

# Magazine Centre of Expertise Smart Sustainable Cities



CENTRE OF EXPERTISE  
SMART SUSTAINABLE  
CITIES

# INTRODUCTION

Welcome to the magazine for the Centre of Expertise Smart Sustainable Cities. This publication offers you insights into what work we do, how we do it and why we do it. It highlights how we take integrated approaches to tackling complex issues of the cities of today and tomorrow.

## WHO WE ARE

Founded in 2014 and located at the HU University of Applied Sciences Utrecht (HU), the Centre of Expertise Smart Sustainable Cities is a platform where companies, organisations, local and regional authorities, and institutes of knowledge collaborate to realise a smart sustainable city. Professionals, students, lecturers, and researchers work on innovative projects by bringing together different knowledge and expertise.

## WHAT WE DO

Our work is people-oriented, using innovative technology that creates value. We approach the issues facing the urban world by taking action, embarking on projects of varying sizes but with large impact. Members of our team represent or support HU in a variety of projects. By joining forces with organisations, businesses, universities, and citizens we use multidisciplinary and integrated approaches to work towards solutions to the issues present in cities. We take questions from partners and stakeholders as a starting point to address issues at the local, regional or international level.

The Centre uses a threefold strategy to address the problems at hand. We work by using:

- learning communities
- practice-oriented research and innovation
- accessible knowledge

We expand upon the depth and breadth of our learning communities and research by operating in multidisciplinary teams that carry out different programme lines. The Centre operates with four programme lines:

- Healthy Areas Healthy Built
- Energy-neutral and Circular Areas
- Smart Urban Mobility
- Transition Processes

Innovation across all four programme lines is critical to the realisation of the smart sustainable city. The design of buildings, neighbourhoods and cities have an impact on people's health and well-being. Designs must take circularity into account, reducing waste and aiming for energy neutrality. There also needs to be infrastructure that allows people to move around cities in accessible and sustainable ways. Finally, citizens must actively participate in processes that help their cities transition into the future. By unlocking knowledge and sharing results, everyone can feel empowered to create a smart sustainable city.

This publication gives you an insight into the integrated approaches the Centre takes to improve urban life. Our collaborations and the impact of our work can be broadly divided into the following categories:

- Applied Research
- Education and Training
- Supporting Policy Development
- Business Collaboration
- Community Development

## WHY WE DO IT

The 21st century is marked by increasing urbanisation that brings about environmental, social, and economic challenges. As more and more people are living in cities, there needs to be sustainable solutions to current issues, as well as practical yet flexible plans for the future. Our mission is that everyone can live together safely and healthily in smart sustainable cities.

The smart sustainable city of the future is one in which everyone can live, work and thrive. Everyone should be able to participate in creating solutions to live comfortably. We hope that you will join us in making the smart sustainable city a reality.



## APPLIED RESEARCH

Putting research into practice is one of the key strategies of the Centre of Expertise Smart Sustainable Cities. Alongside various partners, members of the Centre identify complex issues that cities face, investigate them and provide practical solutions.

# Produce, consume and share: Investigating flexible energy systems with TROEF

In some areas of the Netherlands, congestion on the electricity grid prevents the transport of energy to places where it will be consumed. One possible solution is a layered energy system in which users produce, consume, and share energy through an 'Internet of Energy'. In 2021, TROEF, a consortium of 10 Dutch companies and institutions, started researching the possibilities of a layered energy system. TROEF stands for 'Transparent Reduction of CO<sub>2</sub>, Optimisation of Energy Flows and Flexibility'. Royal BAM Group is working together with HU, AM, Entrnce International, KPN, OrangeNXT, Stedin Netbeheer, NEN, Delft University of Technology and Tymlez. From 2021 to 2024, partners will research the flexibility of energy systems. With the mission of enabling all users to participate in the energy transition, TROEF has received a Mission-driven Research, Innovation and Development (MOOI) subsidy from the Netherlands Enterprise Agency (RVO).

## ENERGY COMMUNITIES

Researchers are investigating how to optimise energy storage, promote direct consumption of self-generated electricity and enable sharing of energy from different sources. An idea is to move away from the traditional electricity grid that transports high, medium, and low voltage energy and transition into utilising energy communities. Communities are divided among three sectors: residential, commercial and mobility. By using an 'Internet of Energy' users would become prosumers of energy. Prosumers may produce, consume, and share excess energy within and between communities to balance out the grid. The overall aim of the energy communities is to transparently exchange energy, reduce CO<sub>2</sub> emissions and make electricity affordable to users.

