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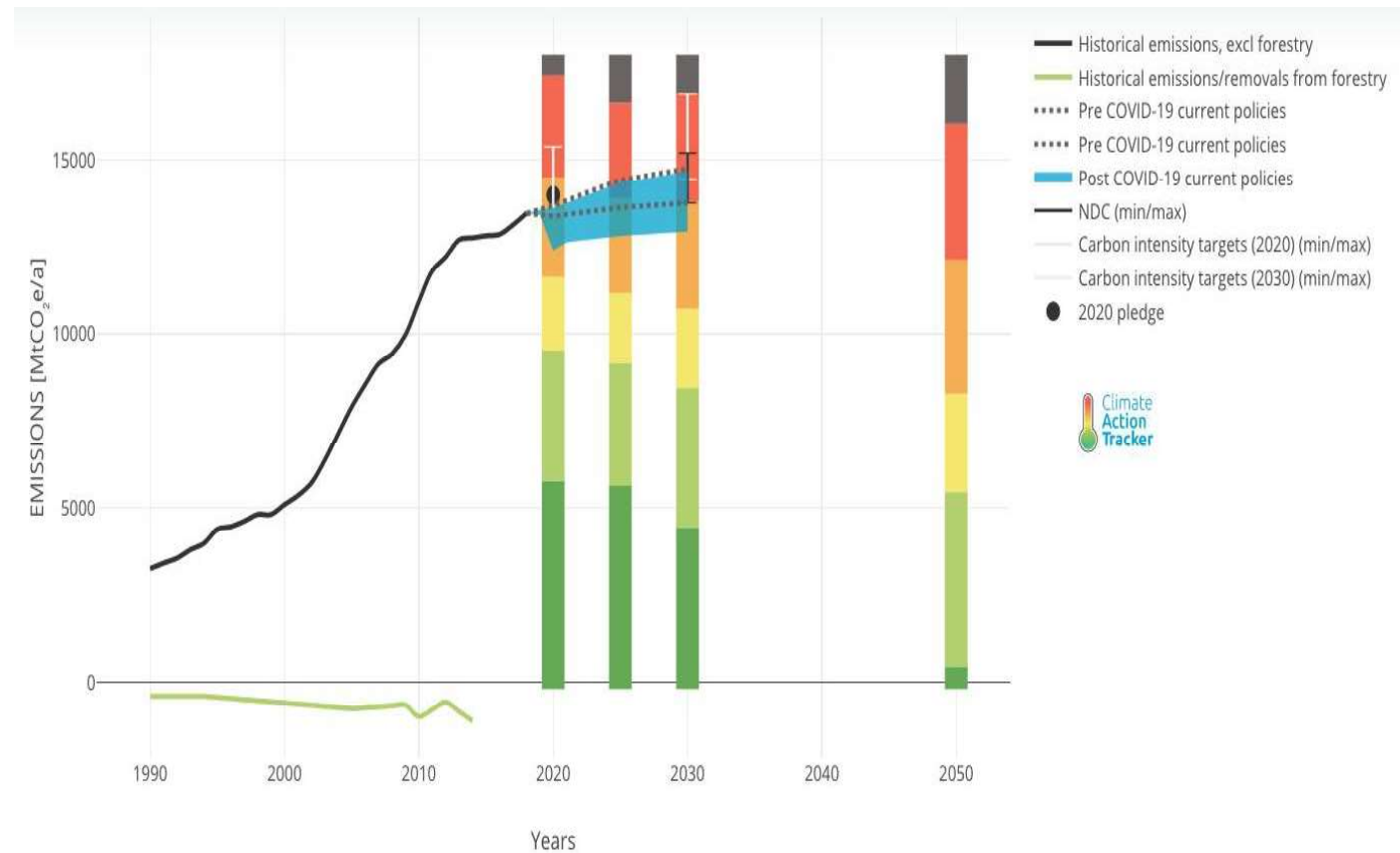
The logo of the Asian Development Bank (ADB), consisting of the letters "ADB" in white serif font on a dark blue square background.The logo for the Hunan Provincial Innovative Low Carbon Center, featuring a stylized blue and white icon on the left and the text "湖南省联创低碳经济发展中心" and "Innovative Low Carbon Center, Hunan" on the right.A colorful, stylized illustration of a city skyline. It includes modern skyscrapers, a traditional Chinese pagoda, a wind turbine, a hot air balloon, a bus, and a red barn. The background is light blue with white clouds.

