R-ACES
Energy Cooperation Platform

Assessment on the Antwerp Eco-Region

[an overview of the activities]

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Technical References

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[1] PU = Public
PP = Restricted to other programme participants (including the Commission Services)
RE = Restricted to a group specified by the consortium (including the Commission Services)
CO = Confidential, only for members of the consortium (including the Commission Services)

[2] R = Document, report
DEC = Websites, patent fillings, video, etc.
DEM = Demonstrator, pilot, prototype
OTHER = other

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Project Summary

The R-ACES project is an initiative promoted by 7 partners from 6 European countries, with the vision to support high-potential industry parks and clusters to become fully fledged ecoregions that reduce emissions by at least 10%. R-ACES means a step-change in the contribution of European Industry to the climate targets of the EU. The industry sector after all represents 25% of all energy demand – and 50% of the total cooling and heating demand on the continent; yet only 16% comes from renewables. By focusing on collective measures and clustering, the efficiency of industry can be drastically increased.

The focus of R-ACES therefore is to turn high-potential, high-impact industrial clusters into ecoregions that achieve at least a 10% reduction in emissions. They do so by exchanging surplus energy, making extensive use of renewables, and tying everything together with smart energy management systems. An ecoregion is a geographic area where energy and information exchanges occur between various companies and actors to reduce waste and energy consumption. Ecoregion can be centered on an (eco-)industrial park or (eco-) business park, linked to its surroundings by a 4th/5th generation district heating/cooling network.

R-ACES is the capping stone, condensing the knowledge and experience gathered throughout EU and national projects into a set of three focused tools, namely a self-assessment tool, a legal decision support tool, and a smart energy management platform for clusters. The tools are embedded in support actions built around peer-to-peer learning, more formal coursework and webinars, and serious games. Together they enable a cluster to really become an eco-region and set up meaningful energy collaboration. The entire package of tools and support is aimed at the high-potential clusters identified in the European Thermal Roadmap. It will be validated in three eco-regions, actively deployed in another seven regions, and disseminated to identified ninety regions European wide. In addition, the tools and support methodology will be made available to third parties in a sustainable way after the end of this project.

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Partners

Institute for Sustainable Process Technology https://ispt.eu/

Condugo https://www.condugo.com/

Spinergy http://www.spinergy.it/

energy CLUSTER DENMARK https://www.energycluster.dk/

LE2C LOMBARDY ENERGY CLEANTECH CLUSTER http://www.energycluster.it/en

pom antwerpen https://www.pomantwerpen.be/

ESCI European Science Communication Institute https://www.esci.eu

EUROHEAT & POWER https://www.euroheat.org/

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Executive Summary

Summary of Deliverable

This report describes the set-up of the Antwerp ecoregion in Belgium. The industrial areas in the Belgian ecoregions have different backgrounds and properties and are therefore described separately.

The activities in the Antwerp ecoregion were mainly focussed on community building with local stakeholders in order to establish energy cooperation projects. During the course of the R-ACES project community building was performed on adjacent Antwerp business parks.

The R-ACES project led to a number of potential energy cooperation projects in different stages of readiness and described likewise. Also the project has a significant impact in the short and long term for companies, developers and local authorities.

The materials and tools developed in the R-ACES project proved to be very useful in the ecoregion development where the tool was used by the partners to define the region and create action plans.

Thanks to the approach developed in the project, we have succeeded in bringing together various groups of companies, governments and other stakeholders and engaging them to at least consider the possibilities of energy cooperation.

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1 Introduction

1.1 Objective of the Work Package 3

The objective of work package 3 (WP3) is to set up the three ecoregions in Belgium, Italy and Denmark. More specifically, it consists of coordinating the efforts leading to the creation and development of the ecoregions and establishing at the same time a comprehensive validation methodology concerning the application of the solutions co-designed in WP2, in the realistic environments provided by the consortium.

As the impact of R-ACES application in industrial sites must be evaluated in the context of:

- Improving the management of energy saving;
- Making profits from the waste heat produced by energy intense industrial production processes;
- Improving at the same time environmental performances.

In the scope of WP 3 "Waste heat-based energy cooperation and transfer pilots", we aim to define a series of validation criteria concerning the application of the three tools developed in WP2.

