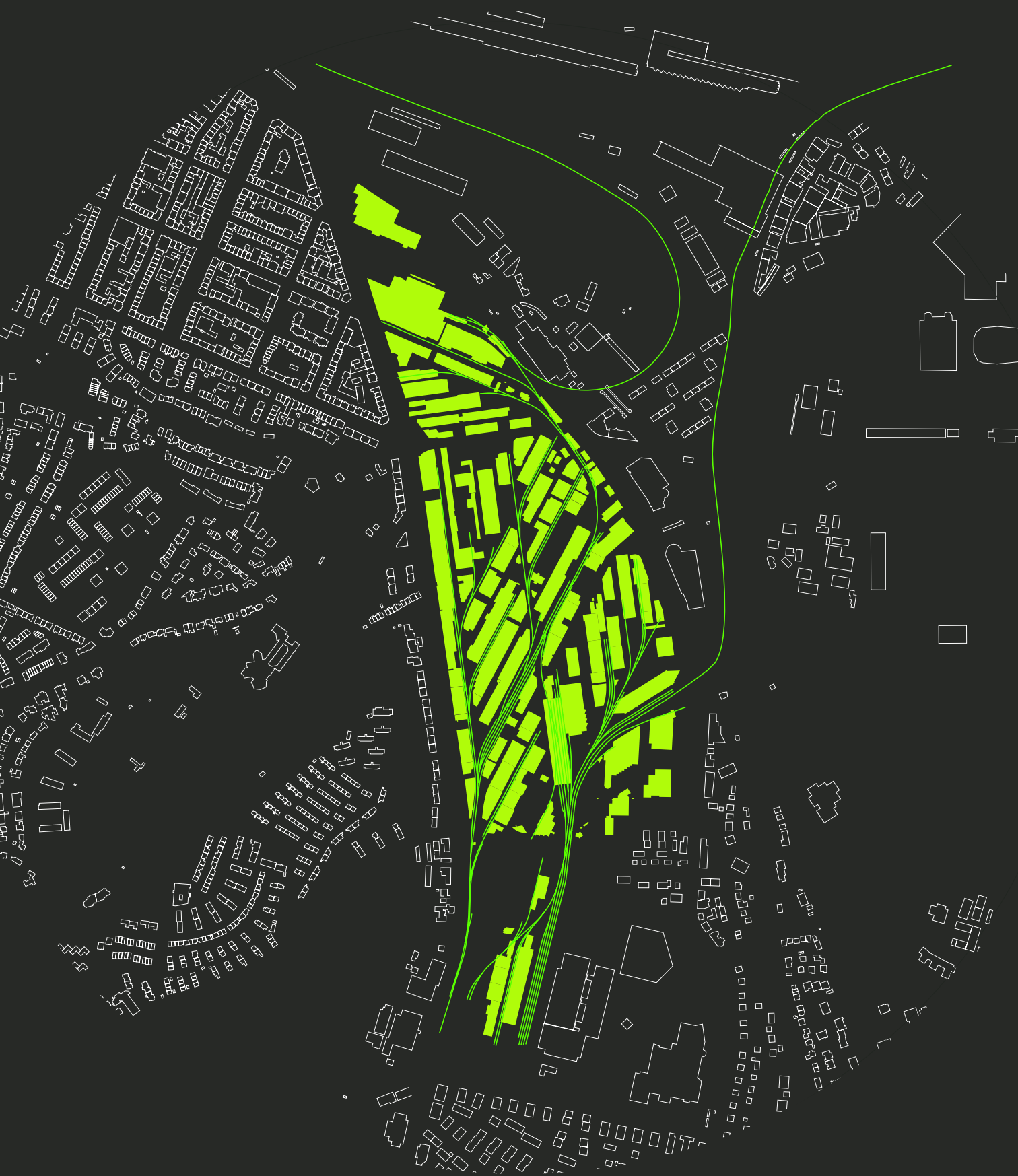


CASE STUDY DREISPITZ



HOW DOES THIS PLAY OUT IN REALITY?

The Dreispitz district project in Basel shows what this means in practice. The district is located 15 minutes by train from Basel city center. It developed in the 20th century as a commercial area. The Christoph Merian Foundation is the owner of the area and wants to develop the district in a sustainable way. It is to become a mixed urban neighborhood where people work, live and learn.