Xiangtan Low-Carbon Transformation for Livable City

Integrated solutions to climate friendly and resilient city

PRC's Greenhouse gas emissions and Commitment to Climate Change

-Carbon peaking by 2030
-carbon neutrality by 2060



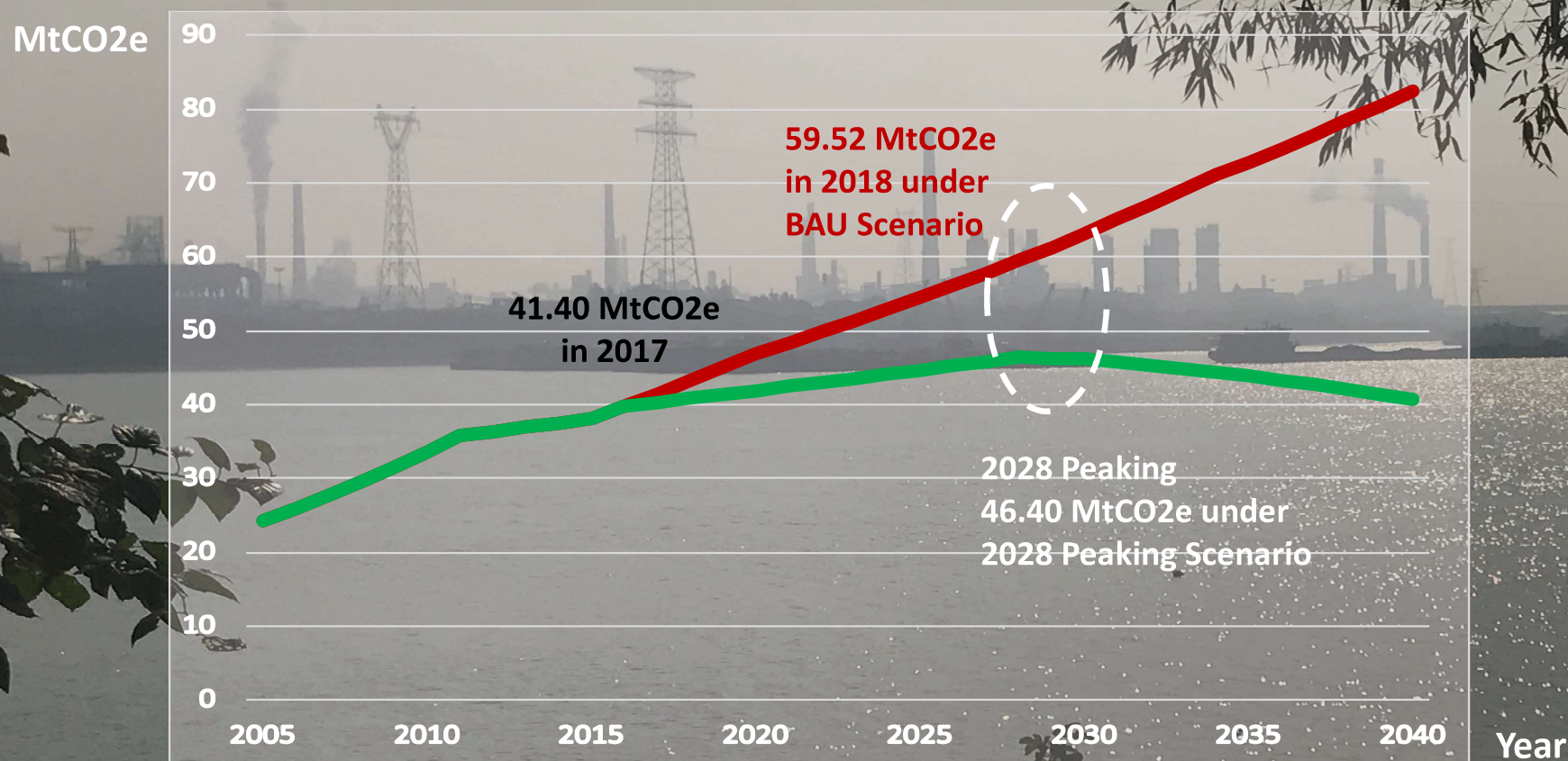
Source: <https://climateactiontracker.org/countries/china/>

Xiangtan, Hunan in the People's Republic of China

- An old industrial town undergoing rapid urbanization and industrial transformation
- Designated low-carbon city since 2018
- Population: 2.9 million
- GDP per capita in 2018: CNY 75,609
(*ranking: 69th in 2017*)



Xiangtan's Greenhouse gas emissions and Low-Carbon Development Plan



Low-Carbon Development (working definition)

Low-Carbon Development refers to ‘sustainable development’ grounded in *systems-thinking* and guided by quantifiable indicators of GHG emissions, which encourages *integrated and collaborative* city planning, *coherent* sector development, *resilience* improvement by taking *preventive approach*, and active governance through engaging and activating *all stakeholders* by providing the *right incentives*.

- Motivation for change
- LC actions shall be easy
- Power, resources, and information/knowledge

“Low-carbon and resilient city must benefit its residents and their wellbeing. Through improvement of livability, citizens shall be proud of their city!”



