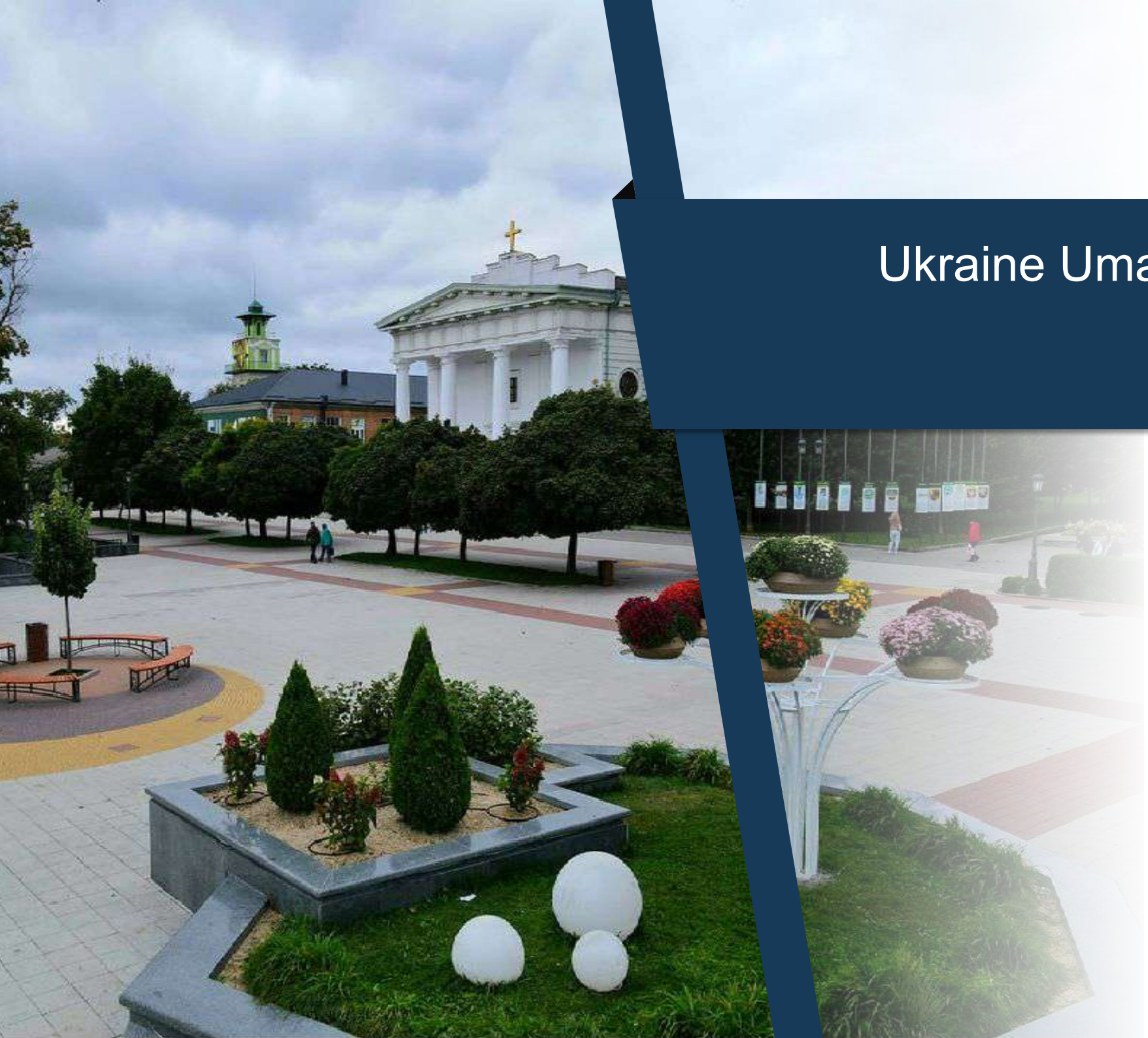

Ukraine Uman Smart City Master Plan

(Final Report)

2024. 04.

KIND
한국해외인프라도시개발지원공사

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I

Project Outline

01 Background and Purpose of the Task

Background and Purpose of the task

By applying Korea's smart city experience and know-how,

"Establishment of a comprehensive plan for a smart city in Uman and systematization of a smart city model for the reconstruction of Ukraine

Background and Purpose

Ukraine

A country in the middle of a war and needs to be rebuilt after the end of the war

- Major cities have been severely damaged by the protracted war of the Russian invasion

Establishment of a 'National Recovery Plan' for post-war reconstruction

- The Ukrainian government sees post-war reconstruction as an opportunity to rebound for economic growth and improved quality of life.
  Estimated recovery costs of at least $750 billion

Necessity of Business Promotion

High interest and commitment to the development of a smart city in Uman City

Lack of professional manpower makes it difficult to establish the

Transfer of Korean smart city construction experience and technical know-how

Utilizing Korean K-City technology and know-how

Building a sustainable Smart Uman City

Role of Ukraine's spread to post-war reconstruction special areas

Through Uman's smart city master plan,
Spread of the K-City model throughout Ukraine

Republic of Korea

Signed MOU between Korea and Ukraine for reconstruction cooperation

- Participation in the reconstruction project in Ukraine
- National land development and smart city creation, etc.

Leading role and participation in post-war reconstruction

- Utilizing Korea's digital technology and know-how in development cooperation in the US-EU-centered reconstruction project
  Active participation in the field of urban development to strengthen independent contributions and roles

Post-war reconstruction as a smart city
To take a leap forward again
Systematic cooperation and support required

K-City based Uman Smart City
Through the preparation of a comprehensive plan,
Systematization of smart city model

Establishing a bridgehead for Korean companies to enter the reconstruction and development business in Ukraine

02 Scope of task

Scope of content

Establishment of Smart City Master Plan

- teristics, case research analysis
- Analysis of related high-level plans, legal systems, and laws and systems related to project implementation
- Establishment of KPIs, goals, visions, and strategies through SWOT analysis
- Smart city, service, and infrastructure planning according to KPI planning indicators
- Economic and financial feasibility studies and economic impacts and social benefits
- Establishment of various financial resources such as PPP(Public Private Partnership)
- Establishment of cost financing plan for each type of business

Capacity building activities for concerned officials

- Invitation training for concerned officials: Experience sharing, business-related sites
- Held on-site workshops: Presentation of task results and strengthening the competencies of stakeholders

Establishment of follow-up plan (proposal): PPP investment.

- Proposal of development of follow-up business models in which domestic companies can participate
- Development of business models in connection with financial investment

Task period | 240 days from the contract

Spatial Scope | Uman, Cherkasy , Ukraine

Within about 8 months, establish a smart city master plan for Uman City, Ukraine, and carry out capacity-building activities through training and workshops inviting concerned officials, and present future follow-up business plans

II

Context Analysis

01 High-level & Related Plans

Analysis of high-level plans and related laws and regulations related to the state and regions of Ukraine

High-level plan	National Economic Strategy 2030 (NES 2030)	• To raise Ukraine's international status and create an efficient digital environment, transportation infrastructure and regional development were selected as key areas. Aims to create a competitive environment for business and investment and improve access to national administrative services.	Creating a digital environment and creating an investment environment to secure national competitiveness
	Future-oriented Ukraine reconstruction conference reflecting the review of the National Development Plan (2022)	• In establishing a national development plan after the war, it is necessary to establish a sustainable national development plan, not just for the purpose of reconstruction. In accordance with the urban development direction jointly pursued by European countries, eco-friendly and smart strategies are applied to enhance the direction of industrial and economic development strategies.	Preparation of a sustainable national development strategy through the introduction of eco-friendly smart strategies
	Cherkasy Regional Development Strategy(2021-2027)	• Established with the goal of the well-being of local residents, efficient utilization of resources, and establishment of a positive image of the region Establishment of a strategic vision that takes advantage of high-tech production, innovative enterprises, modern infrastructure, and a well-educated center for the development of the creative economy and a famous tourist destination rich in historical and cultural heritage.	Improvement of the living welfare of residents and Strategic vision using tourism resources
Related laws	Draft Law on the Principles of State Policy in Response to Transitional Periods(2021)	• Formulating a policy of responding to Russian armed aggression and territorial reintegration Implementation of policies for the preservation and restoration of the territorial integrity of Ukraine, as well as ensuring sovereignty Establishment of development policies in areas such as economy, education, environment, history, and culture	Territorial reintegration policy formulation and Economics, Education, Environment, History, Culture Specification of development policies
	Law on the Basics of National Regional Policy(2022)	• Identify legal, economic, social, ecological, humanitarian, and organizational determinants of national and regional policies Establishment of the basis and characteristics of national and regional policies Selection of priorities and establishment of action plans for the implementation of regional development programs	Establish priorities and action plans for the implementation of local development programs

Suggesting the direction of sustainable eco-friendly smart city development and economic development for the national and regional development of Ukraine

01 High-level & Related Plans

Analysis of key related plans

Cherkasy Development Strategy 2021-2027

Through a SWOT analysis Establishment of the direction of regional development

A national production center that utilizes high-tech production, innovative enterprises, and modern infrastructure.

Nurturing it as a tourism center that utilizes the region's historical and cultural resources

Development Strategy & Objectives

1. Economy: High-tech, productivity, export-based industries
2. Human: Enhance professionalism, adaptability, and collaboration
3. Quality of life: eco-friendly, safe, infra-enhance

Smart Specialized Regional Strategy

1. Improvement of agricultural process direction and food quality through innovative agricultural technology
2. Development of IT & ITC Industry

Uman City Economic Development Plan 2022-2024

Uman Main Industries: Pharmaceutical manufacturing, concrete product production, food production, etc.

Specialized development in the agricultural sector: More than 70% of the total area of the city is made up of farmland

Establishment of detailed action plans in a total of 14 areas

Goals for the Economic Sector

1.Investment activities: Promoting the investment potential of the community
2.Industrial production: Industrial reconstruction, support for local production, etc.
3.Trade: Trade service infrastructure development, etc.
4.Transportation services: road network development, infrastructure construction
5.Housing & Services: Construction and Improvement of Residential Complexes
6.Tourism and leisure activities: Dissemination of tourism information, etc.
7.Land relations: unused land development, etc.

Other Achievement Targets

1.Humanitarian Development Sector: Education, Health, Family and Youth Policy, Physical Education, Improving Culture
2.Sector of social protection of the people: support for families and youth, social protection for residents of Chernobyl and marginalized neighborhoods
3.Ecology & Life & Safety: Environmental Protection, Improvement of Life Safety Level, Occupational Health & Safety
4.Institutional Capacity Building: Management Efficiency, etc.

Ukraine Recovery Conference 2022

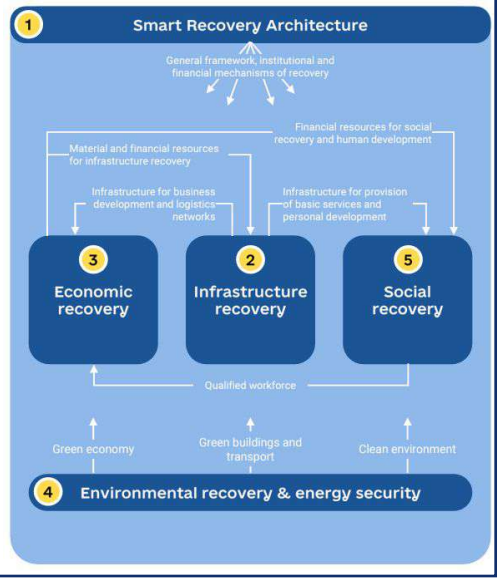
Ukraine Recovery Conference(URC, '17~'22) : Hosted by a total of 5 countries, including

Establish reconstruction strategies in smart building, infrastructure, economic, social, environmental, and energy sectors

Cherkasy province is a support zone during the war, and a strategy is being formulated to revitalize the agricultural and energy

- URC 2022 held in Lugano, Switzerland, to establish a strategy for the reconstruction of Ukraine based on the Seven Lugano Principles

Establish development strategies for each region, such as war-affected areas and support areas, and support the reconstruction of the region in Ukraine through the establishment of international partnerships (field experience, financial support, diplomatic integration, support for seizure of Russian assets, monitoring support)



Presenting a smart city demonstration model centered on tourism and infrastructure for sustainable urban economic development and environmental improvement in Uman City

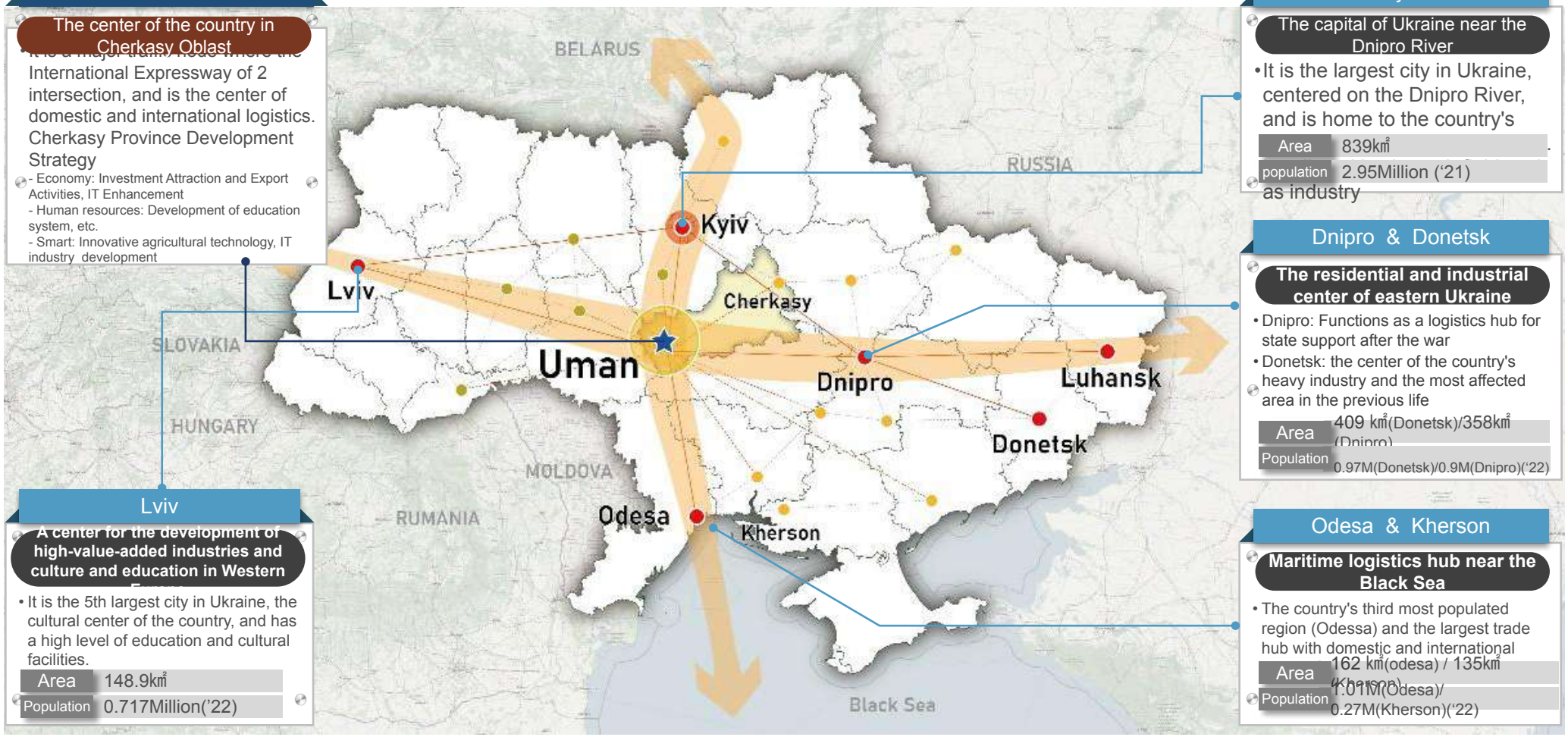
02 Analysis of Status in Uman City

Uman's wide location and characteristics

Uman

The center of the country in Cherkasy Oblast

International Expressway of 2 intersection, and is the center of domestic and international logistics.
Cherkasy Province Development Strategy
- Economy: Investment Attraction and Export Activities, IT Enhancement
- Human resources: Development of education system, etc.
- Smart: Innovative agricultural technology, IT industry development



Kyiv

The capital of Ukraine near the Dnipro River

- It is the largest city in Ukraine, centered on the Dnipro River, and is home to the country's as industry

Area	839㎢
population	2.95Million ('21)

Dnipro & Donetsk

The residential and industrial center of eastern Ukraine

- Dnipro: Functions as a logistics hub for state support after the war
- Donetsk: the center of the country's heavy industry and the most affected area in the previous life

Area	409 ㎢(Donetsk)/358㎢ (Dnipro)
Population	0.97M(Donetsk)/0.9M(Dnipro)('22)

Lviv

A center for the development of high-value-added industries and culture and education in Western

- It is the 5th largest city in Ukraine, the cultural center of the country, and has a high level of education and cultural facilities.

Area	148.9㎢
Population	0.717Million('22)

Odesa & Kherson

Maritime logistics hub near the Black Sea

- The country's third most populated region (Odessa) and the largest trade hub with domestic and international

Area	162 ㎢(odesa) / 135㎢ (Kherson)
Population	1.01M(Odesa)/ 0.27M(Kherson)('22)

It is located in the central part of Ukraine, and has good connectivity and accessibility through the already established wide-area road network between domestic base cities and border countries.

Attracting Uman Smart City Development Demand (Tourism, Industry, etc.) Using Wide-Area Road and Transportation Network and Establishing Urban Development Strategy

02 Analysis of Status in Uman City

Uman City Basic Survey

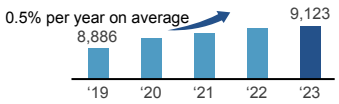
Uman Status

…n Municipality)
- Location: Southwestern Cherkasy
- Population and area: 83,191 / 61.3㎢
- Major industries: Agriculture, processing (machinery, food),

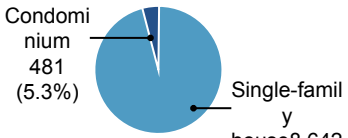
population
83,191 (2022)

Household
36,000 (2022)

Housing
9,123ea (2023)

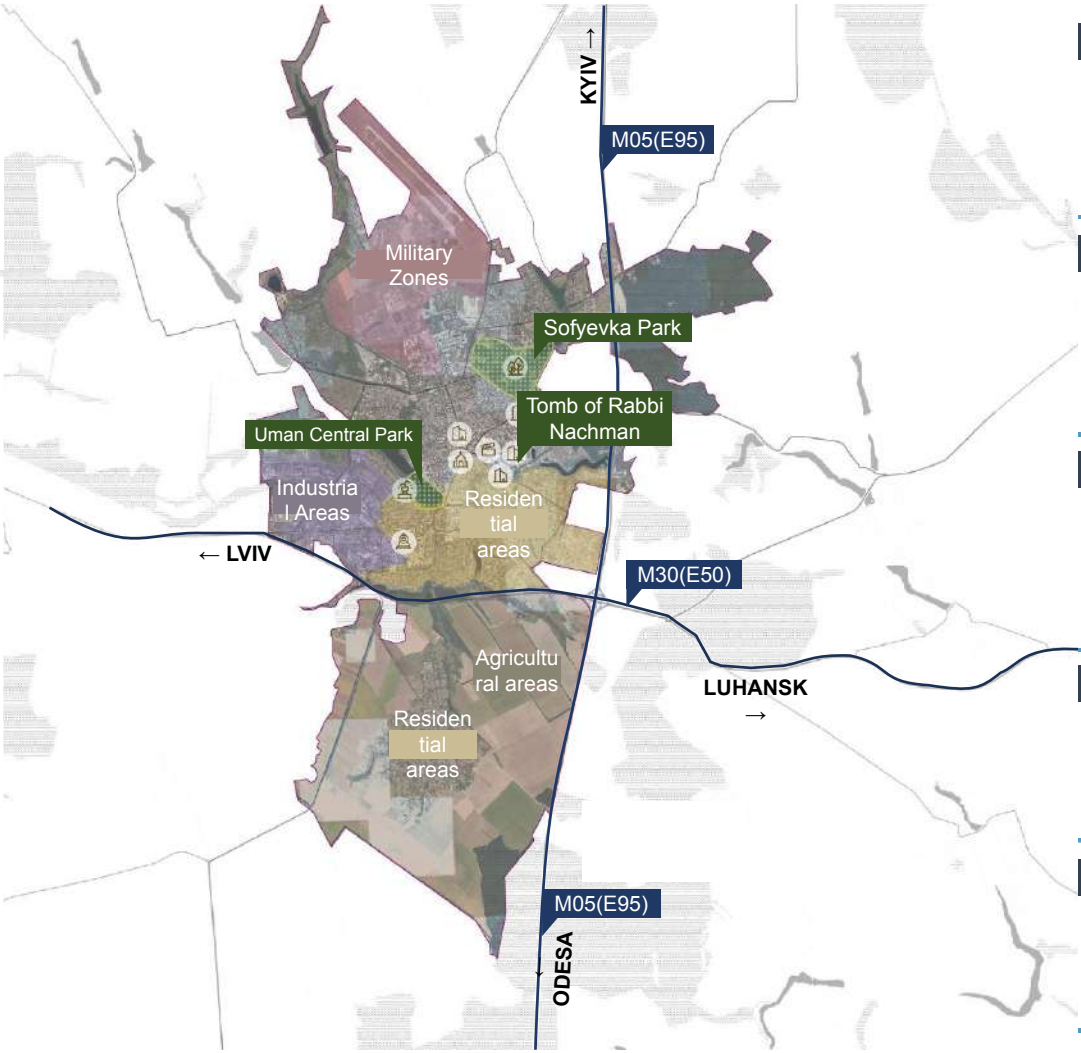


Number by Housing Type



tourist
0.6Million (2019)

Tourist accommodation
56ea (2,000 persons)



Housing & Infrastructure
- Inefficient management of residential buildings and communal infrastructure
  There is no solution to efficiently manage the city's basic infrastructure (smart metering, etc.)

