



## Kiel Dialogue Platform

Webinars on smart urban solutions for climate mitigation

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## Smart urban solutions for climate mitigation – potentials, risks and strategies

Benno Keppner, project manager at adelphi, gave the introduction to the webinar giving a short overview of the topics that were discussed in the following two hours. Frank Graage, Steinbeis Nord-Ost, introduced himself as the moderator of the webinar and presented the agenda.

**Jens-Peter Koopmann, Head of the climate mitigation team in the Environmental Department of the city of Kiel**, started out mentioning that climate mitigation is a topic for the municipality already since decades. In 1995 the city set itself the goal to reduce the greenhouse gas emissions by 40 % in 2020. This was achieved by for example switching an old coal-fired heat and power plant to natural gas. In 2019 a follow-up plan was elaborated, as climate change is happening much faster than expected. Within a funding programme called “master plan municipalities” of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. This is a total of 40 German cities, municipalities and districts, which have set themselves the goal of reducing their greenhouse gas emissions by the year 2050 by 95 percent compared to 1990 and to halve their energy consumption. Koopmann stated that 95 % reduction is an ambitious goal. 40 % reduction was possible for Kiel. But for this new goal everyone must change their behaviour. And currently the “Fridays for Future”-movement is demanding that the reduction must even come faster. Furthermore, the city declared a “Climate emergency”. This means, that all reduction measures need to be speed up. One of the measures is a solar initiative: Speed up of installation of solar panels on municipal and household buildings. Further measures are in the area of mobility: 1) roads for bicycles will be built and this week another campaign started (Stadtradeln). The campaign aims to convince people to use only bikes to go to work. It is successful as a steady increase in the last years can be observed. The Environmental department is very interested in Smart City projects to support climate goals. There are already examples that can be found in Kiel such as Sprottenflotte, which is subsidized by the municipality. Thanks to the subsidized bikes are the first half hour for free. Another project is LoRaWAN to measure energy consumption. The department is often asked for better monitoring on emissions and energy consumption. But the data they have currently is at least two years old. In order to show that the city of Kiel is on track with the climate measures, smart city projects like LoRaWAN are needed.

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### 1.1 Climate related challenges for smart solutions

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**Kikki Lambrecht Ipsen, from the University of Sherbrook (Canada)**, began her presentation with the general assumption that with Smart City solutions are supposed to make the urban system more efficient and therefore also more environmental friendly. However, she noted, there is currently little research on the environmental effects in a holistic way. In her study she aimed to quantify the environmental performance of Smart City solutions at urban system level in a life cycle perspective for the case of Copenhagen. Seven different technological solutions (green roofs, smart windows, pneumatic waste collection, sensorized waste collection, smart water meters, greywater recycling and smart energy grid) were selected and hypothetically implemented. The effects of these technologies were modelled and compared to a business as usual case. The concepts used for the modelling are the urban metabolism and life cycle assessment. With the urban metabolism approach all flows going in (such as electricity, food, water) and out of the city (such as consumer waste and wastewater) are analysed. These were coupled with the life cycle assessment which includes also

environmental effects of resource extraction and manufacturing for the assessment of products. The results show that three solutions are in the overall assessment not beneficial (smart windows, pneumatic waste collection and greywater recycling). That means, that the environmental impact of resource extraction and production are higher than the positive impacts obtained through the implementation of these technologies. For three more solutions the conclusions are not sure. Only the smart energy grid showed definitely beneficial effects for the environment. The analysis showed that through the implementation of the analysed smart city solutions, the burden of environmental problems was shifted outside of the city to the sites where the production and the extraction of raw materials take place. The conclusions drawn from the study were:

- 1) For the analysed technologies, only limited positive influence was found due to burden shifting.
- 2) The results are still not sufficient to discard the whole idea of smart city solutions to reduce the environmental effects.
- 3) The results cannot be generalized as the study focused on the implementation in one specific city and on only seven solutions.

In the following presentation, **Friederike Rohde, researcher at the Institute for Ecological Economy Research (IÖW) Berlin**, talked about the “social and ecological effects of smart city solutions”. She noted that there are several general criticisms of smart city concepts mostly voiced from sociologists and urban planners. These touch upon the idea of technological solutionism, the assumption of control and predictability of urban life and that smart city solutions are primarily pushed by technology companies in order to sell their products. With regard to the assumed immaterial nature of digitization, she noted that digitization is definitely not immaterial. Devices, data centers, network infrastructure and data need raw materials and energy. Currently, ICT account for 4-7 % of global electricity consumption with a fast growth rate predicted in the next decade. Particularly, the demand of data centers and the emissions related to the electricity production are increasing continuously.

This is why, in her opinion, technological feasibility does not necessarily meet societal and ecological goals. For example, she highlighted that autonomous and electric cars do not necessarily solve the mobility problems in cities. In the case of free-floating car-sharing, she mentioned the example of Berlin, where car-sharing is mostly used in the city centre and therefore shifts mobility from public transport to cars. Therefore, she emphasized that the discussion needs to start with the question: which is the societal goal? In contrast to the negative examples on mobility, she presented the Superblocks concept in Barcelona. One superblock consists of 9 building blocks with 5000-6000 inhabitants. Within this superblock only destination traffic is allowed. This resulted in more space of pedestrians, rising quality of air and living quality. This is why Mrs. Rohde sees, in the case of sustainable mobility, the solution in discussions about reorganising public space rather than new technologies.

