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Fraunhofer-Initiative Morgenstadt

Morgenstadt Work Program 2022 – 2023

Within the Fraunhofer-Initiative

MorgenStadt
City of the Future

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Content

Executive Summary

"Morgenstadt: City Insights" (M:CI) is an initiative that pools the expertise of Fraunhofer institutes with the aim of thinking ahead, developing and testing system innovations for the city of the future. The Morgenstadt Initiative is based on the belief that the key to the great challenges of our time lies in the climate-neutral and digital transformation of our cities. It is our mission to identify solutions and transformation pathways for CO2-neutral, livable and resilient cities, and to implement these in an exemplary manner by means of social, technological and organizational innovations. System innovations have a key role to play in this, which is why the Morgenstadt Initiative is organized as an interdisciplinary network, connecting Fraunhofer institutes, cities, local authorities and private sector companies.

The Morgenstadt Initiative pursues a systemic approach by bringing together the extensive R&D expertise of 11 institutes of the Fraunhofer-Gesellschaft. This means that we transfer the thematic sectors of urban development (mobility, logistics, energy, water, environment and climate change, information and communication technologies, buildings, governance and food production) to innovation fields to take into account their interfaces and their interdependencies. On this basis, the Morgenstadt Initiative focusses on 11 innovation fields that are relevant across thematic areas and that bring together different sectors (Figure 1).

This systemic approach taken by the Morgenstadt Initiative identifies innovation potential and translates it into new solutions, strategies and governance models, which are then tested in collaboration with the partners.

The Morgenstadt vision: sustainable smart cities

To promote the goal of climate neutrality in cities and municipalities, comprehensive transformation processes that must meet both organizational and political requirements are needed in urban infrastructures. In this respect, digitalization and climate protection are cross-sectoral megatrends that will shape the restructuring of urban systems over the coming years. The opportunities offered by digitalization (e.g., increased energy efficiency) are offset by the risk of a spike in greenhouse gas emissions caused by rebound effects. Sustainability therefore lies at the heart of the initiative's future activities, ensuring that the city of the future is both smart and sustainable. The concept of a sustainable smart city addresses the nexus between digitalization and sustainability, i.e., the interface between technology development and sustainable urban development in terms of the social, environmental and economic impact. Positive effects such as greenhouse gas reductions in urban sectors will be achieved by combining smart city technologies and artificial intelligence (AI), which can be scaled up based on scientific findings on, inter alia, climate effects and success factors. When it comes to transformation measures, we always take a people-centered approach to implementing our activities. This means that it is essential to include citizens in the process and that the needs, particularly those of vulnerable groups, should be incorporated into the design of the sustainable smart city. What is more, the social compatibility of the climate-neutral transformation of our cities is the main evaluation criterion for selecting and designing our projects.

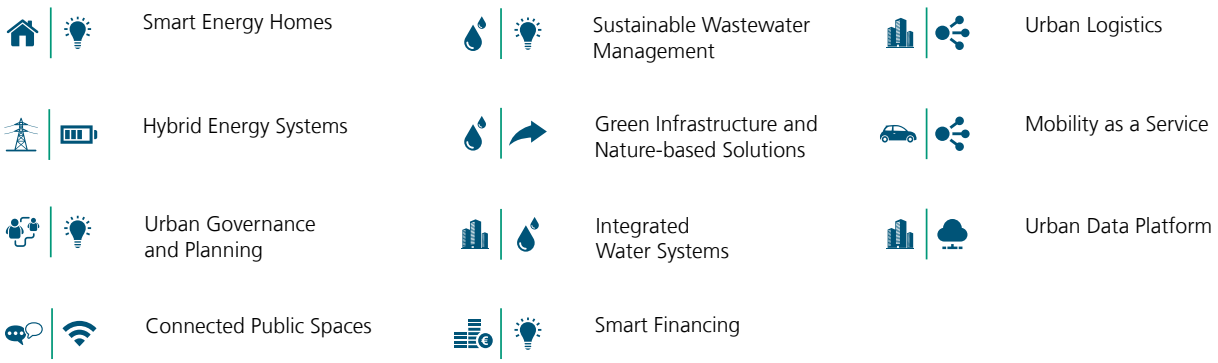

Figure 1: The Morgenstadt Initiative innovation fields.