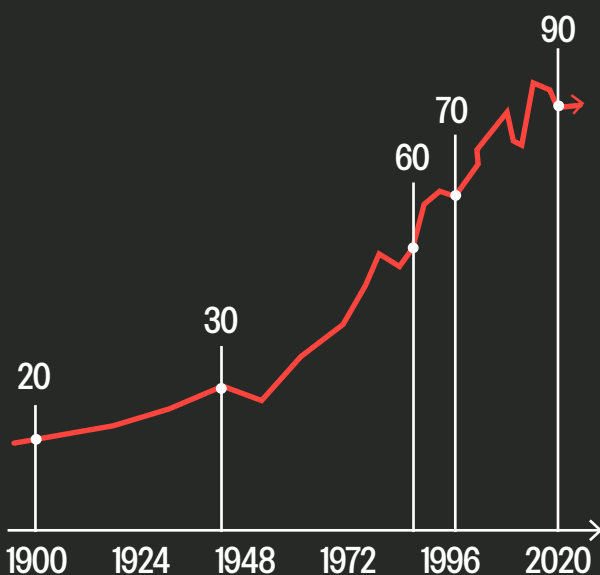


DENSIFICATION

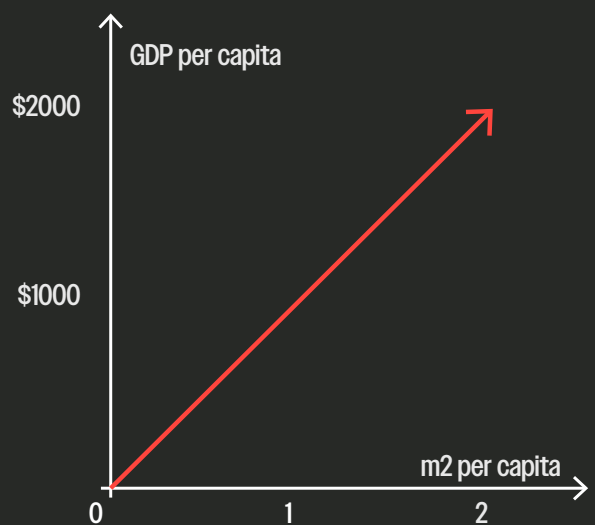


STEP 1 – SAVING

The more space we consume, the more energy we need to heat rooms, lay infrastructure or produce materials for buildings. The global trend is currently towards more and more living space per person - also due to increasing wealth. We need to reverse this trend, move closer together and make do with less space. So sharing saves space and energy! In urban development, this also means densification: We are not building on green fields, but on existing structures.

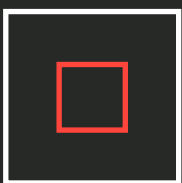


LIVING SPACE PER PERSON BY YEAR IN THE USA



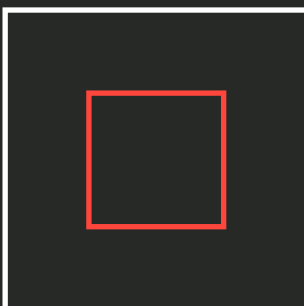
THERE IS A DIRECT LINEAR RELATIONSHIP BETWEEN PER CAPITA INCOME AND PER CAPITA LIVING SPACE

LESS-WEALTHY COUNTRIES



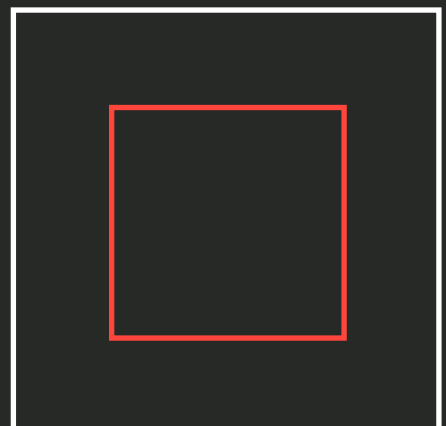
20-40 m² / 3-3.5 inhab.
ca. 5-10 m²

GLOBAL AVERAGE



70 m² / 3-3.5 inhab.
ca. 20 m²

WEALTHY COUNTRIES



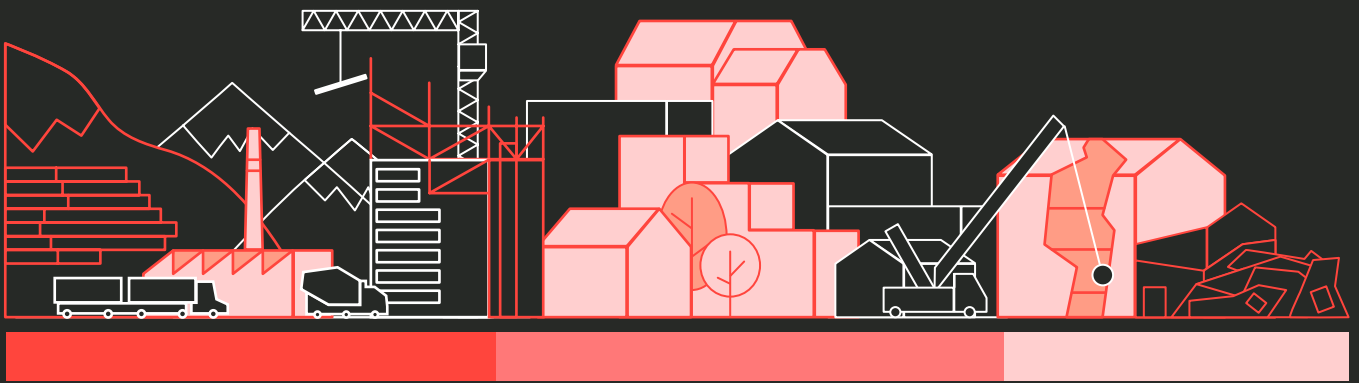
130-200 m² / 2-2.5 inhab.
ca. 60-80 m² per person

USE THE EXISTING



STEP 1 – SAVING

The production of building materials requires a lot of embodied energy: in the manufacture, use and disposal of components. Especially when we build new buildings. However, if we use existing buildings and use renewable raw materials, we can save a lot of embodied energy and even store CO₂!



