4DHフォーラム国際シンポジウム

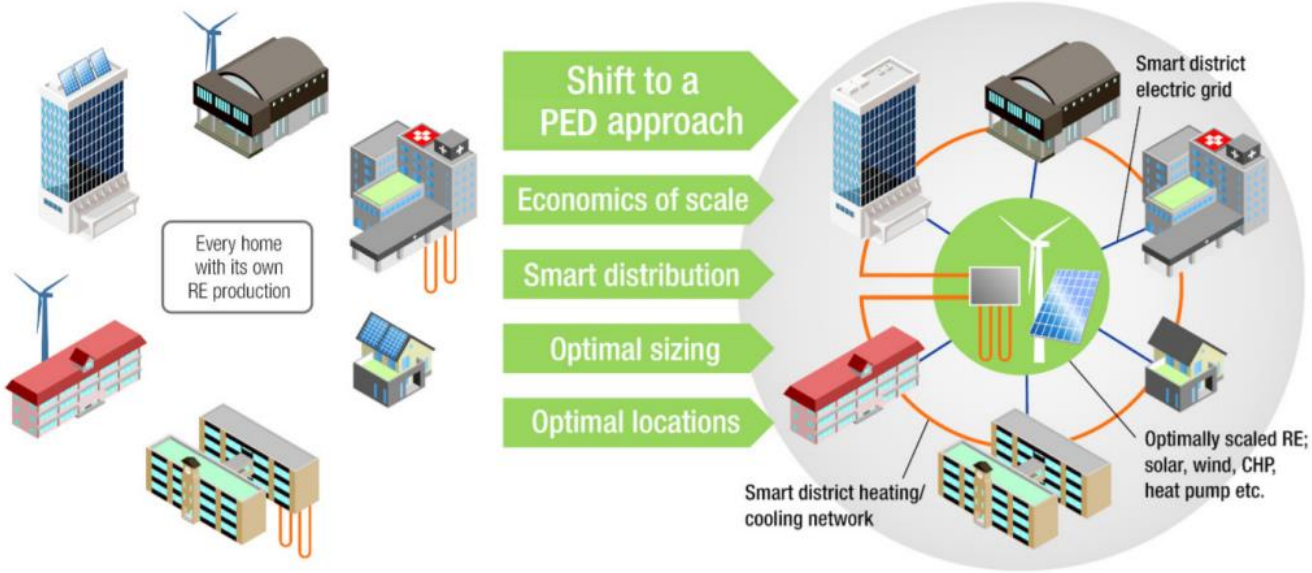
報告3

PED “Positive Energy Districts”への取組み

東京都市大学　加用 現空

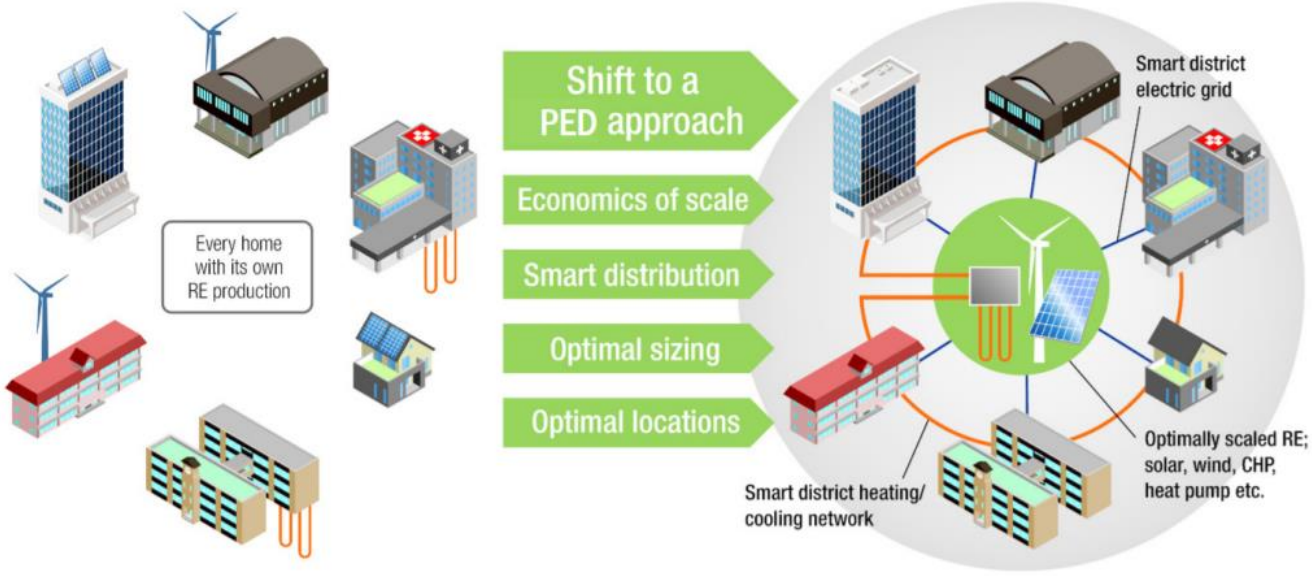
2023.10.20

都市部の街区が対象



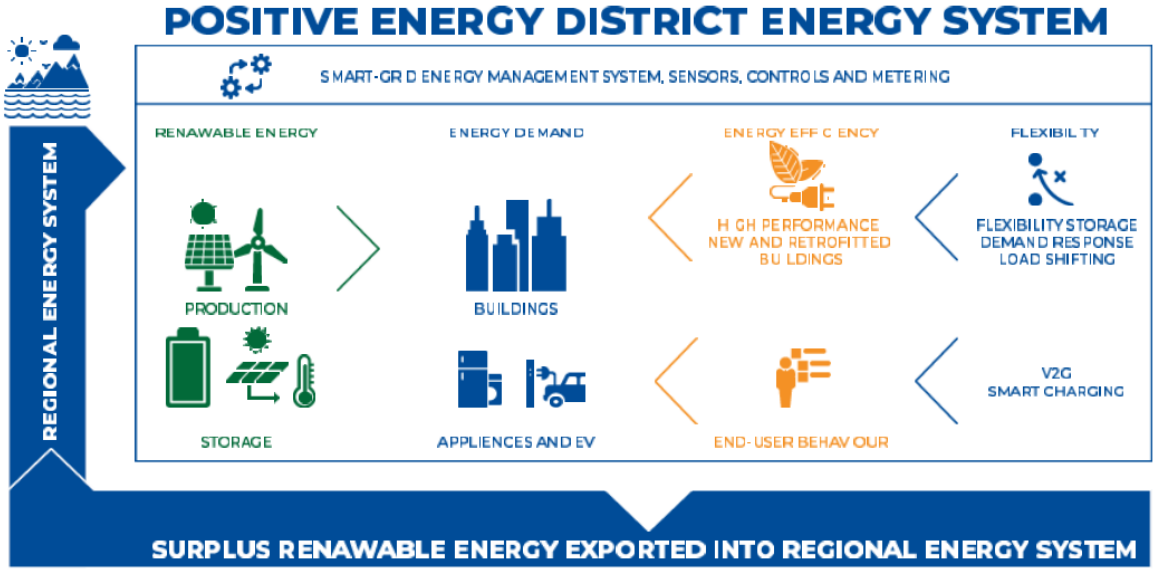
All types of buildings present in the urban environment, and they are not isolated from the energy grid.

エネルギー効率の改善