The three tools are:

- **Assessment tool:** an assessment framework that covers multiple themes. Provides best practices, check lists to users & means to scan energy reduction potentials.;
- **Legal decision support tool:** investigates how to build a practical and simple-to-use decision-support tool for management to decide on the required legal framework for energy cooperation;
- **Energy management platform** (EMP):an ICT-tool that makes energy flows transparent; allows energy consumption and production to be allocated to specific installation, stakeholders and notes; and identifies anomalies and opportunities.

1.2 Objective of this deliverable

This report describes how the R-ACES project was approached in the Antwerp ecoregion (Belgium). After a brief description of the ecoregion, the actions taken and the results achieved are discussed in detail.

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2 General description of the Eco-Region

2.1 Introduction to the Ecoregion Antwerp

The Antwerp ecoregion is located in the northern part of Belgium and consists of 2 industrial areas: Kanaalkant and Terbekehof (see figure 1).

Figure 1: the industrial areas Kanaalkant and Terbekehof are located in the surroundings of the Antwerp city

Figure 2 and figure 3 indicate the borders of each industrial area.

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Figure 2: Terbekehof, Wilrijk (Antwerp)

Figure 3: Kanaalkant, Antwerp/Wijnegem/Schoten

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At the start of the R-ACES project there was no energy cooperation in both of the areas. Each of the companies was working on their own. The individual companies were working on their own energy-efficiency and installation of renewables, although they realized that energy cooperation could offer some benefits. None of them took the initiative to introduce energy-cooperation projects. The use of renewable energy was emerging on a low profile. R-ACES entered the industrial areas to provide the option of energy cooperation within the areas. The added value can be seen as making people aware that there are more pathways towards efficient and sustainable industrial parks. In both areas collective measures and clustering of energy were included in decision-making and crystallized in concrete plans towards climate robust and circular business parks.
Since both industrial areas have different characteristics, hence different energy reduction measures were applicable, the area's characteristics and their energy cooperation developments will be described separately.

2.1.1 Kanaalkant

Kanaalkant is situated close to the city of Antwerp and the largest Flemish seaport and is the second largest industrial estate in the province of Antwerp. Kanaalkant is located on both sides of the Albert Canal. The canal is undoubtedly one of the great assets and the flagship of Kanaalkant. With almost 40 million tonnes of transported goods per year, the Albert Canal is the most important waterway in Flanders.

In total the surface counts about 400 hectares of activity with about 600 companies (see figure 3). The companies of Kanaalkant play a crucial role. The ultimate goal is to work with them to redevelop the area into climate-robust circular business parks.

The provincial government drew up a future plan for the industrial zone and now forms a Canal side partnership of the following local authorities: Wijnegem, Schoten, Antwerp, the Flemish Waterway, the province of Antwerp and POM Antwerp.

The future plan is linked to infrastructural government investments to modernize the area. To provide additional support to the business community at Kanaalkant, there is the area manager as the central point of contact at Kanaalkant.

Interventions in the field of energy take place at both building and cluster level. This presupposes a program for energy conservation, production and exchange. Naturally, this means in the first instance an optimization of the existing buildings, both in terms of positioning, insulation and heating. This applies to the entire business park (residential + business) with extra ambition for new companies. As far as production is concerned, at first sight there seems to be an opportunity for solar panels (on company roofs), wind energy, heat pumps (for the activity on the canal in combination with the reconstruction of the quay infrastructure), shore power (for new waiting quays and at the Dokske van Merksem), CHP (cogeneration in combination with biomass) and finally, there is also the option of installing heat networks.

2.1.2 Terbekehof

Terbekehof is an industrial area with a surface of 160 hectares and is located on the Southern part of the city of Antwerp, in the Wilrijk district. The business park is located along the A12, which connects Antwerp with Brussels. Just south of the area there is a ISVAG waste to energy plant where residual household waste is incinerated and a water purification plant (Aartselaar WWTP). The waste heat of the current ISVAG plant is recovered in a small scale 3 MW district heating grid.

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After a number of years of infrastructural restructuring (mobility and water), the industrial area is now ready to take the next step towards the realization of the business park of the future.

Since 1977 the companies are represented by the trade and industry business association HIW.

HIW aims to become the most sustainable, CO2-friendly and energy-efficient industrial estate in Flanders in terms of infrastructure, energy, green and waste policy. In cooperation with POM Antwerp HIW wants to set up energy cooperation projects to join forces of local companies in order to obtain economic benefits and defend common interests.

2.2 R-ACES activities

The activities in the Antwerp ecoregion were mainly focussed on community building with local stakeholders in order to establish energy cooperation projects.