PRODUCTION

MAINTANANCE

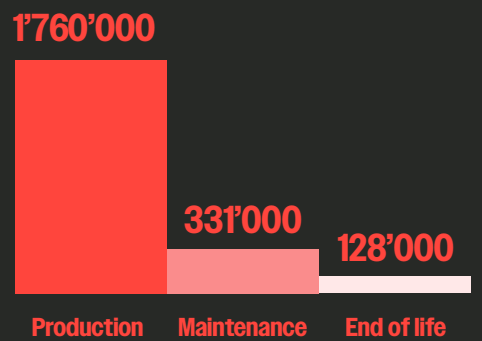
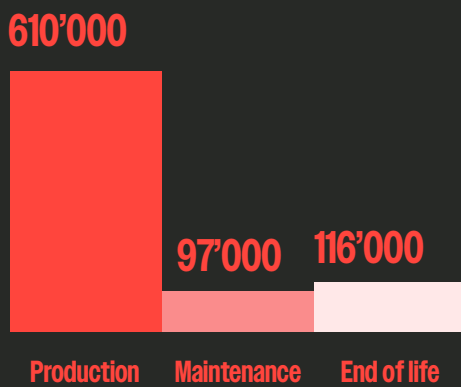
END OF LIFE

Greenhouse Gas Emission
GWP t CO₂eqv.

Embodied Energy
MWh

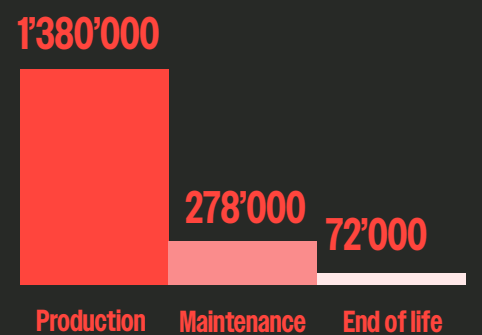
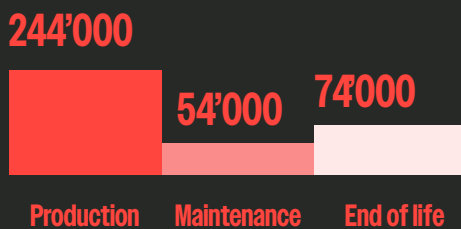
SZENARIO 1 NEW BUILD