- **Cascading local energy flows by making use of any surpluses**
- **Using low-carbon energy production to cover the remaining energy use.**

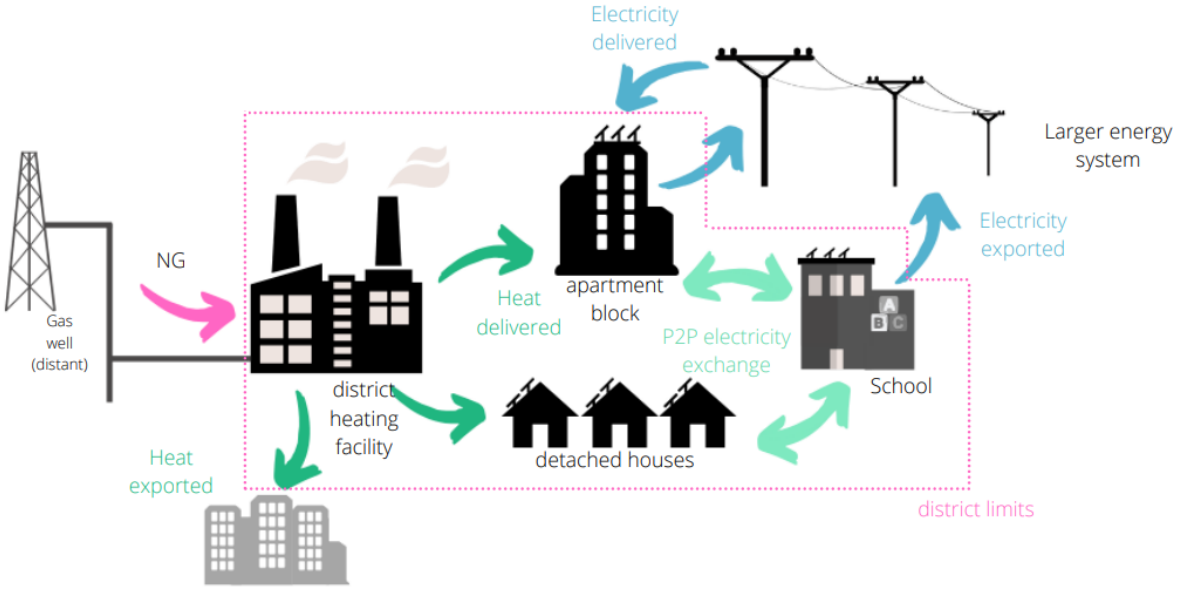
使用する以上のエネルギー生産能力



Positive Energy District solution booklet, EU Smart Cities Information System, November 2020

Create an area within the city boundaries, capable of generating more energy than consumed.