Project overview

Projects in Market design

Project name	Timeline	Deliverables	Details
Data Competence Centre for Cities & Regions	Since 2021	Open, urban data platform for cities and municipalities, portal for information and networking opportunities, development of a provider ecosystem.	Page 13
Urban Data Community	Since 2021	Information and Moderation on data topics, UDC Coins Benefit System, development of Use Cases	Page 13
Innovation Partnership "Integrated Digitalization of Drinking Water Supply - InDigWa"	2022–2024	Identification of potentials to increase efficiency, Use Cases of new uses and proof of concepts	Page 13
Morgenstadt: Future District Alliance	from Q3 2022	Blueprints and development of business models	Page 13

Projects in Research & Development

Project name	Timeline	Deliverables	Details
Urban Data Partnership 2.0	2022–2023	Handouts and working aids for the central topics of Urban Data Governance	Page 15
Innovation Programm Climate Neutral Cities (ICNC)	ongoing	Revision and resubmission of an already developed project proposal	Page 15
KI4Real.Cities	ongoing	Establishment of a »Taskforce AI« with 1on1 support and inter-municipal workshop formats	Page 16
SMARTilienceGoesLive	2022–2024	Application of the Urban Governance Toolbox in the context of implementation measures to increase climate resilience in Halle and Mannheim	Page 16
MobidataSol	2022–2024	Various data products and use cases in the fields of environment and mobility, data trust concept based on a stakeholder analysis and an ecosystem data governance concept	Page 16

Projects in Global Scaling

Project name	Timeline	Deliverables	Details
Partnerships with strategic partners from politics and international financing institutions in Southeast Asia	2022–2023	Establishment and Expansion of strategic innovation partnerships	Page 19
Morgenstadt Global Smart Cities Initiative (MGI)	Until mid-2023	Implementation from pilot projects in Kochi, Piura & Saltillo, Training & Webinars, impact measurement concepts	Page 19
Partnership with cities in the USA for the development of climate resilience projects	ongoing	Implementation of Morgenstadt City Labs	Page 19
Acquisition of further climate protection projects in countries of the Global South, financed by the International Climate Initiative (IKI)	from 2023	Implementation of climate protection projects	Page 19

Event overview

Event name	Timeline	Deliverables
DKSR Urban Data Summit	28. Apr 2022	Implementation of the conference in Mainz
Morkenstadt-Werkstatt NEO 2022	2.–3. May 2022	Implementation of the conference in Ulm
Morgenstadt Data Conference	19.–20. May 2022	Implementation of the conference in Lemgo
Urban Data Forum	5.–6. October	Implementation of the event in Stuttgart (Fraunhofer IAO)
Future Districts Summit	11. Okt. 2022	Implementation of the conference in Munich (Werksviertel)
IFAT 2022	May 2022	Participation at the fair
Morgenstadt Conference "10 Years of Morgenstadt"	5. December 2022	Implementation of the conference in Stuttgart (Fraunhofer IAO)

Coordination of the Morgenstadt Initiative

The principle behind the Morgenstadt Initiative is primarily based on the creation and use of network effects. Central network coordination therefore provides suitable instruments so that all partners can share their latest activities and preliminary results as well as network efficiently. In this context, a knowledge management system with regular updates ensures that all partners can follow the progress of individual projects and activities — and participate if they are interested. The Fraunhofer Institute for Industrial Engineering IAO is responsible for the overall coordination of the Morgenstadt Initiative. The institute's tasks include:

- communication by coordinating the flow of information between all participants;
- communication of the status of projects;
- knowledge management by managing documentation;
- organization of events and workshops;
- public relations work and dissemination;
- coordination of contractors and third parties within the framework of projects.

Events

All members and strategic partners of the Morgenstadt Initiative are invited to attend Morgenstadt Initiative events to exchange ideas and gain insights into the latest developments in sustainable urban development. These networking events are used for communicating updates from projects and innovation partnerships, preparing new projects and funding applications, facilitating networking between Morgenstadt partners. In 2022, the following events are planned or have been carried out:

1. Morgenstadt workshop in May 2022
2. Morgenstadt Data Conference in May 2022
3. DKSR Urban Data Summit in April 2022
4. Urban Data Forum in October 2022
5. Morgenstadt Conference in Q4 2022

Dissemination

The Morgenstadt Initiative actively participates in important trade shows and conferences on sustainable urban development, where it represents its members. Depending on interest and participation, joint stands and content-related contributions can be organized and offered. In 2022 Morgenstadt Initiative took part in the fair IFAT 2022 in Munich.