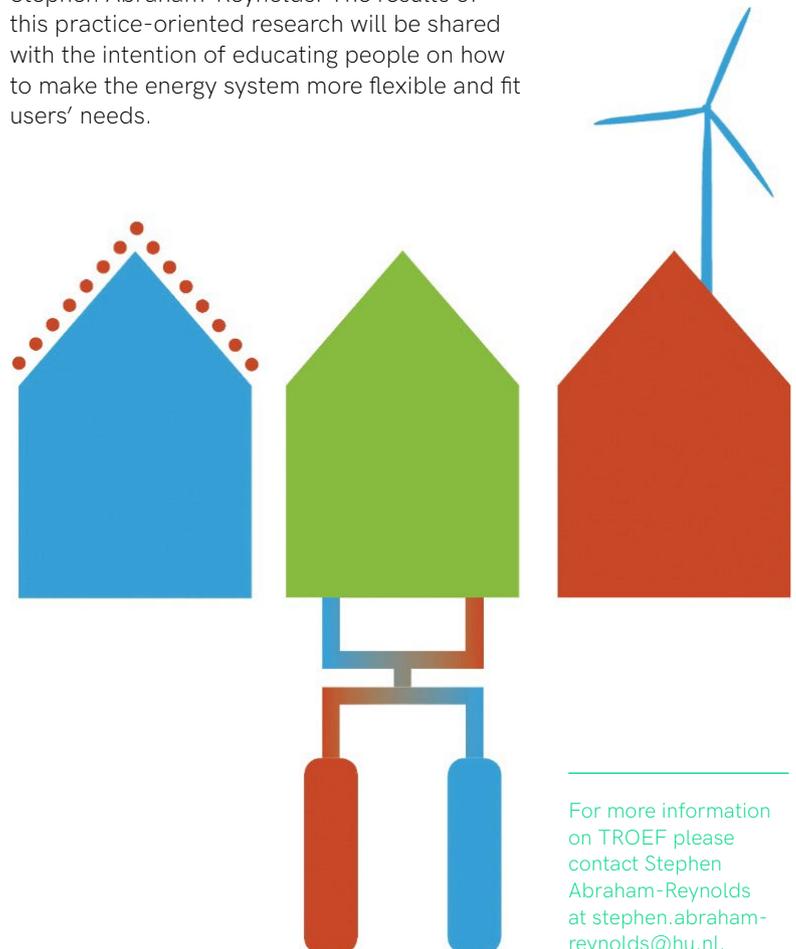
## WORK PACKAGES

HU is responsible for creating a work package that helps with investigating the impact of the layered energy system. The package will address management for key performance indicators, experimental design, and project data analysis. Other partners focus on developing the right IT

infrastructure, understanding value creation, developing business models and mapping customer journeys. Customer journeys are being tracked in living labs, such as the Royal BAM Group office space in Bunnik. There, users can experiment with emerging technologies and services in a real-world environment.

## RESEARCH THAT MATTERS

TROEF is still in its early stages, but the plans for the project are highly valuable to smart sustainable cities. "The mission of TROEF is to use and produce energy for the built environment in a sustainable and smart way, using digital innovations," explains Centre of Expertise Smart Sustainable Cities member Stephen Abraham-Reynolds. The results of this practice-oriented research will be shared with the intention of educating people on how to make the energy system more flexible and fit users' needs.



For more information on TROEF please contact Stephen Abraham-Reynolds at [stephen.abraham-reynolds@hu.nl](mailto:stephen.abraham-reynolds@hu.nl).

# Smart buildings are healthy buildings

## Researching AI and AR in the installation sector

**E**merging technologies in artificial intelligence (AI) and augmented reality (AR) can be utilised in the installation sector to make the built environment smarter and more sustainable. Such technologies could potentially collect better data such as air quality, temperature, and light. Therefore, improvements in the installation sector may also improve building users' health and overall experiences. These ideas inspired the project OMTECH\_IDGB. From November 2020 to June 2021, a consortium of researchers from HU, Tech Campus of ROC-Midden Nederland, Wij Techniek, Techniek Nederland, Kuijpers, Strukton and Croonwolver&dros, The Service Concept, TechBinder, and Eindhoven University of Technology worked on this project. OMTECH\_IDGB researched whether upcoming technologies in AI and AR can be viable tools for small and medium-sized enterprises (SMEs; MKB in Dutch) in the installation sector.

### DEFINING GOALS

The Centre of Expertise Smart Sustainable Cities, along with research groups Technology for Healthcare Innovations (Technologie voor Zorginnovaties) and Applied Urban Energy Transition (Nieuwe Energie in de Stad), represented HU in this project. HU focused on increasing SMEs' awareness of how AI and AR may benefit them. Questionnaires were sent to enterprises to ask how they understood AI and AR, whether they already used these technologies and what their business needs were. Interviews were also conducted to get more in-depth knowledge on current applications and needs of the sector. Based on the data collection and literature review, HU defined five application domains in which AI and AR can be used:

- improving processes
- reducing costs
- training and education
- visualisation and design
- monitoring

"Artificial intelligence and augmented reality are tools to reach your goals," explains Centre of Expertise Smart Sustainable Cities member and Technology for Healthcare Innovations researcher Emelieke Huisman. "So, if you want to implement those technologies, you have to start with defining your aim on how and where to use them."