電力ネットワークへの応答性



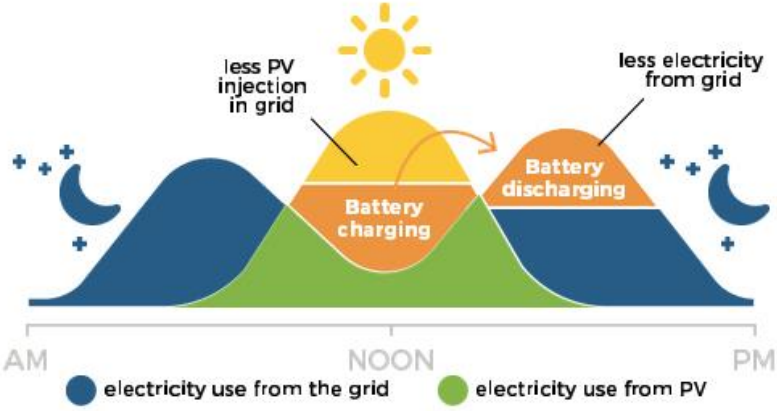
Positive Energy District solution booklet, EU Smart Cities Information System, November 2020

Agile/flexible enough to respond to the variation of the energy market because a PED should not only aim to achieving an annual surplus of net energy.

ネットワークへの影響最小化

It should also support minimizing the impact on the connected centralized energy networks by offering options for increasing

- 負荷マネジメント　Onsite load-matching
- 自己消費　Self-consumption
- 蓄電蓄熱技術　Short- and long-term storages
- コントロール　Energy flexibility with smart control