Demolition and new construction with conventional materials



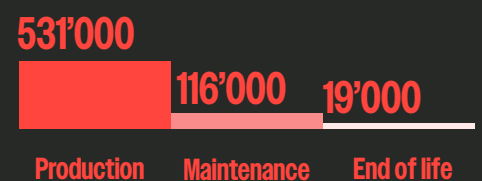
SZENARIO 2 RENOVATION

Refurbishment of existing buildings, densification with conventional materials



SZENARIO 3 ECO-RENOVATION

Refurbishment of existing buildings, densification with renewable materials

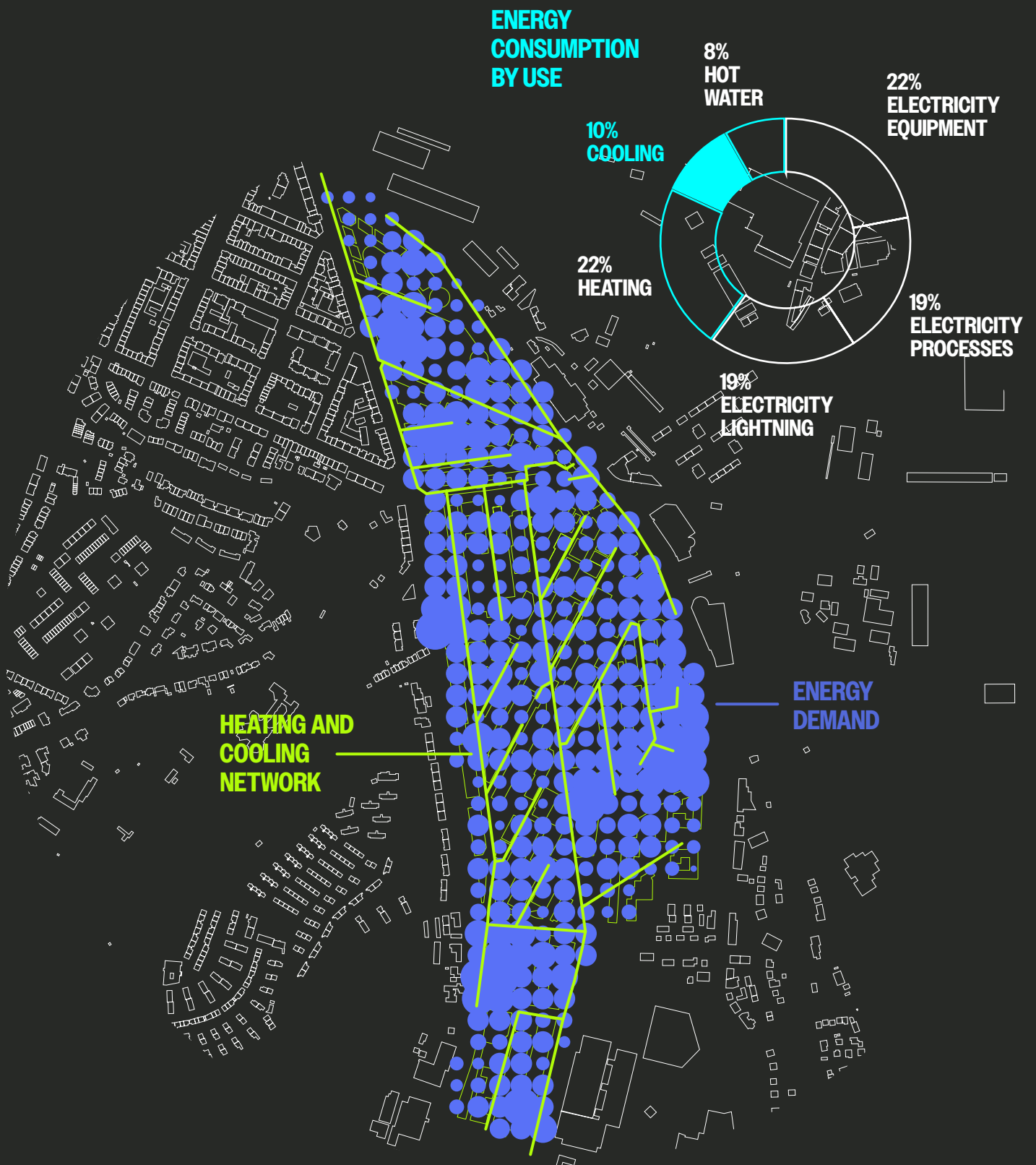


ENERGY NETWORKS



STEP 2 – CONNECTING

Buildings require different types of operating energy, such as electricity for lighting and electrical appliances. Thermal energy for heating, hot water and for cooling. Energy requirements vary depending on use and the time of year and day. Energy can be used most efficiently if the various users are interlinked. While heating is required in households, waste heat is generated in laboratories, which can be used.

