

TITLE: FROM GREY TO GREEN TRANSITION: ESSEN'S EUROPEAN GREEN CAPITAL PROGRAMME

ISSUE AREAS

- ICT and SMART technology **Sustainable mobility** **Land use and nature-based solutions**
- Clean energy Sustainable solid waste management Building energy efficiency
- Innovative urban governance** **Behavioural change**

OVERVIEW

Essen, a city of 590,000 people, is located in the North-Rhine Westphalia (NRW), Germany. In the heart of the Ruhr metropolis of 5.1 million residents, Essen has developed from its history as an industrial city of coal production and steel manufacturing into a green and vibrant metropolis. In the late twentieth century, with the decline of local steel and coal industries, the city needed a structural change, which was done successfully through a series of strategic vision and implementation plans. Essen won the title of European Green Capital of 2017 for its successful transformation from a grey city of coal and steel to the third greenest city in Germany (Early, 2018).

Essen closed its last coal mine in 1986. The city's economy underwent a transformation from coal and steel based to focus on service and finance, the latter providing 86% of the city's employment in 2014. In the grey to green transition, Essen now has extensive walkways and cycleways, over 20 of re-naturalised streams and rivers, and green areas that cover over 50 percent (%) of the Metropolitan area, showing the city's ambition for a sustainable future (European Union, 2017).

THE CHALLENGE - WHY HAS THE CITY TAKEN ACTION

The need for structural repositioning to achieve economic prosperity and sustainability. The German Ruhr area, where Essen is located, used to be an industrial powerhouse of the German national economy in the early nineteenth century. However, in the 1970s, cheaper coal imports began to outcompete German production and drive down the price of domestic coal. The region took a deep dive economically due to the decline of its signature mining industry. At the same time, the region recognized the need for green development, as the residents have been long suffering from pollution due to heavy manufacturing. Moreover, the region suffered from degraded environmental quality and natural resources (Ramon, 2019; Bryce, 2017).

The people and leadership of the Ruhr Metropolis soon took action. The "Structural Change" approach jointly led by municipal and state leadership recognised the need to re-orientate the economic model in an environmentally-friendly and people-centred way. This programme stimulated investments in education and infrastructure but more importantly in environmental protection programmes and urban renewal projects (Ramon, 2019).

Ever since the reorientation, Essen rose to become a key leader in innovative sustainability strategies development and implementation, and has also turned its industrial legacy into future opportunities .

As the European Green Capital, in 2017, Essen initiated the European Green Capital programme to trigger sustainable processes and developments that will continuously secure, or even further

improve the quality of life in the city (Kufen, 2017). The programme includes more than 400 projects and events, divided into five thematic clusters (city of Essen, 2017):

- “**My paths**” describes all sustainable topics regarding mobility including, e.g., cycling, car-sharing, and public transport

- “**My rivers**” focuses on the conversion of the Emscher system and of the project “ESSEN. New Ways to the Water” as well as the green and blue infrastructures associated therewith

- “**My green spaces**” connects to a range of projects including public parks and green spaces and to the services they provide

- “**My shopping**” encompasses the sustainable consumption lifestyle, including food production, fair trading, building materials, waste and recycling

- “**My Future**” refers to new jobs, training and education associated with environmental topics and sustainability.

GOALS AND OBJECTIVES

Goals:

- A modal split of 25% (25% bicycle, 25% car, 25% public transport, 25% pedestrian) by 2025
- 20,000 green jobs by 2025
- Residents can have access to the nearest park within 500 metres (m) by 2020
- Reduction of CO₂ output by 40% by 2020, and 95% by 2050

HOW DID STI PROVIDE A LOW CARBON AND CLIMATE RESILIENT SOLUTION?

(STI as a means of implementation)

- Improved decision making** Offering a low-cost solution **Inclusive decision making**
- Improved governance** **Behavioural change**

(STI as a direct technical solution)

- Cleaner/more eco-friendly infrastructure** **Cleaner/more eco-friendly equipment**
- Faster/better/larger data availability/processing

- **How was it innovative?** (What enabling policies were employed? What were the local/national government’s policy targets, goals and strategies? Were new S&T approaches developed or existing S&T approaches enhanced? Was the cities geography/culture capitalised upon?)