Modus operandi

The Morgenstadt Initiative is supported by the innovation network, which comprises local authorities, companies and Fraunhofer institutes. The activities in each individual pillar are defined in each case by innovation partnerships, which are operated by interested partners and follow their own project description. The innovation partnerships thus focus on one of the following three areas: research and development, global scalability and transnational knowledge and technology transfer, and market design.

In an innovation partnership, Fraunhofer institutes, cities and companies join forces to address a specific challenge and develop projects that can utilize different formats. On the one hand, this makes it possible to respond to a specific call for proposals and, on the other hand, it means that offers that directly target companies and cities can be developed. Furthermore, innovation partnerships can have a regional aspect by bringing together a selected group of actors in a regional context to respond to their local needs. In addition to the innovation partnerships, each of the three pillars includes activities aimed at communicating content to the general public and specific stakeholders as well as promoting future commercial utilization.

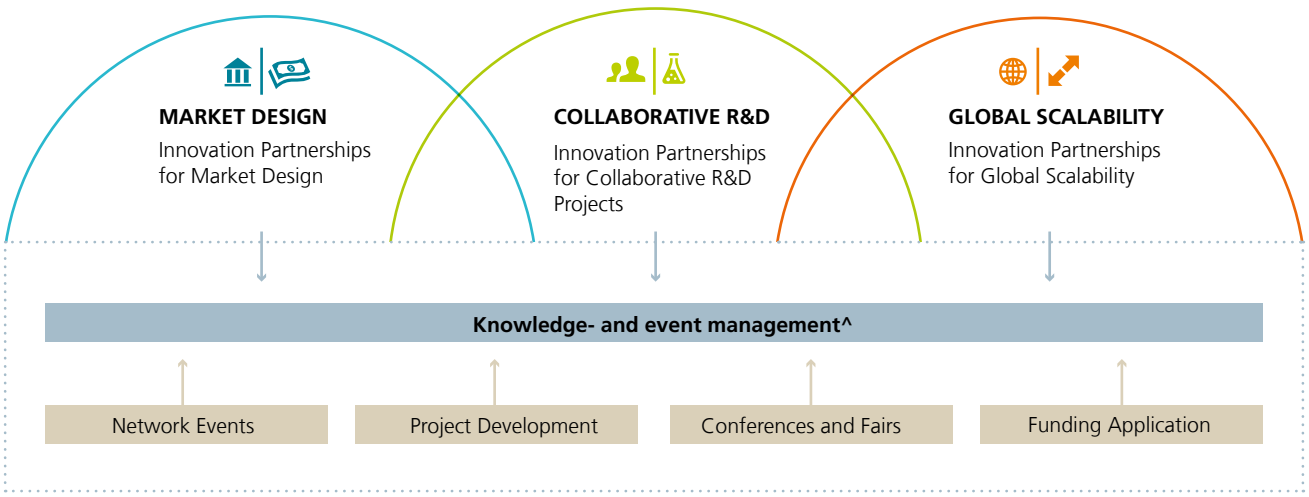

Figure 2: Morgenstadt Initiative modus operandi.

Pillars of the 2022 – 2023 Work Program

For the past two years, the Morgenstadt Initiative has sought to lay the foundations for the market launch of clean and interconnected urban solutions both in Germany and worldwide, and to facilitate their dissemination. In addition to the priority objectives of climate protection and climate adaptation, we actively pursue a holistic and integrative approach that reflects the Sustainable Development Goals (SDGs) of the United Nations. Sustainable solutions must therefore contribute to the common good and should be affordable for municipalities regardless of their size and economic situation. The result should be a more livable city for everyone — irrespective of age, ethnicity, gender and income. Accordingly, we focus on scaling up tried and tested solutions as well as disseminating the relevant expertise. We pursue this objective by offering and promoting cooperation projects and knowledge transfer for municipalities of any size in Germany and Europe. Furthermore, as in the previous two years, we are focusing on the global application of Morgenstadt analysis tools and the implementation of resulting projects with a view to supporting urban transformation around the world. At the same time, we are driving the development of other research projects in order to optimize existing solutions and demonstrate new approaches. Based on these objectives, the Work Program will focus on the following three pillars until the end of 2023:

- Market Design
- Collaborative Research and Development (R&D)
- Global Scalability and International Knowledge and Technology Transfer.

The Work Program describes what is to be implemented by the end of 2023.

Figure 3: The three pillars of the 2022-2023 Morgenstadt Work Program.

Collaborative Research and Development (R&D)

In joint innovation partnerships, current research topics from the Morgenstadt are getting worked on in smaller groups and concrete options for action and pilot projects are defined.