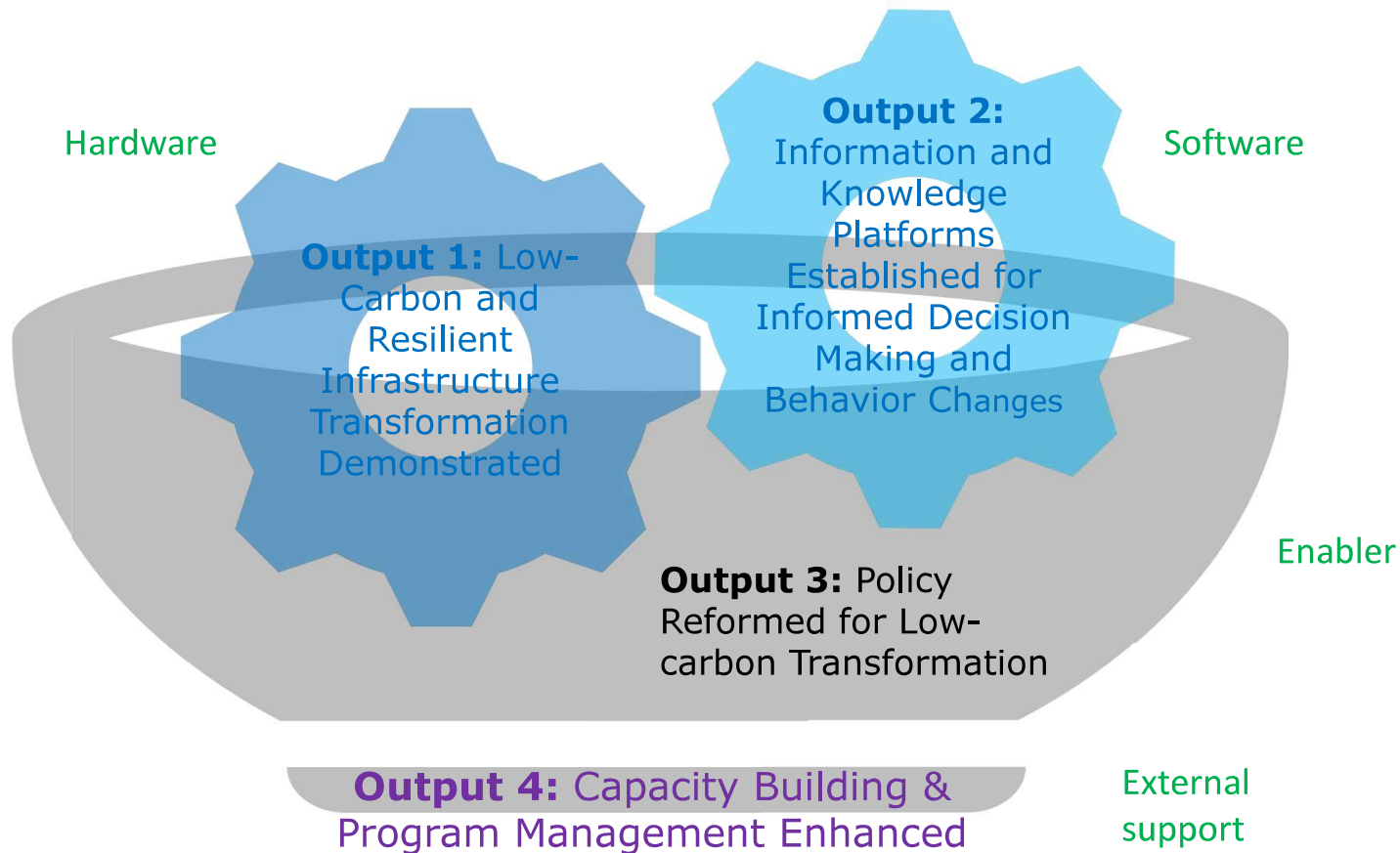








Integrated Program Design to Activate all Actors

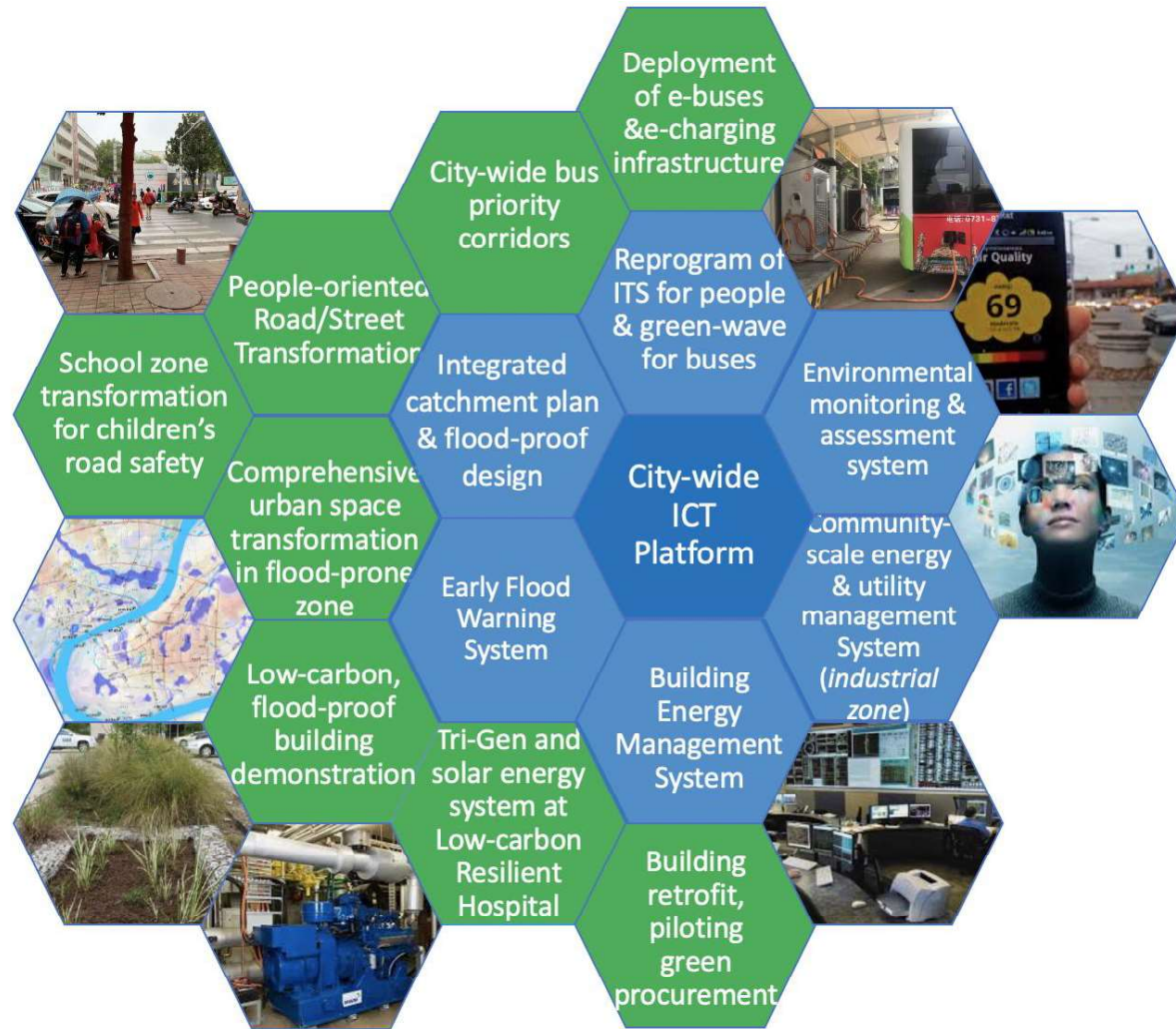


Investment Project



Output 1: Low-carbon & resilient infrastructure