1) My paths - mobility for the future

The Ruhr Area region is characterised by cars, meaning the greatest potential for cutting down CO₂ emissions lie within the area. Essen used the Green Capital year to initiate a transport transition. By

2035, the city plans to achieve the modal split of: 25% of transport users travel by bicycle, 25% by public transport, 25% by foot, and 25% by car (Sustain Europe, 2017).

The city of Essen has been promoting sustainable mobility, showing from its hundreds of kilometres of cycle paths, a network of bike- and car-sharing stations with rising number of electric vehicles charging stations, and a well-developed public transport system. Residents are offered a variety of alternatives to their private cars (European Union, 2017).

Essen's cyclist commuters can access the Ruhr Bike Expressway RS1, Germany's first fast cycle path. In the city, the cycleway connects various tourist attractions, including the notable area such as the Krupp Belt housing major regeneration projects and is three times the size of the city centre. Moreover, running along the tracks of a disused railway line, the path heads west to the neighbouring city Mulheim an der Ruhr. The cycle highway is expected to cover a distance of 101 km connecting 10 cities in total located in the Ruhr metropolitan area, from Duisburg in the west to Hamm in the east (European Union, 2017). When completed in 2020, RS1 is expected to obviate 52,000 car journeys per day, and thus saving 16,000 tonnes of CO₂ per year (Sustain Europe, 2017).

With 590,000 residents, 140,000 commuters and a steady increasing number of visitors on business or pleasure trips, the city has been actively finding its solutions. While bicycles may well be the most ideal form of sustainable transport, Essen has invested in a variety of complementary approaches (European Union, 2017).

In 2017, the region also opened two mobility stations, acting as central hubs connecting not only local public transport, but also other transport options such as car-sharing, taxis, and rental bicycles in a single location. The station also expanded its fleet to have the lowest exhaust gas emissions in the Ruhr Region. Other sustainable mobility initiatives, include the "Essen Mobil" app, which offers users intermodal navigation amongst other things, and the "GreenTicket", which is a monthly ticket subsidised by the European Green Capital and includes discounts by car and bike sharing.

To raise the number of pedestrians in the city, walks for senior citizens have been held weekly in 34 city districts since 2012. In 2017, these also inspired other Green Capitals in Europe. The initiative is known as "Let's take a walk" and is operated by the Senior Citizens' Advisory Board, the Senior Citizens' Department and the Health Conference. This initiative was repeated in 2018.

2) My rivers - between the Emscher and Ruhr

Essen is a city of two rivers, Emscher and the Ruhr, as shown in Figure 1. The two rivers have shaped life in the city for decades. In the industrialisation era, the rivers were abused as sewerages. Therefore, an important part of Essen's green transition is actually blue infrastructure expansion projects that connect the Emscher and Ruhr Valley, with a focus on the two rivers and their local tributaries, their health and service to the community (city of Essen, 2017).

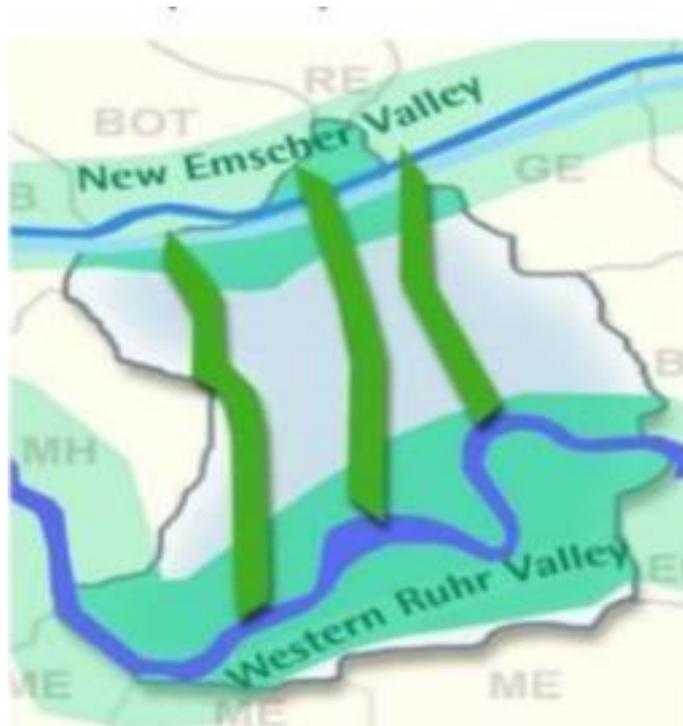


Figure 1. A visual representation of Essen and the two rivers (Source: City of Essen, 2015)