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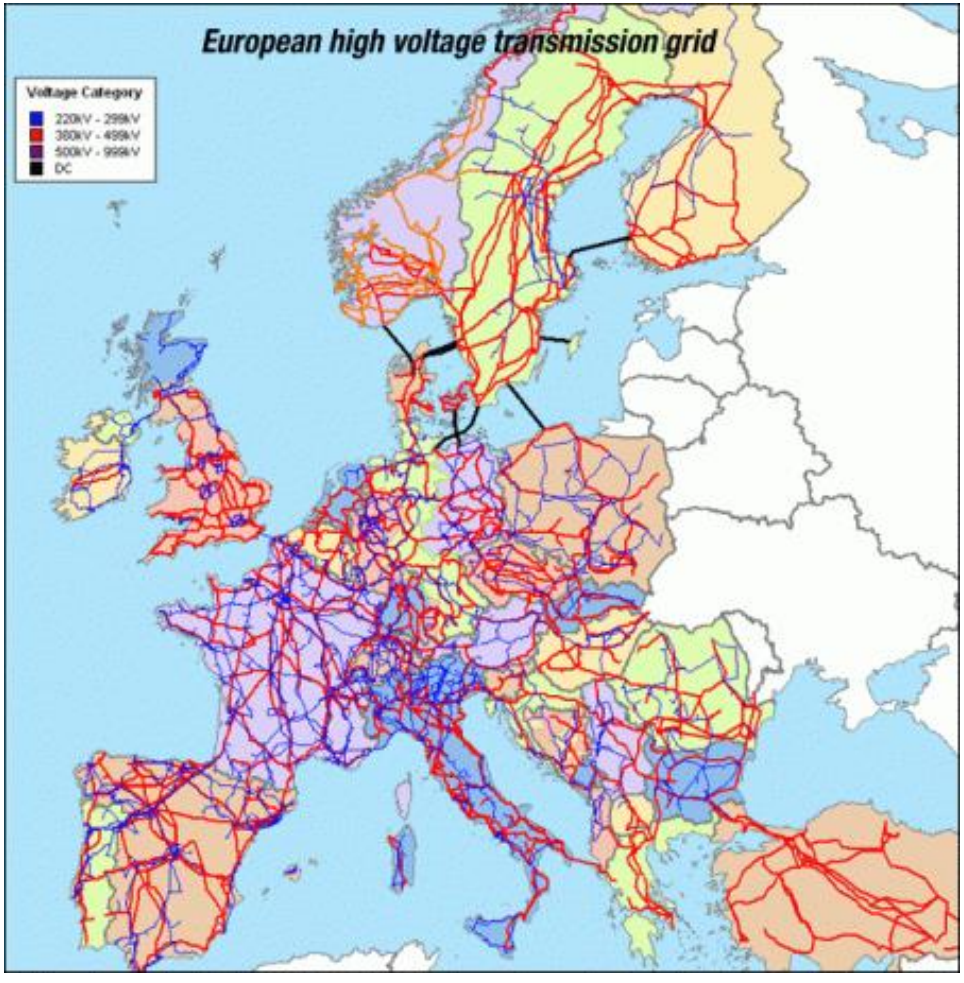
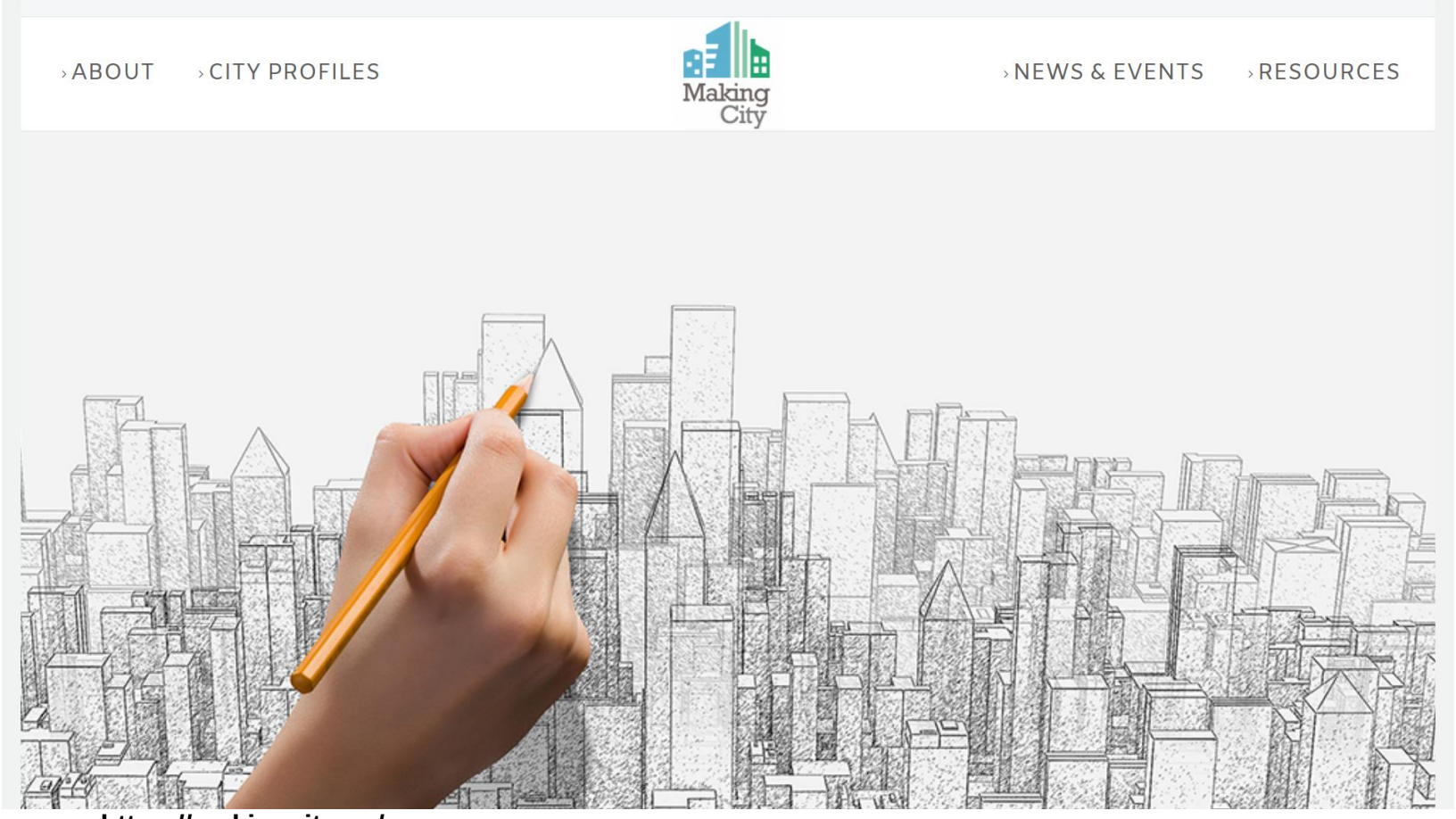