### EMERGING TECHNOLOGIES

In addition to establishing goals, companies should also consider the differences between AI and AR. AR assists with knowledge management, can be implemented in a short period of time for immediate use and can be used with devices such as smartphones or tablets. For example, installers could aim a device at a QR code and assess how their installations are operating. AI is a more long-term solution that is focused on big data analytics. An example could be a sensor that detects the air quality in a building and compares the quality levels in different rooms. HU's next step is further increasing awareness of how companies can customise technologies to fit their needs.

### RESULTS THAT INSPIRE

Recognising the importance of new technologies in the installation sector, companies, institutes and universities combined their expertise to form a learning community. The consortium for OMTECH\_IDGB hosted a webinar in September 2021 to share their research results. In addition to increasing awareness among SMEs, the results aim to inspire young people to join the installation sector. With an aging population, the installation sector can benefit from data-driven, technologically minded young people entering the line of work. By equipping installation companies with the proper tools and techniques, people in cities can benefit from a smarter and healthier built environment.

For more information on OMTECH\_IDGB please contact Emelieke Huisman at [emelieke.huisman@hu.nl](mailto:emelieke.huisman@hu.nl).

## SUPPORTING POLICY DEVELOPMENT

Supporting policy development is one of the ways in which the Centre of Expertise Smart Sustainable Cities aims to put research into practice. Creating action plans for local and regional governments, the Centre hopes to influence sustainable policies within the Netherlands and throughout Europe.

# E-Bussed:

## Influencing local policy to implement electric busses



Upgrading transportation has the potential not only to reduce carbon emissions, but also to create positive experiences for users. HU is a partner of the Interreg Europe project E-Bussed, running from 2019 to 2023. Financed by the European Regional Development Fund, projects under Interreg Europe set out to create policy action plans. The purpose of E-Bussed is to announce the deployment of electric busses in six European regions. Along with the province of Utrecht, other partners include Turku, Finland; Hamburg, Germany; Pécs, Hungary; Livorno, Italy; and Gozo, Malta. Partners will share their findings on how to implement electric busses within their regions, with the aim of leveraging this shared knowledge and influencing policy plans.

### IDENTIFYING BEST PRACTICES

HU is working with the province of Utrecht, the concession holder of Utrecht's public transport. Before creating an action plan, research is being done to identify best practices within four relevant topics:

- drivers and barriers to deployment
- necessary technology
- user interfaces
- procurement and costs

HU is investigating what works best in the Utrecht region regarding these four topics. They will share their findings with and learn from their international partners to determine best practices.

Upgrading transportation and deploying a system of electric busses is a large undertaking. The deployment of new busses will likely come with new rules and requirements for companies who hold concessions with public transport operators. Additionally, the infrastructure of the region must be considered. With more electric busses there will be a great demand for charging stations. The placements of these stations are dependent on the layouts of cities. These types of issues offer many learning opportunities as the research continues.

### IMPROVING URBAN MOBILITY

E-Bussed provides an example of the work being done to accelerate sustainable mobility in urban spaces. Influencing regional policy to implement electric busses in Utrecht can contribute to the Netherlands' goal of making public transport emission-free. In addition, using busses that are not only beneficial to the environment, but also use smart technology, can allow users to fully enjoy their transportation experiences.



For more information on E-Bussed please contact Martijn Rietbergen at [martijn.rietbergen@hu.nl](mailto:martijn.rietbergen@hu.nl).

# Increasing knowledge of circular business models with REDUCES

**W**hen it comes to creating smarter and more sustainable business models throughout Europe, there is no 'one size fits all' approach. HU is exploring this idea in the project REDUCES, which stands for 'RE-thinking Sustainable Development in European Regions by Using Circular Economy Business Models'. This Interreg Europe project started in 2019 and will run until 2023. In addition to Utrecht, partners in the following cities and regions are also involved: Southwest Finland; Valencia, Spain; Manchester, United Kingdom; Maramures, Romania; and Bulgaria. The overall aim is to stimulate circular economy business models and influence local policies in each region.

## IDENTIFYING BEST PRACTICES

Circular economy business models typically involve repurposing products at end-of-life or using them for longer periods of time. Before creating policy action plans for future business models, each region is studying good practices in different companies and countries. HU is researching companies in and around the province of Utrecht. The goal of the research is to turn both scientific literature on circularity and empirical findings from all partners into relevant findings for governmental policy. HU works primarily with businesses in the building and construction sectors. They cooperate with companies to understand their needs, assess the extent to which they use circularity and identify types of business models used. The lead partner country, Finland, has defined five types of business models based on the definition of Finnish innovation fund Sitra:

- product as a service
- renewability
- sharing platforms
- product-life extension
- resource efficiency and recycling

## SHARING RESULTS

Partners of REDUCES not only research companies within their own countries, but they also share findings with each other. Sharing results allows partners to determine how suitable and scalable different circular approaches would be in their own countries.