Emscher River restoration

The rise of steel production and coal mining industry in the Ruhr area in the tenth century was a key contributor to the increased pollution level in the region, affecting the nearby Emscher River the most. Not too long after that, the 865 square kilometres (km²) of the river basin became a dumping ground filled with wastewater from factories, slaughterhouses, mines, and local residents. More than a century later, the river was ultimately transformed into one of Germany's most polluted rivers that even destroyed the surrounding ecosystems (AFRY, NA).

In Essen, two-thirds of the wastewater is disposed of through the Emscher system. Due to coal and steel production, untreated wastewater was still being dumped into the Emscher until the 1990s. With the ambition to improve the water systems around the area and to restore the ecology of Emscher, the public water management association, Emschergenossenschaft, was founded in the 1990s and the conversion project commenced in 1992.

For many years, the area around Emscher has been restricted from the public. The project's objective is to build underground water systems as well as restore nature and increase biodiversity above ground. The re-naturalisation of the Emscher transformed the former sewer in the north of the city into a natural river in the middle of a local recreation area. The expansion of the blue infrastructure improves the quality of life and strengthens Essen's ability to adapt to climate change.

The conversion of the Emscher River has played a major part in the city of Essen's green urban development over the past few years (AFRY, NA). Throughout the entire Ruhr region, 400 kilometres (km) of new sewers have been laid underground, 45 kilometres of which is within the

Essen municipal area (Sustain Europe, 2017). The natural environment streams above ground have thus been re-naturalised and become free of wastewater. The multi-generational Emscher conversion project has changed the face of the city and demonstrates the significance of modern water management infrastructure in the city.

Swimming in the Ruhr

The Ruhr river has been closed to swimmers since the early 1960s (Early, 2018). For many local residents, the highlight of 2017 was the pleasure of swimming in Lake Baldeney. In 2017, A total of 7,000 visitors enjoyed the coal waters on the course of 47 days in the Seaside Beach swimming spot. In 2018, it is planned that the Ruhrverband, the Water management association responsible for Lake Baldeney, will optimise the early warning system allowing more swimming days in 2018. The project acts as an enlightenment for the entire region: the cities of Mülheim an der Ruhr and Bochum are making plans for their own river bathing areas, while the District Administration (Ruhr Peninsula) is considering making a bathing area at the Kampmannbrücke bridge.

3) My green

As the third greenest city in Germany and the first in North Rhine-Westphalia, the city of Essen has over 3,100 hectares of green areas and woodlands. The city is green throughout, with more than half of the municipal area consisting of green areas and open spaces, such as water, fields, woodlands, and urban greens. With diverse parks and green areas, the city is unique in Germany (Sustain Europe, 2017; city of Essen , 2018).

Green urban development has been the driver of urban development in general over the last ten years. The creation and expansion of green spaces, water parks, footpaths, and cycle paths connected district areas and regions, thus laying the foundation for successful urban development of larger areas, and has served as a strategy of integrated adaptation to climate change (Sustain Europe, 2017).

Over the past decades, the municipal action programme, “ESSEN. New ways to the water”, has created a total of 150 km of footpaths and cycleways between the Emscher Valley in the north and the Ruhr Valley in the south. It has erased the urban separation between the north and the south in the Essen municipal area (Sustain Europe, 2017).