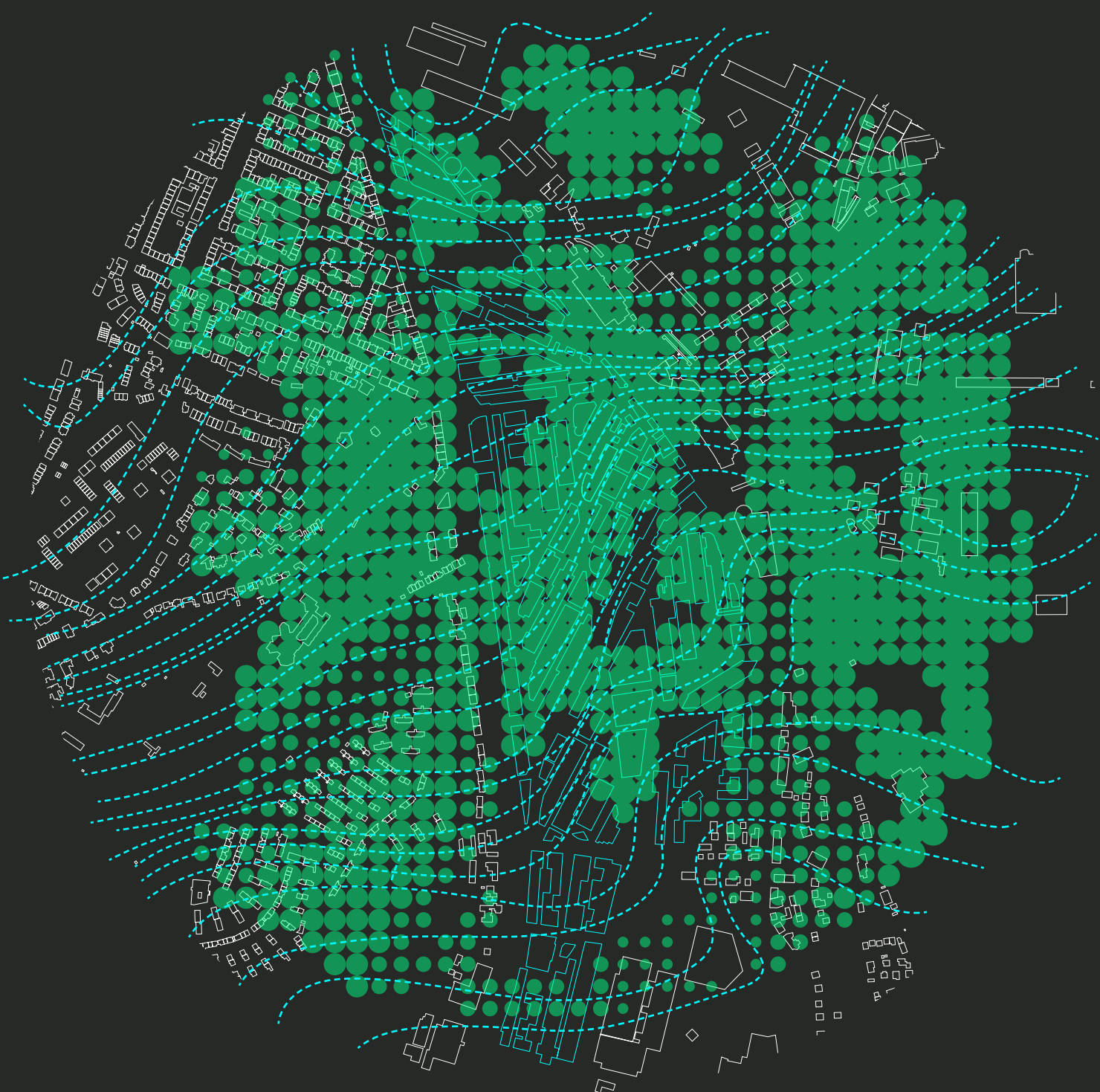


OPEN SPACES



STEP 2 – CONNECTING

As the summers get hotter and hotter, cooling is increasingly necessary. An abundance of greenery in the city can reduce the perceived temperature on hot summer days by up to 10°C. A network of green spaces and wind permeability are important for pleasant public spaces, biodiversity and the reduction of cooling energy requirements.