2.2.1 R-ACES activities in Kanaalkant

POM Antwerp has a community manager working exclusively for the Kanaalkant area and made extensive use of his network. Also POM Antwerp cooperated with the trade and business association Nijverheidskring on the community building to generate energy cooperation projects following the methodology of the R-ACES Ecoregion Development.

The following table presents a general overview of the energy cooperation projects that started up in the Antwerp ecoregion Kanaalkant during the R-ACES project:

Table 1: Overview potential energy cooperation projects Kanaalkant

Kanaalkant	Description
shared steam network foodcluster Merksem	Installation of shared steam network powered by a cogeneration plant for 4 food processing companies
shared PV Logistics Deurne	• Phase 1: 2 MWp PV with PPA contract to other locations • Phase 2: potential 2 MWp PV to share with neighboring food production company
DHN food production company Schoten	Local DHN using residual heat of a pasta sauce and croquette plant to heat local companies and 2 planned residential developments
LEC Wijnegem	• Shared PV logistic buildings • Potential 7,5 MWp PV • Potential 90kW wind turbine
shared PV Foodcluster	Shared PV Foodcluster
(LEC) DHN potential	Low temperature DHN from cooling (shopping mall, meat processing facility and laboratory) connected to 2 residential developments

Since the community building activities started in the Covid-period, a part of the meetings were held digitally.

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The following table gives a general overview of the community building activities in the Antwerp ecoregion during the R-Aces project.

Table 2: Overview stakeholders and community building activities Kanaalkant

Kanaalkant	Stakeholders	Activities summary (chronological)
1. Shared steam network Foodcluster Merksem	• 5 local companies • business association • engineering company	• assembly business association • individual consultations • data collection • feasibility study • discussion results
2. Shared PV Logistics Deurne	• 2 local companies • engineering company • citizen energy cooperative • private energy supplier	• individual consultations • data collection • feasibility study • discussion results • contract signing
3. DHN food production company Schoten	• local companies • residential developers • engineering company • citizen energy cooperative • local authority	• individual consultations • data collection • feasibility study • discussion results • additional feasibility study
4. LEC Wijnegem	• local companies • residential developers • engineering company • local authority	• information sessions • individual consultations • data collection • feasibility study • discussion results • additional feasibility study
5. Shared PV Foodcluster Merksem	• local companies • business association • engineering company • local authority	• individual consultations • data collection
6. (LEC) DHN potential	• local companies • residential developers • engineering company • citizen energy cooperative • local authority	• individual consultations • data collection • feasibility study • discussion results • additional feasibility study

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2.2.2 R-ACES activities in Terbekehof

POM Antwerp cooperated with the trade and business association HIW on the community building to generate energy cooperation projects following the methodology of the R-ACES Ecoregion Development.

The start-up of the activities in Terbekehof were postponed a few times due to the Covid pandemic.

The members of the business association were questioned by means of an online questionnaire. The questionnaire resulted in the idea to start an Local Energy Community in which companies can exchange excess electricity generated by PV.

A number of information sessions were organised to inform local companies of the possibilities of energy exchange. At the end of the information sessions a group of 7 companies agreed to cooperate in forming a LEC. The business association agreed to start the LEC on the basis of the existing organisation structure.

A lot of effort was done to collect and process data to calculate potentials business cases.

With these results the business cases were discussed in several sessions with the 7 companies.

Table 3: Overview potential energy cooperation project Terbekehof

Terbekehof	Description
7. Local Energy Community (LEC)	LEC: • Phase 1: shared PV (existing PV) • Phase 2: shared (new) PV & 2 x 6 MW wind turbines

Stakeholders that were involved included local companies, business association, distribution network company, engineering company.

2.2.3 R-ACES activities other Antwerp business parks

In addition to Kanaalkant and Terbekehof, community building was performed on adjacent Antwerp business parks:

Table 4: Overview potential energy cooperation projects other business parks Antwerp region

Additional locations	Description
8. Science Park Niel: PV, EV loading docks and hydrogen potential (LEC)	• Phase 1: 0,2 MWp PV + EV loading docks • Phase 2: additional PV • Phase 3: potential of H2 as storage medium
9. Transportzone Meer: LEC	• shared PV and wind turbines • loading docks truck transport

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10. Boom: potential DHN	Water treatment plant as an aquathermal heat source (1,5 MW) for industrial site DHN
11. Malle: LEC	• DHN with potential sources: excess heat, concentrated solar heat (AZTEQ), aquathermal heat (sewer system) • PV

2.3 Project results

Potential energy cooperation and renewable energy projects discussed in the previous paragraphs are listed in the overview below with reference to the current status and results.