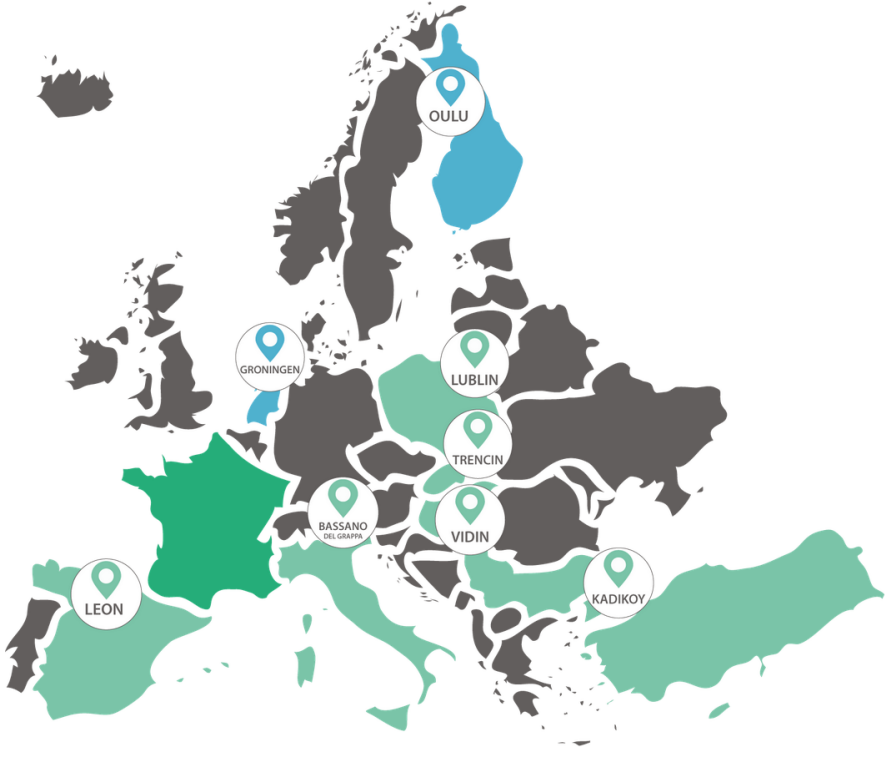
https://energyanalyst.co.uk/introduction-valuing-interconnectors/

MAKING-CITY, Horizon 2020 project



https://makingcity.eu/

MAKING-CITY, Horizon 2020 project



2

LIGHTHOUSE CITIES

6

FOLLOWER CITIES

https://makingcity.eu/

PED Implementation – Groningen

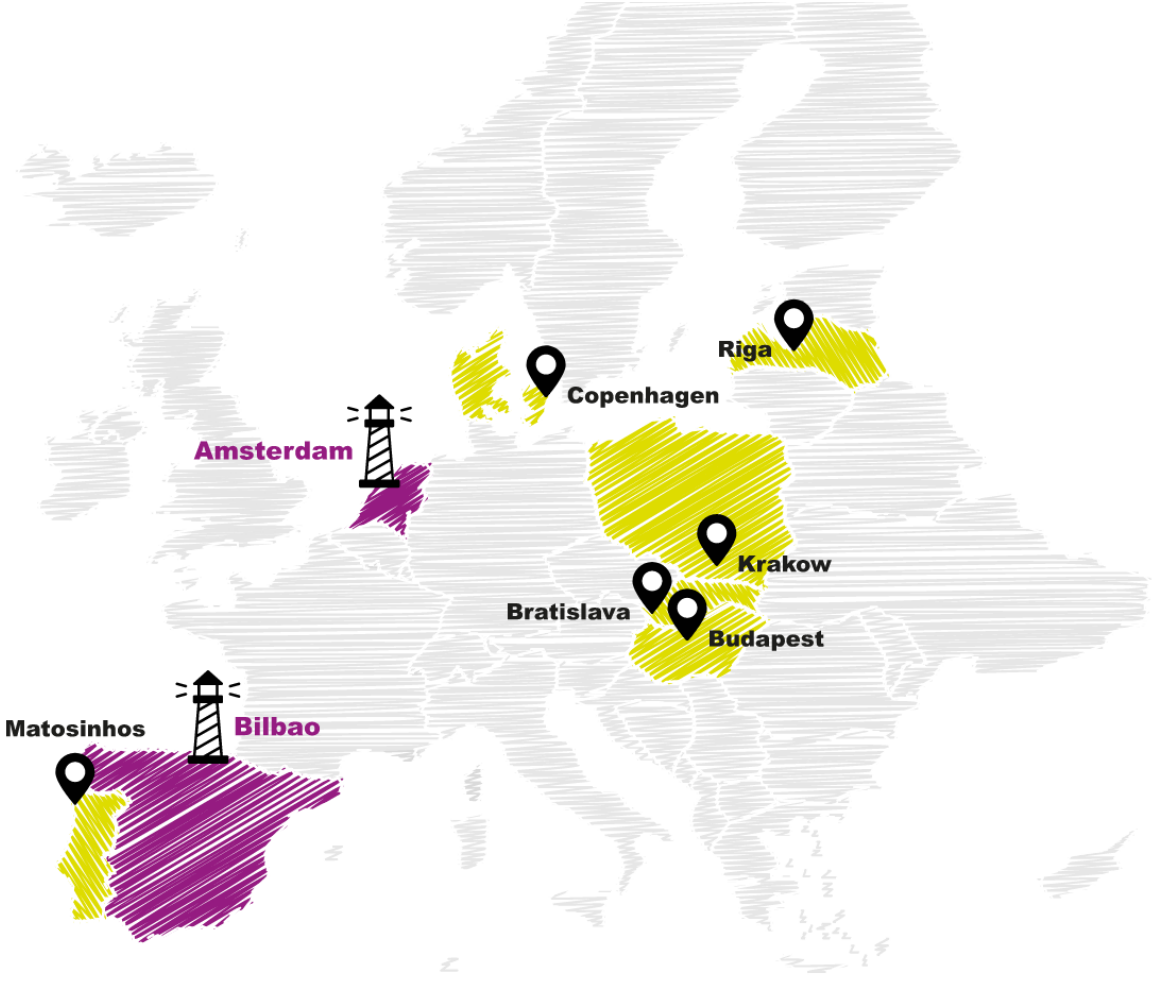
Retrofitting of residential buildings in order to maximise infrastructure performance.