Transportation
- Located in the center of Kyiv, Odessa, Lviv, Luhansk, etc.
  There are 19 privately operated bus routes for public transportation.

Tourist Facilities (Infrastructure)
- Sofyevka Park and Rabbi Nachman's Tomb Pilgrimage
  There is not enough accommodation for more than 600,000 visitors a year

Major Industries & Education
- …tourism, etc.
  Hasidic pilgrimage tourism is an important source of financial income and economic growth for the city
  Secondary institutions (17) and universities (3)

Administration
- Operated 1 administrative service center
  Illegal business has increased due to the lack of accommodation, but the means of collecting taxes such as tourist tax are insufficient.

Uman City has a population of 80,000 people, 36,000 households, and a tourist city with about 600,000 visitors a year.
Preparing a sustainable urban development plan by providing appropriate smart solutions for residential infrastructure and tourism infrastructure in the city

02 Analysis of Status in Uman City

Uman City Land Use and Facility Status

Uman Bus Terminal

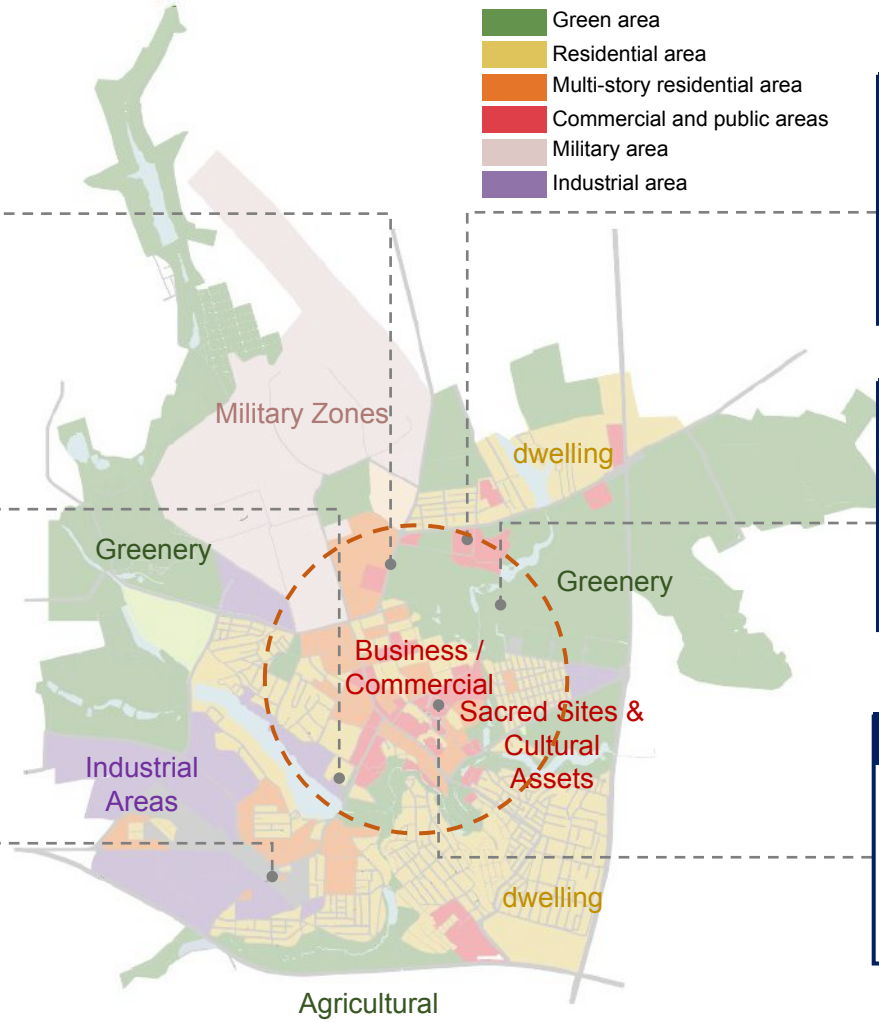
- **Kyivska Street Location**
  More than 300 buses operate every day
  In addition to domestic flights, international routes travel to Poland, the Czech Republic, Germany, etc.

Uman Central Park

- **A park located in the center of Uman city**
  Love Fountain and Monument to Taras Shevchenko

Uman Station

- **Vokzalna Square Location**
  Opened in 1890
  Trains to Kharkiv and Cherkasy are currently in operation



Uman National University of Horticultural Arts

- **Leading University of Uman**
  Together with the Sofivka Arboretum, it is a center for agricultural and horticultural research

Sofiyivka Park

- **As a representative tourist attraction**
  The most visited in Uman
  Botanical gardens and parks of various themes

Tomb of Rabbi Nachman

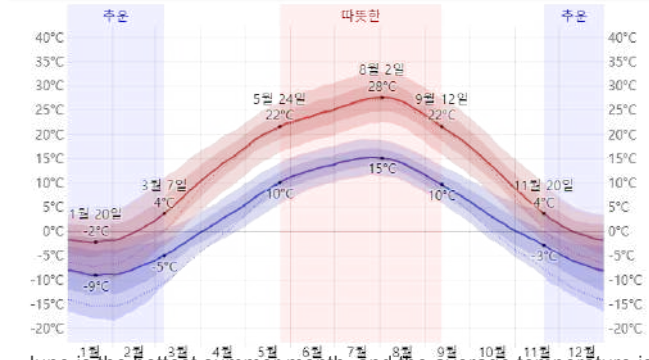
- **Tomb of Jewish Saint Nachman**
  More than 30,000 Jews visit the Holy Land on pilgrimage
  Nachman's Tomb is centered on Jewish facilities

Most of the major facilities and tourist facilities are concentrated in the center of Uman City.
It has a naturally generated urban structure

02 Analysis of Status in Uman City

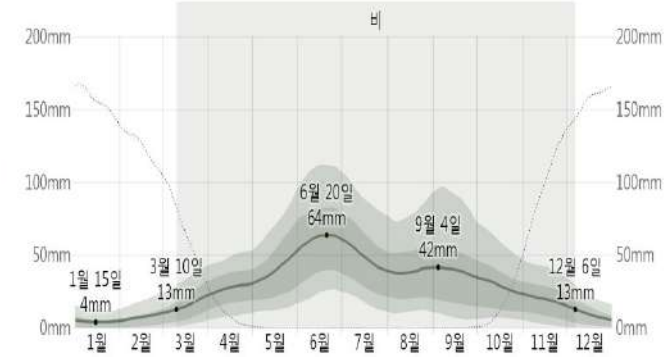
Analysis of the natural environment of Uman

Uman Average temperature (months)



- June is the hottest summer month, and the average temperature is between 15°C~24°C.
  January is the coldest winter, and the average temperature is between -8°C~-2°C.

Average Rainfall in Uman (months)



- Above-average annual rainfall during May~November
  June has the heaviest rainfall, averaging 63 mm

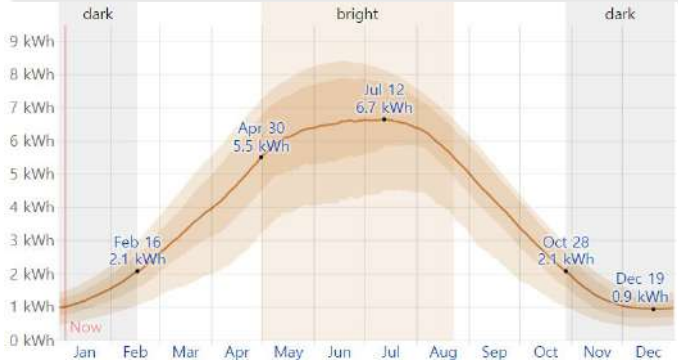
Average humidity in Uman (months)

- Most of Uman is a dry area, but there is a change in humidity from June
  The average humidity is around 2%, so the area is not affected by humidity

Uman Daylight and Time (months)

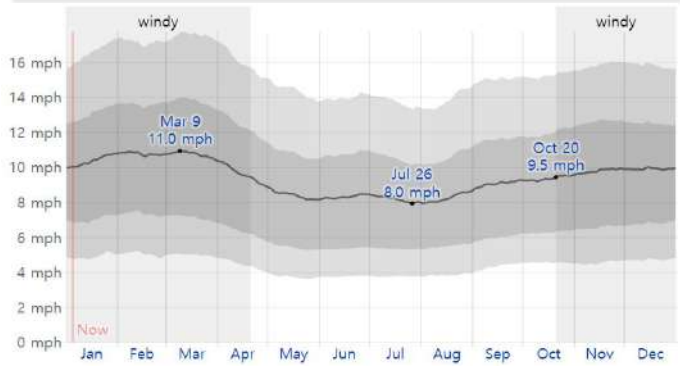
- December is the shortest and June is the longest daylight hours
  Average daylight hours are 12.2 hours (maximum 16.2 hours, June)

Uman Solar Energy (months)



- Solar energy varies greatly from season to season, and the brightest period is May ~ August (5.5 ~ 6.7kWh)

Average wind speed in Uman (months)



- The average wind speed per hour at 10 meters above the ground, and the period of strong wind speed is 6 months (end of October~end of April, average 9.5 mph, maximum 10.8 mph)

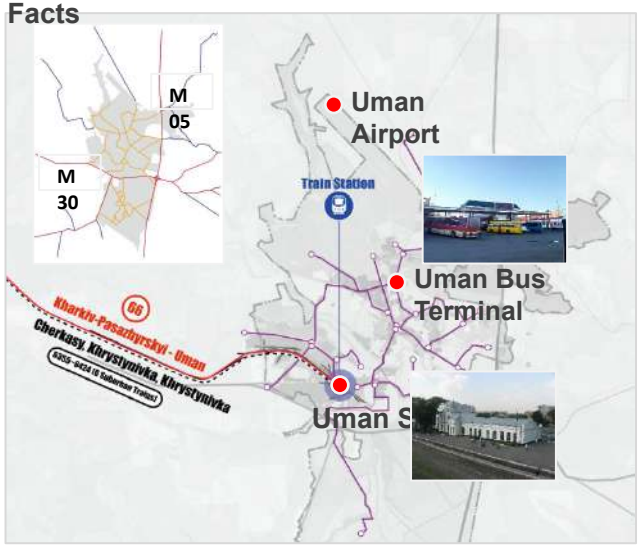
- The average sunshine hour is about 3.4hr/day, and the average wind speed is about 8.5 m/s, so we have high-quality natural resources for the introduction of renewable energy.
  The cold season lasts about 3.6 months, and the average daily temperature is below 4°C, so the introduction of district heating needs to be considered.

02 Analysis of Status in Uman City

Uman City Transportation Network and Public Transportation Status

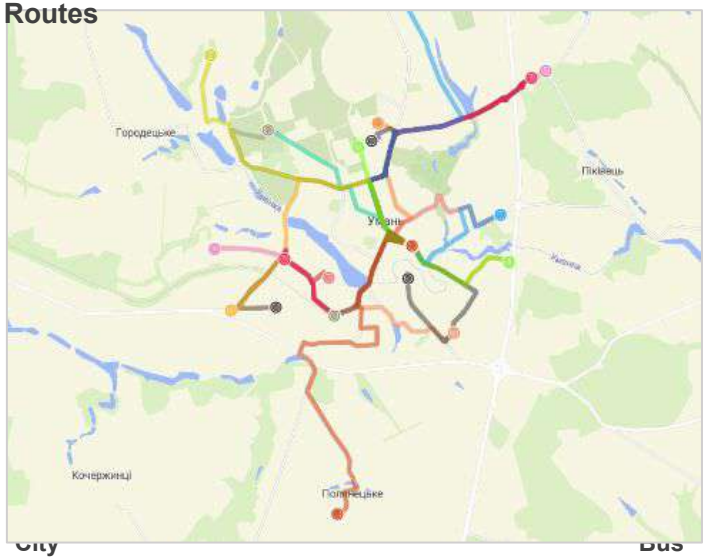
Traffic Status

Uman Traffic Facts



- The city of Uman is penetrated by the M05 road, which connects Odessa and Kyiv, and the M30 road, which connects Lviv and Luhansk.
  The military airport Uman, Cherkasy Oblast, is located 4 km north of the city center of Uman, but is not open to civilian transport.
  In the case of Uman Station, it is located in the south of the center of Uman City by railway, but it lacks competitiveness compared to road transportation.

City Bus Routes



· The city of Uman consists of 19 bus routes, including 18 intra-city routes and 1 suburban route.
· As of December 2023, 16 public bus routes are in service.
· Currently, more than 90% of Uman's area is accessible by bus
· Bus traffic alarms and route maps are available through the Easyway website.

Uman Railway and Intercity Bus Infrastructure

Railway

- Uman's railway line is a branch line of the railway
  Since December 21, it has been possible to travel from Lviv to Uman by train, but only part of the route has been operated due to the war.

Intercity Bus

- Uman bus station is operated by PJSC "Cherkasy OPAS" (local private company)
  More than 300 intercity buses operate daily in Poland, Italy and Moldova, as well as in Ukraine.

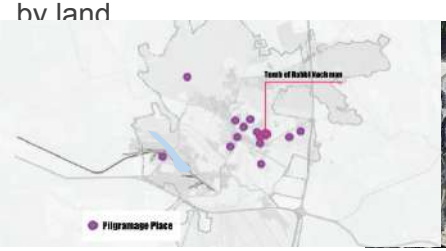
Compared to its important strategic location, Uman City lacks access to wide-area transportation such as airports and railways.
Currently, bus-centered public transportation is the foundation, but it is necessary to revitalize the metropolitan transportation infrastructure by strengthening the connection with other means of transportation in the future.

02 Analysis of Status in Uman City

Uman city visitor characteristics

Rosh Hashanah

- The number of tourists in Uman peaked at 720,000 in 2021 and is in a temporary decline due to the war.
  1 million tourists expected to visit Uman in 2030
  During Rosh Hashanah, 26,862 people from the Seven Realms visited Uman, including 2,261 children and 11 women, many of whom were adult males and members of the Hashism sect (an ultra-conservative Jewish sect).
  The majority of visitors were from Israel (90%), followed by countries from the United States, France, the United Kingdom, Belgium, Moldova, etc.
  Despite the Russian invasion in 2022, pilgrims from Israel arrived in Uman, with more than 50 chartered flights to Moldova and Uman by land



Uman Related Keywords

- The most searched words related to Uman City are Arboretum Sofiyivka, Hasidim, Jewish and large cities such as nearby Odessa and Kyiv
  Based on Israel, the country with the most searches for Uman, Uman's search terms are mainly related to pilgrimage, saints, and Hasidism.

Wide-area infrastructure

Top attractions in Uman

No.	Place	Number of reviews	Remarks
1	**Sofiyivka Park**	390	Park
2	**Tomb of Rabbi Nachman of Breslev**	54	Jewish Holy Land
3	**Uman Central Park**	35	Park
4	Perlyna Kokhannya Music and Light Fountain	16	Park
5	Ostashivskiy Lake	9	Park
6	Umansky Holy Protection Monastery Vasilevsky	4	Places of Worship
7	Uman Lore Museum	5	Cultural Facilities
8	Umanpivo	3	brewery
9	Wooden church of St. Michael the Archangel	3	Places of Worship
10	Uman Art Museum	3	Cultural Facilities

- According to the number of reviews, the main attraction in Uman is Sofyevka Park.
  Rabbi Nachman's tomb and Uman Central Park are next, followed by parks, museums, and the Uman Pibo Brewery.

Visitors to the city of Uman are Israeli in the majority and are deeply associated with Rosh Hashnah and pilgrimages
Other popular attractions include Sofiyivka Park

03 Comprehensive Conditions Analysis

SWOT		Strengths	Weakness
		• It has a variety of tourist destinations, sacred places with a steady demand for visits every year, and a variety of cultural assets Establishment of transportation infrastructure connected by road to the central regions of Ukraine Existing cultural assets, tourism and green space infrastructure	• Lack of accommodation facilities to attract visitors Aging urban infrastructure and lack of connectivity Most Jewish visitors are from ultra-conservative sects (Rejection of electronic media and technology) Lack of distribution and sales infrastructure for the growth of regional specialized industries (agricultural production)
Opportunity	• Uman City's strong will to rebuild a smart city Strengthening the image of a historical, cultural, smart, and tourism city Urban Improvement through Post-War Reconstruction	**Strengths/Opportunities Strategy**	**Weakness/Opportunity Strategy**
		• Establishment of smart infrastructure for the introduction of new services Introduction of Smart Information Services Strengthening tourism infrastructure through the introduction of smart technology Enhance cultural content using cultural assets and visit demand	• Improvement of accommodation through investment and cooperation in response to the shortage of accommodation facilities Expansion of tourism-based infrastructure and contents Improving efficiency through improving facilities and introducing smart technology in preparation for the problem of road and public transportation infrastructure obsolescence Creation of a distribution and direct trading complex that contributes to economic growth using locally produced agricultural products
Threat	• Political unrest due to Russian attack Difficulties in promoting business due to political characteristics Weak road structure in the old city center Aging public transport infrastructure and lack of facilities Population decline in Uman City Aging and scarce water infrastructure	**Strengths/Threat Strategy**	**Weakness/Threat Strategy**
		• Establishment of Uman City's differentiated smart city plan Introduction of personal mobility for ease of movement Improving and connecting Uman's green infrastructure and blue network Fostering industries using smart technology, diversifying the economy, and securing resilience to crisis situations Introduction of technology to ensure the safety of residents and visitors in preparation for political unrest	• Introduction of smart safety system for domestic and foreign tourists Introduction of smart garbage disposal to enhance the image of the city Rapid supply of modular housing complexes for refugees fleeing war Adopting sustainable smart technology to solve the problem of aging and shortage of water resources infrastructure Improving transportation network reliability by addressing transportation infrastructure deficiencies

Based on the SWOT analysis to establish Uman City's smart city plan, strategic elements and response elements according to issues were summarized
Uman City is judged to be a suitable city that can be developed and improved as a smart city

III

Smart City Concept and Promotion Strategy

01 Establishment of the need for a smart city in Uman

Basic Direction

Traffic, safety, energy, environment, etc. Solving existing urban problems

With existing urban planning and budgets
Solving urban problems that are difficult to solve
According to location, climate change, and urbanization
Securing a mid- to long-term response system

→ Responding to Limitations and Problems of Urban Development Planning

Revitalization of urban economy, improvement of Quality of life and Creating new jobs, business

Providing a convenient and safe environment to meet the needs of visitors
Creation of new jobs by revitalizing industrial complexes and creating new businesses

→ Securing momentum for new growth engines in Uman

Urban Infrastructure Efficient management

Intelligent
IoT
integration Operating
Big Data
Networks

→ Proposal of infrastructure integrated operation plan

Presenting a smart city demonstration model linked to the reconstruction of Ukraine

Smart Service | Smart infrastructure | Smart complex | Smart Home | Smart Life

→ Proposal of K-Smart City Demonstration Project Plan

Preparation of a plan to create an efficient and sustainable Uman smart city

Solve the limitations of solving urban problems through smart technology, not physical development

post-war reconstruction and development

By utilizing services/solutions based on the Nth industry technology, the industry continues to grow and life is happy.