1. Kanaalkant: shared steam network foodcluster Merksem
- Energy mapping finished
- Feasibility study showed that the project is not feasible
- Potential PV cooperation project identified

2. Kanaalkant: shared PV Logistics Deurne
- Phase 1: Renovation roof finished / Contract new PV signed / P2P energy cooperation
- Phase 2: new logistics building under construction
- Cooperation project started

3. Kanaalkant: DHN food production company Schoten
- Energy mapping finished
- Feasibility study showed that the project is not feasible at this moment
- Extension feasibility study with additional aquathermal (canal) source
- Possible cooperation project identified

4. Kanaalkant: Local Energy Community Wijnegem
- Energy mapping finished
- Discussions local authority wind
- Discussions with building owners and residential developers ongoing
- Possible cooperation project identified

5. Kanaalkant: shared PV Foodcluster
- Discussions with building owners started
- Possible cooperation project identified

6. Kanaalkant: DHN potential
- Meetings have been conducted to map the local heat available (heat mapping)
- Feasibility study showed that the project is not feasible at this moment
- Further discussions to investigate the potential of adapted business case

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- Possible cooperation project identified

7. Terbekehof: Local Energy Community
- Data collection energy mapping finished
- Feasibility study showed that PV-project is feasible (phase 1)
- Startup meeting with 7 companies (legal and financial structure)
- Cooperation project started

8. Science Park Niel: PV, EV loading docks and hydrogen potential
- Data collection energy mapping finished
- Feasibility study showed that PV-project is feasible (phase 1)
- Contract new PV is being drawn up (phase 1)
- Cooperation project started

9. Transportzone Meer: Local Energy Community
- First discussions with stakeholders resulted in the intention of starting a LEC
- Cooperation project started

10. Boom: potential DHN
- Contact with the water treatment plant operator showed high potential
- Discussions with local municipality ongoing (combination DHN with planned infrastructure works
- Possible cooperation project identified

11. Malle: Local Energy Community
- Local business association has the intention to start energy cooperation project
- Possible cooperation project identified

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3 Added value of the R-ACES tools and materials

The establishment of an energy cooperation project is a complex process requiring different stakeholders, skills, and knowledge in various project phases. Managing such a project is seen as a time intensive and difficult task.

During the start phase of initiating potential energy cooperation projects, the D1.1 Condensed Overview of Results from studies and previous projects was applied by POM. In this deliverable useful projects for reference were listed in an overview with hyperlinks to the projects websites. It proved to be useful as inspiration and knowledge database as basis for the further discussions.

In the process of starting an energy cooperation project POM Antwerp worked following the methodology of the D4.2 Learning Community.

Ecoregion Development:

- define the ecoregion
- formulate shared vision
- stakeholder identification
- create action plans
- process of establishing an energy cooperation project
- assessment tool

The development of the educational online environment in D4.5 Course Material helped to disseminate knowledge to the Ecoregion partners.

Furthermore the D5.3 Online and Categorized Capacity Building Blocks / Use Cases presented on the R-ACES website were useful to demonstrate the potential of identified energy cooperation projects.

The Legal Decision Support tool was used in discussions with potential partners in energy-cooperation project as a framework for discussions in setting-up the project. The tool was presented several times to local authorities, companies and business associations and on each occasion the tool received positive feedback.

The materials and tools developed in the R-ACES project proved to be very useful in the ecoregion development where the tool was used by the partners to define the region and create action plans.

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4 Assessment of the short-term and long-term impact of the developed energy cooperation projects

4.1 Impact in relation to the KPIs

The following section describes the achievements of the energy cooperation projects developed in the Antwerp ecoregion. Since not all project results are measurable yet, there is made a distinction between achievements and estimations. The predictions describe future energy savings of which plans are still made, and results still have to take shape.

In the text below reference is made to the numbers listed under chapter 2.3 Project Results.