It can sometimes be a challenge to fit international findings, definitions and indicators to a local context. Despite any challenges, international findings are valuable and have given HU new insights on how to view the relationships between businesses and governments.

## COLLABORATIONS WITH AN IMPACT

With an end goal of influencing local policy, REDUCES has the potential to make a large impact. "Because these local governments are valuing sustainability more, they also try to influence national and European policymakers and politicians to do the same," explains Centre of Expertise Smart Sustainable Cities member and research group Building Future Cities researcher Evert-Jan Velzing. Even prior to policy plans, this project has a lot to offer in terms of research and learning opportunities. Working with companies and sharing results internationally enhances what we know about sustainable business models. In the end, the aim is to help companies at the local level adapt so that they can thrive in smart and sustainable ways.

For more information on REDUCES please contact Evert-Jan Velzing at [evert-jan.velzing@hu.nl](mailto:evert-jan.velzing@hu.nl).



## BUSINESS COLLABORATION

The Centre of Expertise Smart Sustainable Cities collaborates with businesses in a variety of sectors, providing expertise on sustainability and gaining insights on businesses' goals and needs. Collaboration between companies, researchers and students allows everyone to learn in real-world contexts.

# Matching companies with talented students in the HU Innovation Trainee Programme

Just like larger companies, SMEs are essential to the energy transition. Given the time and resources for research and development, SMEs can expand their capacity for innovation. The Innovation Trainee Programme is a national pilot project that aims to boost connections between companies, researchers, and students. The Taskforce for Applied Research SIA, under the Dutch Research Council (NWO), has provided subsidies for 13 universities of applied sciences to allow soon-to-be-graduating students to conduct research in a joint internship/traineeship. HU is one of the participating universities, and their goal is to stimulate innovation and sustainability in SMEs in the Utrecht region.

## RESEARCH AREAS

The Centre of Expertise Smart Sustainable Cities works with HU professors to match up to 15 ambitious, talented students with SMEs where they can carry out practice-oriented research. Students may work to develop innovative products, services, or processes. Research projects are organised according to the Centre's four programme lines: Healthy Areas Healthy Built, Energy-neutral and Circular Areas, Smart Urban Mobility and Transition Processes. Seven HU research groups are also involved, including:

- Applied Urban Energy Transition (Nieuwe Energie in de Stad)
- Building Future Cities
- Microsystem Technologies (Microsysteemtechnologie)
- Technology for Healthcare Innovations (Technologie voor Zorginnovaties)

- Process Innovation and Information Systems (Procesinnovatie en Informatiesystemen)
- Co-Design
- Innovative Testing in Life Sciences and Chemistry

## PROGRAMME TIMELINE

The programme includes a six-month graduation internship followed by a one-year traineeship. The internship period allows companies to assess students as they start working on research questions tailored to the companies' innovation needs. If they are a good match, students may continue doing research for an additional year after graduation as a trainee. Trainees receive coaching from HU lecturers in their field even after they graduate.

The first group of students started their internship in February 2021 and new rounds of interns start every six months.

## THE ULTIMATE PROJECT

"The Centre of Expertise Smart Sustainable Cities combines research, education and questions from companies. This is the ultimate project," explains Centre of Expertise Smart Sustainable Cities member Marjoke de Boer. Companies receive research expertise in the areas of sustainability and innovation, and trainees enjoy an extended time to conduct research in their fields. These collaborations allow SMEs to develop solutions for a smart sustainable future.

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For more information on the HU Innovation Trainee Programme please contact Marjoke de Boer at [marjoke.deboer@hu.nl](mailto:marjoke.deboer@hu.nl).

## TRANSFORM-CE: Identifying circular solutions to single-use plastics

To transition into the future, enterprises will have to adopt circular business models, especially when it comes to designing, making, and using plastic products. HU is a partner of the project TRANSFORM-CE, which entails 'TRANSFORMing single-use plastic and creating a circular economy (CE) business model'. The goal of TRANSFORM-CE is to convert single-use plastics to materials to be used as input for new products. Supported by Interreg North-West Europe, this project runs from 2019 to 2022. Working

alongside partners in the United Kingdom, Germany, Belgium and with other Dutch organisations, HU provides companies with expertise on how they can apply circularity to their business models and transform the life cycle of plastics.