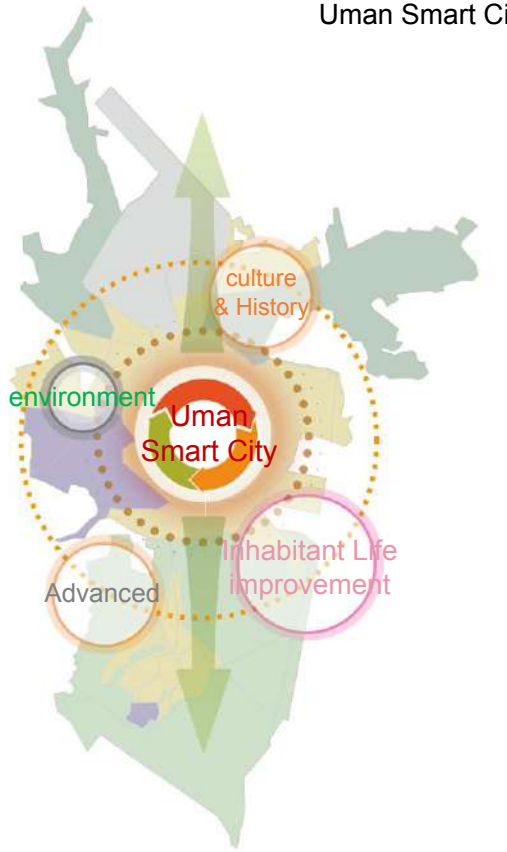
Urban Issues Response Resolution → Local Economy activation → Innovative Urban Management → Sustainable Smart Cities → Hyper-connectivity Intelligent Cities → Citizens' lives Increased value

02 Derivation of direction of Uman smart city development

Uman City Response to Urban Problems

- Derive the urban problems that Uman City has and derive the functional elements of the smart city solution that can respond/solve using smart technology

Issues / Basic Directions	Urban Issues Response Resolution	Local Economy activation	Innovative Urban Management
Creating favorable conditions for the development of the tourism industry and developing services	○		
Creating a clean ecological environment with the goal of carbon neutrality by 2050		○	
Develop effective management of housing and urban infrastructure			○
Preparation of a plan to secure a stable water supply system	○		
Development of a plan for disposal of household/industrial waste		○	
Securing eco-friendly public transportation and preparing measures to strengthen traffic safety			○



Smart technology utilization area for solving problems in Uman City

Traffic Logistics	• Revitalization of public transportation system and securing service system Solving parking problems Establish a safe walking plan	Ecological environment: • Providing eco-friendly transportation Expansion of electric charging stations
Water	• Securing a stable water supply system Establishment of wastewater and rain water utilization system	Energy resource: • Securing a green energy supply chain Manage the efficient use of resources Consideration of the introduction of district heating and cooling system
Safety	• Introduction of intelligent CCTV system Building Smart Street Lights	City Operating administration: • AI Increases the Utilization of Big Data Preparation of facility management plan
Living environment Waste	• Establishment of a virtuous cycle of resource recycling Food Waste Disposal Waste Treatment System	Economy: • Preparation of smart farm introduction plan Accommodation for tourists and refugees

03 Uman City's Smart City Basic Plan

Smart City, Establish a vision and goals

- By comprehensively reviewing the latest status of Uman, major issues, and regional characteristics, Establishment of Uman customized smart city vision and goals
- Proposal of a smart city ecosystem creation strategy for sustainable smart city construction and operation

Creating New Urban Space | Creating New Urban Value | Sustainable Urban Innovation DNA

Mission

Utilizing innovative smart technology Systematically support urban recovery and create an ecosystem that will induce sustainable growth

Vision

Leading the way in recovery and sustainable development

Ukraine Leading Smart City

Core Values

- Resilience
- Sustainability
- Safety & convenience

	Smart Mobility	Smart Safety	Smart Energy & Environment	Smart Economy	Smart Operation
Goal	A mobility innovation city that guarantees rapid movement and convenience	A safe city that protects citizens from disasters, crimes, and accidents	Renewable Energy and Resource Circulation Eco-friendly energy self-reliant city	Cultural, tourism and industrial area characteristics of Uman, Revitalizing the local economy through strengthening	D N A city that can integrate and operate data-based urban infrastructure
Promotion direction	• Providing eco-friendly transportation and solutions to strengthen wide-area connectivity and mobility convenience in the city Building an intelligent road infrastructure that ensures pedestrian safety and ensures traffic flow	• Establishment of urban infrastructure and intelligent control system to strengthen disaster prevention and response Establishment of a safety system that prevents crimes and accidents in advance and enables immediate and systematic response in the event of an emergency	• Realization of a high-efficiency, eco-friendly and energy-independent city based on renewable energy such as solar power, wind power, and bio Intelligent water management, water circulation, and resource circulation-based Zero Waste to realize an eco-friendly green city	• Providing innovative spaces and convenience services to improve the quality of life of visitors and residents Promote local economic development by strengthening Uman industrial services such as high-tech recreation, tourism, and agriculture	• Provision of innovative spaces and convenience services to improve the quality of life of visitors and residents, and efficient city management Promote local economic development by strengthening Uman industrial services such as high-tech recreation, tourism, and agriculture

04 Uman City's Smart City Promotion Strategy

04-1 Spatial Specialization Plan for the Creation of New Urban Spaces

Space specialization considering regional core issues and planning the direction of urban development

Smart

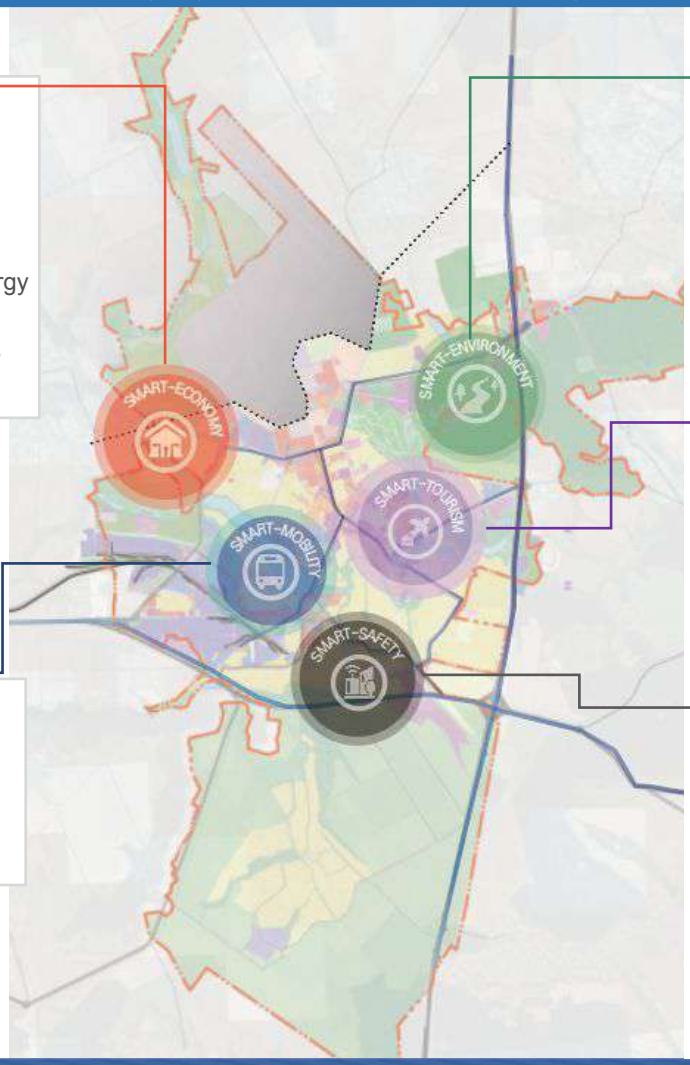
Smart Economy·Tourism

- Introducing residences to address tourists, refugees, and housing needs
  Based on agriculture and smart technology, local economic development
  Expanding the introduction of renewable energy such as solar power generation, wind power generation, and biomass to improve the city's energy self-sufficiency and realize an eco-friendly city

Smart

Smart Mobility

- Activation of eco-friendly public transportation (electric buses, bicycles, PM, etc.)
  Introduction of parking control system to solve parking problems



Smart

Smart Environments

- Introduction of renewable energy and smart technology to minimize various environmental pollution
  Creating a sustainable space by linking blue network and green network

Smart

Smart Tourism

- Complementing the tourism infrastructure in the city center
  Establishment of tourism infrastructure considering Hasidic culture

Smart

Smart Safety

- Smart technology that improves the quality of life for residents
  Improvement of street and road facilities for safety in downtown areas and introduction of facilities for resident safety

Establishment of a sustainable urban development plan through the application of smart solutions in 5 fields to the entire city of Uman
Laying the foundation for the development of future smart cities in Ukraine through the promotion of smart tourism-related demonstration projects tailored to the current state of the city

04 Uman City's Smart City Promotion Strategy

04-2 Smart Service Specialized Plan for New City Value Creation

Specialization 1

Smart Mobility

A mobility innovation city that guarantees rapid movement and convenience

- ▸ Improvement of public transportation facilities in Uman City and introduction of transportation infrastructure to expand eco-friendly transportation
- ▸ Creation of a smart mobility ecosystem that supports free movement

Paradigm Shift and Development of Green Transportation

Future Technology Development and Service Change

- Need to provide integrated transportation services based on future technology

Private Transportation > Public transport > Shared Transportation > Electric Vehicles

Implementing Cloud-Based Smart Mobility

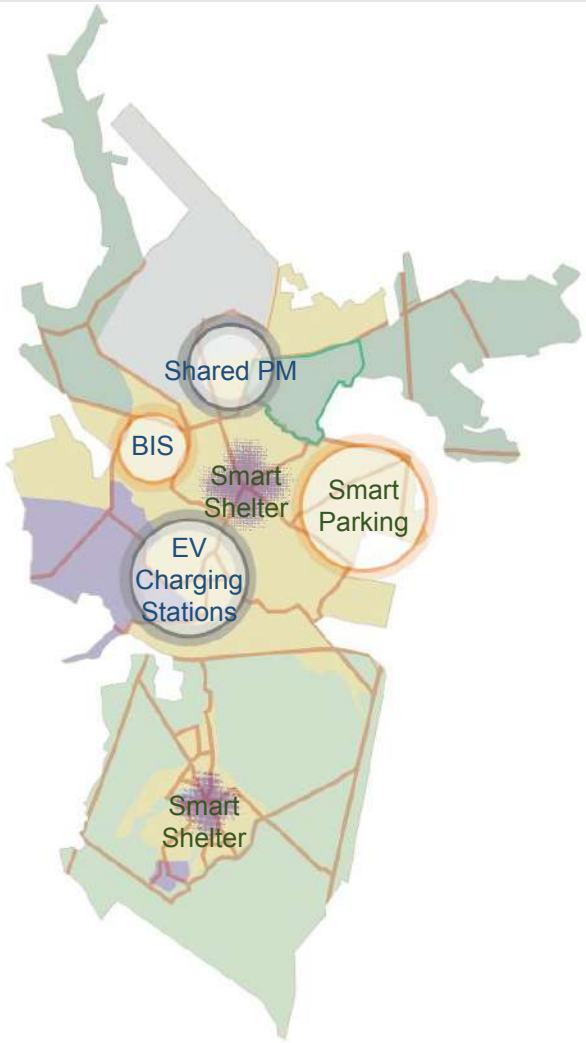
Establishment of a transportation platform

- Introduction of smart parking system to solve parking problems
  Expansion of electric charging station electric vehicle infrastructure

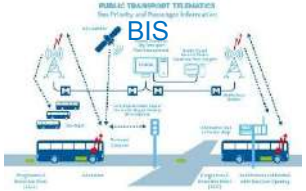
Improving public transportation facilities

Bus Infrastructure Improvements

- Introduction of BIS (Bus Information System) to provide real-time information such as traffic conditions, vehicle location, number of passengers, bus movement information, and routes
- Smart shelter for bus infrastructure improvement and BIS system introduction



1. Providing Bus Infrastructure/Parking Solutions



Improvement and smartization of basic transportation infrastructure in the city

2. Establishment of eco-friendly transportation infrastructure

Eco-friendly transportation (e-bikes, electric vehicle infrastructure)

Relieve traffic congestion, expand walking convenience, and Expansion of travel distance through eco-friendly PM linkage

04 Uman City's Smart City Promotion Strategy

04-2 Smart Service Specialized Plan for New City Value Creation

Specialization 2

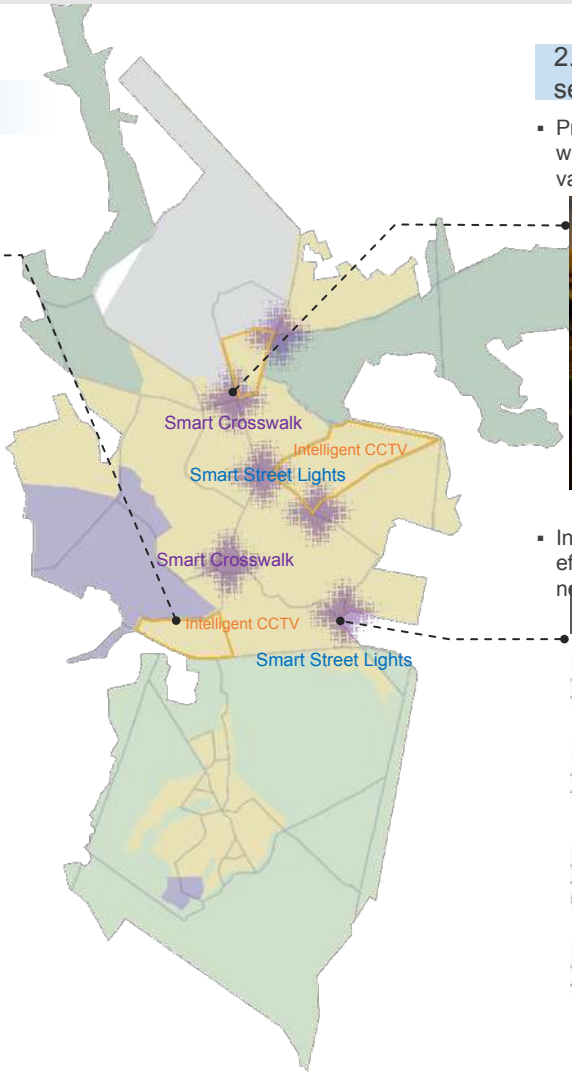
Smart Safety

Implement of a safe city that protects citizens from disasters, crimes, and traffic accidents

- ▸ Establishment of traffic safety infrastructure and services that make it safe to walk on the road
- ▸ Prevent crime in advance and respond immediately and systematically in case of emergency Establishment of a support system

1. Establishment of a system to prevent and respond to the occurrence of crimes

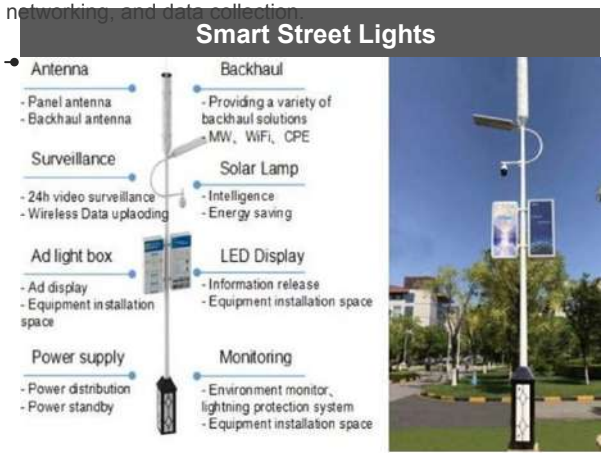
- Focusing on dangerous areas, congestion areas, and vulnerable security areas, monitor through intelligent CCTV installation and AI video analysis, and connect with related organizations in case of dangerous situations.



2. Establishment of traffic safety infrastructure and services

- Prevention of pedestrian traffic accidents with pedestrian/pedestrian warning through artificial intelligence IoT detection technology and various warning functions

- In addition to street lighting, there are also functions such as energy efficiency, sensor and IoT integration, wireless communication and networking, and data collection



04 Uman City's Smart City Promotion Strategy

04-2 Smart Service Specialized Plan for New City Value Creation

Specialization 3 **Smart Energy & Environment**

An eco-friendly energy self-reliant city based on renewable energy and resource circulation

- ▸ Realization of an energy-independent city based on renewable energy such as solar power, wind power, and biomass
- ▸ Realization of Zero Waste Eco-friendly City through Waste Recycling

1. Realization of eco-friendly energy production-consumption-based ecosystem

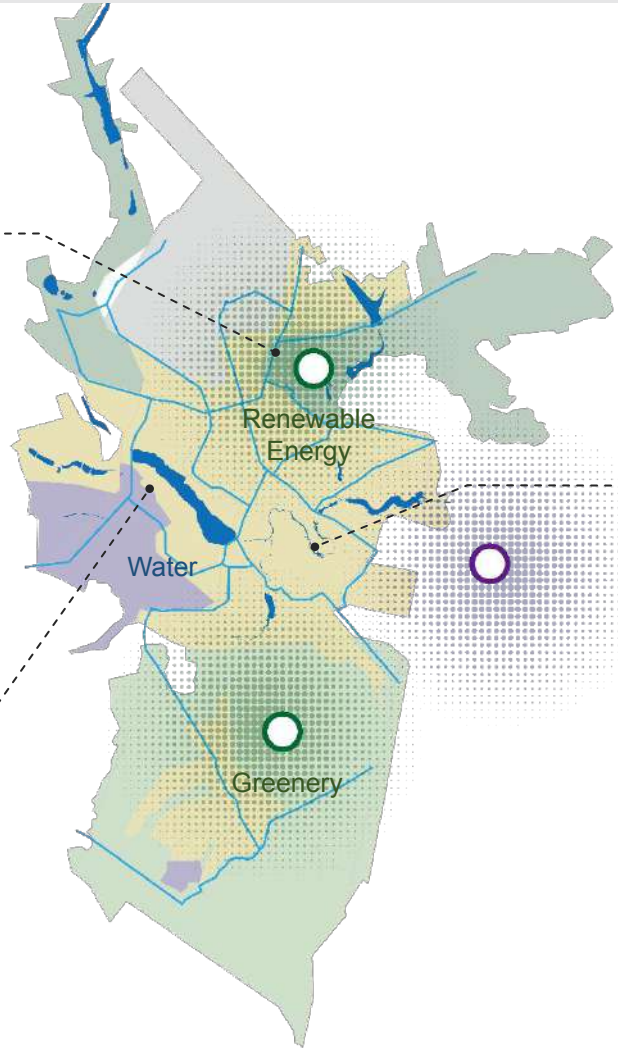
- Expanding the introduction of renewable energy such as wind power generation and biomass to improve the city's energy self-sufficiency and realize an eco-friendly city

Renewable Energy

2. Implementation of a healthy water supply system

- Vertical water treatment system that can treat water sources in urban areas on its

Smart Water Purification Plant



3. Establishment of garbage collection platform and monitoring system

- Provides real-time garbage loading in the collection box to support efficient collection and management

Smart Garbage Collection

04 Uman City's Smart City Promotion Strategy

04-2 Smart Service Specialized Plan for New City Value Creation

Specialization 4

Smart Economy·Tourism

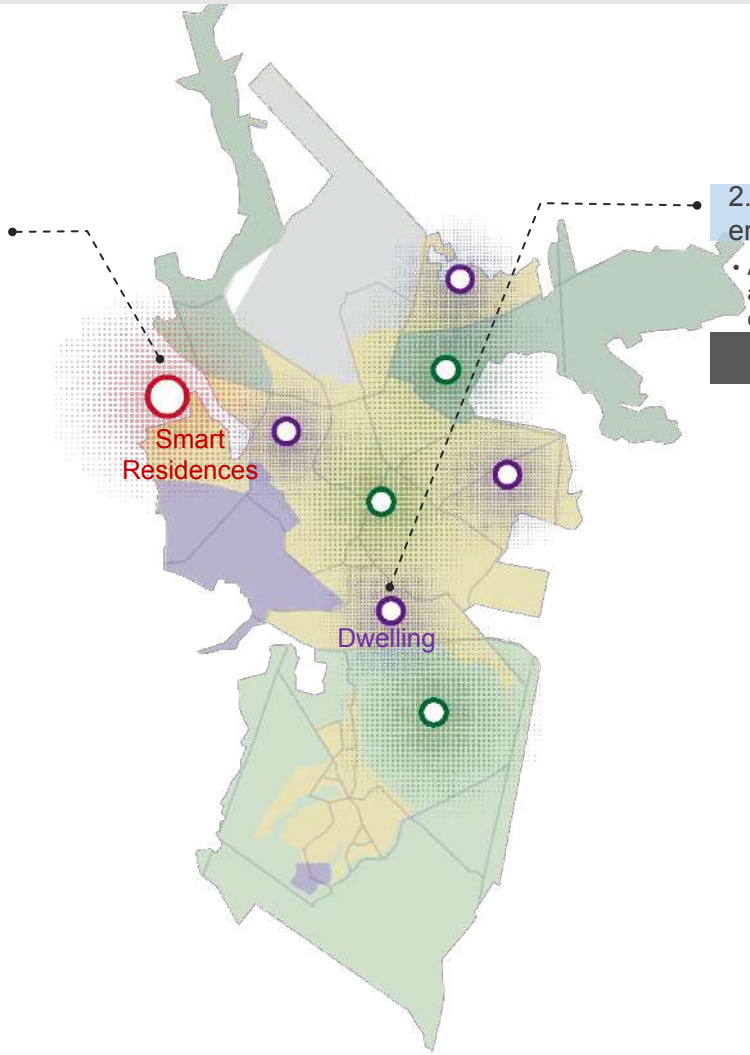
Revitalization of local economies that reflect smart technology

▸ Introduction of smart technologies that can revitalize the economy, such as smart homes, smart complex operations, and smart farms

1. Complex management that can reduce housing costs and operate efficiently

• Utilizing ICT technology to monitor renewable energy production, energy consumption, fine dust, and water quality in the complex.