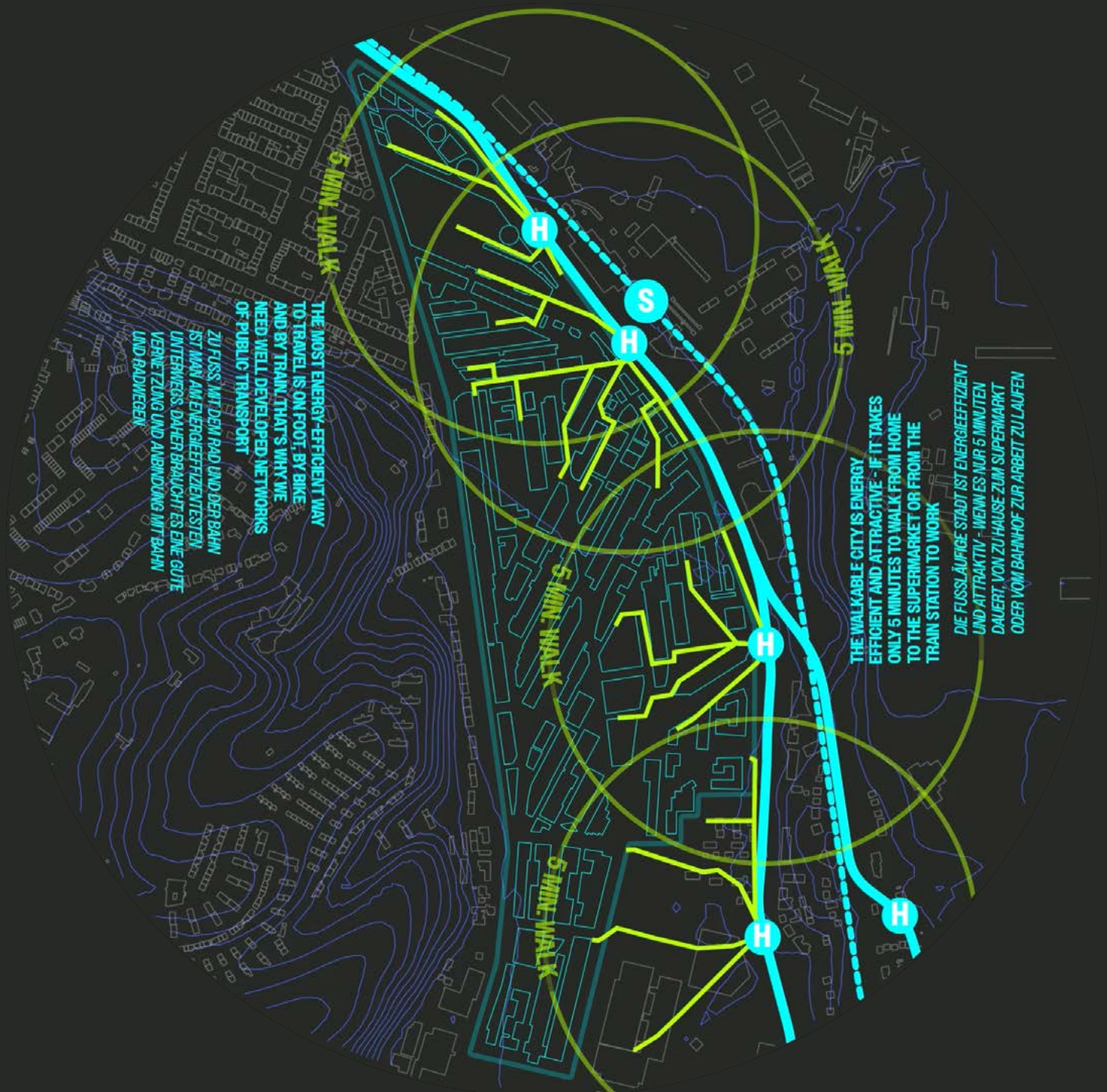


SHORT DISTANCES



STEP 2 – CONNECTING

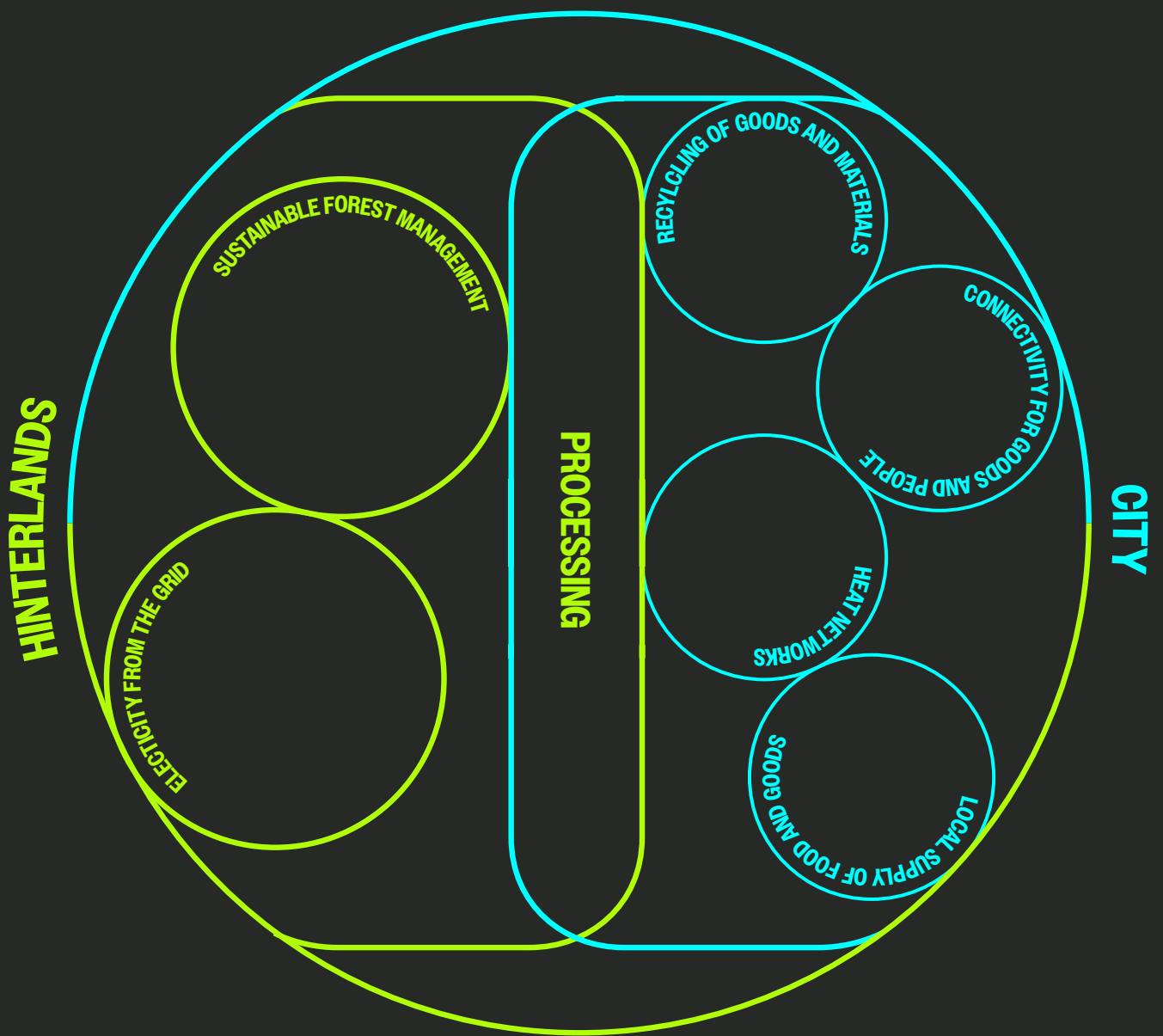
The most energy-efficient way to travel is on foot, by bike and by train. That's why good networking and connections with rail and cycle paths are needed. Low energy consumption for mobility can be very attractive if it only takes five minutes to walk from home or the train station to the workplace, place of learning or supermarket.