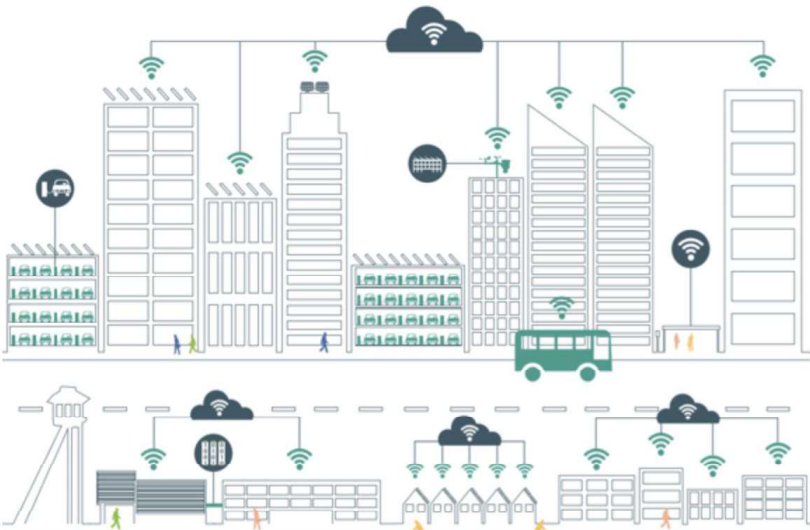
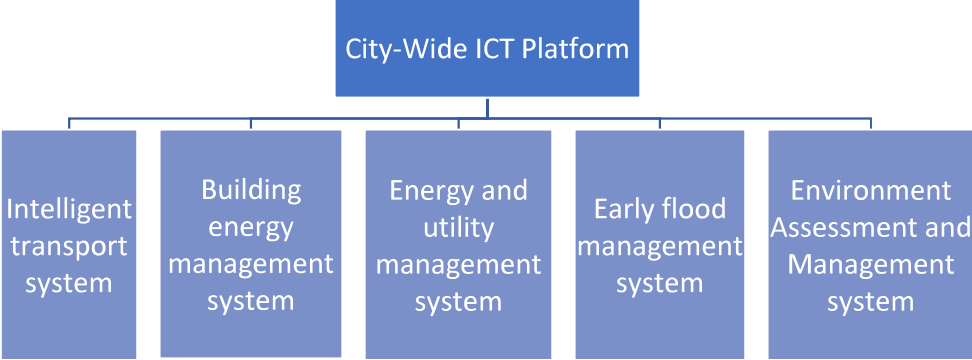
- transport/mobility
- green Building
- clean energy
- urban space and connectivity