Smart Complex Management



2. Build a more convenient and safe living environment

• A convenient residential environment that connects home appliances and facilities through a communication network and can be monitored and controlled based on artificial intelligence

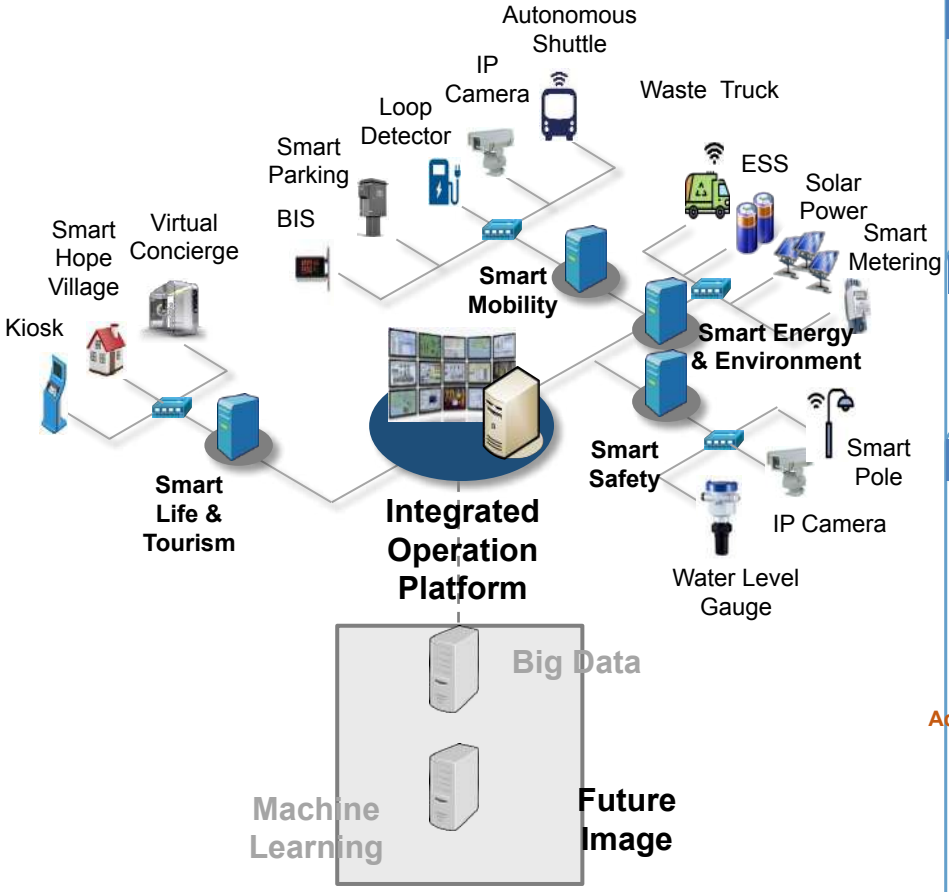
Smart Home

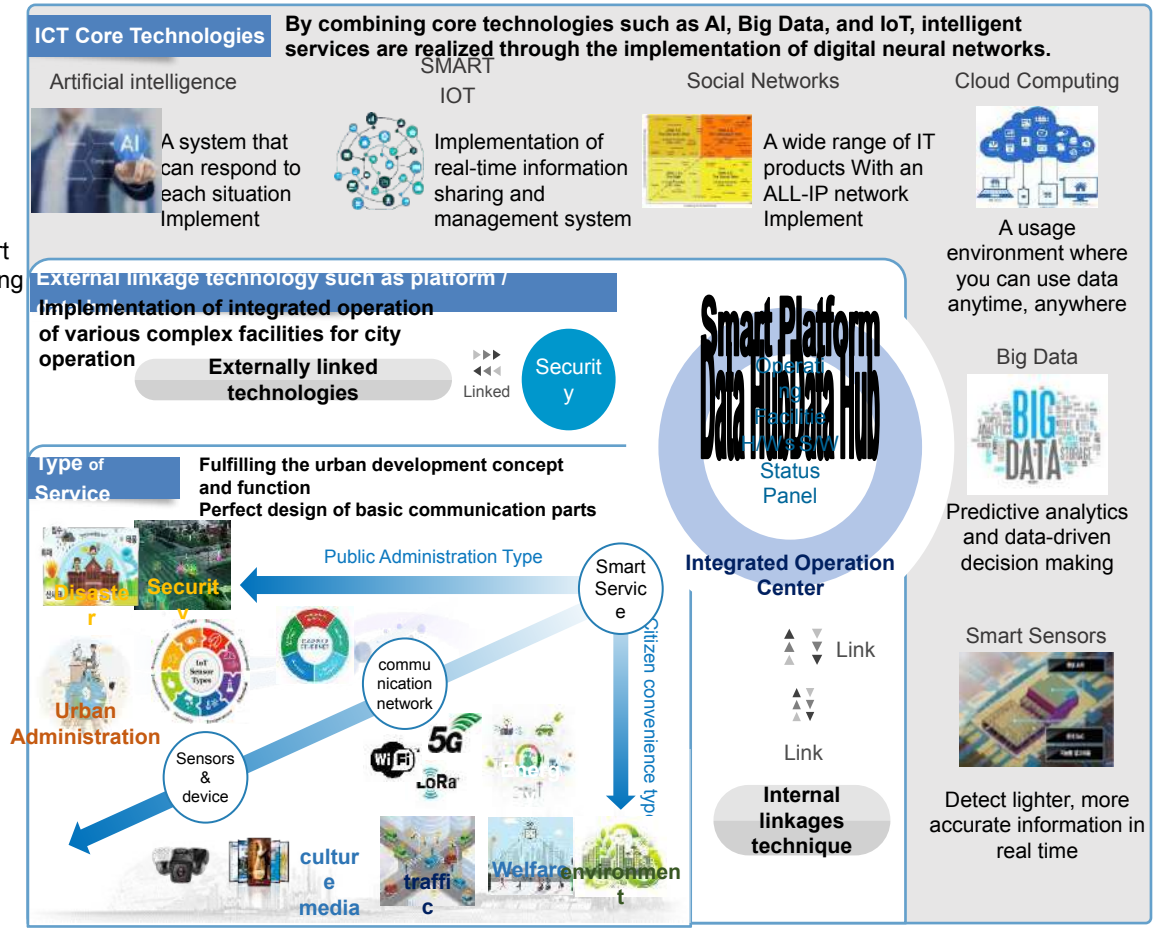
04 Uman City's Smart City Promotion Strategy

04-3 Data·network·Building an AI Platform

D·N·A city

- Sustainable data hub for data-based smart city operation· Establishment of AI-based urban integrated operation platform foundation
- Implementation of next-generation network-based environment to create a foundation for information collection for urban innovation





Ⅳ Smart City Services Derivation

01 Uman Smart City Solution Derivation

Smart Mobility

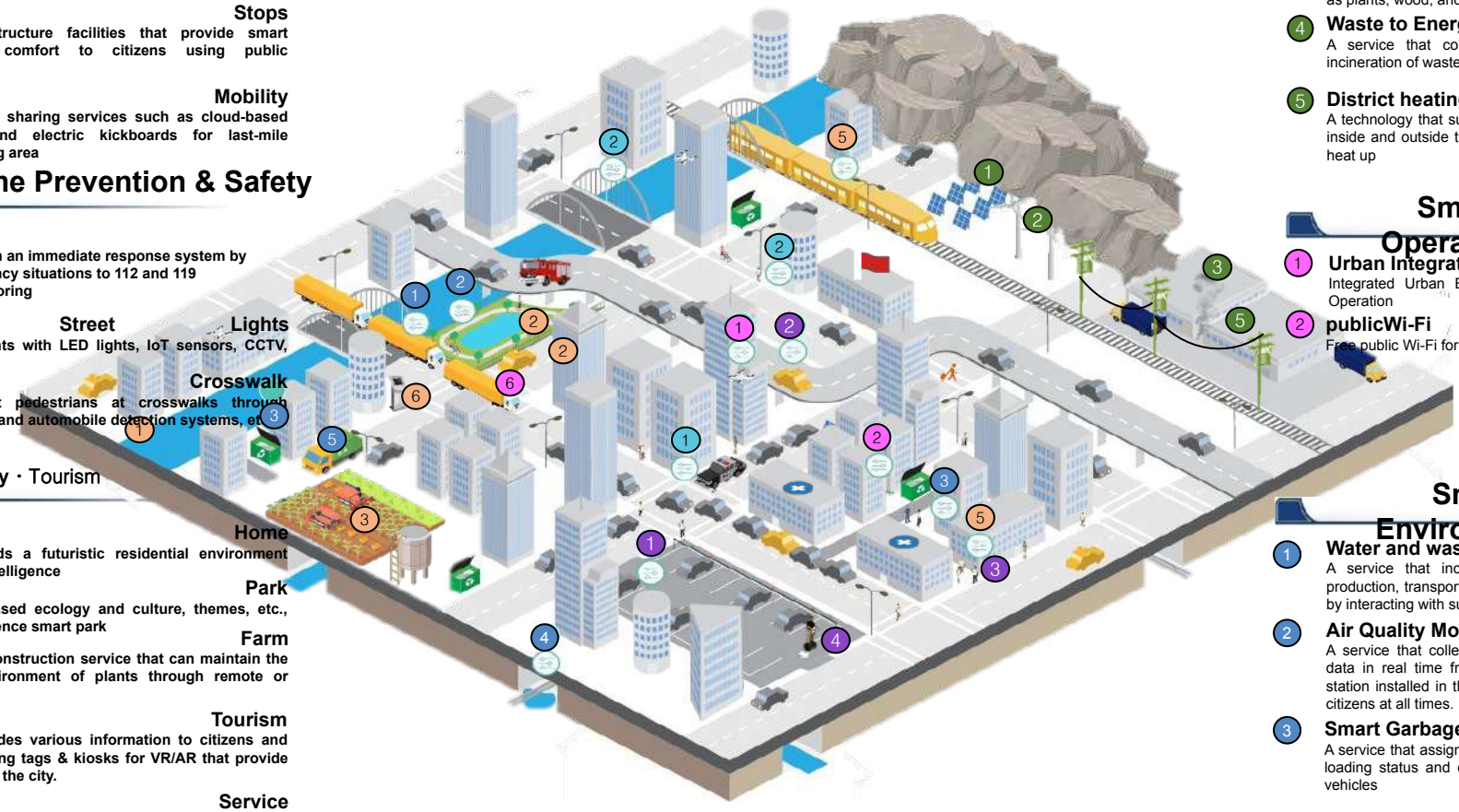
1. **Smart Parking**
   A service that provides drivers with unmanned payment and real-time parking information
2. **Intelligent unmanned enforcement**
   A traffic enforcement system that monitors, detects, and cracks down on speeding and traffic light violations on the road 24 hours a day and night. Violation information such as violating vehicle video and automatically recognized license plate number is provided to the center.
3. **Smart Stops**
   Convergence infrastructure facilities that provide smart convenience and comfort to citizens using public transportation buses
4. **Personal Mobility**
   Eco-friendly mobility sharing services such as cloud-based electric bicycles and electric kickboards for last-mile utilization in the living area

Smart Crime Prevention & Safety

1. **Public Security**
   A service to establish an immediate response system by transmitting emergency situations to 112 and 119 through CCTV monitoring
2. **Intelligent Street Lights**
   Intelligent street lights with LED lights, IoT sensors, CCTV, etc.
3. **Smart Crosswalk**
   Services to protect pedestrians at crosswalks through pedestrian detection and automobile detection systems, etc.

Smart Economy · Tourism

1. **Smart Home**
   A service that builds a futuristic residential environment based on artificial intelligence
2. **Smart Park**
   Smart technology-based ecology and culture, themes, etc., experiential convergence smart park
3. **Smart Farm**
   Farm environment construction service that can maintain the optimal growth environment of plants through remote or automatic control
4. **Smart Tourism**
   A service that provides various information to citizens and foreigners by installing tags & kiosks for VR/AR that provide tourist information in the city.
5. **One-Card Service**
   A service that allows you to use public transportation, bicycles, credit cards, identity verification, access security, and other access, information, payment, and mileage accumulation necessary for daily life in the city with one card.
6. **Digital Signage**
   A service that installs media boards, media poles, and media facades in key locations in urban spaces to provide information on daily life such as news, environment, and municipal administration information by optimizing the location and situation.



Renewable Energy

1. **Solar Power**
   Power generation technology that converts the light energy of the sun to generate electricity
2. **Wind power**
   Power generation technology that converts wind energy to generate electricity
3. **Biomass Power Generation**
   Technology to obtain heat and electricity from organic matter such as plants, wood, and residues
4. **Waste to Energy**
   A service that converts heat generated in the process of incineration of waste into energy such as steam and electricity
5. **District heating and cooling**
   A technology that supplies heat media through pipes to buildings inside and outside the area and receives it from each building to heat up

Smart Operations

1. **Urban Integration Operation Center**
   Integrated Urban Energy Monitoring and Energy Optimization Operation
2. **publicWi-Fi**
   Free public Wi-Fi for citizens and tourists

Smart Environments

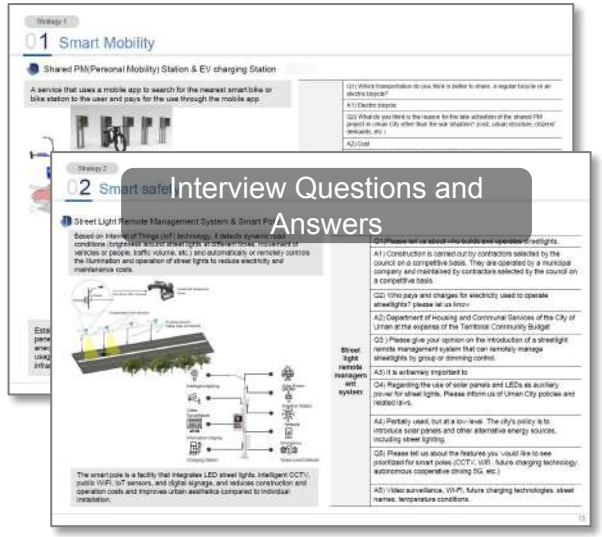
1. **Water and wastewater treatment**
   A service that incorporates ICT into the process of water production, transportation, and consumption to increase efficiency by interacting with suppliers and consumers
2. **Air Quality Monitoring**
   A service that collects and analyzes air pollution measurement data in real time from an automatic air pollution measurement station installed in the city and provides air quality information to citizens at all times.
3. **Smart Garbage Collection**
   A service that assigns a unique ID to the trash can to monitor the loading status and optimize the transportation route of garbage vehicles
4. **Wastewater Management**
   Remote management system for wastewater treatment facilities is an integrated system for the entire treatment process from inflow to discharge.

01 Uman Smart City Solution Derivation

Stakeholder Interviews

- Date : 2023. 12. 22.(Friday)
- Target: Mayor of Uman City, Uman Agency Officials
- Purpose :

  Review the differences in understanding of Ukraine's current state of Ukraine and smart cities and conduct interviews with key statuses related to the destination



Scope of Interviews and How to Use Them

Natural Disasters Derivation of Urban Response Plan in the urban regeneration according to climate change	**Use of Facilities** Review of the feasibility study focused on visitor facilities as a tourist city	**Obsolescence** Identify dangerous areas and old buildings, and review spatial improvement and countermeasures for old buildings	**Religion, History, Culture** An Analysis of the Status and Characteristics of Visitors Considering the Jewish Pilgrimage Culture of Uman City
Traffic Utilization of existing mobility infrastructure, applicability of new mobility transportation, and solution of traffic problems	**Tourism** Maintaining regional characteristics and improving tourism software and hardware suitable for the target site	**Higher-level and related plans** Referring to previous research and planning, Review of site-related spatial concept and concept	**Legal system, technical level** Reviewing Smart City Services and Urban Regeneration Projects that can be established and operated under the legal system

01 Uman Smart City Solution Derivation

Stakeholder Interviews

Energy

- When solar energy is introduced, it is expected to be helped by emergency power, currently it is only installed by private and private individuals, and it is partially used in street lighting, but at a low level
  The utilization level of renewable energy is low at less than 2%, and they want to introduce renewable energy using biomass
  Positive introduction to district heating systems

Use of Facilities / Traffic

- Aging, poor and inadequate public transportation system
  In the case of traffic within the city, traffic congestion occurs only during certain periods (Rosh Hashna)
  Saturation of garbage collection sites (currently 90% of usage) and aging water and sewerage facilities
  Opinions on the introduction of PM are positive, but current demand is limited, and there is a lack of autonomous driving infrastructure

Urban Infrastructure

- There are 125 CCTVs installed in Uman City, but they are not intelligent CCTVs, but ordinary CCTVs
  Wi-Fi service is currently available in Uman Park.
  Public buildings, tourist attractions, bus stops, and passenger transport vehicles need to be equipped with Wi-Fi facilities
  Sidewalk safety is not a major risk, but lighting needs to be improved

The history, cultural remains / Tourism

- In 2023, 35,000 Jews visited during Rosh Hashnah.
  Most visitors are adult males (84%), with more than 90% Israelis

Key comments

- Uman needs services in mobility, public transport infrastructure, residential and tourism infrastructure, intelligent CCTV, and waste management.

Interview Analysis Results

> Key tasks demanded by Uman City
> Revitalizing the tourism industry and improving urban infrastructure

Creating favorable conditions for the development of the tourism industry and developing services

Creating a clean ecological environment with the goal of carbon neutrality by 2050

Develop effective management of housing and urban infrastructure

Stable water supply system
Preparation of a security plan

Increase in domestic/industrial waste and preparation of disposal measures

Securing eco-friendly public transportation and preparing measures to strengthen traffic safety

02 Smart Service Classification

Introductory Services evaluation

✓ Through interviews with officials in charge of the smart service pool derived from the previous and review of
smart city policies, introduction of each service, examine the feasibility and effectiveness of adoption

Evaluation Criteria	Evaluation Factors	Evaluation Details	Contents
Benefits	Profitability	Return on investment (facility investment + operating cost) after service supply	High ROI (Within 5 years) :5, Middle ROI (Within 10 years) :3 Low ROI (more than 10 years): 1
	Scalability	Cherkasy Oblast and Ukraine Scalability	Ukraine Extended Application: 5, Cherkasy Oblast: 3, Apply in Uman: 1
Execution Usability	Technical usability	Underlying technology / existing system presence	Utilization of technology introduction: 5, Commercialization :4. National Research Projects 3, In development2, etc 1
	Policy usability	Publicity and policy conformity regulatory, legal and institutional suitability	Large public benefit and suitable legal system: 5, Large public benefit and need improvement of legal system :4, Public benefit and legal system appropriate: 3, Small public benefit but suitable legal system : 2, Small public benefit and need to improve legal system 1