The question should be: Which goals can be achieved with technological solutions and which ones by other measures? This results in alternative visions for the Smart City. In Vienna for example the project “Grätzeloase” (neighbourhood oasis) is an example that smart city can also comprise of social innovations. For one evening some roads in the city are closed for a dinner of the neighbourhood. This creates more contacts and an improved living quality for the residents. She is proposing a Digital Social Innovation, which is a digitisation for the common good. Smart Cities in her vision need to be open, inclusive and collaborative. For example, through publicly owned infrastructure, open city platforms and cooperative platforms. She ended her presentation with a quote by Cedric Price: “Technology is the answer ... but what is the question?”

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## 1.2 First Discussion

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### **What is your takeaway from these presentations and your work in Kiel?**

Jens-Peter Koopmann stated that we learned that digitisation and smart city solutions need a lot of energy. He found this out also in Kiel when they checked the consumption of data centres of the municipality. But he emphasized that a pilot project showed that 7 % of energy was saved in a data centre with new technologies. Those savings can be even achieved with increases in the capacities in parallel. Another example, he mentioned was a new “E-Sport-Centre” in Kiel. He raised the question of the magnitude of energy consumption that will be caused by this centre. He found out that nobody had thought about this even though the energy consumption of new measures need to be checked in Kiel. This is a result of the political decision of “climate emergency”. For him this decision means, that the question should always be whether the technology is necessary. He illustrated this with another example: In schools in Kiel, now electronic white boards are installed. However, the energy demand for the white boards are now overcompensating the decreases that were previously achieved through LED-lighting. This shows for him the necessity of awareness raising, that every decision is related to energy consumption.

Kikki Lambrecht Ipsen highlighted the need for more research on cases in other cities. Data is a crucial question. The analysis was based on open data. The data of the city was possible to collect. But data on production is difficult to gather. That is why, she would like to see companies publishing more data on their energy and resource consumption.

### **We see a constant promotion on non-sustainable practices and lifestyle by large commercial entities. Increasing consumption of consumer electronic devices for example but also clothing, fast food etc. How to deal with this kind of pressure to our communities?**

Friederike Rohde said, that we should take into account, that we do not offer additional services. The question needs to be, what is the aim and not “oh there is this technology, and we need to apply it”.

### **Would you say, that many cities do not enough effort to think about the first step of the aims?**

Friederike Rohde answered, that some cities are definitely connecting smart city solutions with their city goals. One example is Vienna. They looked at their mobility masterplan, their city development masterplan etc... and then asked themselves how smart city solutions can help to achieve the goals of these masterplans. However, she noted that the role of technology is not that prominent in Vienna.

### **Did you have certain indicators for your masterplan?**

Jens-Peter Koopmann pointed to the reporting tools of the Federal Ministry. However, with these they are not able to take into account the aspects in the presentation of Mrs. Ipsen. The reason is that only the energy and resource consumption in the city is accounted for. Furthermore, he said, that a city alone cannot collect all this data and do this kind of assessment.

Kikki Lambrecht Ipsen, said, for her the main point is, that planers should be aware that things can happen that they did not expect. Therefore, being aware that technology for the sake of technology should not be the goal, can be a good start. This does not mean, that not more holistic assessments are needed. But these assessments are the task of researchers.

Additionally, she mentioned, that more testing of smart city solutions before a large roll-out could be also a good approach.

### **What do you think about elderly people and their capability to use smart city solutions and being part of this concept?**

Friederike Rohde answered, that cities need to be really attentive that the smart city is inclusive. Sometimes that means that also analogue solutions need to be implemented in order to account for the needs of older people. The important questions in this regard is on infrastructure of the city: Are these infrastructures located where the people are living? Sometimes, she highlighted, it is more important to enhance these and not more digital solutions.

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## **1.3 Overcoming climate related challenges – strategies and experiences**

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**Marek Muiste, Tartu Regional Energy Agency**, started his presentation pointing out that Estonia is one of Europe's most energy and carbon intense economies. This results in important environmental, social and energy efficiency challenges for the country. One important part in the search for the solution are cooperation models that help to reduce the environmental footprint. The project SmartEnCity is on component of the city of Tartu to move to a low carbon economy. In the project a combination of knowledge partners (university, energy agency, and consultancy), service partners and the municipality are working together. Also, the private sector and citizens are participating. The project aims also to create value of the community. One part of the project are Smart Zero CO<sub>2</sub> refurbishments of 17 soviet-era apartment buildings. The question at the beginning was: "What can we do with these buildings, if we do not want to demolish them?" The idea was to use the best technology and the best approach to create best case examples. The goal was to show that the challenge of an ambitious renovation of buildings from 1960 and turn these into attractive apartments can be achieved. Because if this can be shown, then there are no excuses for other buildings. The renovation is part of the Smart Zero CO<sub>2</sub> City Tartu strategy with other components such as a rapid charging network for electric vehicles, electric city bike service and green electricity. All this creates a framework for citizens and companies to take better, environmentally friendly decisions. Today, the share of the emissions of the municipal sector in the city is not even 10%. This shows that especially the private sector and households need to reduce the emissions. With trainings and capacity building the private sector and households will be informed to take advantage of the options the city is creating.