Achievements of the R-ACES project in the Antwerp ecoregion:

- A Local Energy Community will be set up which will initially exchange residual energy across various locations of 3 companies. After a run-in period, a major expansion to additional companies is planned. KPI 1, 2 and 6 (7)
- Installation of a new PV installation on the roof of a logistics building with a capacity of 1 MWp, whereby the generated energy is shared among the various locations of a company. In a next phase, the new building will be equipped with an additional PV installation of 1 MWp, whereby the energy will be shared with a neighbouring company. KPI 1, 2 and 6 (2)
- Improvements were made to internal energy consumption through the community building and discussions were started with neighbouring companies. KPI 5 (5)
- Food cluster: replacement oil-fired steam boiler with natural gas-fired one. KPI 1, 2 and 6 (1)

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Predictions of impacts of the R-ACES project in the Antwerp ecoregion:

- Installation of a new PV installation on the roof of a logistics building with a capacity of 1 MWp, whereby the generated energy is shared among the various locations of a company. In a next phase, the new building will be equipped with an additional PV installation of 1 MWp, whereby the energy will be shared with a neighbouring company. KPI 1, 2 and 6 (2)
- In the context of practice what you preach, POM Antwerp'sown patrimony is tackled in terms of energy consumption and renewable energy. KPI 1 and 2 (8)
- The city of Antwerp wants to accelerate the roll-out of PV on large industrial roofs and has decided to support this through community building, financing roof stability studies and developing business cases. KPI 5

Estimations of impacts of the R-ACEs project in the Antwerp ecoregion:

- There is a detailed business case available that is currently not feasible but can be used as a basis for a feasible energy exchange project in further future development. KPI 1, 2 and 6 (6)

4.2 Success stories

The project has a significant impact in the short and long term for companies, developers and governments.

- Municipal decision to investigate the application of heat networks in new residential developments. KPI 5
- Support in the creation of energy landscapes. Through energy landscapes, together with the local authorities involved, we look for tailor-made measures to save energy as well as to generate more and green energy. In doing so, we ensure that the generation and storage of energy are given a qualitative place in our space. KPI 5
- The city of Antwerp wants to accelerate the roll-out of PV on large industrial roofs and has decided to support this through community building, financing roof stability studies and developing business cases. KPI 5
- Due to the implementation of the project, the capacity and knowledge within POM Antwerp was further expanded. KPI 5
- Expanding a network in which POM is regarded as a partner to realize projects in the long term. KPI 5
- Developing an integrated internal structure within the province of Antwerp to tackle energy projects in a more structured way in the future. KPI 5
- Sensitizing relevant stakeholders through presentations at specialized study days. KPI 5

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- Ongoing talks with owners of logistics buildings to install additional PV and share excess energy generated with neighbouring businesses and two new residential developments. A potential of x MWp has been identified. KPI 1, 2 and 6

5 Conclusion

In general, we can say that the R-ACES project had an impact on the ecoregions where the methodology was applied.

Thanks to the approach developed in the project, we have succeeded in bringing together various groups of companies, governments and other stakeholders and engaging them to at least consider the possibilities of energy cooperation.

In a number of cases this led to internal interventions in companies, initiatives that supported governments, changes in approach within governments internally that will lead to results in the long term, energy cooperation projects for which the first steps towards realization were taken, a number of potential cases that were investigated but did not lead to a viable business case and also the effective start-up of energy cooperation projects.

The covid pandemic did have an impact on the project: many acquaintances took place behind a computer screen, which delayed the project at the very least and certainly made it more difficult.

Making resources available to broadly develop project ideas has sometimes proved to be a challenge and seems useful in discussions to convince stakeholders of the added value of the proposed project.

Concluding, we can look back on a successful project that will have an impact in the short and long term.

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6 References

APA Format Citation Guide:
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7 Annexes

Annex 01

R-ACES definitions

Project Glossary

Definition of Key Concepts in the R-ACES project

Business park: An area of land in which many office buildings are grouped together with a common infrastructure (‘s). Business parks, like industrial sites, often have similarities in heating and cooling demand. Certain businesses may even have residual energy streams, for example data centers. As such, business parks may also organize as an ecosystem or eco business park (EBP) and become an important stakeholder within an ecoregion.

Eco Business Park: *“An eco-industrial park is a community of businesses located on a common property in which businesses seek to achieve enhanced environmental, economic and social performance through collaboration in managing environmental and resource issues. This is known as industrial symbiosis, which is a means by which companies can gain a competitive advantage through the physical exchange of materials, energy, water and by-products, thereby fostering inclusive and sustainable development.”* (United Nations Industrial Development Organization)

Communicate: professional and public coverage of the project results and achievements, benefits and potential deployment. This will be realised via the adoption of a large variety of distribution channels, including already existing platforms focusing on energy cooperation in industrial sites and business parks and energy exchange/cooperation at large.