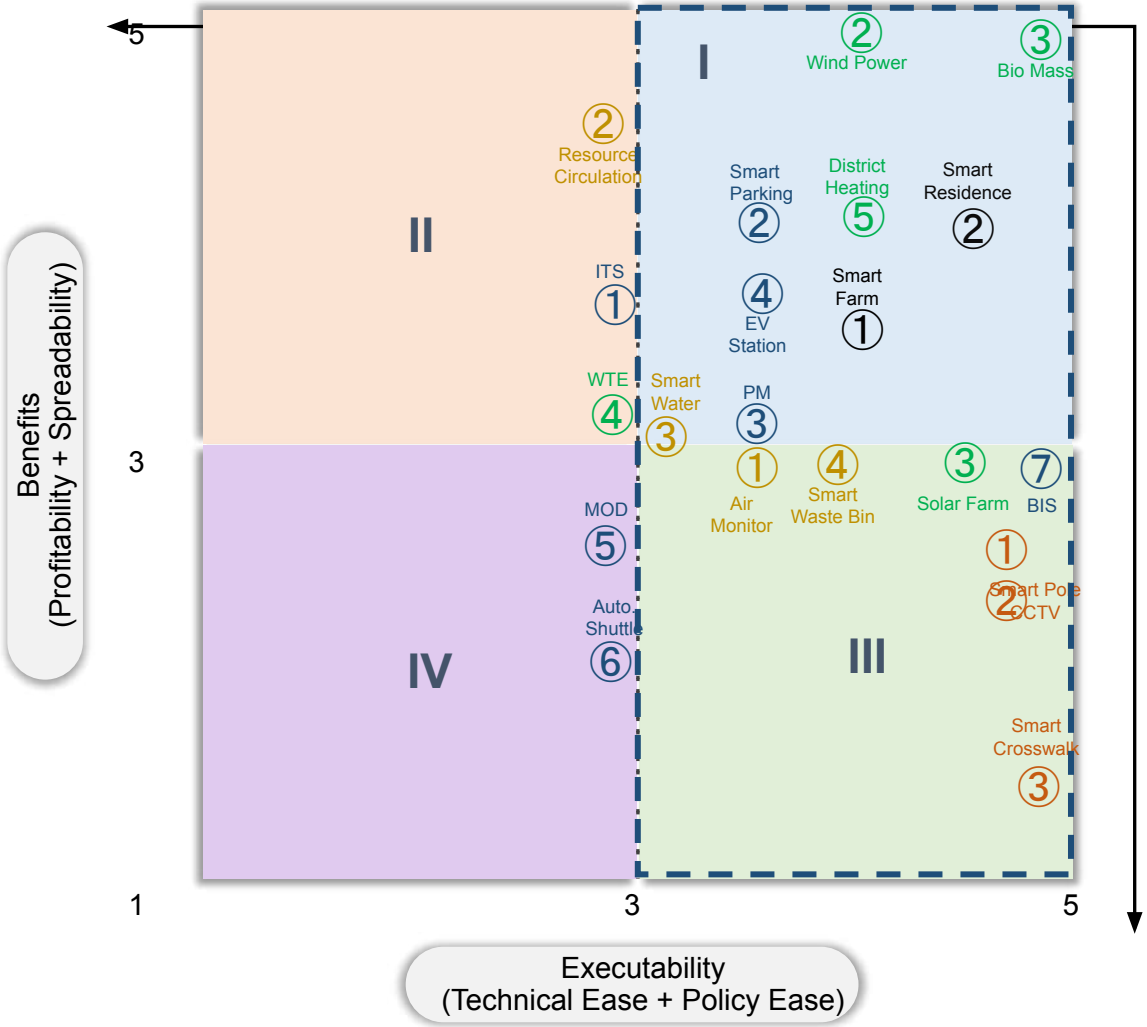
Category	Service	Profitability	Diffusivity	Sum	Technic	Policy	Sum
Smart mobility	① Smart Roads (ITS)	1	5	3	5	2	3.5
	② Smart Parking (Road)	4	4	4	5	2	3.5
	③ Shared PM Stations	3	3	3	4	3	3.5
	④ EV Charging Stations	3	4	3.5	4	3	3.5
	⑤ Mobility on Demand (MOD)	2	3	2.5	3	3	3
	⑥ Self-driving shuttle bus	1	3	2	3	3	3
	⑦ Bus Information System	1	5	3	5	5	5
Smart Safety	③ Intelligent CCTV	1	5	3	5	4	4.5
	④ Smart Street Lights	1	5	3	5	4	4 . 5
	⑤ Smart Crosswalk	1	3	2	5	5	5

Category	Service	Profitability	Diffusivity	Sum	Technic	Policy	Sum
Smart energy	① Solar Energy	2	4	3	5	4	4.5
	② Wind power	5	5	5	5	3	4
	③ Biomass	5	5	5	5	5	5
	④ Waste To Energy	1	5	3	5	1	3
	⑤ District heating	3	5	4	5	3	4
Smart Environments	① Atmospheric Environment Information	1	5	3	5	5	5
	② Resource Circulation Facility	4	5	4.5	5	1	3
	③ Smart Water Purification Plant	3	5	4	4	2	3
	④ Smart Garbage Collection	1	5	3	5	3	4
Smart Economy	① Smart Farm	3	4	3.5	4	4	4
	② Smart Residences	4	4	4	4	5	4.5

02 Smart Service Classification

Priority Selected

✓ Through a review of the introduction effect and ease of implementation, priority services to be built and services to be accessed by the public are selected and classified



Ⅰ	**Quick Wins (Priority construction target service)** It has a high payback rate, high diffusion, and is in line with the policy
Ⅱ	**Nice To Have (Medium-term deployment target services)** In line with the policy, but medium-term construction projects
Ⅲ	**Strategic Initiatives (Public Access Target Services)** The return on investment is low, but for the benefit of citizens Public-led adoption
Ⅳ	**Leave for Now (Long-term access target services)** The technology maturity is low at this point in time. Very low ease of realization

V

Smart City Service Introduction Strategy

01 Smart Mobility Service Introduction Strategy

02 Smart Safety Service Introduction Strategy

03 Smart Energy Service Introduction Strategy

04 Smart Environment Service Introduction Strategy

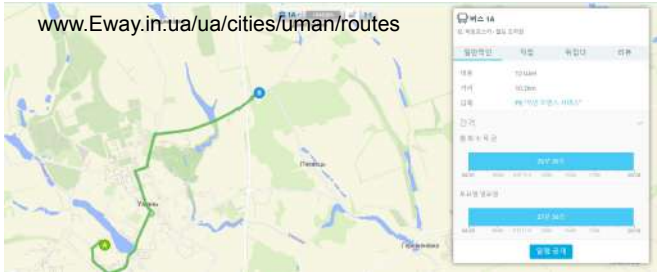
01 Smart Mobility Service Introduction Strategy

1 Smart Mobility

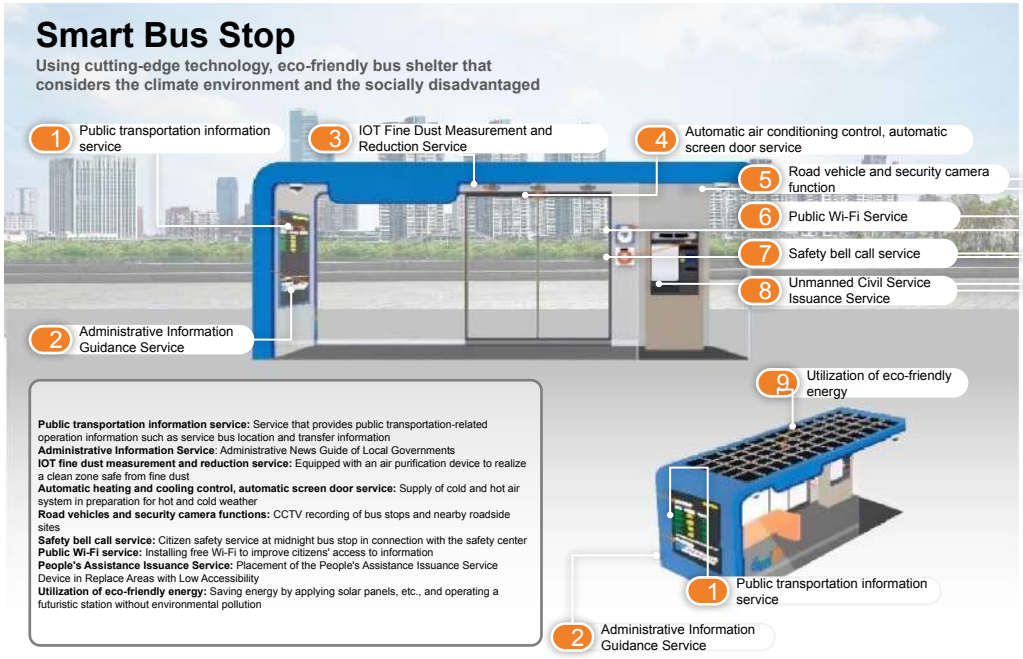
Smart Bus Shelter, BIS

- (Smart Bus Shelter) An intelligent bus stop that provides services such as surrounding geographic information, weather, air quality information, and traffic information, as well as information.
  (Bus Information System: BIS) A high-tech transportation system that collects real-time location information of buses and provides real-time bus arrival information, current location, and emergency situation information to promote the use of public transportation.

Current Situation Analysis

Status	• Bus Status - A total of 19 routes (5 or more routes are inactive) - Number of users: 500,000 / year • Provision of route information and departure and arrival time information - Route information: Check the website of EasyWay or call the bus company - Departure and arrival time information: No real-time departure and arrival information 
Requirements & Improvements	• Establishment of smart stops and real-time arrival information provided by mobile apps and smart stops Considerate to use it as resistance infrastructure in case of war (wireless Wi-Fi, CCTV, security bells, structural materials, etc.)
Introduction Guide	• Out of the total 178 bus stops in Uman City, 25 bus stops with 2 or more routes will be first replaced with smart shelters and then expanded
Build & Operate	• Uman City (Public)
Considerations	• It is necessary to prepare a plan for cooperation with private bus transport operators to install OBE (On Board Equipment) terminals in buses.

Service Overview



Bus Information System

Bus stop information terminals

- Estimated arrival information and bus location Providing route information and advertising promotion

Home page

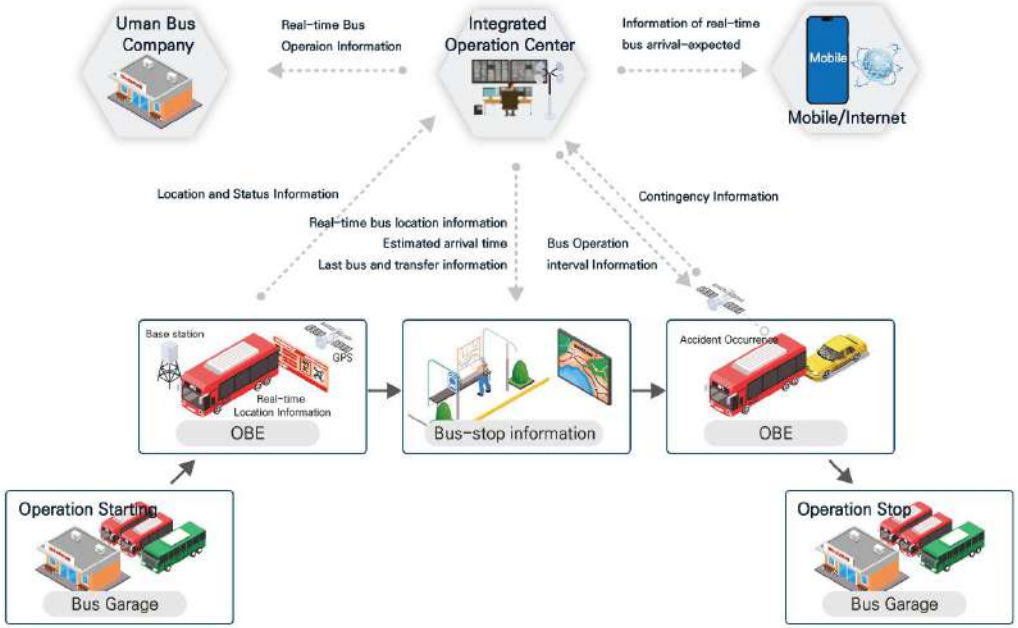
- Bus delivery via the web Portal Map Application

Smartphones and QR codes

- Convenient bus using smartphone Verify your information

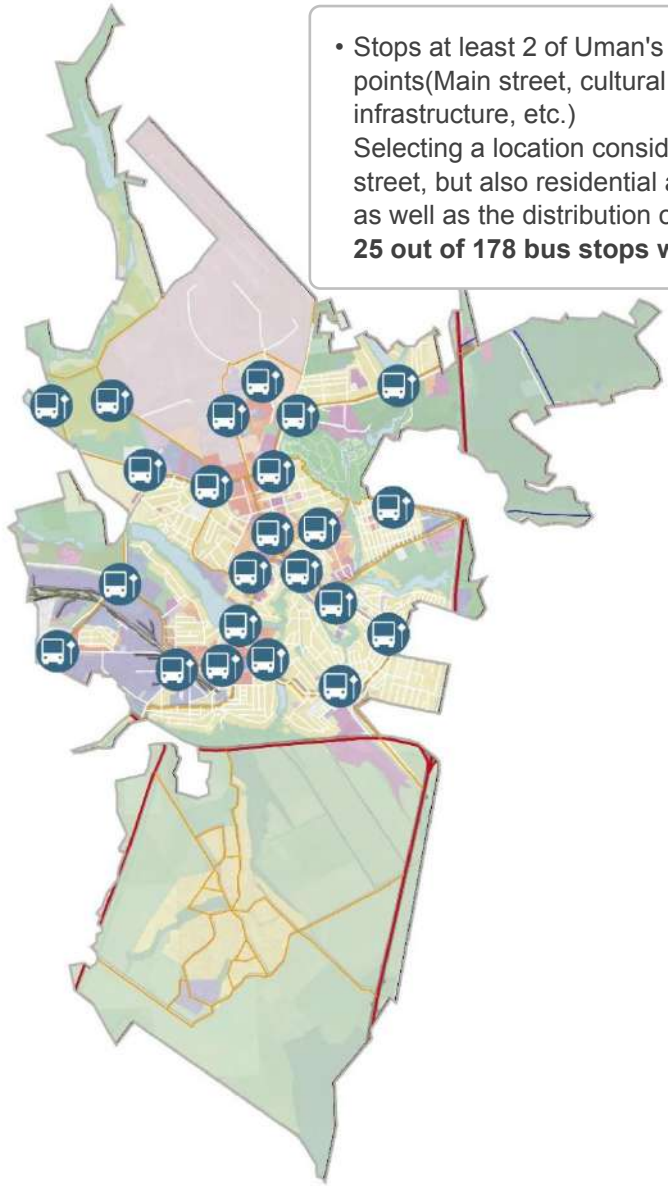
01 Smart Mobility Service Introduction Strategy

Function



Function Classification	Function Description	
Bus Operation Information Monitoring (Center)	Bus Operation monitoring	• Manage basic information related to bus operation such as bus route information, transfer information, and stop information The current operation status of the bus is displayed on the map.
Public transport Information Services (For citizens)	Bus Status Information	• Search route information by route type and route number Location and details of bus stops, real-time bus information
	Informational	• Weather, news, advertisements, etc.
Terminal Operation Management	Display of bus operation information	• Displays the bus arrival information at the bus stop
	PR Management	• Set information about the promotion or advertisement of the device (wording, display time, etc.)
	Information & Schedule Management	• Weather, news, advertisement information external linkage settings, schedule management functions such as schedule input, modification, and deletion
	Publishing Management	• Remote moderation, content distribution management
	Resource Management	• Manage media files and resources
	Control/State Management	• Collect and control status information
	Collection of basic information	• Collecting status information from bus stop information terminals

Deployment Scope



- Stops at least 2 of Uman's 18 bus routes and major points(Main street, cultural assets, transportation infrastructure, etc.)
  Selecting a location considering not only the main street, but also residential areas and intersections, as well as the distribution of the area
  25 out of 178 bus stops were selected first

01 Smart Mobility Service Introduction Strategy

Quantity & Construction Cost

Category		Standard	Quantity	Unit(USD)	Amount(USD)
Center System H/W	BIS Management Server	Xeon (Rocket Lake), 32GB	1	47,375	47,375
	BIS Operation Server	Xeon (Rocket Lake), 64GB	1	59,250	59,250
	Mobile App Server	Xeon (Rocket Lake), 32GB	1	23,750	23,750
	Operating Terminal	i7(13th), 16GB	1	3,625	3,625
				Subtotal	134,000
Center System S/W	BIS Informational S/W	Provision of basic bus information, etc.	1	796,485	796,485
	O & M APP	Mobile Info Guide	1	159,355	159,355
				Subtotal	955,840
On-site equipment	Bus Shelter Structure	W6,000x2,000xH3,000	50	38,000	1,900,000
	Internal Power System	STS 1.2Tx600x700x200	50	3,750	187,500
	BIT Informational	Full Color LED 64mm (Three steps of ten columns)	50	14,250	712,500
	OBE(Bus Terminals)	OBE Terminal and center interlocking equipment	100	1,250	125,000
				Subtotal	2,925,000
Bus Shelter Internal Systems	LED Dimming Sensor	LED 15W(220V~, 60Hz)	200	63	12,500
	Internal ventilator	Air volume 70CMH, 200V/60Hz	100	88	8,750
	Air conditioning and heating facilities	AC220	50	375	18,750
	Automatic Doors	Double Sliding Doors	100	313	31,250
	Billboard (Outside, Inside)	Aluminum 1000x2000XT35	100	750	75,000
	Bench	Mineral Deck	50	563	28,125
	LED milestone	120W/36V(50~60Hz)	100	500	50,000
	CCTV	Fixed CCTV	50	625	31,250
				Subtotal	255,625
Total					**4,270,465**

- In the case of bus stops, a total of 50 structures were set for 2 sets of up and down based on 25 points.
  H/W and on-site equipment are subject to the unit price of the Nara market, and transportation, customs clearance, and installation costs (25%) are reflected.
  S/W is based on domestic commercial S/W and development unit cost, including localization customization (45%) cost

01 Smart Mobility Service Introduction Strategy

1 Smart Mobility

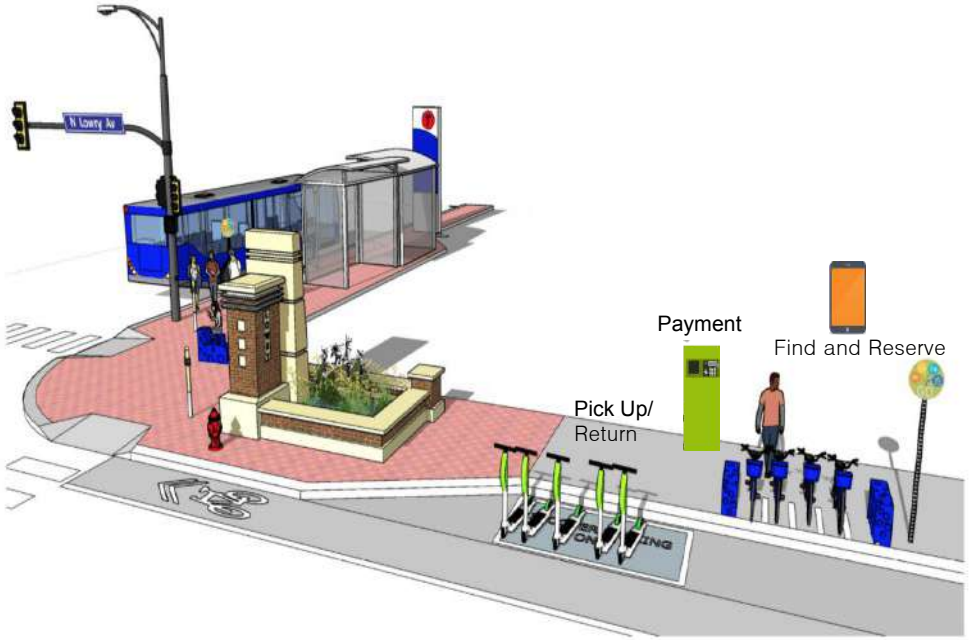
Shared PM

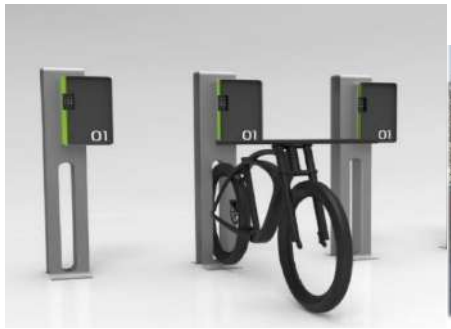
- (Shared PM) A service that uses a mobile app to search for a smart bike or bike station closest to the user and pays for the use through the mobile app

Current Situation Analysis

Status	• The Ukrainian government has encouraged the adoption of electric vehicles and electric charging stations by exempting them from VAT and state customs duties when purchasing electric vehicles abroad through the law "On Certain Issues of Vehicle use..." The penetration rate of electric vehicles is increasing by 20% every year Most electric vehicles are charged at home The cost of charging an electric vehicle is UAH 2.5 /kw (₩86/kw) for home use. In the case of shared PM, it is difficult to promote due to excessive investment cost compared to demand.
Requirements & Improvements	• In the case of electric charging stations, it is necessary to review the capacity of the power supply and select the number and location within the available range. A situation in which a plan for a shared PM station is hoped for in the central bus terminal  Uman Central Bus Terminal
Introduction Guide	• Envisioned as an electric bicycle sharing service rather than a regular bicycle Introducing a fast charging system for Electric vehicle charging stations
Build & Operate	• PPP
Considerations	