**Živilė Šimkutė, Kaunas University of technology**, presented examples from Lithuania in the transport and energy sector. To give some insight on the situation in Lithuania, she showed that the biggest share in emissions of Lithuania comes from the energy sector. This share consists of transport 28% and 12,4 % in energy production. Other important sectors are industrial processes and agriculture. The country has a comprehensive climate framework. For example, the Lithuanian Climate change program gives incentives for investments in renewable energy sources and energy efficiency. One of the problem areas, as in the case of Estonia, is the heating of buildings. More than 50 % of Lithuanians are living in mostly unrenovated soviet-era buildings. Currently, only 7 % are renovated, now with a new programme the ambition is to renovate 5000 buildings, which would mean an increase of 12 %. However, the renovation rate is not increasing. In many cases the problem is that people are owning the apartments and some reject the renovation. The rejection comes from examples, in which the renovation was not done properly. In these cases, this led to lower air quality, mould in the building. This shows the main problem is not a technological one. The task is to talk to the people and convince them of the benefits of renovation. Also, the

emissions from transport are rather high. The parliament just decided on a tax on fuels for private cars. This gives a financial incentive to change to more environmental friendly options. Another example is a ticket application that reduces the paper tickets. However, it is expected that not more than 7 % of the people will be using the application. An inclusive solution was to integrate benefits for visually impaired, for example the app is announcing the arrival of a bus. But also this example shows, that in the end it is not only about digital technologies, but that also infrastructures need to be changed. For example, this would mean to build bicycle roads. For Živilė, Smart city concepts therefore need to mix various solutions with informed decision making. However, in her observation, municipalities are still investing more into technologies and not in people. Frequently, they do not consider that the costs of the maintenance of the system might be more expensive than the development. Furthermore, “analogue” solutions (i.e. changes in infrastructure) are not sufficiently considered. Furthermore, one needs to acknowledge that city planning takes time, and the outcomes might be seen sometimes only far in the future.

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## 1.4 Second Discussion

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### **Which fuel is used for buses in Tartu?**

Marek Muiste explained that the municipal bus fleet is only using biogas from waste. There was already some experimentation with electric buses. But those are not rolled out yet. And the biogas is two problems at once, because the biogas is created from waste and it is used for environmentally friendly mobility.

### **Did you encounter risks that you did not expect beforehand?**

Marek Muiste pointed out that risks need to be considered and managed as good as possible. However, there is not sufficient knowledge yet about these issues.

### **Did you use Life-Cycle Assessments (LCA) already to assess smart city projects?**

Živilė Šimkutė pointed out, that in her institute LCAs are frequently used. For example, they had a project on circular economy indicators that help to understand the whole picture. Another topic in the institute are to create better understanding of ecosystems.

### **A positive effect of the corona-pandemic was an increase of biking in Berlin. Did you have similar effects in your cities?**

Marek Muiste: What we saw was a visible reduction of a car use in Tartu. During the most intensive quarantine time we saw the streets how they were designed, because before they were always overused. And many people liked what they saw.

Kikki Lambrecht Ipsen: I live in a small town in Canada, with very little public transport. After a decrease in the intense times of the pandemic, now there is more car use. Because the public transport is so poor, and it is not a biking city because there are too many hills.

Živilė Šimkutė: In Kaunas there was a similar development as in the case of Mrs. Ipsen. However, we also saw that bike sales went up, the public spaces were used more, and the sales of pianos went up during the pandemic. Unfortunately, there was also more waste.

Jens-Peter Koopmann: In Kiel, unfortunately, the multi-use-coffee-cup-system, which was finally established before the pandemic was then cancelled. As in other city also bikes are sold out. Another positive effect was that the city administration is now able to use video meetings and the mayor decided that people working in the administration are not allowed to take inner-

German flights. However, there are still doubts of some people about whether video conferencing is better than driving to a meeting.

Friederike Rohde: The last point of Mr. Koopmann, was also for her the most interesting aspect of the pandemic: the administrations are discovering the benefits of digital solutions. During the pandemic they were forced to provide the infrastructure for remote work. She published with others a paper on the chances for more [inclusive digitisation in Berlin](#).

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## 1.5 Conclusions

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1. When planning smart city projects the risks of burden shifting or rebound effects need to be considered more.
2. The first task for municipalities should be to find an answer to the question: "What is the goal?" The second step is to consider different solutions, which might comprise digital solutions.
3. Digital solutions are not always in line with societal goals. Often, the goals can be achieved with other solutions such as changes in the infrastructure.
4. The smart city should be inclusive: This means that also analogue solutions need to be implemented in order to account for the needs of older people.
5. More research, data and monitoring & evaluation is needed in order to quantify the impacts of smart city projects and to estimate whether they contribute or not to climate mitigation.