### PROMOTING CIRCULARITY

With the help of experts, designers, researchers and students, HU supports businesses in achieving their circularity ambitions. HU's main contribution to

TRANSFORM-CE is a 'business uptake' work package, which informs businesses on how they can re-evaluate the life cycle of their products and creatively reuse resources. International partners provide expertise on project management, technical testing, and material flow analysis, all of which help HU in creating the work package. Making the package involves three main activities:

1. Workshops assessing the needs of businesses and barriers to uptaking recycled content in new products.



# Living in the future

## Team Celcius and their Solar Decathlon win

**T**he Netherlands has a housing shortage of more than 300,000 homes. This issue inspired Team Celcius, an interdisciplinary group of HU students, to create a sustainable housing concept. Team Celcius is named for its core values: circular, eye-opening, limitless, community, innovative, unconventional, and self-sufficient. The team began working in October 2018 to enter the 2020 Solar Decathlon, hosted by the United States Department of Energy. Due to COVID-19, the competition was postponed until the week of April 12, 2021. The competition was worth the wait, because Team Celcius took home three prizes, including: 3rd prize for operations, 2nd prize for architecture and 1st prize for engineering.

### A WINNING TEAM

Collaborations between students, the university and businesses resulted in the prized Celcius House. HU provided funding, and the students then took charge of purchasing, building, contracting, managing, and communicating. They partnered with over 30 Dutch and international businesses to construct the house in Zwolle. Companies were enthusiastic about forming a learning community with the students, putting their expertise together into the creative design of the house. "It was giving them a platform for their innovative projects to show," explains Team Celcius member Rutger Kroeze.

### A CHALLENGING CONCEPT

Besides construction, students were challenged with creating a concept that was both marketable and sustainable. The modular and circular concept helped Team Celcius stand out from their competitors at the Solar Decathlon. The modular



design of the house allows users to disconnect panels or to expand the frame. Circularity is seen with recycled materials, insulation made from biomass and wood as a substitute for concrete. Even amidst COVID-19, Team Celcius succeeded in creating a product that can inspire the future of the Dutch housing market.

### CREATING INNOVATIVE SPACES

The Solar Decathlon has passed, but Team Celcius is still partnering with businesses. The Celcius House has been moved to its permanent site in Hoefkwartier in Amersfoort, a neighbourhood set to become an innovative living and working space. The Celcius House will remain there as a 'living lab', a testing site for people to explore creative solutions in sustainable housing.

An enthusiastic group of students, Team Celcius showed that they could combine their expertise and apply it to real-world problems. They gave various companies the space to innovate and contribute in creative ways. The story of Team Celcius is an inspiration to all who wish to make their visions of smart sustainable cities come to life.

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For more information on Team Celcius and the Solar Decathlon please contact Rutger Kroeze at [rutger.kroeze@student.hu.nl](mailto:rutger.kroeze@student.hu.nl).

2. Good practice case studies on the circularity of companies' business models, circularity within the value chain and operational processes. Five case studies are being conducted in each of the four partner countries, and HU is responsible for the methodologies.
3. In-depth support case studies particular to recycling. The aim is to provide expertise to companies who wish to become circular but are unsure of how to make the best use of recycled materials.

There is also a pilot plant in Almere that uses IEM (intrusion extrusion moulding) to transform low-quality plastics into materials that can be created into useful products, such as park benches. HU gains practical insights from the pilot plant. "We need each other's

knowledge," explains Centre of Expertise Smart Sustainable Cities member Malou van der Vegt.

### THE CIRCULAR FUTURE

To help companies reach their full potential in a circular economy, there needs to be the right match between companies, designers, types of plastics to reuse and the right products. One of HU's next steps is creating a roadmap which illustrates how businesses can adopt circularity. The roadmap and the results of the work package are planned to be shared online, as transparency is essential for encouraging companies to take up circular business models. Guiding businesses through their circular journeys can result in smarter, more sustainable products in local economies.

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For more information on TRANSFORM-CE please contact Evert-Jan Velzing at [evert-jan.velzing@hu.nl](mailto:evert-jan.velzing@hu.nl).

## EDUCATION AND TRAINING

Students are integral to knowledge production for the Centre of Expertise Smart Sustainable Cities. With various academic backgrounds, students at HU have several outlets for creating learning communities with internal and external partners.



# Learning tools and techniques in the Smart Sustainable Cities minor programme

Since 2016, the minor programme Smart Sustainable Cities (SSC) has been equipping HU students with tools to investigate the issues present in urban society and create lasting, sustainable solutions. This programme was created as an integrated solution to a collection of previous minor programmes on sustainability. Working under the themes of People, Planet, Profit and Smart, the SSC minor attracts people from all disciplines who want to dive deeper into the economic, social, and environmental concerns in future cities. With their diverse expertise and backgrounds, students approach sustainability issues from multiple perspectives. About  $\frac{1}{3}$  of students in the programme are international.

### GENERAL COURSE

The SSC minor consists of 30 ECTS, which takes one semester to complete. Students first take the 15 ECTS General Course. There is a new workshop every week, particular to one of the four themes: People (inclusiveness, participation, policy), Planet (energy, mobility, circularity), Profit (business models, marketing/communication) or Smart (Big Data, ICT). Workshops focus on creating understanding within these topics, as well as applying the appropriate methods and tools.