There are two parks in the city that also symbolize the city’s structural change and adaptation to climate change through sustainable architecture, landscaping and water management. From 2007 to 2012, a park was built on the location of the Krupp cast steel factory. The park has become a recreational space for local residents located at the edge of the city centre. The rainwater from the roofs of the ThyssenKrupp headquarters is collected to feed the lake in the park. The other is the Zollverein UNESCO World Heritage Site. Being a former coal mine, nature has reclaimed the areas. The diversity of species in the Zollverein Park is unique and astounding: 540 kinds of ferns and flowering plants, 100 kinds of lichen, and around 60 kinds of birds, 20 kinds of butterflies and 6 kinds of amphibians. A part of the resident species is also not original from the area owing to the

transport of goods from around the globe resulting in rare plants settling on the grounds (Sustain Europe, 2017).

4) My shopping

In 2017, as the title holder, Essen is utilising the opportunity to shift the residents' expenditure into a more sustainable pattern.

Essen has been promoting nutritious, sustainable and locally grown produce for consumption. A diverse range of associations, initiatives, and service providers in the city have long been promoting healthy diet, saving electricity, and making sustainable use of resources. Essen has long been acting as a role model for urban gardeners, with 9,000 allotment holders, 17 community gardens, and 14 farm shops (city of Essen, 2018). With fair trade products being readily available, Essen received certification as a Fair Trade Town in 2013 (European Union, 2017).

The city has been promoting the "[greenApes](#)" app since 2017, an application for sharing information on ways to adopt a sustainable lifestyle. Commuting by bike, buying "local root" products or recycling, is rewarded with points redeemable in a number of shops (European Union, 2017).

As one of the several projects that fall under "My shopping", Essen organised a one day event - **Day of Good Food** - in each of the seasons of spring, summer and autumn, to explore sustainable production and consumption of local food. Farmers, community gardens, allotments and other local producers were being encouraged to show their work, and cycle tours were scheduled along the line with the city's green corridors that connect the main sites on urban food routes (European Union, 2017).

Promoted under the joint title of "Sow, harvest, eat", each of the three seasonal events has a slightly different emphasis. In spring, the programme contains activities dedicated to sowing and gardening, while in summer, the programme offers an open-air party with cultural programmes. The event in autumn is flanked by an exhibition highlighting aspects of food production and nature conservation (European Union, 2017). Around 70 farmers cultivated a total of 3,000 hectares in Essen. Many products can be bought directly in the farm shops on-site.

Essen's food guide, the "Good food in Essen" first published in 2015, has served as an inspiration for residents who are keen to explore new sources of home-grown produce. The new edition of the guide has been updated in 2017 (European Union, 2017).

A part of the guideline outlines the rationale and the wider context, with information on aspects such as traditional and organic agriculture, climate change and natural resources preservation, as well as packaging and waste. Other contents include urban gardening, fair trade, and main logos that identify organic produce (European Union, 2017).

The second part shows a variety of businesses in Essen from farms and community gardens to shops and restaurants that fulfil the guide's criteria. The objective is to highlight suppliers of

organic, seasonal produce grown in and around the city, prioritising artisanal manufacturing over industrial processing where applicable. Fair trade shops are also included, widening the scope to source imported products with more sustainability (European Union, 2017).

5) My future

The structural change in Essen has also brought about new, green opportunities for the city's residents. The city is fostering green jobs, education, and training that ties with sustainability. By 2025, it is expected that the number of green jobs in Essen will grow from 13,000 by the end of 2017 to 20,000.

The old industries jobs have been replaced by new green jobs that have strong ties to sustainability. It is worth noting that green jobs have been created in the energy sector, where major providers based in Essen are pursuing innovative production. A plenty of small and medium-sized enterprises specialise in environmental technologies, and further activity focus on resource efficiency. Moreover, training and education are readily available for green careers in a diverse range of additional areas, such as water resource management, hydraulic engineering, and horticulture (European Union, 2017).

The sustainability focus is reflected in various activities that Essen is advancing as a part of its Green Capital programme, in the form of a number of projects dedicated to the theme "My future". Initiatives and projects involving kindergartens, schools, associations, and business, along with the general public, are helping to cultivate a new green mindset.

Environmental education starts at a very young age. A wide range of kindergartens, child day-care facilities and schools was immensely committed in 2017. Children participated in activities to raise beds, plant colourful gardens or learn about the method of waste avoidance and separation.

- What science and technologies were used? (What does it do? How does it work? How does it address the challenge?)