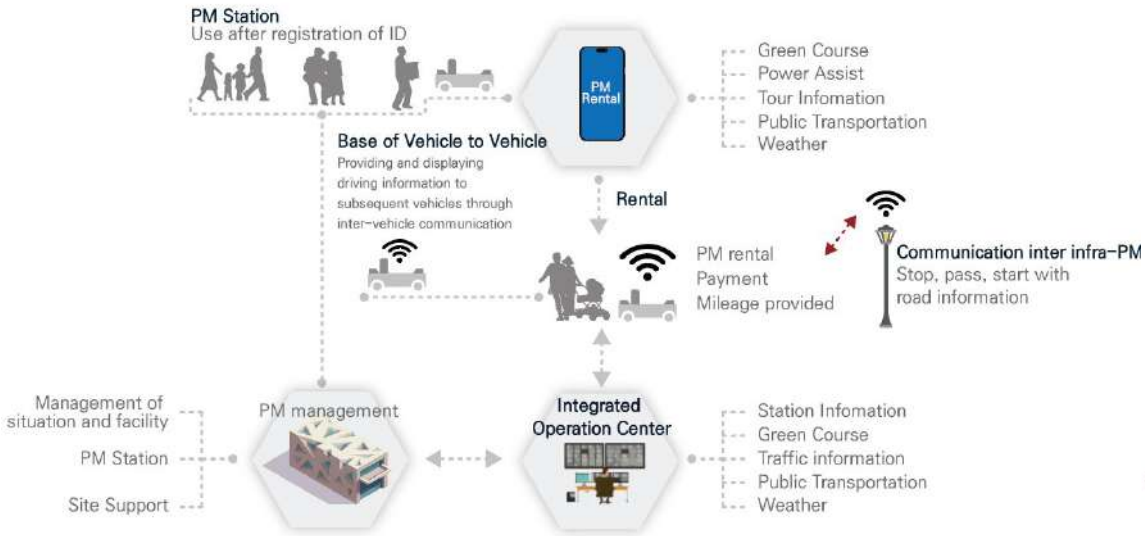
Service Overview





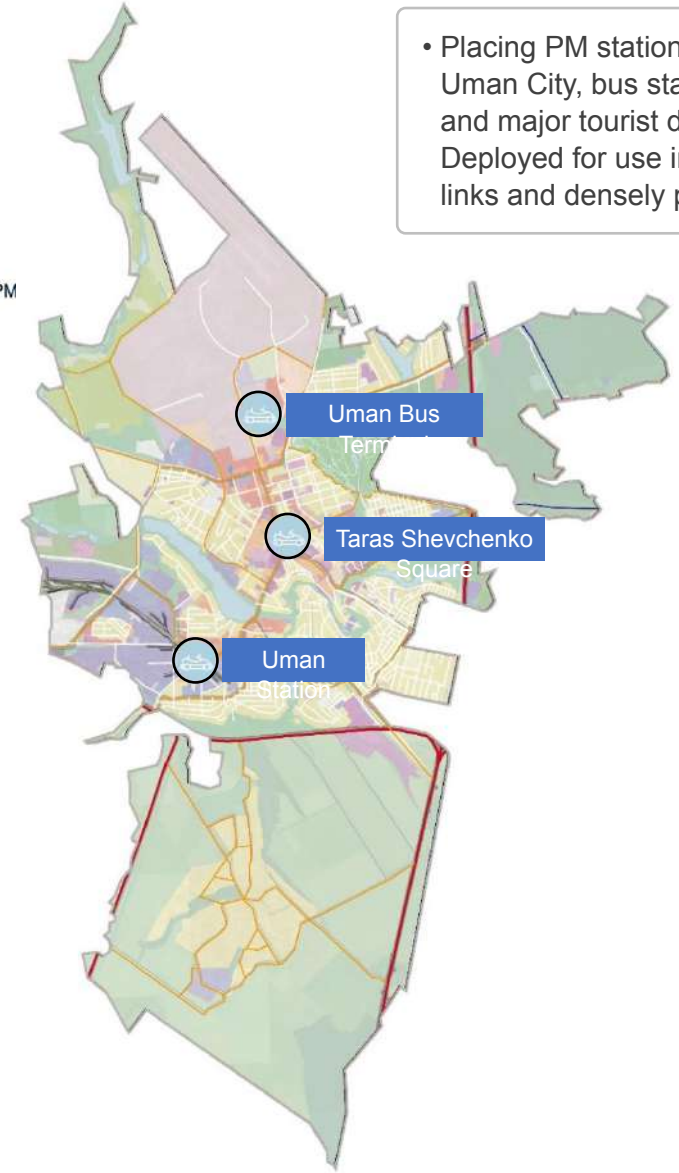
01 Smart Mobility Service Introduction Strategy

Function



Classification	Function Description	
PM Rental and Return	PM Rental Management	• PM rental and return management Maintenance & Relocation Management Theft management of PM (granting of PDA PUP-UP to relocated vehicles)
	PM Rental	• Confirm the rental of PM to passengers As an add-on, it provides travel distance, calories consumed, and usage time
	PM Return	• Confirm the return of the PM to the unmanned PM drop-off station near the destination
PM Usage Management	PM Rental & Return Management	• Register and manage PM members Mobile/App application Receipt of return result through mobile/app
	PM Usage Management	• Manage the overall uptime of registered PMs Management of lenders by PM and management of rental days Rental and return status management
	PM Charges Management	• Status management for non-payment users Payment and income management for usage fees

Deployment Scope



- Placing PM stations in the center of Uman City, bus stations, Uman Station, and major tourist destinations
  Deployed for use in other transportation links and densely populated areas

01 Smart Mobility Service Introduction Strategy

Quantity & Construction Cost

Category		Standard	Quantity	Unit(USD)	Amount(USD)
Center System H/W	Operation Server (Control,DB,WEB,APP,Network)	Xeon (Rocket Lake), 64GB	1	270,000	270,000
	Operating PC	I7(13th), 32GB	1	2,375	2,375
				Subtotal	272,375
Center System S/W	Operation Management System	Membership Management & Bicycle Operation Management System	1	286,810	286,810
	Mobile APP System	Mobile Sharing Service	1	31,900	31,900
				Subtotal	318,710
On-site equipment	Bicycle	Customization	100	625	62,500
	Smart Terminals	Detachable/combined with bicycle lock and rack	100	375	37,500
	PM Station	Bicycle rack/electric scooter storage	5	21,375	106,875
	AP & AP Enclosures	Built-in AP for wireless communication with the bicycle	5	2,250	11,250
	E-scooter	Electric Kickboard	30	750	22,500
				Subtotal	240,625
Total					**831,710**

- H/W and on-site equipment are subject to the unit price of the Nara market, and transportation, customs clearance, and installation costs (25%) are reflected.
  S/W is based on domestic commercial S/W and development unit cost, including localization customization (45%) cost
  Based on 5 locations, 20 bicycles, 6 electric kickboards, and 1 PM station

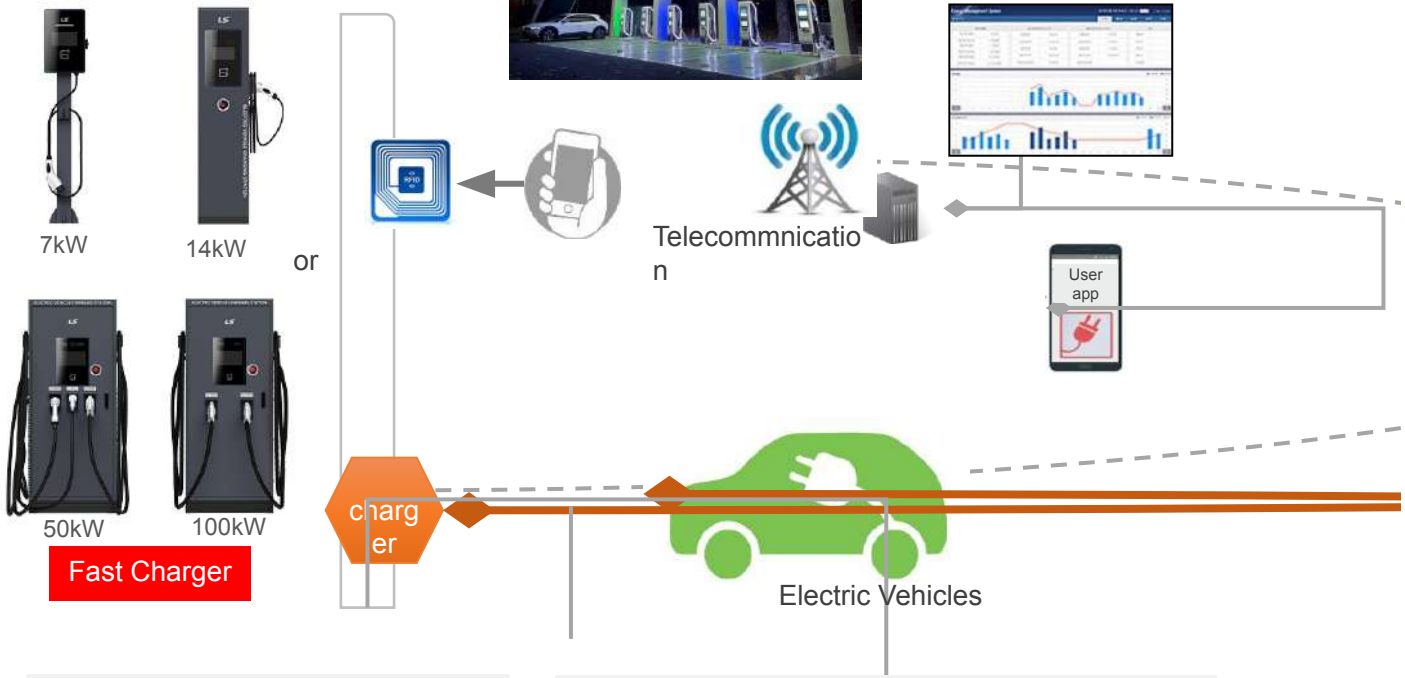
01 Smart Mobility Service Introduction Strategy

EV Station

- (EV Station) Contributing to the increase in the penetration rate of electric vehicles and building an infrastructure that can achieve environmental conservation and energy efficiency

Function

When charging an electric vehicle, information on electricity usage and authentication is provided by the charging infrastructure.
Linking with information systems and providing information through apps



(Outdoor) Installation of slow chargers and fast chargers, and charging in a separate outdoor space with a parking area

(Indoor) Used in apartments that do not have a place to install a slow charger, and in buildings that need to solve the problem of parking spaces for electric vehicles

Deployment Scope

01 Smart Mobility Service Introduction Strategy

Quantity & Construction Cost

Category		Standard	Quantity	Unit(USD)	Amount(USD)
Center System H/W	Mobile App server	Xeon (Rocket Lake), 64GB	1	23,750	23,750
	Operating Terminal	i7(13th), 32GB	1	3,625	3,625
				Subtotal	27,375
Center System S/W	Charging Station Operation Control System	Charging station information, charging management, heat detection, reservation system, overload management	1	174,000	174,000
				Subtotal	174,000
On-site equipment	Electric Fast Charger	50kW, 1400×1800×990mm	10	50,000	500,000
	Electric slow charger	11kW, 300×410×100mm	40	12,500	500,000
	Charging Canopy	Charging Facility Infrastructure Locations1400×1000×2100mm	50	3,750	187,500
				Subtotal	1,187,500
Total					**1,388,875**

- H/W and on-site equipment are subject to the unit price of the Nara market, and transportation, customs clearance, and installation costs (25%) are reflected.
  S/W is based on domestic commercial S/W and development unit cost, including localization customization (45%) cost
  Based on 5 locations, 20 bicycles, 6 electric kickboards, and 1 PM station

01 Smart Mobility Service Introduction Strategy

1 Smart Mobility

Smart roadside parking

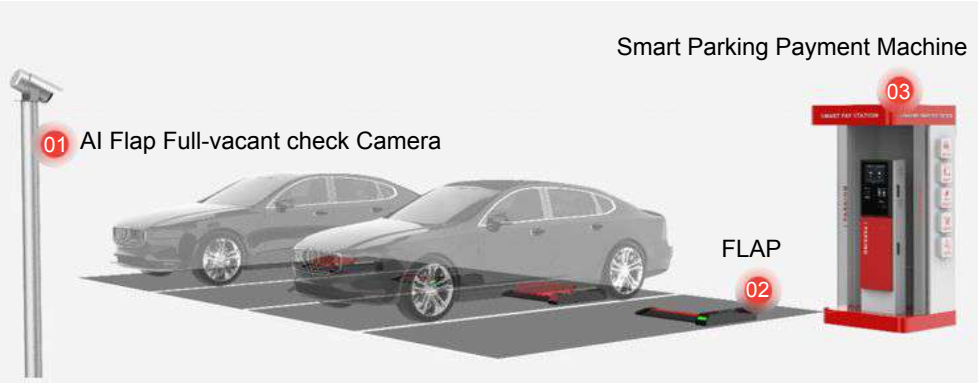
- A system that enables effective parking fee collection by installing FLAP (Parking Floor Installation Barrier) on the parking surface of the parking lot or on the street parking lot in places where it is difficult to install a parking system.

Current Situation Analysis

Status	• Overall, the parking problem is not serious, but there is a parking problem in the market near the Jewish holy site. The city operates free public parking in some areas, but parking spaces are limited in the city center. The city council has promoted a project to convert free public parking lots into euro public parking lots (10~50 Parking Lots) Overall the road is narrow • Parking fee: The city government does not set its own parking fee, and in the case of private parking lots, the parking fee is UAH 25~50 /day (₩860~1700 per day) 
Requirements & Improvements	• Need to build smart roadside parking in the center of the city and around Jewish holy sites The construction of a parking tower is considered in the mid- to long-term
Introduction Guide	• Preparing a plan to build a smart on-street parking lot centered on the wide roadside in the center of the city center and the market area near the Jewish holy site Review of the introduction of AI-based flap-based roadside parking lots and the introduction of unmanned payment machines and management at the city integrated operation center
Build & Operate	• Uman City (Public)
Considerations	• City ordinances on paid parking and parking fees need to be enacted

Service Overview

AI FLAP Parking Control System



1 AI Flap Camera

- Vehicle parking detection and identification (roof coil)
- Parking occupancy recognition function Parking Lot CCTV Function
- AI-based detection accuracy and high resolution

2 FLAP

- Installed on individual parking surfaces, control of entry and exit
- When parking the vehicle, the flap rises to LOCK,
- Descend and leave at the time of settlement
- Parking with green/red lighting Channeled

3 Smart Parking Payment Machine

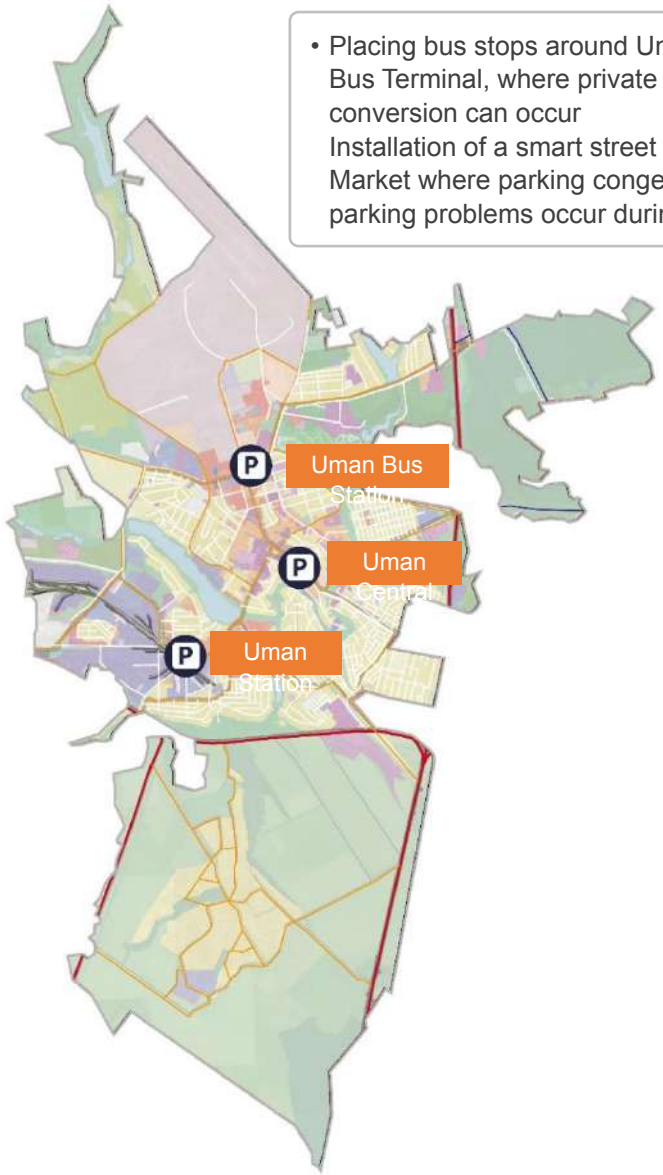
- Pre-payment of parking fee
- Touchscreen display
- Pay by credit card, transportation card, pay, etc.
- It is called by the intercom deployment and 1:1 call support

01 Smart Mobility Service Introduction Strategy

Function

Function Classification		Function Description	
Site Manage	Entrance management	Entrance full light management	Display information on the number of parking spaces available for each floor on the entrance general full
		License plate number recognition	Recognizing the license plate of the entering vehicle, parking management DB, entry time, and vehicle number information storage
		Information on the entrance display board	Display of recognized license plate number
	Parking Location & Advance Payment	Parking location and fee inquiry	Location information, vehicle number information, and fare inquiry in the parking management DB
		Parking Fee Settlement	Credit card and cash payment
	Departure Management & Payment	Confirmation of departure	Checking the exit of the parking surface through the roof detector Update of the number of parking spaces in the parking management DB
		Exit vehicle number recognition	Check whether the vehicle number and parking fee have been pre-settled through the exit vehicle number recognizer
		Exit display board information	Vehicle number and parking fee information
		Parking Fee Settlement	Credit card and cash payment
	Facility Management	Parking Facility Management	Monitor the operation status of on-site equipment such as electronic signs, circuit breakers, and kiosks Facility information such as parking facility maintenance
Information	Parking Information	Parking lot location information	Provision of parking lot location information entered in GIS (mobile and web)
		Information on the number of parking spaces	Providing information on the number of parking spaces collected by the parking management function
		Parking Fee Information	Hourly/daily parking fee information is provided by the system management function
	Parking Guidance	Operation of parking induction VMS	Number of parking spaces, direction display

Deployment Scope



- Placing bus stops around Uman Station and Uman Bus Terminal, where private car-to-public transport conversion can occur
  Installation of a smart street parking lot near Uman Market where parking congestion occurs and parking problems occur during Rosh Hashuna

01 Smart Mobility Service Introduction Strategy

Quantity & Construction Cost

Category		Standard	Quantity	Unit(USD)	Amount (USD)
Center System H/W	Parking Management Server	Xeon (Rocket Lake),64GB	1	62,500	62,500
	Parking VMS Operation Server	Xeon (Rocket Lake), 32GB	1	31,250	31,250
	Mobile App Server	Xeon (Rocket Lake), 32GB	1	31,250	31,250
	Operating Terminal	I7(13th), 16GB	1	4,688	4,688
				Subtotal	129,688
Center System S/W	Parking Information Management S/W	Provision of basic parking lot information, top surface, parking availability information, etc.	1	420,500	420,500
	VMS Information Display S/W	Parking lot information display system	1	42,050	42,050
	Operation & Management APP	Mobile Parking Information	1	168,200	168,200
				Subtotal	630,750
On-site equipment	Automotive short-circuit and vehicle number recognizer	Parking lot entry and exit vehicle number recognition and access control	6	18,750	112,500
	Unmanned Parking Payment Machine	Parking location check, pre-unmanned kiosk	15	15,625	234,375
	Parking Information VMS	Schematic, 3Color	9	8,875	79,875
	On-street parking detector	On-street parking detector	150	9,125	1,368,750
				Subtotal	1,795,500
Total					**2,555,938**

- H/W and on-site equipment are subject to the unit price of the Nara market, and transportation, customs clearance, and installation costs (25%) are reflected.
  S/W is based on domestic commercial S/W and development unit cost, including localization customization (45%) cost
  Based on the number of on-street parking spaces at one location of 100 cars (300 cars in total)

02 Smart Safety Service Introduction Strategy

2 Smart Safety

Smart Crosswalk

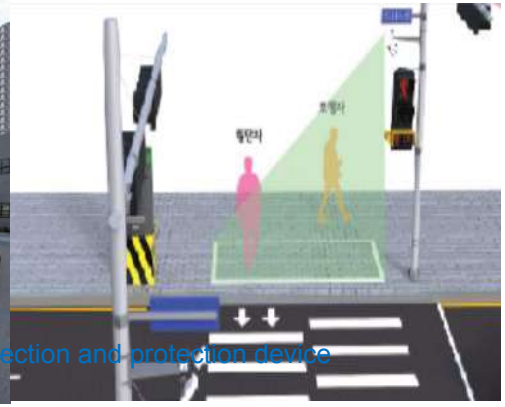
- A service to prevent crosswalk accidents during the day and night by alerting drivers and pedestrians through assistive devices such as human body sensing-based voice guidance, LED waiting line display, and speed alert at the crosswalk

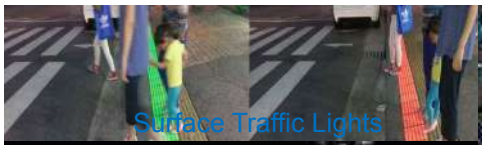
Current Situation Analysis

Status	• There are 154 pedestrian crossings and 19 traffic lights in Uman, 9 of which have the function of displaying the remaining time and sounding The city government has a plan to expand and upgrade traffic lights. In accordance with the Resolution of the Cabinet of Ministers of Ukraine "On Road Traffic Regulations", 50 meters around educational institutions and kindergartens are designated as School Zones. Absence of crosswalk alarm facilities related to people with disabilities 
Requirements & Improvements	• Remediate unstable networks Disability Notification Facility Needed Press the physical button to call the green signal
Introduction Guide	• Focusing on the intersections installed on the central road and the School Zone, it is gradually upgraded to a smart intersection. Plan your communications system to be LTE and wireless-centric Implementation of audio-visual warning devices centered on the disabled and the elderly Child pedestrian detection and protection
Build & Operate	• Uman City (Public)
Considerations	• Analysis of intersections with 19 traffic lights installed and review of construction plans after the installation