## 2 Smart urban solutions for climate mitigation – case studies in mobility and energy in Kiel, Germany and the Baltics

Second webinar focused on practical cases of smart urban solutions for climate mitigation. Benno Keppner, adelphi, introduced to the session and gave participants some questions for reflection in his opening remarks. He mentioned that the definition of a smart city is still vague. It includes topics such as smart mobility, smart energy and smart waste. With some pictures he illustrated visions of a smart city as a technologically optimized version a nowadays cities. However, he asked whether city planners should not rather listen citizens before planning smart city concepts. Picking up on the inputs from the first webinar, he asked further, whether there should not be first a consensus on the goals for a city, followed by an examination how digital technologies can help to achieve those? The Smart City Charta<sup>1</sup> describes the goal of smart cities to achieve climate-neutrality and resource-efficiency. However, an important question is, whether smart cities are really more climate friendly? As a major problem he identified that there is still a lack of data and monitoring & evaluations. Improvements in these areas would help to answer the question with higher confidence. Finally, he pointed out some potentials of smart city projects such as incentives for public transport, mobility alternatives (i.e. car sharing), energy efficiency and real-time data for example on emissions and energy demand. On the other hand the risks, he sees lie in a shifting of environmental burdens (see input of Mrs. Ipsen in the first webinar), rebound effects that means efficiency gains through technology, could result in an increase in demand, and a general overestimation of positive environmental effects. In order to develop and implement smart city solutions that are climate friendly, he presented some questions that should guide decisions:

- Does the solution address the city's key climate challenges?
- Is the solution compliant with urban environmental and climate goals?
- Are positive climate impacts foreseeable through the smart solution?
- Does the smart solution have an integrated design with the respective infrastructure sector, other infrastructures and other solutions in the field?
- Will other measures necessary for sustainable urban development be taken at the same time as the smart solution?
- Are rebound effects unlikely?
- Are burden shifting effects unlikely?
- Has it been examined whether analogous solutions to the smart solution exist that have less impact on the climate?

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### 2.1 Smart solutions in Kiel – contributions to urban climate mitigation<sup>2</sup>

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**Kim Svenja Strupp, KielRegion**, presented the project Mokwi, which is a local platform for sustainability projects and initiatives. The platform is a common project between the city of

<sup>1</sup> [https://www.bmi.bund.de/SharedDocs/downloads/DE/veroeffentlichungen/themen/bauen/wohnen/smart-city-charta-kurzfassung-de-und-en.pdf?\\_\\_blob=publicationFile&v=4](https://www.bmi.bund.de/SharedDocs/downloads/DE/veroeffentlichungen/themen/bauen/wohnen/smart-city-charta-kurzfassung-de-und-en.pdf?__blob=publicationFile&v=4)

<sup>2</sup> The planned input of Henning Schröder, SW Kiel Netz GmbH, was canceled due to health reasons.

Kiel and other municipalities as well as KielRegion. Mokwi's main aim is to empower citizens to realize projects that foster positive change, e.g. in climate and environmental protection. Mokwi is built on WeChange, which connects a community of project realizers; currently over 300.000 people are organized via WeChange. It is free of charge. The platform is constantly improved and is open source. It runs on green servers and follows data protection standards. The platform is continuously further developed, e.g. a local cloud function is currently devised.

**Philipp Walter, KielRegion**, introduced the Sprottenflotte to participants. The Sprottenflotte is a station-based bike sharing system, intended to improve the climate footprint of the transport sector in the city. It is on measure of the Masterplan for climate mitigation of the city of Kiel. The plan outlines climate targets and measures for the municipality.

The system currently is considered a success. Reasons are the absence of vandalism and continuously increasing of users. Peaks in demand were observed during strikes by the public transport system. After Corona bike rentals increased significantly. Reasons for the success are, according to the Mr. Walter that the project is run by a local agency, which created a local identity of the project as well as that the media picked up the bike sharing system in Kiel and generated public interest. Three use scenarios are observable: citizens use the bike sharing system in their leisure time and as commuters; a third group are tourists that use the system.

The bike sharing system is designed to be easy to use and to complement public transport. The system is a hybrid – registration is possible via an app or via a hotline. It is possible to rent a bike without a smartphone.

In the third input several options of using crowd-sourced data for enhancing cycling infrastructure, were presented by **André Muno, Project Leader at Climate Alliance**. The climate alliance is providing digital tools for municipalities to improve cycling infrastructure and incentivize cycling. They comprise Stadtradeln, Radar and Movebis.

Stadtradeln (engl. City Cycling) is an application and campaign to promote cycling and sustainable mobility on the local level. Climate Alliance organizes yearly campaigns and competitions in cooperation with municipalities. The idea behind it is to have a competition between cities and within the city for the most miles rode by bike. The campaign runs for 3 weeks – the participants collect the kilometres they drove by bike via app or online. The local authority promotes the campaign on the local level. In 2020 more than 500.000 users and more than 1.500 municipalities participated in the campaign.