Solar panels on the roofs of some buildings and car parks.

Solar thermal panels with geothermal heat pumps

AmsTErdam BiLbao cItizen drivEn smaRt cities

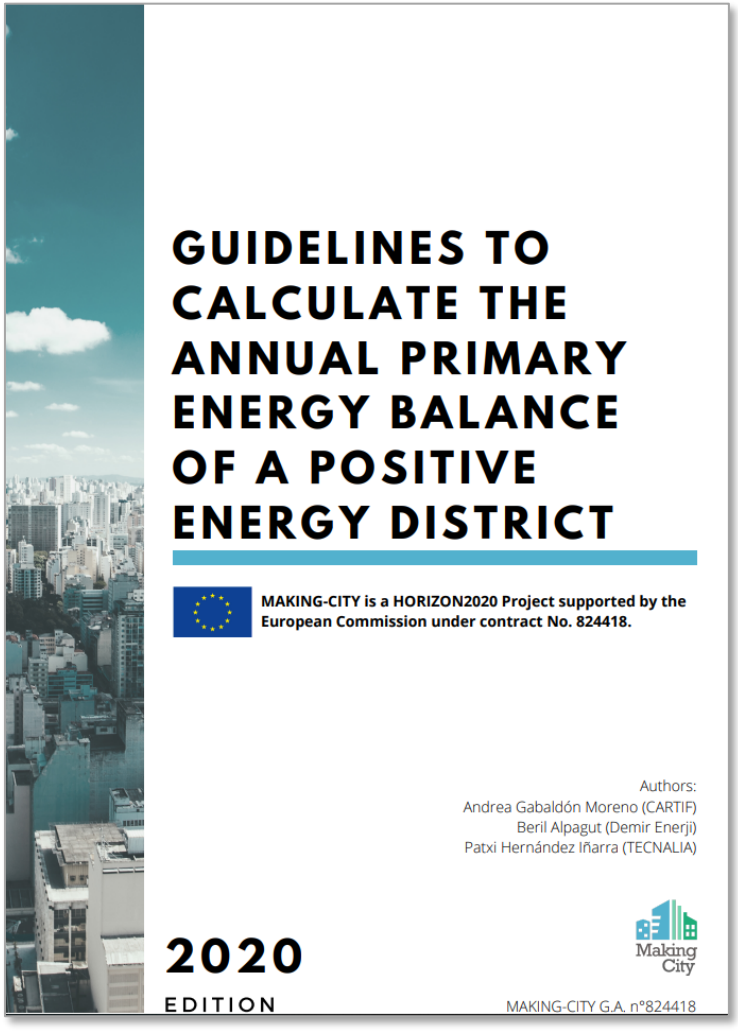
ATELIER is an EU-funded Smart City project aiming to create and replicate Positive Energy Districts (PEDs) within two Lighthouse Cities and six Fellow Cities.


Riga
Copenhagen
Amsterdam
Krakow
Bratislava
Budapest
Matosinhos
Bilbao

PED Implementation – Bilbao

5,500 new homes, 150,000 m^2 of office spaces, citizen spaces (154,000 m^2) and social and cultural facilities (93,500 m^2)

- Accessible by zero-emissions vehicles.
- Three areas connected via a geo-exchange loop.
- Geothermal and hydrothermal renewable energy



METHODOLOGY

To calculate your primary energy balance (in terms of non-renewable primary energy) you can follow this eight-step methodology:

Making City

1

DEFINE YOUR PED BOUNDARY

The boundary is defined by the spatial and administrative relationship between the final energy consumption and the energy generation units (inside the buildings or beyond the boundaries, e.g. the grid). Depending on the relationship, your PED can have virtual, geographical or functional boundaries.