### SUSTAINABILITY CHALLENGE

The second part of the programme is a 15 ECTS Sustainability Challenge. HU arranges students

with clients interested in particular sustainability issues. Students investigate the issue, manage the project, create solutions, and give advice to the client. Nearly half of the students choose to do a Sustainability Challenge abroad, working in either Alcoy, Spain; Turku, Finland; Manchester, United Kingdom; or Hanoi, Vietnam. Past projects included research into reducing carbon emissions for the Turku bus network or advising a lighting manufacturer in Hanoi. These international partnerships were born out of the European Sustainable Solutions for Existing and New City Environments (ESSENCE) project, developed by the CARPE-Network and Erasmus+. Even in the years following the ESSENCE project, students in the SSC programme still benefit from an international learning community.

### MEANINGFUL EDUCATION

As a sustainable minor, activities in the SSC programme contribute to one or more UN Sustainable Development Goals. The programme allows students to conduct research that is meaningful for both their education and the world. Members of the Centre of Expertise Smart Sustainable Cities are currently writing a textbook on the necessary tools and techniques for students to take what they learn in the SSC minor and apply it to the real world. Connecting people inside and outside of the classroom, this programme encourages lifelong learning and collaboration on complex issues.

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For more information on the SSC minor programme please contact Martijn Rietbergen at [martijn.rietbergen@hu.nl](mailto:martijn.rietbergen@hu.nl).

## COMMUNITY DEVELOPMENT

Achieving a smart sustainable city depends not only upon researchers, policymakers, businesses or students - citizens must also be actively involved. This section details how the Centre of Expertise Smart Sustainable Cities works with the community.

# Energy poverty in the private rented sector

## A community approach

**M**illions of Europeans live in energy poverty, meaning that they are unable to afford energy services at levels that meet their needs. Energy poverty may result from low incomes, inefficient housing or high energy prices. ENPOR is an international project funded by the European Union's Horizon 2020 research and innovation programme that is working to alleviate energy poverty in the private rented sector (PRS). HU represents the Netherlands in this three-year project that investigates energy efficiency policies and tools in 10 EU Member States.

### REINFORCING THE ENERGIEBOX

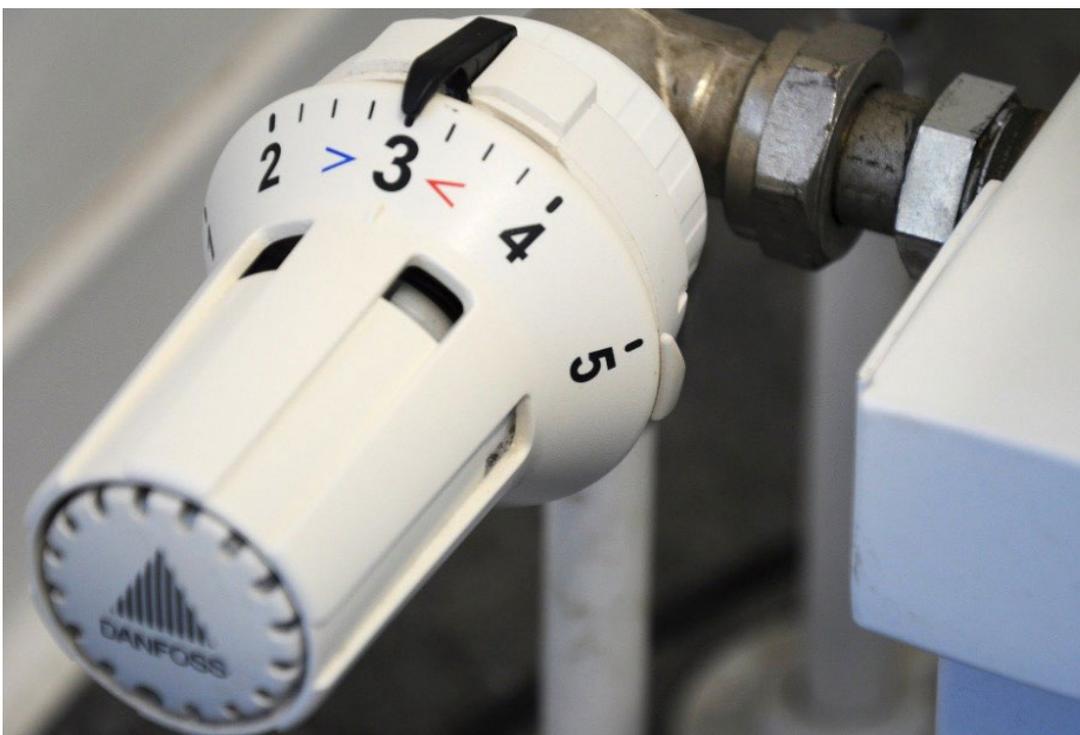
HU is researching the effectiveness of the Energiebox pilot project in Tilburg. Energiebox is an initiative that provides participating households with a free box of small items to control their energy consumption, as well as free advice from an energy coach. The aim of the project is to track users' experiences and see how the Energiebox concept can be best used to help the PRS. Researchers are investigating how the contents of the box, the advice and the communication strategy can be improved. Focus groups consisting of residents, landlords, energy coaches and municipality representatives are planned so that all stakeholders can share their experiences.