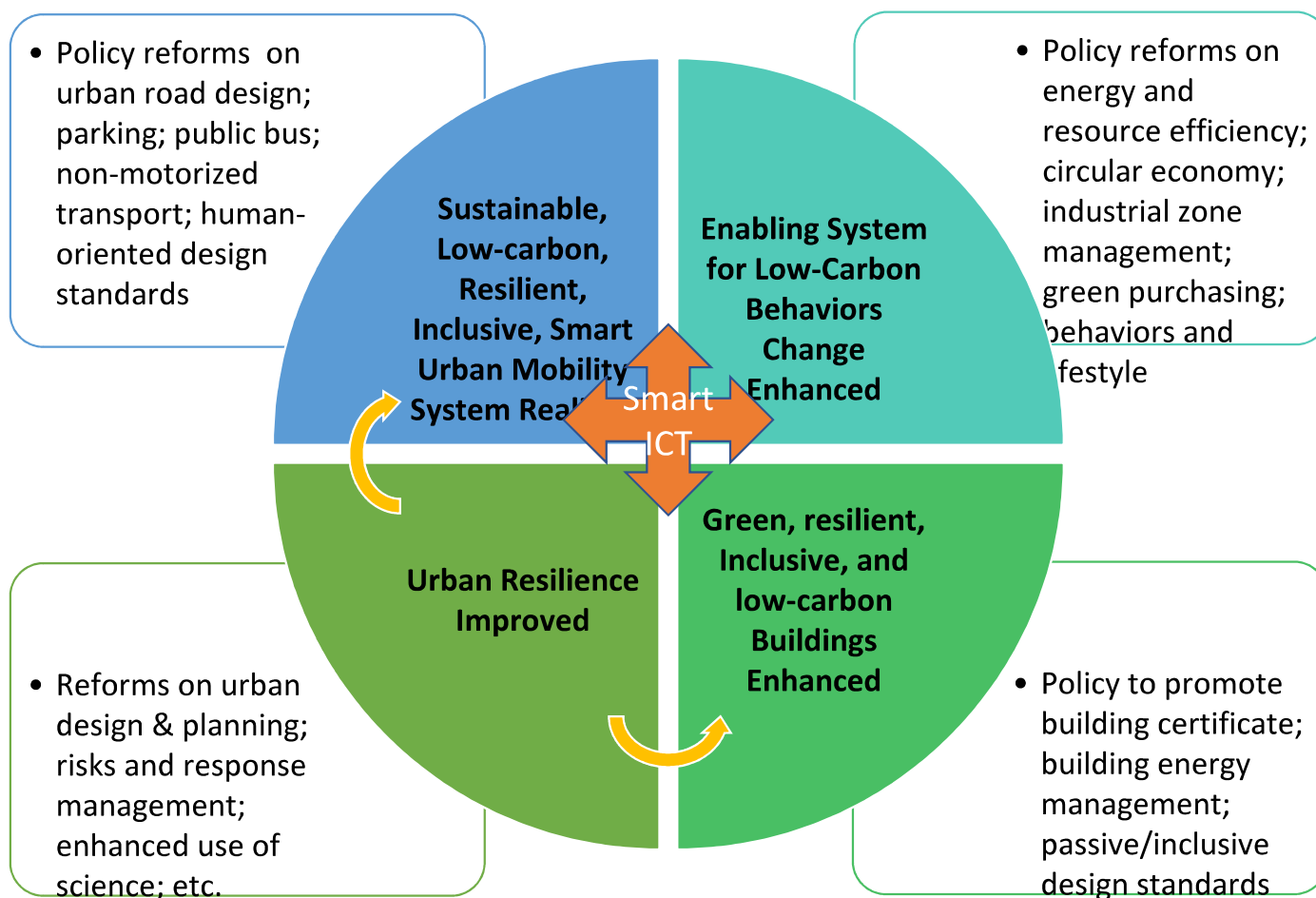
Output 2: Information & knowledge platforms