Radar is an application intended to give cyclists a voice. The users are able to report problems with the cycling infrastructure directly to the city. This can be done giving the exact location and even sending a photo to the municipality. The overall goal is to improve the cycling infrastructure. Radar can be used alongside the city cycling campaign free of charge.

Movebis is a research project, run by the Technical University of Dresden and Climate Alliance, answering several research questions in relation to bicycling in cities. The project is using data collected during the city cycling campaign. Questions raised are e.g. who is using the bike, why, when, where and with what experience.

Challenges observed by the climate alliance in relation to their campaign are the lack of political will to implement improvements for cyclists, that staff is overloaded with a wide range of tasks, that there is an uncertain future of local contacts, a lack of technical know-how as well as outdated IT infrastructure (digital administration of Germany is ranked 23<sup>rd</sup> among EU 27). Approaches to overcome these problems are to raise awareness for the potential of cycling and digital tools, to align personnel and structures to the requirements, to improve the cooperation inside and outside the municipalities, including networking, to professionalise PR

and to change the framework conditions in Germany to render climate protection mandatory for municipalities.

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## 2.2 Discussion

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### How do you support cities in the challenges they face? How do users benefit from your work?

The Climate Alliance helps with communication, e.g. by giving advice on who to include and by providing brochures, handouts and leaflets. However, there is a wide range of cities participating, smaller cities often have not enough resources at hand. Another challenge is handling Big Data, large amounts of data generated.

Sprossenflotte and city bike sharing improves the living quality in the city. A user group analysis revealed that many use the system for commuting and for leisure time activities. Currently, it is not clear how many car rides are substituted by the bike sharing system, but as demand is rising significantly, the system is regarded as a success. People need to have the opportunity to choose the mobility mode of their choice, for every use.

Mokwi is currently used for different purposes, examples include spreading information about new projects, events.

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## 2.3 Lessons learned in the Baltics

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The concept of Smart Zero CO<sub>2</sub> has been developed in the SmartEnCity project in Tartu, which was presented by **Marek Muiste, Tartu Regional Energy Agency**. There are many challenges currently in Tartu regarding public transport. The main one is that private car usage currently dominates as mobility mode and is increasing in the last years. This trend is self-supporting – the more cars are on the street, the more demand for motorized individual transport increases. Cities have three options for the future: continue the current trend, maintain the equilibrium or try to intervene and change the trend. Intervention and re-design of the system is best from a climate perspective.

Many innovations are currently piloted in Tartu, e.g. a carbon free public transport system that uses a real-time bus trafficking system; buses are fuelled by fully renewable biomethane from waste and a contact-free ticketing system is implemented. 4330 tons of CO<sub>2</sub> emissions are calculated to be saved annually. The Tartu city portal shows real time information from city buses as well as the location of city buses.

Currently, the public transport system has been improved and the carbon foot print has been improved, but the city's carbon footprint would still need to be reduced significantly, by going beyond public transportation and focusing on walking and cycling and reducing car use.

**Žaneta Stasiškienė, Kaunas University of Technology**, talked about the consequences of the liberalization of energy markets in Lithuania. Today, all residents can choose the most suitable energy provider. This changes the demand from private consumers and allows them to choose more sustainable forms of energy. The energy price has been set by the national council, to protect socially vulnerable groups. The innovation is intended to decrease the climate footprint of the energy sector.

Climate neutrality at the city level also requires sustainable urban water management, with this statement **Nika Kotoviča, Riga Energy Agency**, opened her presentation on measures in Riga, Latvia. Urban areas are becoming denser and land is more and more sealed. This leads to reduced infiltration, less evaporation and considerably higher runoff volumes. These pressures are forcing urban planners and storm water specialists to develop cost-effective and holistic strategies dealing with greater volume and velocity of stormwater. In Riga, there is a large share of urban greening and waterbodies (39 %). Current stormwater management practices consider just one unique solution, pipes. However, the pipe solution, also referred as conventional stormwater drainage, has been proved insufficient to manage all impacts related to urban runoff. The solution requires going beyond a narrow focus on a single problem to undertaking a comprehensive water resource protection strategy. With an Integrated Storm Water Management (ISWM) system a city can achieve multiple goals of water quality protection and flood mitigation to protect the natural and built environment, and ensure that storm water is treated as a resource that enhances our cities, rather than treat it as waste that needs to be removed through underground storm sewers. Green areas in the city play a vital role in the adaptation to climate change for example by reducing the risk of flooding, air pollution and urban heat islands of built environments. At the end of her presentation Nika Kotoviča demonstrated examples of sustainable stormwater management with the help of open structures, vegetation and pervious surfaces, sharing Riga's experience on integration of green infrastructures and nature-based solutions in urban transport infrastructure, urban housing, urban greenery and public spaces.