High technology - deep underground

The unstable soil and high risk of subsidence caused by mining is one of the technological challenges that the construction of the new underground wastewater system has been dealing with. The sewage system is built using pipe jacking at 40 metres deep under the ground, which in turn, created a need for renovation and modernization of the existing wastewater treatment plants. Previously, the plants processed and purified the water from Emscher, handling about 30 cubic metres (m³) of water per second. Now, only the wastewater is collected and channelled to the treatment plants with the new sewage system, making the plants more efficient (handling 15 m³ of water per second) (AFRY, NA).

The Emscher wastewater sewer was designed as an armoured concrete sewer. The future wastewater will stress the sewer to a high degree so that clear answers had to be found as early as the planning phase for material questions, questions of corrosion, aeration and ventilation as well as for health and safety issues. For the Emscher wastewater sewer a minimum utilisation period of 100 years was established..

With regards to the system and operating reliability of the Emscher wastewater sewer designed as a mono-pipe sewer, Emschergenossenschaft has come up with a special solution. If a section of the sewer failed, the wastewater would be passed on by means of pumps and of temporarily installed pressure pipelines. The limits for this solution are a delivery rate of 3 cubic metres (m³) of water per second and a depth position of 25 m. Where these limits need to be exceeded, even today the Emscher wastewater sewer is already built as a dual pipe sewer.

ICT technologies

An integral part of the transition to a greener, cleaner lifestyle is to inventorize carbon emissions at the consumer level. The GreenApes has developed a game that allows consumers to earn points called BankoNuts throughout the day for engaging in behaviours that are considered low-carbon (e.g., carpooling, using green energy, biking or buying organic products). The Apps focus mostly on what consumer level actions contribute to the transition to a low carbon society.

KEY AREAS OF CONSTRAINT/SUPPORT

INFRASTRUCTURE REQUIREMENT

POLICIES AND REGULATIONS

THE SCALE OF THE PROGRAMME/PROJECT

The Green Capital programme includes 453 projects and events as shown in Figure 2.



Figure 2: Green Capital programme overview (Source: Green Capital Essen Project Office, 2018)

TECHNOLOGY CAPACITY

COST AND FINANCING /BUSINESS MODEL

As shown in Figure 3, the total budget of Green Capital of Europe – Essen 2017 is 16.5 million euros with over 50% spent directly on the projects. As for public sponsors, the Federal Government provided 4 million euros in funding and the State of North Rhine-Westphalia provided a further 6

million euros in funding. A total of 1.5 million euros from sponsors boosted the budget (city of Essen , 2018).

Moreover, the European Green Capital – Essen 2017 also gained support from more than 50 partners and sponsors at the regional and local levels. Their way of participation was diverse, including sponsorship provision in the form of financial or material resources, among others. A large crowd of supporters also contributed with their own programmes and projects to the Green Capital or are involved content-wise. Additionally, the project office generated significant media reach (European Union, 2017).

Through the year of 2017, support was obtained from three main sponsors, two premium sponsors, six co-sponsors, seven further sponsors, two foundations and 14 project sponsors. A total of 2.8 million euros were benefits in kind containing additional services, and 1.5 million euros in funding. Owing to general and project-specific sponsorships, numerous projects were made possible (European Union, 2017).