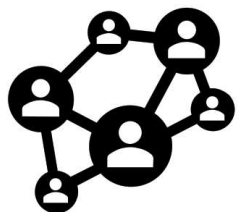
Output 3: Capacity building and Knowledge Enhanced

Smart Xiangtan



Policy and Reforms to support and sustain the transformation and behavior changes

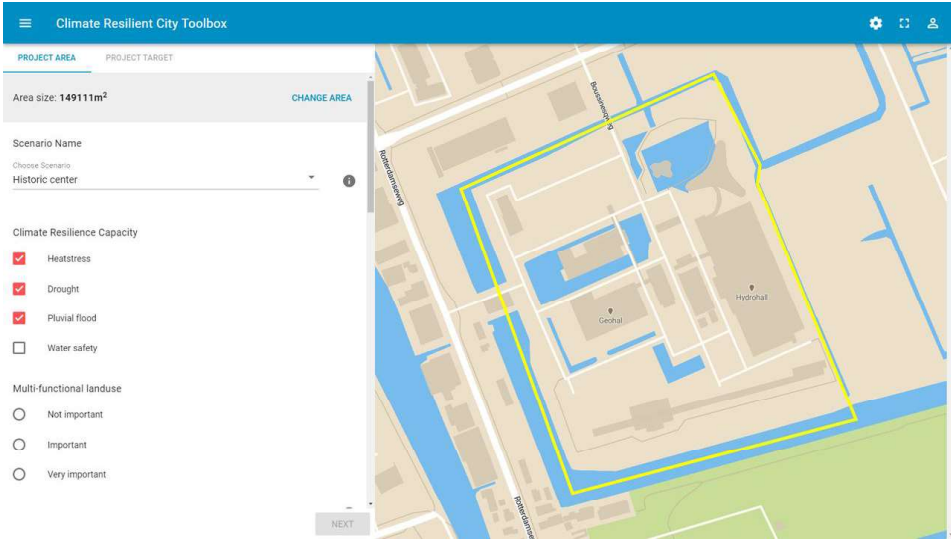
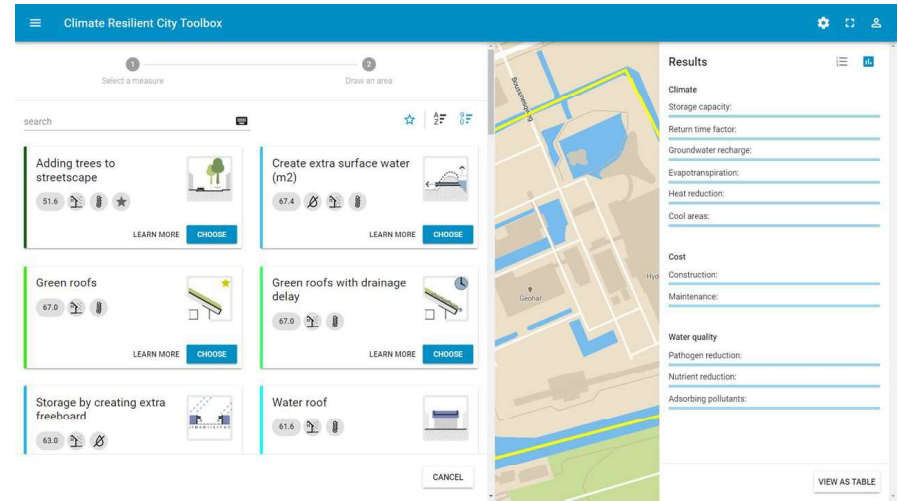
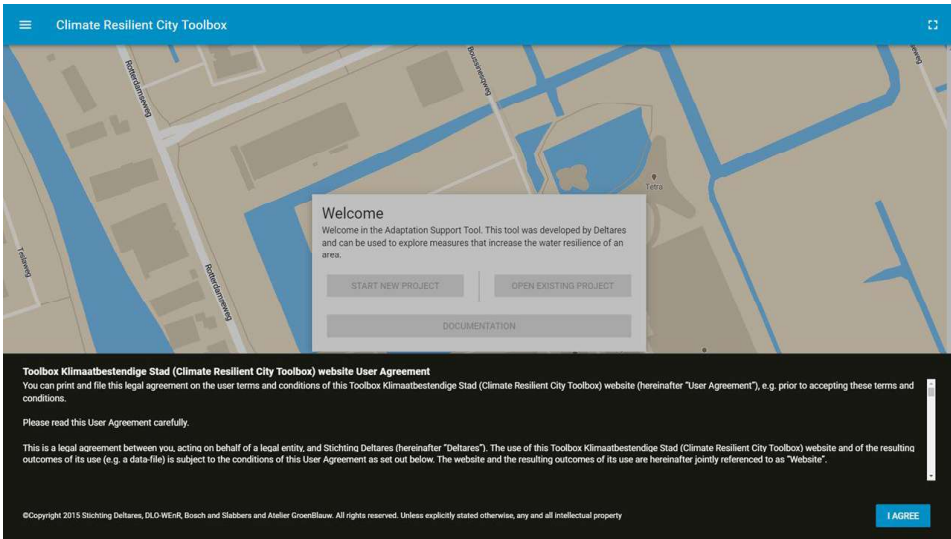