Disseminate: exploitation of the project results to relevant stakeholders in the regions. It intends to ensure a low threshold in accessibility, usage of R-ACES tools and methods. This includes access to the tools, to the use case libraries and to the training and capacity building material and related self-explanatory instruction manuals.

DHC: Abbreviation of District Heating and Cooling. A system for distributing heating/cooling generated in a centralized location through a system of insulated pipes for residential and commercial heating requirements such as space heating/cooling and water heating/cooling.

> 4th generation DHCs: *“4GDH systems provide the heat supply of low-energy buildings with low grid losses in a way in which the use of low-temperature heat sources is integrated with the operation of smart thermal grids. Smart thermal grids consist of a network of pipes connecting the buildings in a neighbourhood, town centre or whole city, so that they can be served from centralised plants as well as from a number of distributed heating and cooling producing units (or decentralised units) including individual contributions from the connected buildings. The concept of smart thermal grids can be regarded as being parallel to smart electricity grids. Both concepts focus on the integration and efficient use of potential future renewable energy sources as well as the operation of a grid structure allowing for*

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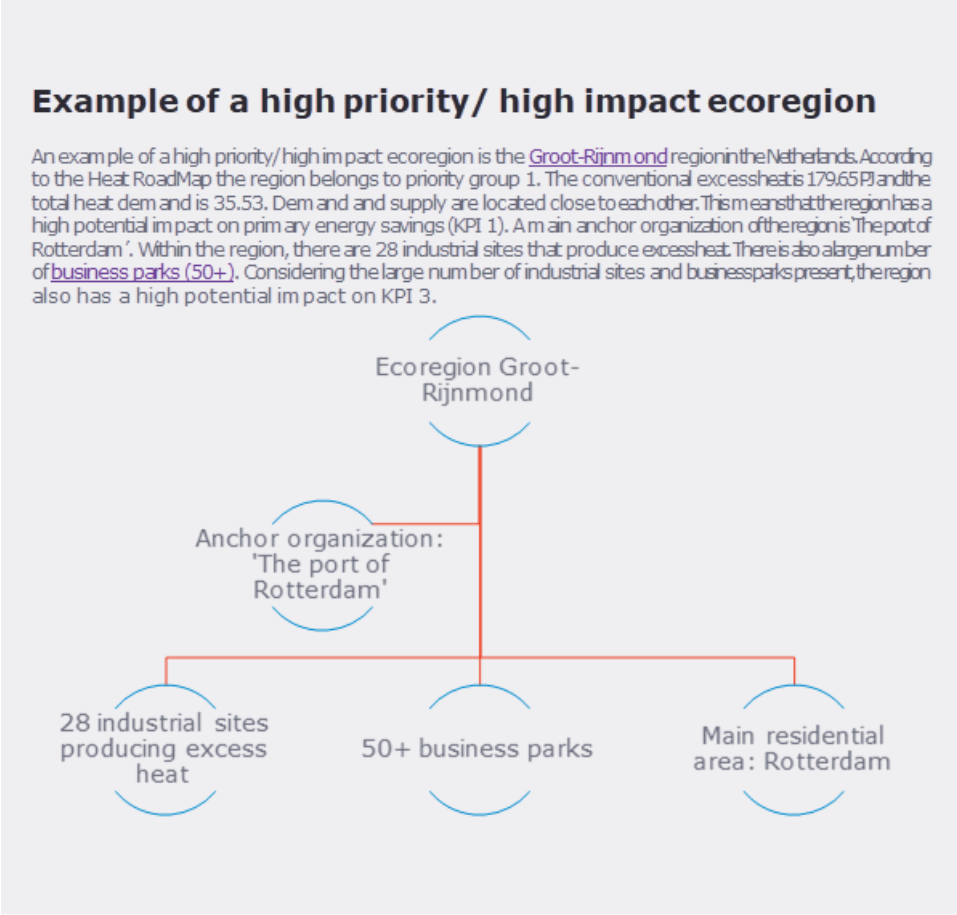
distributed generation which may involve interaction with consumers." (adapted from Lund et al, Energy 68; 2014, p1-11).