Total costs – 16.5 million EUR

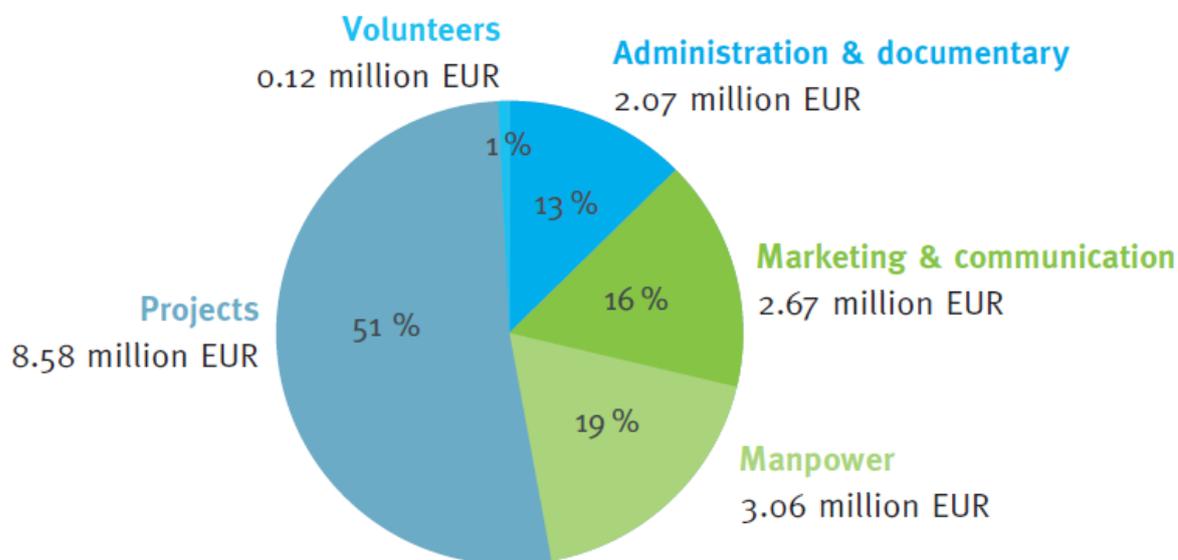


Figure 3: Total costs of Green Capital programme (Source: European Union, 2017)

HUMAN RESOURCE CAPACITY

The specialists were recruited on a needs-oriented basis, alongside the small Green Capital project office team. A strong sense of solidarity developed in the team that consisted of a diverse mix of professions, ranging from sciences to marketing, from finance to human resource administrations, from sponsoring management and public relations to stage management, and from production technology to programme direction (European Union, 2017).

Using its broad interdisciplinary expertise, the respected members of the Scientific Advisory Committee supported the city of Essen in formulating and implementing its targets. Moreover, the Wuppertal Institute and the Ruhr Universities Alliance also provided scientific support under the contract framework by the city of Essen (European Union, 2017).

Moreover, 158 volunteers from 21 nationalities were involved in 1,386 activities of the Green Capital programme.

POLITICAL COMMITMENT

The Green Capital programme has gained political support from the Minister President of NRW to Essen's Lord Mayor Thomas Kufen and Head of the Environmental Building Department, Simone Raskob.

INSTITUTIONAL SET-UP

By the end of 2015, the "Green Capital project office" was established with a total of 45 women and men, with municipal employees and freelancers included. It was part of the city administration functioning as a staff unit of the Environmental, Building and Sports Department. Simone Raskob, the Head of Department, acts as the overall project lead. The project team leaders, Mattias Sinn and Ralph Kindel in the project office manages the programme implementation, including communication, marketing, finances, sponsoring, volunteer management, and administration (city of Essen, 2018).

KEY BENEFICIARIES

Essen's residents.

TIMELINE

Green Capital programme: throughout the year of 2017

IMPACTS

CARBON REDUCTIONS

58,284 kg of CO₂ were saved.

RESILIENCE

CO-BENEFITS

Tourism in 2017:

- 500,000 additional visits to Essen motivated by business and tourism
- 1.1 million people visited the green oasis in the city centre, an increase of 7.5 percent compared to 2016
- The number of overnight stays increased by 6.9 percent

- Growth of 8 percent in available tours and participants

Biodiversity:

- 100,000 flower bulbs and 50,000 perennials were planted along the main traffic arteries of the city to promote biodiversity.
- More than 1,100 trees were planted
- More than 800 species were counted at Zollverein Park

Water supply:

- A total of 26 re-naturalised streams and rivers, and 92,000 cubic metres of the best drinking water every day.

FACTORS FOR SUCCESS

- The deep involvement and commitment of the municipal authorities, from the Youth Welfare Office, the Schools Administration Office to the Building Administration Office and the Environmental Office, are the driving force
- The Essen's residents, the businesses, scientists, industries that collaborate on the projects and activities and move them forward
- A total of 158 volunteers coming from all over the world that provide assistances
- Around 30 sponsors in the main sponsors, premium sponsors, co-sponsors, patrons, and project sponsors categories supported the Green Capital programme with funding and benefits in-kind
- The strategic vision and strategic priority work areas that coordinate integrated implementation

LESSONS LEARNED

OPPORTUNITIES, CHALLENGES, AND SCALING UP

The year 2017 was full of activities and initiatives. One of the central challenges is to retain the momentum and awareness that were created on various levels as a result of the Green Capital year.