Market design

Together with partners from politics, business, research and society, the Morgenstadt Initiative is driving forward concrete projects to shape the market. Topics such as a data competence center, new types of investment vehicles and solution certificates for smart city products and components are on the agenda. The goal is, among other things the creation of functioning organizations with lasting existence in the newly established market for the market for the city of the future.

Global Scalability

Global Scalability and International Knowledge and Technology Transfer. The central analysis tool of the Morgenstadt Initiative is the Morgenstadt Framework and the associated City Lab. In cooperation with partners, global scaling aims to establish the City Lab as an international standard for urban transformation strategies and to create replicable financing and implementation models that can be flexibly adapted to the respective context.

Pillar 1: Market Design

There is currently a particular need for suitable scaling models and processes in order to implement smart city applications and solutions on a widespread basis.

Smart solutions can only achieve their full potential for climate protection, resilience and a livable city if urban development makes the transition from pilot projects to widespread application.

According to forecasts, the global sustainability market — including infrastructure projects — is set to grow to 74 billion US dollars by 2030. In the future, sustainability technologies and their market launch may therefore represent a central pillar for Germany as an industrial and innovation hub, as well as for the rest of Europe, while at the same time contributing to a vital economic transformation.

Scaling sustainable urban solutions requires innovative technical solutions to be evaluated to identify their various application, customization and financing options in order to make them easily accessible to all municipalities. New, holistic value models that no longer calculate profitability on a purely market-oriented basis but take into account common good and climate justice considerations as well as new public-private partnerships to finance and operate them are also required. In addition, close coordination between local authorities, legislators and the private sector is a decisive factor for overcoming not only financial but also legal barriers to innovative solutions in our cities.

Market Design activities

Data Competence Center for Cities and Regions (DKSR)

The DKSR is a joint venture of Deutsche Telekom, the Fraunhofer-Gesellschaft, The Urban Institute [ui!] and Axxessio GmbH. It is the result of a Morgenstadt innovation partnership and provides an open urban data platform for cities and municipalities in Germany and Europe. A total of five Morgenstadt institutes are involved in the development of scalable solutions in the fields of data sovereignty, data management and data visualization within the framework of this joint venture. In addition to the open urban data platform, the DKSR also provides partners with an information portal through which information can be provided and exchanged to launch joint development projects. There are also plans to develop a supplier ecosystem, enabling providers to distribute their applications directly via the platform, thereby providing a comprehensive interconnected solution from a single source.

Timeline Since February 2021

Deliverables An open urban data platform for cities and municipalities, a portal for information and networking possibilities (DKSR.Square), development of a supplier ecosystem.

Urban Data Community

The Urban Data Community is the partner community of the DKSR and a Morgenstadt innovation partnership. The UDC moderates exchanges between partners on topics such as data governance, use case development, funding lines and financing, and adopts a common position towards politics and funding. By establishing a benefit system (UDC coins) for the development of use cases, connectors and open source components that benefit the community, the UDC makes a direct contribution to market design. The benefit system will be piloted in 2022.

Timeline Since Q1 2021

Deliverables Information and moderation on data topics, UDC coins benefit system and development of use cases.

Innovation partnership Integrated Digitalization of Drinking Water Supply — InDigWa

The innovation partnership Integrated Digitalization of Drinking Water Supply — InDigWa is aiming for an integrated approach to the digitalization of the supply of potable water across the entire supply chain. The partners involved come from the fields of water extraction, treatment, distribution and use, and include both private and public institutions alongside the scientific partners of the Morgenstadt Initiative. The objective of the innovation partnership is to generate synergy through an integrated approach to the entire supply chain and challenges across all sectors by collating, using and valorizing data in a collaborative way. As well as this, it aims to anchor data protection regulation principles in the data collection and use structure. On top of economic and business benefits, it is expected that resource, energy and water efficiency gains will be identified and made achievable. The innovation partnership is currently in development and begins its pilot phase in Q4 2022.

Timeline Q4 2022 – mid-2024

Deliverables Identification of potential areas for increasing efficiency, use cases for new applications and proof of concepts.

Morgenstadt: Future District Alliance

The "Morgenstadt: Future District Alliance" will be established mid-2022 as a new innovation partnership. Existing Fraunhofer knowledge on innovative district and campus development will be pooled in "sprints" and transferred into concrete development projects. The aim is to establish technology forecasting and develop "blueprints" as well as a new business model and target processes for the partners' concrete projects. The collaboration will provide participants with national acclaim as THE innovation platform for the smart, climate-neutral districts of tomorrow.