### 3 Open forum – citizen participation in climate smart solutions – Lessons from Kiel, Germany and the Baltics

The third and final Webinar of Kaunas Dialogue invited the participants to exchange on the topic of citizen participation in climate smart solution projects. After welcoming remarks from the moderator Frank Graage, Steinbeis Nord-Ost, **Jonas Dageförde, Chief Digital Officer in the municipality of Kiel**, introduced the Smart City Strategy of his city. Kiel is not yet known as the front runner city for digital technologies and smart city solutions. But Kiel is the first zero waste city in Germany and won German Sustainability Award 2021. Mr. Dageförde emphasized that in his opinion a smart city covers a lot more than technology. The goal of smart cities should be to figure out how technologies can help to become a zero waste or sustainable city. Besides, the Digital Strategy Kiel focusses on digitizing the administration. This comprises for example to implement digital data administration system in order to use less paper, digital services for citizens and building up digital Infrastructure such as glass fibre, LoRaWAN, data platforms. Further key points of the digital strategy are open data, smart mobility, creativity and culture, and the fostering of digital competences. The last point addresses one crucial challenge, pointed out by Mr. Dageförde: to motivate more people to use the digital solutions and to overcome fears.

In a second intervention, **Niklas Reinert, member of the participation team in the municipality of Kiel**, talked about citizen participation and how digital tools are used in these processes in Kiel. Digital participation tools are used to collect the ideas and concerns of citizens. Online based participation platform will be introduced. This also reduces the costs for participation processes. Two modules for participation can be already found: 1) a municipal project list, with project in which participation processes are planned. The list is linked with a map of Kiel, to localise the projects. 2) Defect report: This is a reporting platform, where citizens can signal damaged roads or damaged streetlights. Although, Mr. Reinert said, that in his point of view this is rather a low threshold service than a participation tool. Three more modules will be launched in 2021: 3) the idea reporter: Residents can propose ideas for projects. People can vote for the projects. Only the ones with the most votes are selected for deeper investigation by the municipality. 4) Budget tool: Here citizens have the municipal budget at a glance and can propose changes. 5) A Survey tool in order to obtain the opinion of citizens in certain questions and open polls with various options. Mr. Reinert, mentioned two further activities. One is Kiel 2042, which is a future visioning project for the 800<sup>th</sup> anniversary of Kiel in 2042, with a broad participation process. Citizens are asked how they envision their life's in 2042. Until April 2020 6000 people were reached. Concrete projects and results will be derived. One is a new participation tool where people can discuss based on the example of the Better Reykjavik Platform in Island. The second activity is a big participatory process on how data and which technologies are used. The city won funding from the federal government for a 2-year-project.

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#### 3.1 Citizen Participation in Smart City Development and Climate Mitigation

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The next input was given by **Eva Schweitzer, from the Federal Institute for Research on Building, Urban Affairs and Spatial Development**, where she is responsible for Digital

Cities, Risk Prevention and Transportation. Her topic was the digital divide and how to overcome it. Digitisation deepens the inequality that is already existing, between digital natives and those not so familiar with digital technologies. As an example, she showed that in the city of Munich a digital divide can even be observed between neighbourhoods. She showed that the use of digital tools and the internet is strongly varying between neighbourhoods depending on the share of citizens with a university degree. This is why, she thinks that is important to foster the necessary skills for the smart city to be inclusive. Digital inclusion and literacy can only be developed on a lifelong base on a spatial level. We would need in every neighbourhood mentors and places to address people living there. An example is the Fab Labs, where tools are used to teach people how to use robotics and coding. Another means is a Senior I-Pad, which was developed by University of Vienna for older people living in elderly care homes. For the younger generation she mentioned the example of energy games and hackathons. Those can be used for a conscious use of digital technologies. In another project her institute experimented with the game mine craft as a planning and strategic tool. Finally, she presented an example from Kiel: the Mundraub Map. The idea behind this tool is to activate people for input on the website. In this case the citizens can give locations where fruits can be found.

**Mathias Trenel, partner of Zebralog**, an agency for cross-media citizen participation, started his presentation with a definition of smartness as making citizens smarter. The focus of smart cities should not only lie on robotics and digital applications. One could even say a smart city doesn't need technologies at all. But they can be seen as an enabler. In another definition he pointed out his idea of citizen participation as a productive cooperation with citizens and the harvest of their ideas. This is more than the general picture of participation processes as a dealing with public discontent (NIMBY). There are various steps of participation: Information; Listening and Consultation; Co-Design and Cooperation; Joint Decision. With each step the participation is more comprehensive and profound. However, a participation paradox can be observed often. At a very late planning stage the public is very interested in participating, but it is very costly to change plans in this stage. While at the beginning of the planning process often little interest of the public can be observed. This is why, in his opinion it is crucial for successful participation processes to create and increase public interest at an early stage of the planning. Cities have various options for offline participation such as large scale events, workshops, interventions in urban space. Furthermore there are four general possibilities for online participation: 1) Crowdmapping is a very effective tool. This is shown for example in the case of crowdmapping for the improvement of bike lanes in Berlin, where every third visitor put examples on the map. 2) Idea generation: A question or Topic is raised: Citizen can give answers and categorize those. 3) Discussion of options: I.e. the motorway can go in one or the other way. Different options and their advantages and disadvantages can be discussed. 4) Annotation: Texts or brochures that should be discussed. A document is uploaded, and citizens can give comments. Mr. Trénel finally presented two exemplary cases of citizen participation. The first one, a new plant for sewage sludge, shows the importance of transparency. For the people living around it is easier to live with changes when they know what is happening. This is why on a website i.e. the timeline for the planning and building process is presented. Furthermore, a public complaint system was implemented, where affected people can raise their voice. Thereby, wishes and fears of neighbours are heard with the aim to create a peaceful neighbourhood. In the second case, two options for the location of new public restrooms in Berlin were shown. The first one is the offline version, with a pop-up dialogue in the street and the second one the online tool of crowdmapping.