5th generation DHCs: *"5GDHC is a highly optimized, demand-driven, self-regulating, energy management system for urban areas. Its key features are: 1) ultra-low temperature grid with decentralized energy plants; 2) closed thermal energy loops ensuring hot and cold exchange within and among buildings; 3) integration of thermal and electricity grids."* (D2grids, Interreg NWE)

Ecoregion: An ecoregion within the R-ACES project is a geographic area where energy and information exchanges occur between stakeholders of various types to reduce energy consumption. Geographical size does not matter (the size of an ecoregion can be as small as a business park or as large as a city). Important is that an ecoregion relies on an anchor organization responsible for managing the area (for example park management). Another aspect is the proximity of stakeholders to ensure interconnected energy flows (continuity of supply, quality of supply, quantity). Within an ecoregion, a wide range of assets could be involved: office parks, data centers, multimodal centers, technological centers, agro-centers, science parks, brain parks, lighthouse parks, chemical parks, eco-industrial parks, and cluster/business parks. For the demand of heat, also residential areas could be taken into account. As such, the term ecoregion functions as an 'umbrella term'.



High priority region: A high priority region is an Ecoregion, as defined above, that has balanced potential match of heating/cooling supply and heating/cooling demand in both quantitative (amount of heating/cooling) and qualitative (temperature, form of heat) terms. The region should be identified by heat roadmap studies (for example, the Heat RoadMap Europe or Stratego) or other research activities. In addition, the regions should have networking possibilities. The regions can include industrial sites, business parks and residential areas.

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The table below gives an indication of the priorities. R-ACES will focus on priority group 1 +2.

Table 2.19. Excess heat ($E_{heat,o}$) and heat demand (Q_{tot}) characteristics for the definition of priority groups to identify heat synergy regions

	Characteristics			
Priority group	**Excess heat[a] [PJ/a]**	**Heat demand[b] [PJ/a]**	**Priority status**	**Comment**
1	$\Sigma E_{heat,o} > 10$	$Q_{tot} > 10$	Very high	High levels of both $E_{heat,o}$ and Q_{tot}
2	$1 < \Sigma E_{heat,o} < 10$	$Q_{tot} > 10$	High	Moderate levels of $E_{heat,o}$ and high Q_{tot}
3	$\Sigma E_{heat,o} > 10$	$1 < Q_{tot} < 10$	Moderate	High $E_{heat,o}$ and moderate levels of Q_{tot}
4	$1 < \Sigma E_{heat,o} < 10$	$1 < Q_{tot} < 10$	Low	Both $E_{heat,o}$ and Q_{tot} at moderate levels
0	$\Sigma E_{heat,o,max} < 2.5$	$Q_{tot,max} < 25$	No priority	Both $E_{heat,o}$ and Q_{tot} at low levels

[a] Maximal theoretical levels of annually available excess heat.
[b] Space heating and domestic hot water preparation in residential and service sectors.

High potential region: Within the project proposal, sometimes the term high potential ecoregion is mentioned. From now on, this term will not be used within the scope of the R-ACES project.

High impact (in R-ACES terms): Regions that have a high potential impact on the R-ACES KPIs. More specifically, regions are meant that have a high potential impact on KPI 1: Primary energy savings, and KPI 3: Number of plant sites and number of industrial parks where businesses commit to energy cooperation.

Energy cooperation: Energy cooperation activities between industries, which include physical clustering (e.g., of buildings and processes, energy exchange, collective production) and/ or service clustering (e.g., joint contracting). Both can deliver a more stable cumulative demand, economy of scale for larger installations with higher efficiencies and smaller spatial footprint and an optimized demand response. Within R-ACES, the focus is mainly on energy cooperation through the exchange of heating and cooling.

Energy Management Platform: is an ICT-tool that makes energy flows transparent; allows energy consumption and production to be allocated to specific installations, stakeholders and nodes; and identifies anomalies and opportunities. A key feature is that it is very easy to use for a wide range of stakeholders. In this way, it is possible to deploy it in a cluster and give access to the different company and cluster managers – each at their level of detail and with the information they should have access to. On the ecoregion level, there will be a dashboard that shows different energy flows.

ESCO: Abbreviation for Energy Service Company. An ESCO is a business that provides a broad range of energy solutions including designs and implementation of energy savings projects, retrofitting, energy conservation, energy infrastructure outsourcing, power generation and energy supply, and risk management.

Facilitator: someone who helps to bring about an outcome (such as learning, productivity, or communication) by providing indirect or unobtrusive assistance, guidance, or supervision. This task does not include technical expert know-how, instead facilitators are trained to facilitate interaction between multiple actors.

Industrial cluster: Within the project proposal, sometimes the term Industrial cluster is used. From now on, this term will not be used within the scope of the R-ACES project.

Industrial park: Within the project proposal, sometimes the term Industrial park is used. From now on, this term will not be used within the scope of the R-ACES project.