Timeline Starting Q3 2022

Deliverables Blueprints and business model development.

Pillar 2: Research and development

As well as our focus on market design, company research activities also plays a central role in the Morgenstadt Initiative. In this respect, we are focusing particularly on the systemic Morgenstadt approach to critical bridges between sectors and systems with the aim of utilizing holistic transformation agendas, for example, linking technologies and infrastructures to achieve carbon neutrality in cities. The Morgenstadt Initiative will also work on the overarching challenges facing sustainable city development, for example digital transformation of cities, new planning tools and stakeholder-based innovation formats.

Even after the Work Program has started, the Morgenstadt partners may introduce new research themes and challenges, and corresponding R&D programs will be developed on the basis of them.

Research and development activities

Urban Data Partnership 2.0

The UDP is already in its second phase. Following its successful conclusion, the project was further developed and is now once again active, functioning as an innovation network aiding digitalization managers and Chief Digital Officers (CDOs) of municipalities as well as city businesses. The initiative also aims to create a shared knowledge of complex structures, processes and bases for decision making in the field of digital transformation for cities and municipalities, and provide practical handouts for specialist workers and managers. Doing this will set in place a strategic foundation from which organization in urban data governance can be developed. Contributions from experts and dialog between like-minded colleagues aid with decision-making, developing and utilizing the right tools, as well as presenting a strong voice in industry. The Urban Data Partnership will begin in Q4 2022 and is aimed at municipalities and their partners (e.g., local authorities, data centers) starting their digital transformation. Content developed collaboratively in workshops is, with the help of a use case, transferred to real-life practice in the municipality. In focus groups organized by theme, the partners are able to exchange their knowledge in a targeted manner, thereby learning from each other. The content focuses on the following themes:

- Data governance (creating organization and developing strategy in management)
- Data platforms and architecture (standards, open systems, data models, etc.)
- Data quality and valorization of data (data management, data security, holistic cost-use analyses)
- Participation and citizen science
- AI in city development
- Data collection through sensors

Timeline 2022–2023

Deliverables Handouts and working aids on the Urban Data Governance central themes.

Innovation Program Climate Neutral Cities (ICNC)

The Innovation Program Climate Neutral Cities (ICNC) empowers cities and municipalities to use indicator-based tools, the "Municipality Climate Index" and data on climate-relevant emissions from sectors such as mobility, and transport, energy, industry, etc. to identify potential savings. At the same time, city representatives explore which typical challenges and demands can be tackled by implementing possible climate-saving solutions. The aim is to develop "problem typologies" in areas such as infrastructure, governance, acceptance in the community, finance, etc. based on their experience as well as solution outlines provided by businesses.

Timeline Ongoing

Deliverables A reworked and resubmitted pre-developed project application.

KI4Real.Cities

The KI4Real.Cities innovation partnership supports municipalities and local authorities in systematically approaching the theme of artificial intelligence (AI). By taking a pragmatic approach to the needs of the participants, they will get to know the basic prerequisites for AI applications. Practical examples will enable them to make initial assessments of the feasibility and benefits for their current situation as well as with a view to the future.

Timeline Ongoing

Deliverables Establishment of an "AI taskforce" with one-to-one support and inter-municipality workshop formats.

SMARTilienceGoesLive

SMARTilienceGoesLive builds on two previous funding phases from the German Federal Ministry of Education and Research (BMBF) as part of the City of the Future funding program to support municipal decision-makers and players in implementing climate-resilient city development. An Urban Governance Toolbox developed in the previous funding phases will be used to implement definite climate-resilient measures in the partner cities of Halle (Saale) and Mannheim, and its practicality and whether any additional content or optimization is required will be tested through this practical application. Implementing measures in the partner cities is dependent around the two focal topics of heat and heavy rainfall, also taking into account inter-city collaboration, the training and involvement of city managers, as well as the involvement of citizens. In this context, concrete measures will be set out, including drinking fountains, shading, a solar land register and geodata use strategies for heavy rainfall.

Timeline 2022–2024

Deliverables Application of the Urban Governance Toolbox in the context of implementation measures for increasing climate resilience in Halle and Mannheim.