### ENCOURAGING INVOLVEMENT

Alongside the desire for climate friendly behaviour, saving money drives households to participate in energy-saving initiatives. Therefore, households need to trust that such initiatives can help them save money. Desk research has been done to investigate best practices for communicating about energy projects. Local, tailored approaches are preferable. Referrals from friends, family and local organisations can encourage new households to participate. In addition, sharing information in different languages enables households from different cultural groups to participate. Overall, energy-saving initiatives work best when the whole community is involved.

### ENERGY TRANSITION FOR ALL

Providing households with the knowledge and resources to participate in the energy transition allows them to save money for themselves and help the planet. Involving landlords can push the impact even further, as they have the power to improve the efficiency of their buildings. As the research into Energiebox continues, the goal is that it can serve as a blueprint for addressing energy poverty in different municipalities as well as other countries. The Centre of Expertise Smart Sustainable Cities hopes that this concept can help lower the barriers for all members of a community to contribute to the energy transition.



For more information on the Energy poverty programme please contact Martijn Rietbergen at [martijn.rietbergen@hu.nl](mailto:martijn.rietbergen@hu.nl).

# FINAL THOUGHTS

Nadia Verdeyen is the Director of the Centre of Expertise Smart Sustainable Cities. Here she shares some reflections on the Centre's origins, partnerships and what it means to live in smart sustainable cities.

## HOW AND WHY DID THE CENTRE START?

"Collaboration between practice, research and education is of great importance to our university. Since the 1990s, HU has had programmes in the field of sustainability, with the aim of embedding sustainability in the hearts, minds and actions of employees and students. The start of the Centre was the next step in bringing together practice, research and education around the theme of sustainability. And we contribute to the vision of our university: 'HU wants to make a significant contribution to the quality of life and society in our urban environment'.

We involved people from large and small companies, government, non-profit organisations, students, and professors. In this way the focus was determined: energy, health and making the transition happen in the context of the city."

## WHAT HAVE YOU LEARNED FROM YOUR PARTNERS?

"A big lesson is that you have to be flexible when working with partners: being open to other perspectives and ways of working. Another important one is that it's very inspiring when students, researchers and people from organisations work together. If we really want to address the societal challenge concerning sustainability, it's necessary that we work together, learn together and get inspired."

## WHAT KINDS OF PARTNERS DO YOU HOPE TO WORK WITH IN THE FUTURE?

"We want to strengthen the good collaborations we have right now with the local, regional and national government. We also have good collaborations with companies and NGOs. An important next step would be to have even more small and medium-sized companies included."

## HOW DO YOU MAKE SURE THAT HELPING PEOPLE IS ALWAYS THE FOCUS OF YOUR PROJECTS?

"By involving people from the beginning. In a project like TRANSFORM-CE, you involve people from companies. For Inside Out, a project on renovating an apartment building, the people living in the apartment building are involved from the beginning. We have worked together with companies, governments and sometimes NGOs. And now we are really making a next step where citizens are crucial as a partner."

## WHAT RESULTS DO YOU HOPE TO SEE IN THE FUTURE?

"For the future, I hope to see even more results in the real world, for instance renovated apartment buildings that are healthy and free of fossil fuels. Or an area in the city that is transformed to a healthy sustainable area. So this can be achieved by learning and working from the framework of sustainability together with citizens, companies, governments and knowledge institutions."

## FINALLY, WHAT DO THE WORDS 'SMART' AND 'SUSTAINABLE' MEAN TO YOU?

"I think sustainability is one of the big challenges as humanity that we have to address, so that future generations can still have a good life on this planet. I want to contribute as a professional with my work for the Centre, and in my personal life. To make it manageable, I select one topic at a time to work on and change my habits. For instance, one of these topics I have worked on was transportation. So, I try mostly to use walking, biking or public transportation and only use cars if necessary. Right now, my focus is on the impact of food on sustainability and health."

Smart has two perspectives. On the one hand, smart is involving everyone, taking the wisdom of the people. On the other hand, technology can help us advance our sustainability goals. For instance, to make the transition to a fossil-free city, we need the technology to generate sustainable energy and to renovate large amounts of houses. Technology also enables us to collect data to monitor the generation and use of energy. So, technology is important, but technology should also help people in a way that they are happy with it."



# Centre of Expertise Smart Sustainable Cities by the numbers

Here are some facts and figures from 2020...