Industrial region: Within the project proposal, sometimes the term Industrial region is used. From now on, this term will not be used within the scope of the R-ACES project.

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Industrial site: An area zoned and planned for the purpose of industrial development. An industrial site can be thought of as a more "heavyweight" version of a business park or office park, which has offices and light industry, rather than heavy industry. They may contain oil refineries, ports, warehouses, distribution centres, factories, and companies that provide manufacturing, transportation, and storage facilities, such as chemical plants, airports, and beverage manufacturers (Wikipedia).

(R-ACES) Learning community: Local group of stakeholders that are (a) directly involved with the energy collaboration on a site; and (b) engaging in both organised and informal exchange of knowledge and best practices over the course of the project period. These groups are the first beneficiaries of instruments like serious gaming. Learning communities from different sites in this project will eventually be brought into contact with each other to further stimulate the exchange of best practices.

Learning network: *"Allow for enduring relationships built on trust to develop among companies within an industrial site. In turn these relationships encourage information sharing, creative solutions, long term planning and governance among stakeholders. Social aspects increase interactions among stakeholders and strengthen collaborations and partnerships including industrial ones"* (Scaler, 2018). To establish such learning networks, the R-ACES project will use learning communities.

(R-ACES) Legal support tool: A tool that supports practitioners by giving the legal decision support for joint contracts. A low threshold for usage is a critical requirement. The tool is self-explanatory, application oriented, using well-defined and clear terminology. The tool should be able to deal with a high diversity of local situations. For practical reasons, the name of the legal tool might change during the R-ACES process. In this case, the consortium will be informed.

LESTS framework: Abbreviation for Legal, Economic, Spatial, Technical and Social/Managerial. LESTS is a framework that is used in the project to categorize barriers and drivers in ecoregions. The different categories include: Legal, e.g. liabilities, regulatory requirements, third party contracts, service agreements, rules; Economic, e.g. cost savings, waste/ resource recovery value, funding mechanism, taxes & environmental considerations; Spatial, including geographical proximity, planning rules and environmental considerations; Technical, e.g. sharing and cascading resources, system stability, facilities; Social/Managerial, e.g. with regard to workers, consumers, local communities employment, community engagement, and capacity building.

Lock-in: Exchange of by-products will lead to long term reliance on an outside company, which will restrict flexibility of the involved companies and possibility for innovation, or possibility to relocate the site.

Longlist (for example longlist of regions): Exists of lists of items (rows), for example regions, that have been selected on the basis of loose selection criteria (columns). The long list is a first step in creating a short list. The long list should cover all potential subjects that might be of interest to the short list. Example:

Region	Region	Country	Source	# DHCS	# Industrial sites	# Business parks	Contact person	Contact details
1	Maasvlakt	Nederland	...					
2	Chemelot	Nederland	...					
3	Terneuzen	Nederland	...					

Long-term: Long-term impact of R-ACES is gained after the end of the R-ACES project (in KPI terms).

Peer2peer: A network of peers (R-ACES stakeholders) that perceive each other as equal. The peers interact with each other in order to learn from each other. The peer2peer learning context is a formal or informal setting, in small groups or online. Pear learning

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manifests aspects of self-organization. By this is meant, that there is no hierarchical structure within a peer2peer network (Wikipedia).

(R-ACES) Self-assessment tool: A tool that helps ecoregions to determine the next steps they have to take in the energy cooperation process. The tool exists of a number of questions practitioners have to answer. Based on the answers, the practitioners will get a score and some practical considerations they should take into consideration.

Serious gaming: A method for learning-through-experience that presents participants with a case study in which they have to play pre-assigned roles to each reach a pre-defined objective as quickly as possible. The interactive & competitive gaming element increases the attractiveness and the learning outcome of the case study. Serious gaming addresses cooperation elements among a large variety of practitioners and focus at creating acceptance and awareness, where the learning communities focus at sharing experiences between peers.

Shortlist (for example shortlist of regions): List of items, for example regions, that have been selected from a long list on the basis of (strict) selection criteria. Hereby, the advantages and disadvantages of each item are considered (OpenLearn). The shortlist contains items that have a high potential and likelihood to contribute to the R-ACES goal.

Short-term: Short-term impact of R-ACES is gained during the R-ACES project.

Use case: A written description of the sequence of steps performed by an ecoregion to come to fruitful energy cooperation.

Use case library: A library that contains multiple use cases.

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