CONNECTING TO HINTERLAND

STEP 2 – CONNECTING

Networking also needs to be considered beyond the district - because it is not possible to generate enough climate-neutral electricity or grow enough natural resources in the district alone. And, of course, we would also like to travel.



RENEWABLE CITY



STEP 3 – RENEW

If we save where we can and make optimum use of energy and resources, we will still always need energy and materials. These must be produced renewably and thought of in cycles.

All surfaces of the built city can become electricity generators through photovoltaics. By using geothermal energy, heating and cooling can be generated in a climate-neutral way all year round. As many buildings as possible should be preserved in the Dreispitz. Where necessary, renewable raw materials must be used.

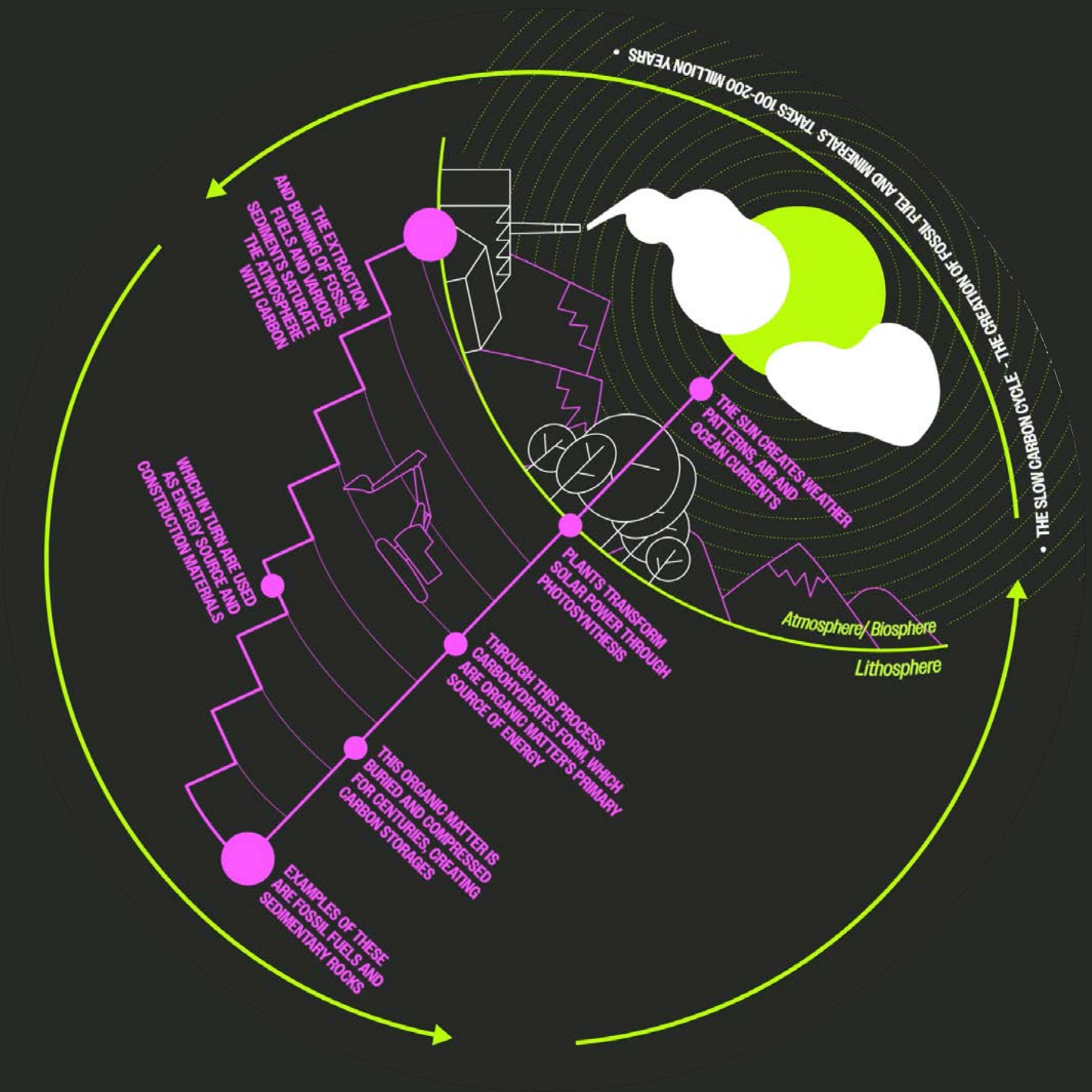


LESS FOSSIL



STEP 3 – RENEW

Our energy comes from the sun and the earth. Fossil energy was created over millions of years from organic matter, once converted from solar energy through photosynthesis. Using fossil energy releases carbon dioxide, causing the climate crisis.