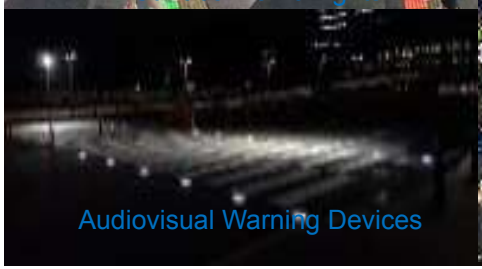
Service Overview

Pedestrian (child) detection and protection device





Surface Traffic Lights

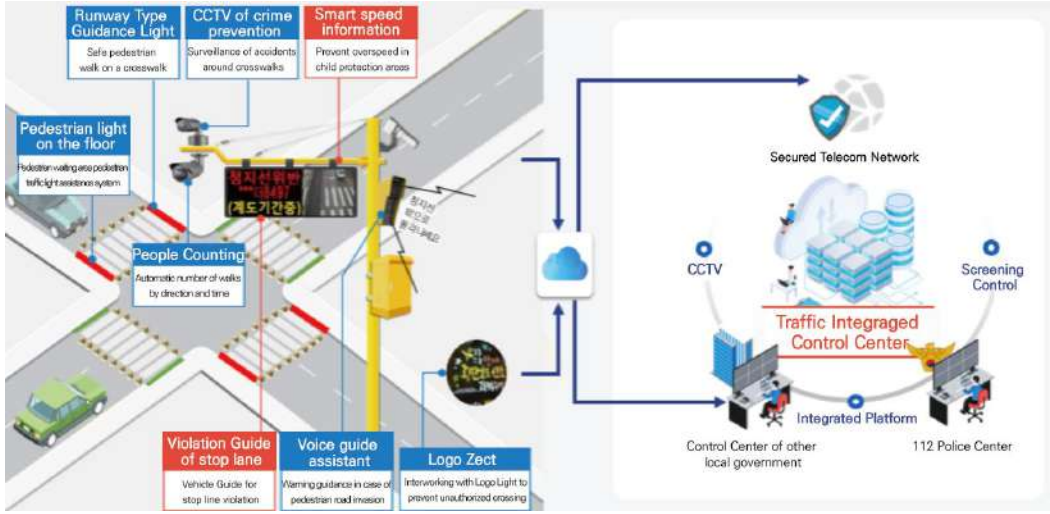


Audiovisual Warning Devices

Demonstration of future technology for pedestrian safety

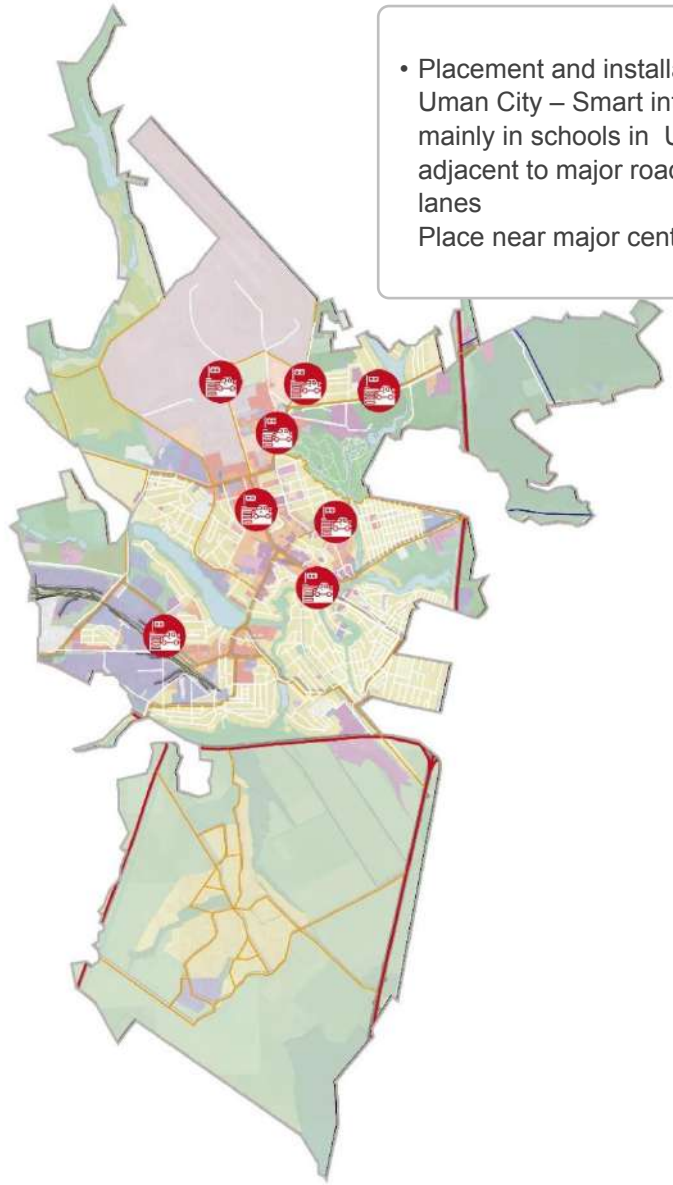
02 Smart Safety Service Introduction Strategy

Function



Function Classification		Function Description	
Smart Cross walk	System	Stop Line Violation Indication System	• When violating the stop lane, the guidance phrase is displayed, and the vehicle recognition map
		Extension of walking signal	• Automatic extension of crossing time for the traffic-vulnerable to ensure pedestrian safety
		Smart speeding information display	• Unusual Area Speeding Information Representation (DFS) Awareness and Guidance
		Immediate crackdown on illegal parking	• Special Degree Area Illegal Parking Enforcement Ensuring Pedestrian Safety
	Traffic lights	Road surface traffic light	• Safety Sidewalk Floor Traffic Light Linkage Recognition and Guidance
		Gliding Signal Marker	• Recognition and map of crosswalk encroachment in a specific road area
	Add-ons	Voice Guidance Assist	• Pedestrian crossing safety monitoring, area encroachment map broadcast
		Safety, Crime Prevention People Counting	• Crosswalk traffic safety, jaywalking awareness, usage statistics performance indicators

Deployment Scope



- Placement and installation near schools in Uman City – Smart intersections are placed mainly in schools in Uman City that are adjacent to major roads with more than 2 lanes
  Place near major centers and intersections

02 Smart Safety Service Introduction Strategy

Quantity & Construction Cost

Category	Item	Standard	Quantity	Unit(USD)	Amount(USD)
Center System H/W	Operation server (control,WEB,APP)	Xeon (Rocket Lake), 32GB	1	53,375	53,375
	Operation Server(DB)	Xeon (Rocket Lake), 32GB, 10TB	1	35,625	35,625
	Operating PC	I7(13th), 16GB	1	4,750	4,750
	Subtotal				93,750
Center System S/W	Integrated Operating System	-	1	123,685	123,685
	Subtotal				123,685
On-site equipment	Control device (integrated, built-in)	Integrated controller (local police agency standard)	10	5,375	53,750
	Detection Sensor	Strut Mounted Type, Laser Scanner	10	4,750	47,500
	Integrated pedestrian light pole	SUS,316L, H3800	10	9,000	90,000
	Basic anchor and accessories	H4000	10	313	3,125
	Speaker	Directional Speaker	10	875	8,750
	SMPS	Power Control	10	375	3,750
	Disabled sound hand signal	National Police Agency Standard Specification	10	250	2,500
	Floodlight	LED 80W	10	625	6,250
	LED Backlit	LED	10	1,000	10,000
	Pedestrian Traffic Lights	Red, Green, Remaining Time Indicator	10	875	8,750
	Communication Monitoring	Communication Modules	10	3,625	36,250
	Speaker & Sensor Enclosure	sus,316L, Waterproof	10	3,625	36,250
	LED floor pedestrian aid signal light	300*100*60	10	9,500	95,000
	Option Board	Standard Brother Mounting Type	10	2,375	23,750
	Control Box Type 1	SMPS, Circuit breakers, controllers	10	3,625	36,250
	CCTV	PTZ Camera & Storage	10	1,000	10,000
	Subtotal				471,875
Total					**689,310**

- H/W and on-site equipment are subject to the unit price of the Nara market, and transportation, customs clearance, and installation costs (25%) are reflected.
  S/W is based on domestic commercial S/W and development unit cost, including localization customization (45%) cost
  Standards for setting up 10 schools and major centers

02 Smart Safety Service Introduction Strategy

2 Smart Safety

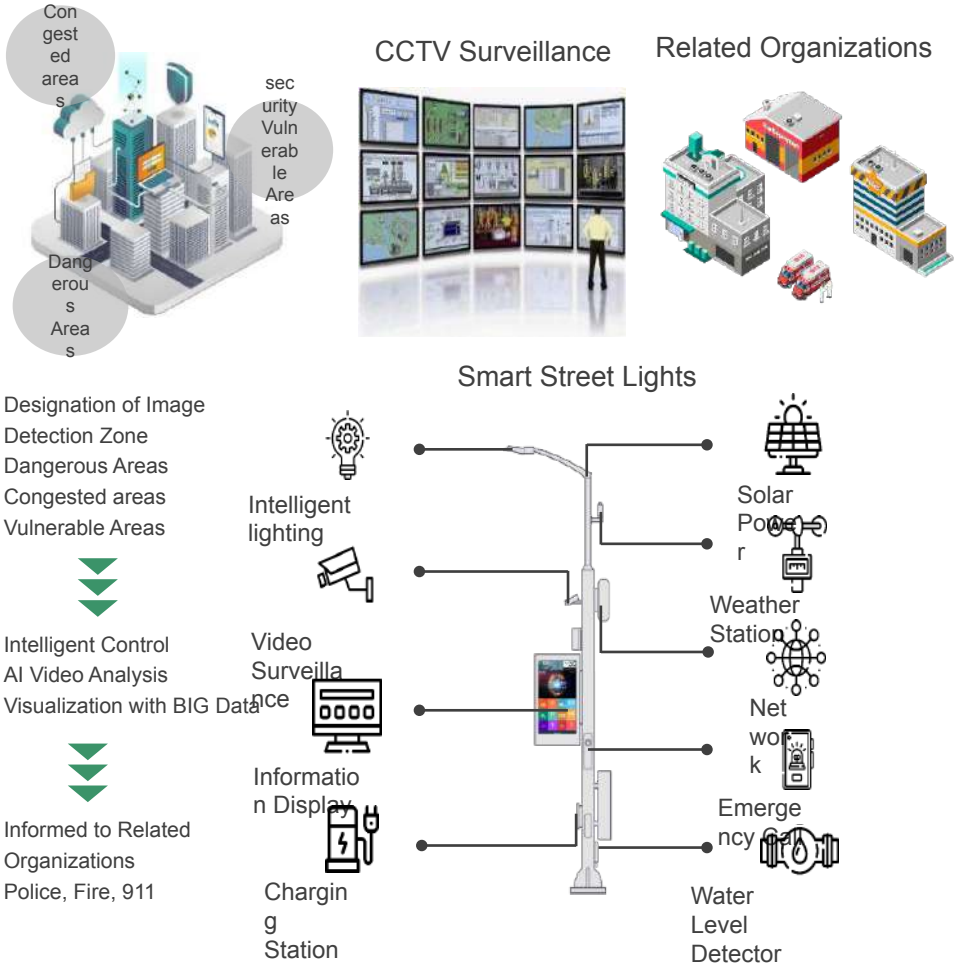
Intelligent CCTV, Smart Street Lights

- (Intelligent CCTV) Focusing on dangerous, congested, and security-vulnerable areas, it monitors through intelligent CCTV installation and AI video analysis, and connects with related agencies in case of dangerous situations.
  (Smart Street Light) It is a facility that integrates LED street lights, intelligent CCTV, public WIFI, IoT sensors, and digital signage, which reduces construction and operation costs and improves urban aesthetics compared to individual installations.

Current Situation Analysis

Status	• Intelligent CCTV - 126 CCTVs in the municipality - Before the war, the city of Uman had planned and designed a CCTV control center - Uman's crime rate is below the national average - CCTV operation is outsourced to a private operating company selected through bidding • Smart Street Lights - 75% of cities have streetlights - Maintenance and management of street facilities are managed by MCP KOMUNALNIK - The electricity bills used to operate street lights are paid by the Dept. of Housing and Communal Service (Expediture of Department of Housing and Public Services depends on Community budget). • Remote management of street lights - No remote management capabilities
Requirements & Improvements	• Intelligent CCTV - Desire to introduce a CCTV system that can recognize license plate number and face • Smart Street Lights - Brightness and energy independence need to be improved - Requires remote management capabilities
Introduction Guide	• Planning of intelligent CCTV system and integrated control center Planning with remote management system with group management or dimming control function Smart streetlight plan that displays CCTV, LED, Wi-Fi, charging function, street name, and atmospheric environment information
Build & Operate	• Uman City (Public) or PPP
Considerations	

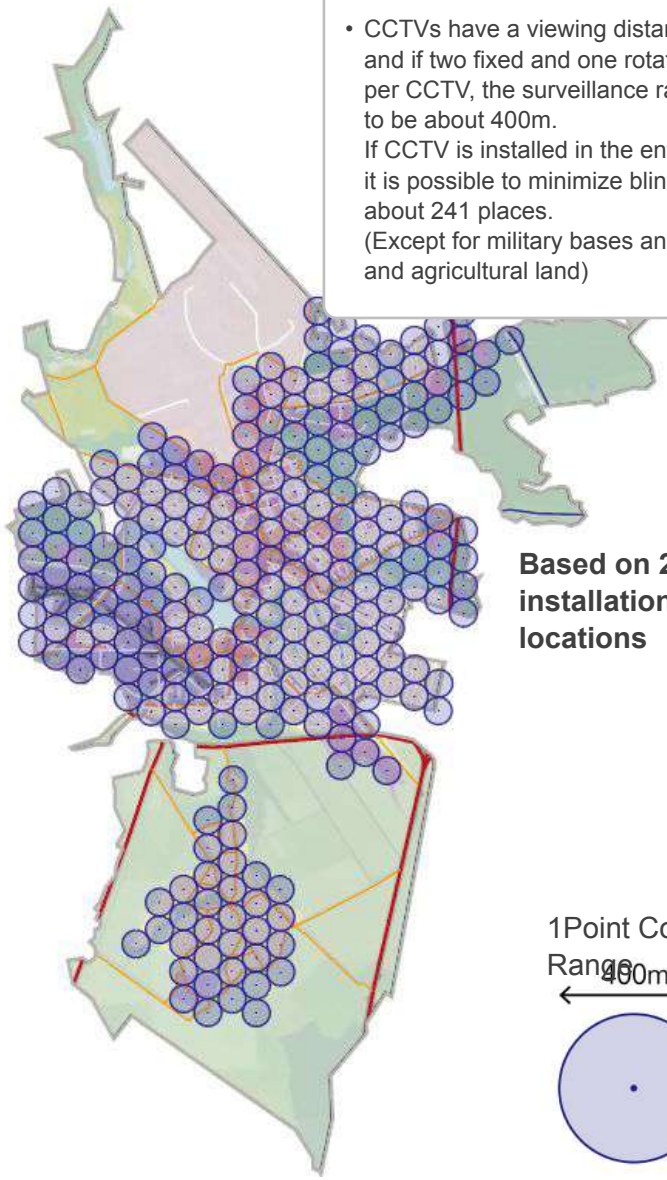
Service Overview



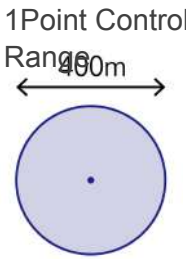
02 Smart Safety Service Introduction Strategy

CCTV Control Range

- CCTVs have a viewing distance of about 200m, and if two fixed and one rotating type are installed per CCTV, the surveillance range can be calculated to be about 400m.
  If CCTV is installed in the entire area of Uman City, it is possible to minimize blind spots when installing about 241 places.
  (Except for military bases and some green areas and agricultural land)



Based on 241 installation locations



Quantity & Construction Cost

Category		Standard	Quantity	Unit(USD)	Amount(USD)
Center System H/W	Video Storage & Distribution Server	Xeon (Rocket Lake), 16GB	10	28,125	281,250
	Video Analysis Server	Xeon (Rocket Lake), 16GB	5	28,125	140,625
	Video Storage Storage	100TB, 1024Mbps, UHD Simultaneous storage of 128 cameras	3	112,500	337,500
	L2 switch	Control system configuration and center integrated system linkage	5	233	1,165
	SAN switch	For image storage storage	3	2,850	8,550
	Security Operation Terminal	I7(13th), 16GB	5	2,850	14,250
	Subtotal				783,340
Center System S/W	Video Storage Distribution S/W	Video storage, monitoring, and retrieval	20	9,135	182,700
	Video Analysis S/W	Real-time object recognition and abnormal situation detection	241	1,044	251,604
	DBMS	Server DBMS	20	19,140	382,800
	Integrated Operation S/W	Integrated operation of security CCTV and intelligent video analysis	1	252,300	252,300
	Subtotal				1,069,404
On-site equipment	Security CCTV (PTZ)	Fixed 200 Milion pixels	241	1,875	451,875
	Security CCTV (General)	Speed dome camera 130 Million pixels, zoom possible	482	625	301,250
	Emergency bell/Microphone	Direct connection to the center in case of emergency	241	375	90,375
	Speaker	Direct connection to the center in case of emergency	241	213	51,333
	Pillar	Φ190.7×6000×3mm	241	375	90,375
	Subtotal				985,208
Total					**2,837,952**

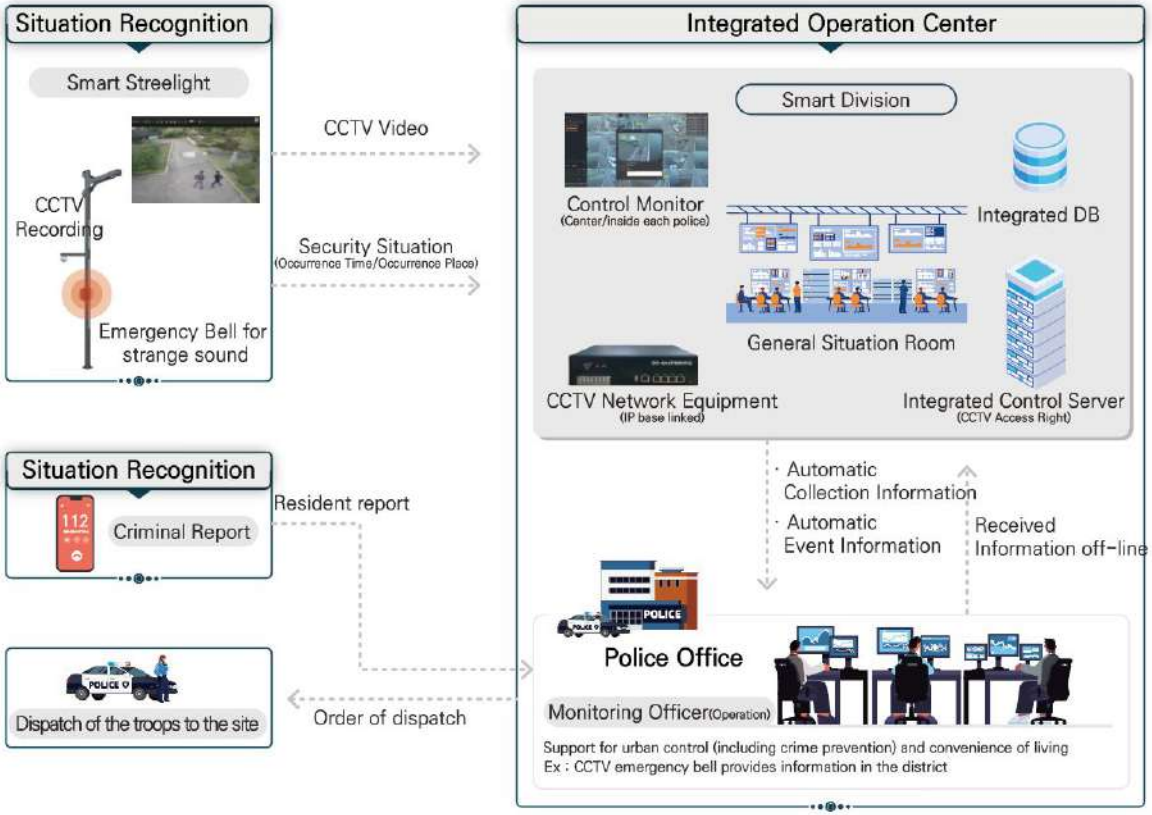
- H/W and on-site equipment are subject to the unit price of the Nara market, and transportation, customs clearance, and installation costs (25%) are reflected.
  S/W is based on domestic commercial S/W and development unit cost, including localization