MobidataSol

Intelligent Data Products for Urban Mobility Applications Through Ecosystem Data Governance in the Solingen Smart City Data governance and data custody models will be important tools for smart cities in the future, enabling them to share high-quality data and apply it to many uses. MobiDataSol is a joint research project involving the Klingelstadt Solingen, the Fraunhofer IAO and ISST institutes, the ifeu — Institut für Energie- und Umweltforschung (Institute for Energy and Environmental Research) and the University of Stuttgart. Its aim is to create and test a central governance system for data flows in the ecosystem for data products in the field of mobility and the environment.

Timeline 2022–2024

Deliverables Various data products and use cases in the fields of the environment and mobility, data custody concept based on a stakeholder analysis and an ecosystem data governance concept.

Pillar 3: Global Scalability and International Knowledge and Technology Transfer

The systemic application of the Morgenstadt Initiative is also shown in the development of the Morgenstadt Framework and its application model, the Morgenstadt City Lab. Both rely on the knowledge that cities are complex, adaptive, socio-technical systems and the transformation of a city must involve all of these levels — from technology and infrastructure to planning, governance and finance as well as civil society and citizens. When effecting this transformation, it is important to acknowledge that the technical, economic and business context varies. The solutions must therefore be adapted to the individual needs of each city.

Since 2014, Morgenstadt City Labs has been successfully utilized in 19 cities. Building on this work, in 2022–2023, the Morgenstadt Initiative is striving to tackle the main challenges for cities worldwide and to utilize the City Lab approach in various formats around the globe. These range from overarching modular consultation to defining and establishing systemic urban investment strategies. The Morgenstadt Initiative also aims to further develop the Toolbox for successfully transferring the solutions developed worldwide to suit international project collaboration. As part of the collaboration with international organizations it aims for, Morgenstadt members will also have the opportunity to join the assessment and development teams of City Lab and knowledge and technology transfer projects.

Scaling activities

Relationships with strategic partners in politics and international financial institutions in South-East Asia

Building and strengthening relationships with strategic partners in politics and international financial institutions in South-East Asia to further strategically develop the ASEAN region for the Morgenstadt Initiative.

Timeline 2022 – 2023

Deliverables Development and expansion of strategic innovation partnerships, additional joint projects.

Morgenstadt Global Smart Cities Initiative (MGI)

Funded by the International Climate Initiative (IKI) from the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMU), the Morgenstadt Global Smart Cities Initiative (MGI) supports model cities in India, Mexico and Peru in developing and establishing sustainable transformation processes and helps them to achieve international sustainability targets (in particular SDG 11: »Make cities and human settlements inclusive, safe, resilient and sustainable«). The MGI's core aim is to reduce the effects of climate change on the pilot cities by increasing their resilience to climate risks and improving management of natural resources. The key ingredients of close international collaboration between partners from research, industry and management, exchanges of knowledge and experience between pilot cities as well as the expertise of the Morgenstadt Initiative are a recipe for the success of the initiative. Having analyzed the three pilot cities using the Morgenstadt City Lab method, the MGI team are spending 2022 focusing on establishing pilot project in Kochi, Piura and Saltillo. Alongside this endeavor, the team will work with local partners providing activities on increasing capacity through webinars or training courses. As part of establishing the pilot project, the impact monitoring concept developed for the MGI will be transferred to the pilot cities. This will help them to monitor the effects of the pilot project and other project concepts after the project has ended.

Timeline Until mid-2023

Deliverables Implementation of pilot projects in Kochi, Piura and Saltillo, training courses and webinars, concepts for impact assessment.

Planned Projects

There are also plans to raise funds for additional projects in the field of climate change and sustainable city development in the Global South by the end of 2024. As with the Morgenstadt Global Smart Cities Initiative, the International Climate Initiative and German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) funding programs work alongside a strategic partnership with the Gesellschaft für Internationale Zusammenarbeit (GIZ) to provide the main force of action. The City Labs method will also be used to support cities in the U.S. with the climate crisis. Based on the Morgenstadt Framework, a City Lab will be developed on the theme of climate resilience and then tested in South Carolina before being rolled out across the country. The climate resilience City Lab will thereby support coalition-building and agenda-setting at municipal and state levels and will create concrete proposals around the development for the local ecosystem with regard to climate resilience, protection and adaptation.

Information

Are you interested in the Morgenstadt Initiative, a specific innovation partnership or would like to contribute your own ideas? Then please feel free to contact us:

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If you have any questions about individual innovation partnerships and the fields of innovation please contact the Fraunhofer experts: https://www.morgenstadt.de/en/ueberuns/team.html

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