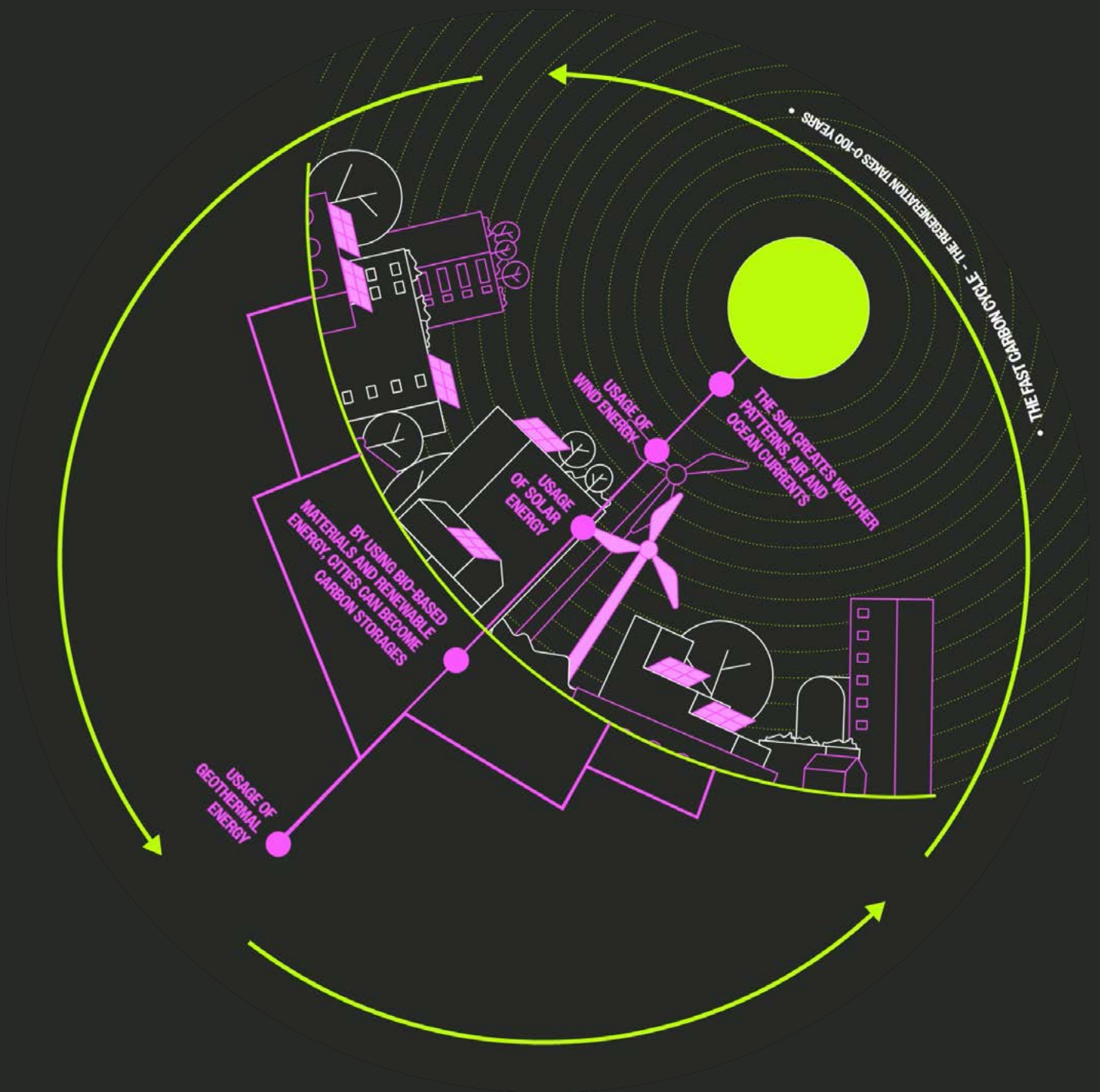


MORE RENEWABLE



STEP 3 – RENEW

We therefore need to think in small cycles: In the city, we can use solar energy directly with solar panels. With geothermal energy, we make use of geothermal energy. In combination with renewable raw materials, the climate-friendly transformation of the city can succeed.



INFO



TEAM & EXHIBITION

A project by

BAUHAUS EARTH

TRANSSOLAR

URBAN CATALYST

Exhibition

Transform! Design and the Future of Energy

23.03.2024 – 01.09.2024

VITRA DESIGN MUSEUM

Concept und Content **Johanna Amtmann, Eva-Maria Friedel, Rosa Hanhausen, Philipp Misselwitz, Luca Mule, Yuliya Navatskaya, Matthias Schuler, Christine von Raven, Christoph Walther**

Design & Animation **Luca Mule**

Modell Exhibition **cncberlin.de**