2

CALCULATE YOUR ENERGY NEEDS

Heating, cooling, domestic hot water and electric energy needs must be identified. The need could be determined by several approaches including monitoring, calculations based on bills, simulation, standards or statistical data.

3

CALCULATE YOUR ENERGY USE

The amount of energy used to cover the demand is established as thermal and electric energy use, i.e. the energy input needed to satisfy the needs. It can also be identified as the useful energy output of the thermal and electrical generation systems.

4

CALCULATE YOUR ON-SITE GENERATION

Once the energy systems used to cover the determined energy uses are identified, .alculate the useful output of these systems (i.e. the energy generation). Then, identify if there is any remaining energy needs to be covered by non-renewable energy systems or external grids.

5

ESTIME THE ENERGY DELIVERED

Both the output and input of each system are linked with a source of energy inside or outside the boundary for each energy carrier. A greater energy consumption over a renewable energy generation within the boundary indicates an import (in) from outside the boundary. A greater renewable energy generation within the boundary over energy import from outside the boundary indicates an export (out) to outside the boundary.

6

CALCULATE THE PRIMARY ENERGY

Weight your energy imports (delivered to the PED) and exports (delivered outside the PED) per energy carrier using primary energy factors, in order to calculate the primary energy exported and the primary energy imported. Primary energy factors could be taken from national or international standards.

7

CALCULATE THE ENERGY BALANCE

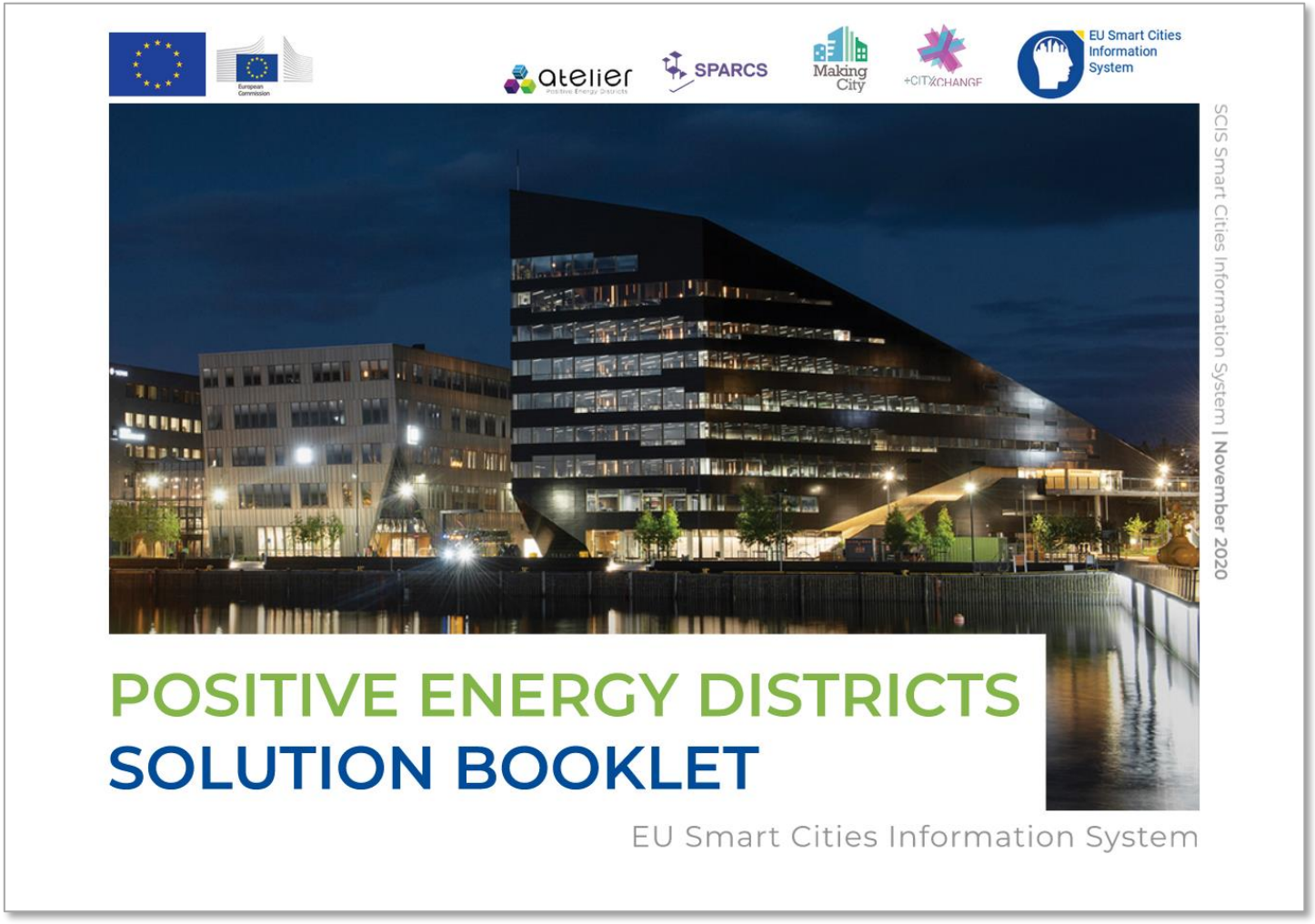
The primary energy balance is calculated as the difference between the primary energy imported to the PED boundaries minus the primary energy exported outside the PED's boundaries.