The key actions include:

- Continue to develop the projects that began in 2017, and sustainably pursue and successively implement the mid-term targets set for the European Green Capital – Essen 2017 (targets for 2030)
- Monitor and follow up on these targets through a monitoring and verification system, and having the courage to take additional action as necessary in the event of serious deviations from the targets
- Continue the interdepartmental cooperation successfully established within the city administration in 2017 and during the implementation phase, conduct open discussions between the offices, disclosing conflicts, and working together to find solutions
- Develop international communication, and sharing experiences on a peer-to-peer basis

- Strengthening the dialogue and cooperation with the general public initiated in many projects, in order to utilise the great potential for social commitment and imagination, and to integrate the creative potential of the general public, and
- Actively help and link with the different regional activities and initiatives, and pool them to form a shared regional future narrative.

SUSTAINABILITY

After the conclusion of Green Capital year 2017, the city of Essen continues to pursue its goals. The Green Capital experience will be brought into the newly founded “Green Capital Agency”. The aim of the establishment is to design strategic measures for the long-term goal and achievement of the targets developed in the application. The successful projects from 2017 still persists, including resident’s initiatives, the volunteer network, the “green islands” in the city centre, participation in European Mobility Week, and environmental education in the Nature School. Engaging in important networks and the implementation of technical events are also planned to further promote regional and international communication (Green Capital Essen Project Office, 2018).

The European Green Capital 2017 marks the opening of a green decade throughout the entire Ruhr area. Coal mining ended in 2018 and the Emscher conversion will be completed in 2020, the results presentation of the KilmaExpo.NRW and the Climate Metropolis Ruhr will take place in 2022. Ambitious targets have been set by the Ruhr metropolis, and the successful transition, which has earned the recognition of the EU Commission, will continue. The city of Essen will continue to develop itself to be a more climate-friendly, low carbon and resilient city which provides a high quality of life for its residents (Sustain Europe, 2017; European Union, 2017).

“My paths”

In terms of mobility, the city has set firm targets that the city intends to adhere to (25% modal split). This includes boosting cycling infrastructure and foot traffic, as well as advocating for public transport. The master plan has been developed so as to further intensify air pollution control.

“My rivers”

The key project of the Emscher conversion is “ESSEN. New ways to water”, which has been reflected in over 500 projects since 2005. By 2017, the city has re-naturalised 26 streams, and a few measures will be continued to be implemented till 2021. The idea is to connect the Ruhr and Emscher river valleys with a system of green belts and waterways, which is also shown in the logo of Green Capital City of Essen. The idea is brilliantly mastered in the planning stage, and it will be sustainably implemented.

Human capacity

The city continues to support the residents’ projects and expand the involvement of volunteers in all environmental sectors so as to further promote the idea of Green Capital.

TRANSFERABILITY

As the green-to-grey transformation is an in-depth structural change and pivoting process for the city, it is difficult to replicate entirely in other cities. However, there are many exemplary learnings, programmes, and strategic planning processes under Essen's Green Capital programme that can be transferred, including:

- The ability to translate political commitment to local implementation
- The pioneer actions categorized under the five thematic areas
- The opportunity to identify and leverage economic opportunities and combine with the city's sustainability initiatives and positioning

EFFICIENCY/EFFECTIVENESS

The Green Capital programme is a success, as it presents a new image of the Ruhr region as well as the city of Essen. With the perception change within the residents, Essen also managed to project the image of the region as a whole as a successful transformation to the world. The programme was successful also due to the increased attention and raised awareness of mobility issues in particular, which is the city's Achilles' heel during the application process.

INSTITUTIONAL CONSTRAINTS/SUPPORTS

The set-up of the project office makes it easier for the city to integrate resources and perform coordinated programme management. Recruitment on demand-basis also guarantees that the budget and funding do not go to waste.

FURTHER INFORMATION / CONTACT

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<https://ec.europa.eu/environment/europeangreencapital/winning-cities/2017-essen/>

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