Implementation Arrangement

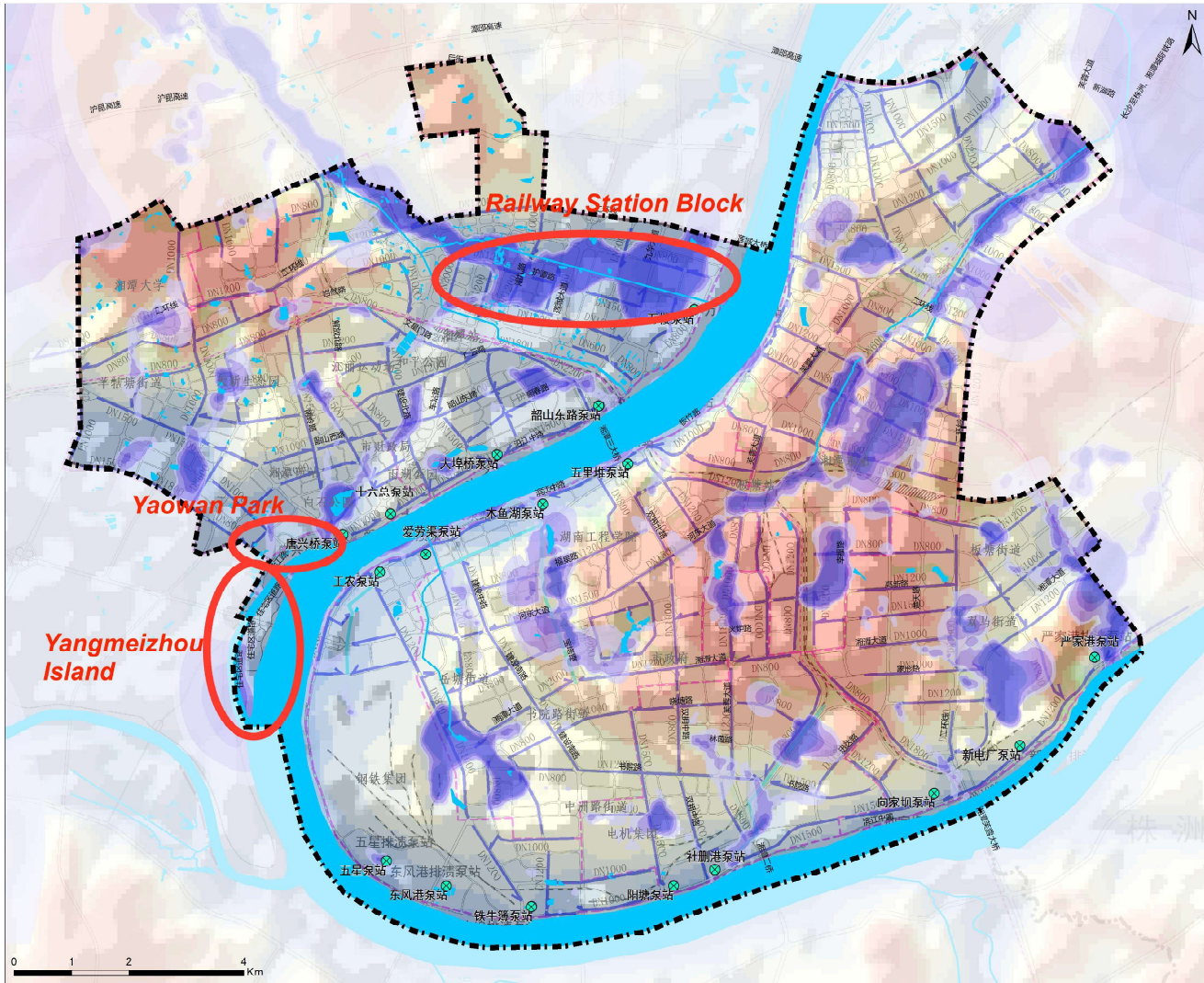






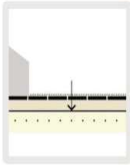
Results		Results	
Climate		Climate	
Storage capacity:	_____	Storage capacity:	48.29 m3
Return time factor:	_____	Return time factor:	8.26 +1
Groundwater recharge:	_____	Groundwater recharge:	170 mm/year
Evapotranspiration:	_____	Evapotranspiration:	51.65 mm/year
Heat reduction:	_____	Heat reduction:	0.07 C
Cool areas:	_____	Cool areas:	0
Cost		Cost	
Construction:	_____	Construction:	10348 €
Maintenance:	_____	Maintenance:	103 €/year
Water quality		Water quality	
Pathogen reduction:	_____	Pathogen reduction:	0 %
Nutrient reduction:	_____	Nutrient reduction:	0 %
Adsorbing pollutants:	_____	Adsorbing pollutants:	0 %