8

SANKEY DIAGRAM

Once all the steps are finalized, an energy flow diagram can be drawn (known as Sankey diagram), based on the energy flows identified in the previous steps (energy needs, energy uses, energy delivered and primary energy columns).

2020.https://makingcity.eu/wp-content/uploads/2021/01/MCGUIDE-6.pdf

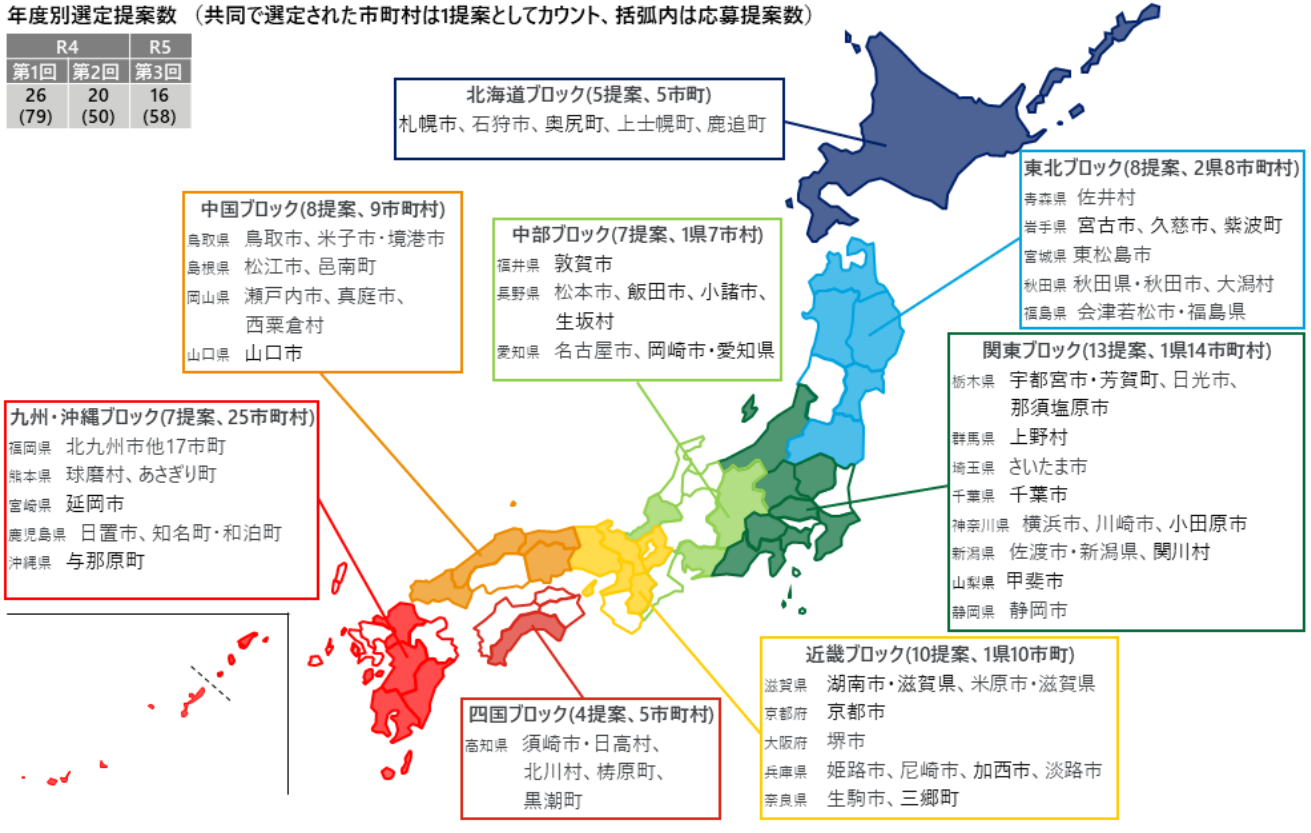


Positive Energy District solution booklet, EU Smart Cities Information System, November 2020

脱炭素先行街区

年度別選定提案数 （共同で選定された市町村は1提案としてカウント、括弧内は応募提案数）

R4		R5
第1回	第2回	第3回
26 (79)	20 (50)	16 (58)



https://policies.env.go.jp/policy/roadmap/preceding-region/

ありがとうございました