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## 3.2 Discussion in virtual Breakout-Groups

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Following these inputs, the webinar participants were split up in three breakout-groups to discuss their experiences and ideas for successful citizen participation for climate smart solutions. The breakout-groups started with the introduction of the participants to each other. The following discussions were guided by three main questions that were raised by the group moderators Benno Keppner, Leon Leuser and Frank Graage. The three guiding questions were:

- Please provide an example of a problematic or failed citizen participation (in climate smart solutions). Please explain why it was problematic / failed in your opinion.
- How can citizen participation benefit climate smart solutions? What should we realistically expect of citizen participation in climate smart solutions?
- What are success factors for citizen participation?

### 3.2.1 First Breakout-Group

The first breakout-group was moderated by Benno Keppner. Participants from Riga mentioned that in their city several examples exist for how citizen participation can benefit public decision-making. These are strategic document development, participatory budget and integrating citizen participation for building and new construction projects. The participatory budget was a pilot project which focused on the improvement of public space; citizens contributed to finding the places that needed to be improved. Riga also established a bank of ideas, where citizens vote for the best ideas.

Participants also stressed the instrumental character of citizen participation & digital tools. They are not beneficial in themselves, but only create value when applied in the right context and time. What really matters is process management: being aware of different formats, tools, contexts, and managing these according to the aim of the project.

One important aspect according to the participants is that citizens and collective actors are not homogeneous. This means that participatory processes greatly benefit from stakeholder-analysis, which e.g. identifies the different actors relevant for the process, their positions and perceptions of the problem. Participants also noted the different nature of participation depending on the political salience of the project. In some cases, when the project is not very politically debated, participation becomes less challenging to moderate. An example was the case of car sharing. In Riga the establishment of mobility points for micro-mobility was successful because the places where they were located were not problematic, neighbourhood organizations were involved and citizens asked where the mobility points should be located. However, when different positions are conflicting, participation becomes increasingly challenging (e.g. in the case of rendering parking space into bicycling lanes).

One participant highlighted the difference between participation and information / consultation. Integrating citizens at the end of the political process when decisions are already made usually does not qualify as participation but should be labelled information. This implies that participation should be accompanied by appropriate political communication and honesty which clearly states the aims of the process.

### 3.2.2 Second Breakout-Group

In the second breakout-group, moderated by Leon Leuser, participants discussed the first guiding question controversially. One participant from Lithuania had the opinion that the whole planning system in Lithuania is an example for failed participation. The reason for this statement was that people are only informed in unclear ways. As an example protests about the redesign of a historic park in Vilnius were mentioned. In this case, the citizens were informed when all decisions were taken. However, in the end the city administration was forced to drawback and hold an architecture competition. As a result, today there are guidelines how to design the process. Another participant mentioned a similar case from Riga. The participants wondered that apparently cases like these can be found in almost every country. However, they found that even these worst cases can often not be termed “failed” because as a result of protests often plans change in the end and / or lessons are learned for future processes. Generally, participants observed that cases like these occur because the administration or the processes are not sensitive enough for the needs and interest of citizens. Another reason was found in the administrative culture that often needs more openness. Besides this, it was noted that often major conflict lines lie not between citizens and the administration but between different groups of citizens, i.e. between cyclists and car drivers.

With regard to the second guiding question, participants said that any solution is much more sustainable if it is discussed with the future users. Furthermore, participation processes can reveal that not only one but differentiated solutions are required for various groups of citizens. Furthermore, climate smart solutions can benefit from participation as privacy concerns of citizens can be discussed. One option proposed for climate smart solutions was to focus on citizens who have strong values and are engaged. With those the city can try to create, experiment and innovate solutions. The participating citizens would then exchange with others on their experiences and could thereby increase the acceptance of new solutions.

Factors for successful participation collected during the breakout-session were:

- The sensitivity of planners to include the interests and needs of citizens
- The question with which participation processes need to start: who needs to be asked and what should be asked / discussed
- The connection of visions collected during the participation process with concrete actions
- The application various forms and methods for participation depending on the target group and the concrete project
- The requirement to engage the citizens and underline that ideas are taken into consideration
- The involvement and combination of expertise from citizens and planners

### 3.2.3 Third Breakout-Group

In the third breakout-group, moderated by Frank Graage, participants discussed in general about problematic issues. One problem noted was that public hearings are often too late as the citizens have already made up their mind. On the other hand, often the topics within participation processes are in many cases too abstract to engage the public. An issue that often occurs is the lack of flexibility in decision taking. With regard to the integration of climate mitigation in smart city concepts the participants emphasized that often climate issues are not the top priority in these plans.