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PROJECT:	Development of Ecosystem-Based Adaptation Measures for Climate Risks in Xiangtan	
TITLE:	Xiangtan City Urban Flood Vulnerable Areas	
LEGEND:	<p>Flood Risk Category</p> <ul style="list-style-type: none"> Low High <p>Stormwater System</p> <ul style="list-style-type: none"> Pump Main Pipe Culvert Subcatchment Boundary <p>DEM (m)</p> <ul style="list-style-type: none"> < 35 35 - 40 40 - 45 45 - 50 50 - 55 55 - 60 60 - 65 65 - 75 75 - 100 > 100 <ul style="list-style-type: none"> Water Shrubby Areas 	
CLIENT:	Asian Development Bank	
COMPANY:		
DESIGN:	TX	
LAYOUT:	TX	
REVIEW:	WJ	
APPROVAL:	WJ	
SCALE:	1:32,000	
DATE:	16/8/2019	
ISSUE STATUS:	Draft	
FIGURE No:	Figure 4	
NOTES:	IF PRINTED AT FULL	ORIGINAL
	A3 - NOT TO SCALE IF EMBEDDED IN PAGE.	SIZE: A3

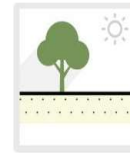
Permeable pavement (infiltration & storage)



Permeable pavements consist of porous material that absorbs rainfall. Water can be stored either in the top layer (e.g. very open asphalt concrete) or in below the top layer in the foundation. Besides reducing runoff, permeable pavements can trap suspended solids and filter pollutants from the water.



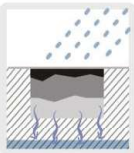
Creating shade



Creating shade is important to prevent surfaces from heating up and to cool the surroundings. This can be accomplished by using trees, pergolas, overhangs, awnings and such. Arcades and covered walkways are urban elements commonly used in warm countries to create shade.



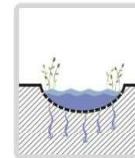
Rain garden



These are sandy soil or aggregate filled depressions that treat stormwater runoff to improve water quality. Stormwater is captured and allowed to percolate through the soil/aggregate layer, where pollutants are removed, prior to being released through an underdrain located at the bottom of the depression.



Rainwater detention pond (wet pond)



Buffer ponds temporarily capture precipitation and allow it to drain off slowly. During rainfall, the rainwater is captured in the pond and subsequently drained off to create room for the next precipitation. Buffer ponds can be designed to have a mostly stony or a mostly natural appearance.



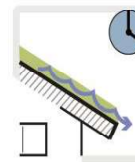
Infiltration trench



An infiltration trench, also known as a French drain, is a linear feature used to reduce stormwater runoff and improve water quality. These shallow excavated trenches are filled with aggregate or crushed stone that is designed to allow for stormwater to infiltrate the ground plane and ultimately percolate through permeable soils into the groundwater. Their linear shape can also serve to convey stormwater from one area



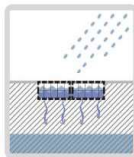
Green roof with drainage delay



Green roofs with drainage delay are also called retention roofs. It is a green roof that can store extra water in a substrate layer under the green planted layer and is drained delayed with a pinched drain. A polder roof is a retention roof where the control system is linked to the weather forecast.



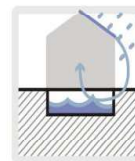
Infiltration boxes



Infiltration boxes buffer rainwater underground and allow using a single area for two purposes. In general they offer more storage capacity than above-ground infiltration installations. More rainwater can be buffered temporarily and gradually released into the groundwater. The extra infiltration leads to less drought damage, subsidence and salinization.



Systems for rainwater harvesting



Rainwater harvesting is the collection and storage of stormwater for reuse on site. This is most commonly achieved by capturing runoff from the roof of a building, however, it can also include the collection of runoff from throughout the site or byproducts from systems such as air conditioning condensate. The collection structures can take on multiple forms and be installed either above ground or subsurface. Depending on its source and treatment, the harvested water can be reused on site for irrigation.





Critical elements to build “Resilient city”

- ✓ Scientific knowledge for better decision making
- ✓ Integrated planning and collaboration across sectors
- ✓ Better use of Smart technology
- ✓ Use of nature-based solutions in every corners of a city – multiple benefits to residents
- ✓ Integrated solutions to activate all actors

Thank you for your attention

Welcome to Xiangtan!!!

ADB

湖南省联创低碳经济发展中心
Innovative Low Carbon Center, Hunan