More than 450 students worked with us on various projects

We collaborated with over 100 partners on regional, national, and international projects



We worked on 34 projects concerning energy, circularity, the built environment, and urban mobility

Our core team consisted of 22 people: director, professors, lecturers, researchers, and support staff



# Project List

New and Ongoing Projects (2021)

PROJECT	LEAD PARTNER	FINANCIER	START	END
Smart Solar Charging	Utrecht Sustainability Institute	ERDF (European Regional Development Fund) EFRO Kansen voor West	2017	2021
Celcius student team	HU University of Applied Sciences Utrecht	Business partners, Solar Decathlon organisation, HU Centre of Expertise Smart Sustainable Cities	2018	2021
Inside Out	Utrecht Sustainability Institute	The Ministry of Economic Affairs and Climate Policy ('Topsector Energiesubsidie')	2019	2021
Emerging technologies, AI and AR in the installation sector ('Opkomende technologieën, AI en AR in de installatiebranche')	HU University of Applied Sciences Utrecht	Taskforce for Applied Research SIA - KIEM	2020	2021
Handbook Smart Sustainable Cities	HU University of Applied Sciences Utrecht	HU Centre of Expertise Smart Sustainable Cities	2020	2021
Representing the voice of next generations in mobility futures	HU University of Applied Sciences Utrecht	Unit Innovation in Mobility - Ministry of Infrastructure and Water Management	2020	2021
Student flats of the future ('Studentenflat van de toekomst')	HU University of Applied Sciences Utrecht	HU Centre of Expertise Smart Sustainable Cities	2020	2021
Transform-CE	Manchester Metropolitan University	ERDF (European Regional Development Fund) - Interreg North-West Europe	2019	2022
Bio-Iso	HZ University of Applied Sciences Zeeland	Taskforce for Applied Research SIA RAAK MKB	2020	2022
Cooperative in Balance, Innovative Sustainable Energy Services ('Cooperatief in Balans, Innovatieve Duurzame Energiediensten')	Hanzehogeschool Groningen	Taskforce for Applied Research SIA RAAK MKB	2020	2022
Energy poverty in the private rented sector (ENPOR)	Institute for European Energy and Climate Policy	European Commission Horizon 2020	2020	2022
National Research Group Platform Urban Energy ('Nationaal Lectorenplatform Urban Energy')	HU University of Applied Sciences Utrecht	Taskforce for Applied Research SIA - Platforms	2020	2022

PROJECT	LEAD PARTNER	FINANCIER	START	END
HU Innovation Trainee Programme ('HU Innovatietrainee Programma')	HU University of Applied Sciences Utrecht	Taskforce for Applied Research SIA - Innovation Traineeship	2021	2022
E-bussed	Turku University of Applied Sciences	ERDF (European Regional Development Fund) - Interreg Europe	2019	2022
REDUCES: REthinking Sustainable Development in European Regions by Using Circular Economy Business Models	Turku University of Applied Sciences	ERDF (European Regional Development Fund) - Interreg Europe	2019	2023
Region-oriented SLIM ('Gebiedsgericht SLIM')	Cocreatos	ERDF (European Regional Development Fund) EFRO Kansen voor West	2021	2023
Multi-year Mission-driven Innovation Programmes in Energy (MMIP)	TNO	The Ministry of Economic Affairs and Climate Policy Netherlands Enterprise Agency - RVO	2020	2024
TROEF: Transparent Reduction of CO <sub>2</sub> and Optimizing Energy in an Ecosystem of Flexibility ('TROEF: Transparant Reduceren van CO <sub>2</sub> en Optimaliseren van Energie in een Ecosysteem van Flexibiliteit')	Royal BAM Group	The Ministry of Economic Affairs and Climate Policy Netherlands Enterprise Agency - RVO MOOI	2021	2024
AVR Climate Positive Circular Communities	Norwegian University of Sciences and Technology	Green Deal Europe - European Commission Horizon 2020	2021	2025
ROBUST: Robust Sustainable Electricity System through Regional Flexibility ('ROBUST: Robuust Duurzaam Elektriciteitssysteem door Regionale Flexibiliteit')	Utrecht Sustainability Institute	The Ministry of Economic Affairs and Climate Policy Netherlands Enterprise Agency - RVO MOOI	2021	2025
Gasless living well-organized ('Gasloos wonen goed geregeld')	TNO	The Ministry of Economic Affairs and Climate Policy (TKI Urban Energy - DEI)	2020	
Future factory	Factory Zero	The Ministry of Economic Affairs and Climate Policy Netherlands Enterprise Agency - RVO MOOI	2020	2024
Werkspoorkwartier: Creative circular manufacturing area ('Werkspoorkwartier creatief circulair maakgebied')	Utrecht Sustainability Institute	ERDF (European Regional Development Fund) EFRO Kansen voor West	2017	2021

## Colophon

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