On the question of “How citizen participation can benefit climate smart solutions?” the participants presented good cases. The first one was a mobility lab in which students worked together with the senior community in order to improve their mobility with digital solutions. In another project climate managers were trained on digital tools. In the city of another participant

climate protection ambassadors are working in city districts to solve issues on local level. Also the role of NGOs that are active in neighbourhood projects e.g. on the air quality control was stressed.

Success factors for citizen participation that were identified within this breakout-group were:

- To start a co-design process early
- To use hybrid tools to enable access without own digital tools
- To give pricing advantages e.g. for testing
- To teach digital skills in order to increase the capacity for participation
- An open and flexible attitude on municipality side that makes it possible to discuss also negative aspects of a project with citizens
- A long-term approach to citizen participation
- The provision of mentors that help people, who are not themselves proactive

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### **3.3 Conclusions**

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1. Citizen participation is crucial for successful climate smart projects.
2. There are nowadays various methods for online and offline participation. Sometimes it can be useful to combine these in order to reach all target groups.
3. Transparency and sensitivity for the needs and interests of citizens are important success factors for participation processes.
4. Increasing digital literacy of citizens is a prerequisite in order to reduce already existing inequalities and to reach an inclusive smart city.
5. A well thought-out process management as well as an active information and marketing activity for new plans are important for successful participation.

## 4 Programme: Smart Urban Solutions for Climate Mitigation

**SESSION I: Tuesday, September 8th, Zoom teleconference**

**Smart urban solutions for climate mitigation – potentials, risks and strategies**

Time	Topic	Presenter(s)
13:45	Webinar opens (technical assistance: Leon Leuser)	Franc Graage (Steinbeis)
	<b>Welcome!</b>	
14:00	Introduction to the webinars	Benno Keppner, adelphi
14:05	Welcome from the moderator	Frank Graage, Steinbeis Nordost
14:10	Municipal Climate Mitigation and Masterplan Strategy of Kiel	Jens-Peter Koopmann, Head of the climate mitigation team, Environmental Department, Kiel
	<b>Climate related challenges for smart solutions</b>	
14:20	The risk of burden shifting - Lessons learned from Copenhagen	Kikki Lambrecht Ipsen, Université de Sherbrooke, Canada
14:35	How sustainable is the smart city? Ecological and social impacts of smart city solutions.	Friederike Rohde, TU Berlin
14:50	Q & A & Discussion: recommendations for municipalities	
	<b>Closing</b>	

**SESSION II: Thursday, September 17th, Zoom teleconference****Smart urban solutions for climate mitigation – case studies in mobility and energy in Kiel, Germany and the Baltics**

<b>Time</b>	<b>Topic</b>	<b>Presenter(s)</b>
12:45	Webinar opens	
13:00	<b>Welcome and introduction!</b>	
13:00	Welcome from the moderator	Frank Graage, Steinbeis Nordost
13:05	Intro: smart solutions and positive climate effects	Benno Keppner, adelphi
	<b>Smart solutions in Kiel – contributions to urban climate mitigation</b>	
13:15	Mokwi – your local platform for sustainability projects and initiatives	Kim Svenia Strupp, KielRegion
13:30	Smart Energy: the Stadtwerke Kiel	Henning Schröder, SW Kiel Netz GmbH
13:45	Sprottenflotte: bike sharing in Kiel	Philipp Walter, KielRegion
14:00	CITY CYCLING (STADTRADELN): crowd-sourced data for enhancing cycling infrastructure	André Muno, Project Lead, Climate Alliance
14:15	Q&A & lessons learned	
	<b>Lessons learned in the Baltics</b>	
14:30	Insights from SmartEnCity in Tartu, Estonia	Marek Muiste, TREA
14:35	Insights from Lithuania	Žaneta Stasiškienė, Kaunas University of Technology
14:40	Insights from Riga, Latvia	Nika Kotoviča, Riga Energy Agency
14:50	Q&A & Discussion	
15:00	Closing	

**SESSION III: Tuesday, September 22<sup>nd</sup>, Zoom teleconference****Open forum – citizen participation in climate smart solutions – Lessons from Kiel, Germany and the Baltics**

<b>Time</b>	<b>Topic</b>	<b>Presenter(s)</b>
12:45	Webinar opens	
	<b>Welcome!</b>	
13:00	Welcome from the moderator	Frank Graage, Steinbeis Nordost
13:05	Kiel's digital strategy & the role of participation	Jonas Dageförde, Chief Digital Officer Kiel
	<b>Citizen Participation in Smart City Development and Climate Mitigation</b>	
13:15	Smart City and digital literacy	Eva Schweitzer, BBSR
13:25		Matthias Trénel, Zebralog
13:50	Q&A	
14:00	<b>Discussion in virtual break-out-groups</b>	
14:40	Group-presentation by group moderators	
15:00	<b>Closing</b>	