02 Smart Safety Service Introduction Strategy

Smart Street Lights

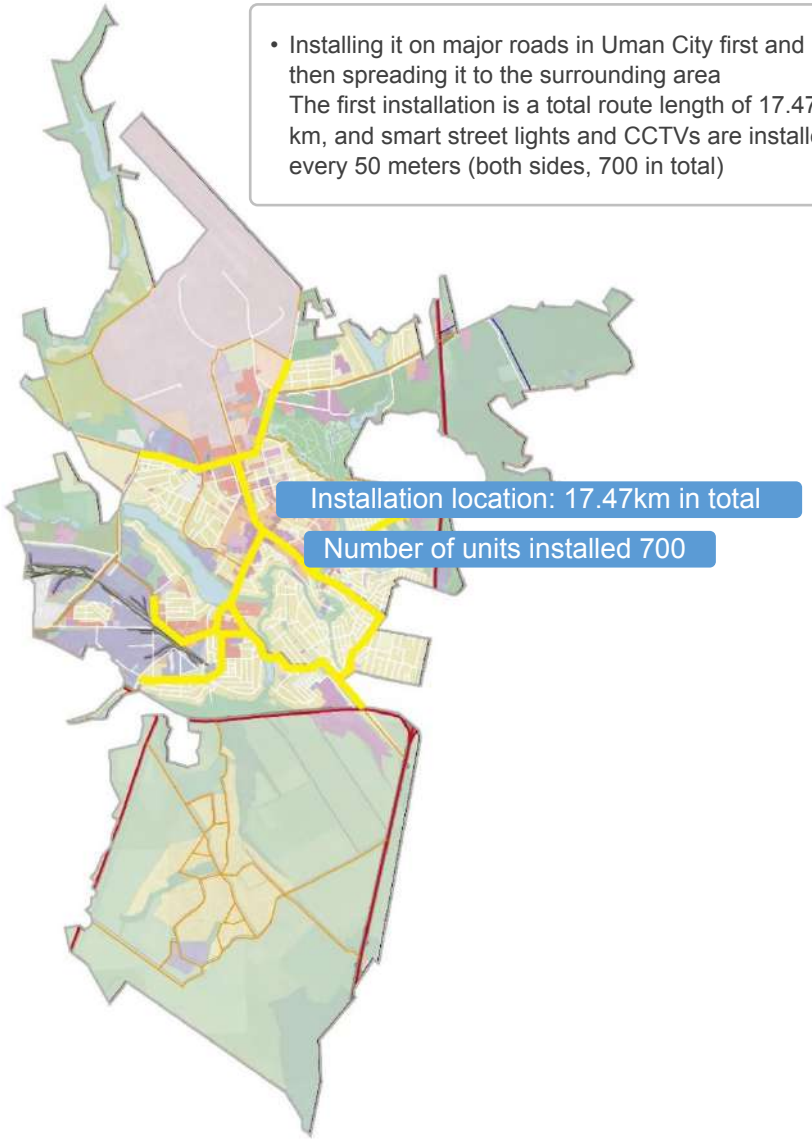
Function

A service that supports the establishment of a crime prevention and immediate response system by installing CCTV for security purposes on roads, pedestrian paths, commercial areas, and parks, 24 hours a day, and establishing a crime prevention and immediate response system by collecting and analyzing the images.



Deployment Scope

- Installing it on major roads in Uman City first and then spreading it to the surrounding area
  The first installation is a total route length of 17.47 km, and smart street lights and CCTVs are installed every 50 meters (both sides, 700 in total)



02 Smart Safety Service Introduction Strategy

Quantity & Construction Cost

Category		Standard	Quantity	Unit(USD)	Amount(USD)
Center System H/W	SSL Managemant Server	SSL Managemant,Engine/Adaptor S/W installation	2	8,550	17,100
	SSL NVR	64CH, HDD 6bay (48TB)	2	8,550	17,100
	WiFi controller	1AP 50User per unit	1	28,425	28,425
	WiFi Managemant Server	Dashboard/Integrated Authentication/Integrated Portal Installation	1	8,550	8,550
	Subtotal				71,175
Center System S/W	SSL Managemant S/W	Core Code NYX Managemant Ent	2	52,809	105,618
	SSL Senser Managemant Engine	Core Code Ent	2	65,946	131,892
	SSL Senser Managemant Adaptor	Core Code Adaptor	6	13,224	79,344
	WiFi Dashboard	WiFi Operations Dashboard	1	32,973	32,973
	WiFi Integrated Authentication	WiFi Single sign-on	2	32,973	65,946
	WiFi Integrated Portal	WiFi Unified Portal	2	32,973	65,946
	SSL protocol	Development fee included	5	26,448	132,240
	Subtotal				613,959
On-site equipment	Smart Pole	6M, 1st Class (Aluminum)	700	5,625	3,937,500
	SSL Luminaire (100W)	Smart Node Connectivity module provided	700	1,500	1,050,000
	SSL Street Light Enclosure	SSL Fixture care	70	2,000	140,000
	SSL Power Meter	Identify electricity usage by group	70	375	26,250
	SSL Control Collection Server	Outdoor Servers by Group	70	4,750	332,500
	SSL communication gateway	Main AP	70	2,875	201,250
	CCTV	200 Million pixels, rotary type (calculated separately)	700	-	-
	SSL Smart Node	NXY serise	700	625	437,500
	WiFi AP	Free Wifi provided	700	2,875	2,012,500
	Subtotal				8,137,500
Total					**8,822,634**

- H/W and on-site equipment are subject to the unit price of the Nara market, and transportation, customs clearance, and installation costs (25%) are reflected. S/W is based on domestic commercial S/W and development unit cost, including localization customization (45%) cost

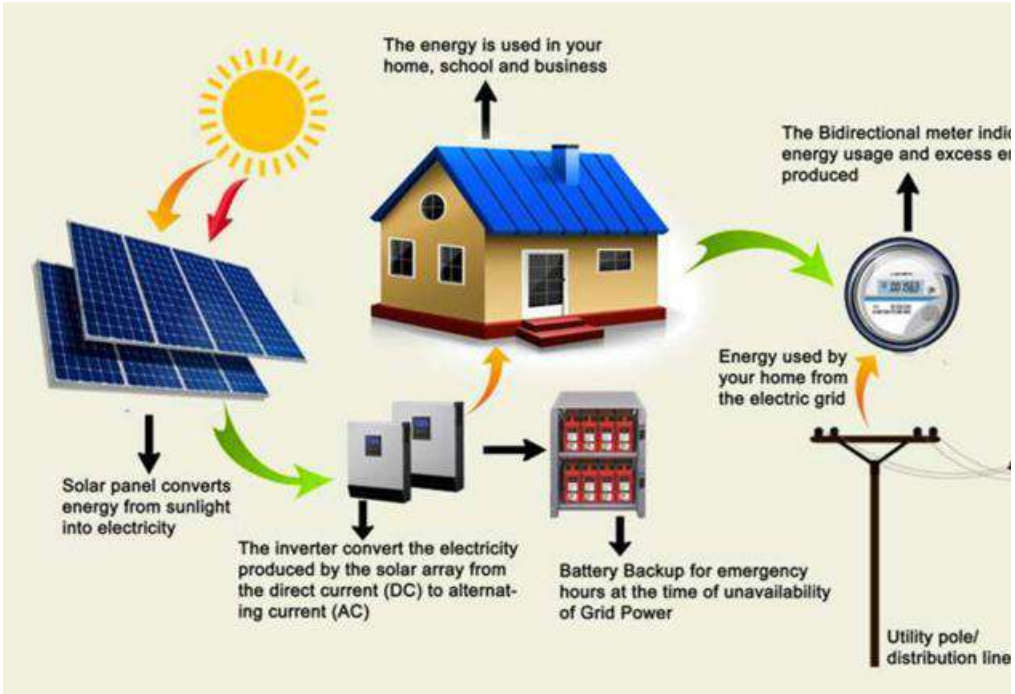
03 Smart Energy Service Introduction Strategy

Solar Power	▪ A power generation system that directly converts light energy from the sun into electrical energy

Current Situation Analysis

Status	• Establishment of private and private solar power generation facilities Shortage of power generation facilities due to Russia's war The average daylight hours are about 3.4hr/day, which can be applied to solar power generation
Requirements & Improvements	• Desire to build a renewable energy infrastructure based on distributed power generation Desire to be built in public facilities (schools, kindergartens) and effective spaces
Introduction Guide	• Supplying electricity to about 2,000 households to be built in Smart Residence (maximum annual demand: about 20,000MWh) Utilizing idle spaces such as rooftops, roadsides, and foothills in Smart Residence, about 2MW of solar power generation facilities are installed. (Supplying about 12% of electricity consumption, about 2.6ha of required area)
Build & Operate	• Uman City (Public) or PPP
Considerations	• Due to the depreciation of solar power generation, there is a need for a net metering system that can sell excess power to the outside world. Transmission and distribution network and grid stabilization facilities are supported by the public

Service Overview



03 Smart Energy Service Introduction Strategy

Function

Solar power generation

Solar Farm : Total area(161,200m2) * 70% / 12,000(1MW/m2)= 9.4MW

• PV_dc.out PvDC -> AC inverter Reduced efficiency in the process by 80%

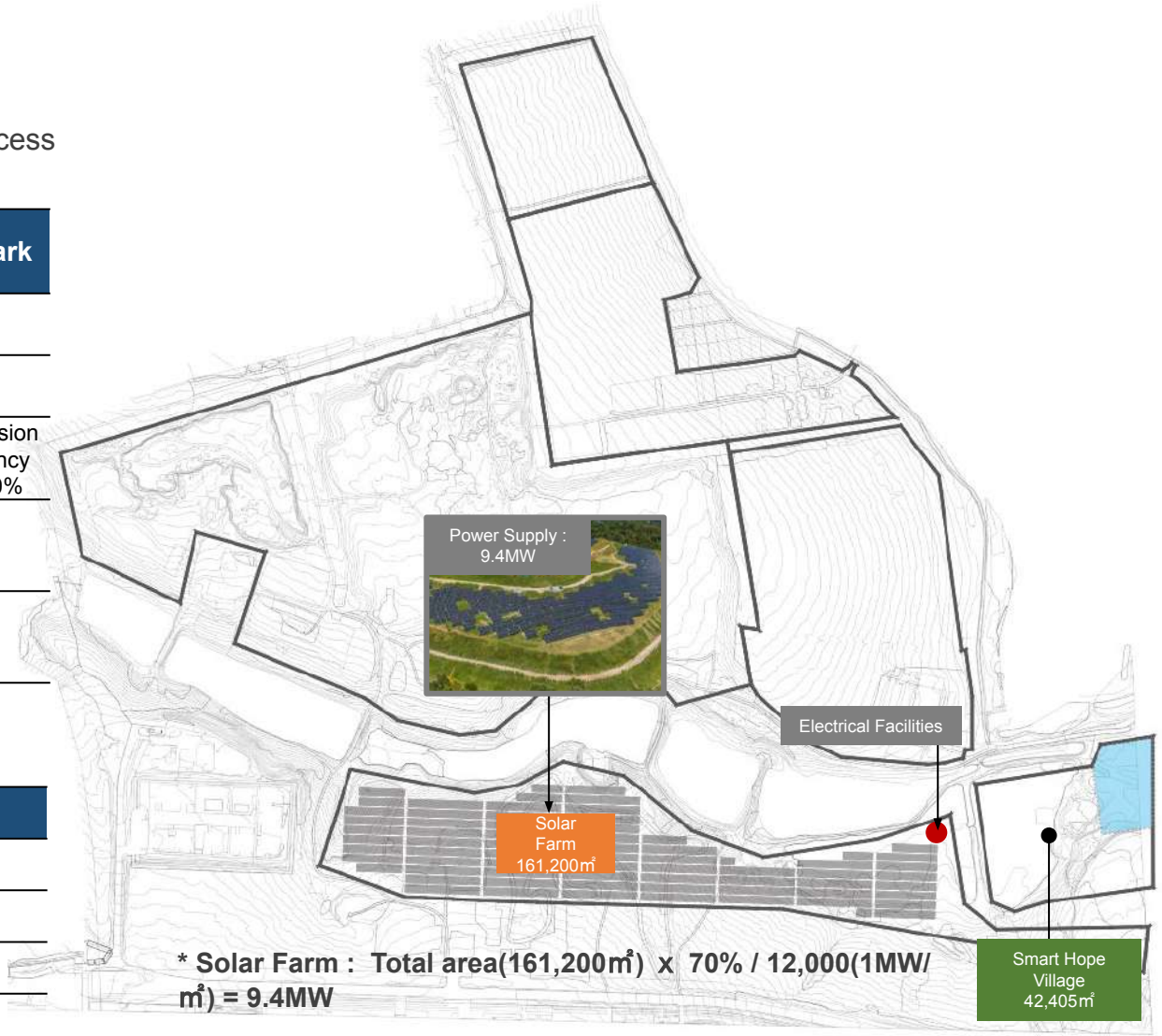
Estimating the capacity of a solar power system

Explanation	Unit	Value	Remark
Solar PV, Installation Capacity Solar Installed Capacity	MWdc	9.4	
Elec Generation per annum Annual Electricity Production(DC)	MWhDC/yr	11,665	
Elec Generation per annum Annual Electricity Production(DC→AC)	MWhAC/yr	9,332	Conversion Efficiency eff. 80%
Elec Consumption per Household Annual electricity consumption per household	MWh/yr	5	
No. of Household t be supplied Number of households supplying electricity	**No. of Households**	**1,866**	

Spec of Solar Power System

Name	Unit	Value
Photovoltaic Modules	Rated Maximum Power(W)	550
	No. of cells	144(6x24)
	Weight(kg)	27.8
	Module Dimensions(mm)	2,278 * 1,134
	Installation Module Q'ty	17,091

Deployment Scope



03 Smart Energy Service Introduction Strategy

Quantity & Construction Cost

Category		Standard	Quantity	Unit(USD)	Amount(USD)
On-site equipment	Photovoltaic Modules(161,200㎡)	Unit	1	4,738,849	4,738,849
	inverter	Unit	1	675,343	675,343
	Distribution/switchboard, power grid connection	Unit	1	1,053,077	1,053,077
	Structural construction	Unit	1	2,460,996	2,460,996
	Electrical, civil engineering, structural construction	Unit	1	1,819,993	1,819,993
	Design/Supervision, Licensing	Unit	1	1,133,203	1,133,203
	Other expenses	Unit	1	3,628,539	3,628,539
Total					**15,510,000**

• H/W and on-site equipment are based on the unit price of the national market, and local procurement is considered (25%)
In the case of S/W, it is built in the integrated control system

04 Smart Environment Service Introduction Strategy

Smart Water Purification Plant (Distributed Water Purification Facility)	▪ A vertical water treatment system that self-treats various water sources in urban areas to address water shortages and leakage and pollution caused by long-distance transmission between water purification plants and end consumers.

Current Situation Analysis

Status	• 80% of Uman's water supply comes from B.Tserkva, 136 km away. The water supply pipe built in the 80s is in urgent need of repair, and contaminated water is supplied to the city of Uman to go through its own water purification process. The main body of water supply, operation, management, and billing is Uman Vodokanal, a public company. Uman's water supply network has a total length of 412 kilometers, of which 42% are dilapidated The sewage network in Umen has a total length of 26 kilometers, of which 30% is dilapidated and deteriorated. 40% of water treatment is treated through sewer pipes, but 60% is discharged from households
Requirements & Improvements	• Aging water and sewer lines need to be replaced and repaired
Introduction Guide	• Planned to treat raw water collected from stormwater + groundwater retention ponds and industrial water through a vertical smart water purification plant with a water purification capacity of 1000㎥ per day The aging water pipe network needs to come up with countermeasures.
Build & Operate	• Public
Considerations	• It is necessary to negotiate with the billing entity of the supplied constant

Service Overview

5G Specialized network-based water purification plant process operation

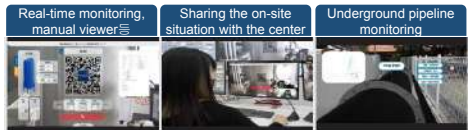
Hyper-connectivity · Ultra-low latency · 5G specialized network, which is a high-speed next-generation network Introduce and operate the process stably
*5G specialized network: Customized 5G network that enables cutting-edge technology to be realized in a specific space through dedicated frequencies

Realistic integrated monitoring system that fuses digital twin

Quickly respond to crisis situations by simultaneously controlling process information and CCTV in 3D virtual model and VR environment

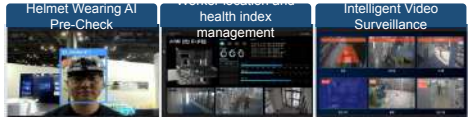
Next-generation maintenance with mobile AR

Check the process information and manual in real time with one mobile device, Efficient operation of AR etc.



Worker safety management using AI and IoT

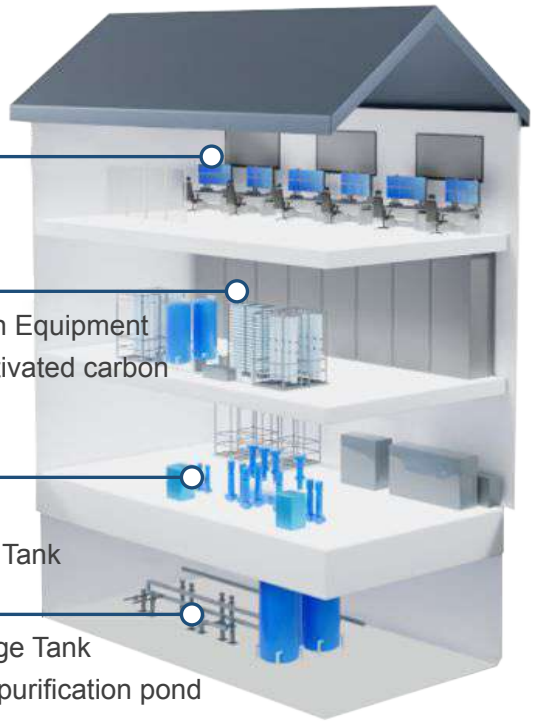
AI image analysis detects on-site abnormalities and analyzes worker health status and proactively manage high-risk tasks



04 Smart Environment Service Introduction Strategy

Function

Facility Capacity 100㎥/day
(membrane filtration base)



- 3F — Control Room
- 2F — Membrane Filtration Equipment
  Highly oxidized, Activated carbon Promotion Center
- 1F — Electrical room
  Chemicals Storage Tank
- B1F — Waste Liquid Storage Tank
  Drilling well, Water purification pond

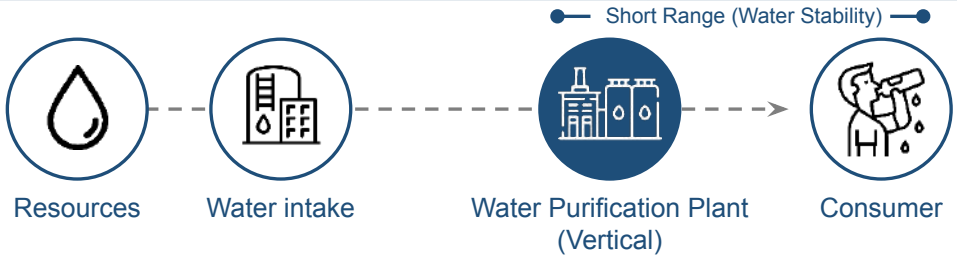
Operation and monitoring control of facilities, working space for workers

Membrane Filter and active Carbon / Main Filter facility and PR room

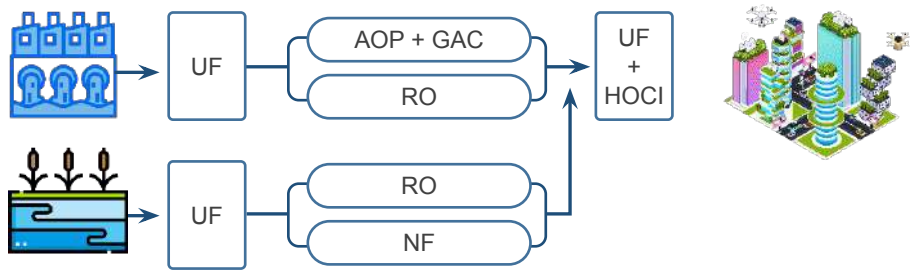
High-pressure pump and electrical facilities for membrane filtration process

Heavy Facility of Intake, Filtering, Chemical tank.

(To-Be) Consumer-centered supply system



Smart Water Purification Plant Water Treatment System Chart



04 Smart Environment Service Introduction Strategy

Quantity & Construction Cost

Category		Standard	Quantity	Unit(USD)	Amount(USD)
Smart Water Purification Plant Manufacturing Purchasing	Central Control Room	Unit	1	597,500	597,500
	Water Purification Plant	Unit	1	58,750	58,750
	Water intake site	Unit	1	58,750	58,750
	Supplier	Unit	1	9,375	9,375
	S/W Engineering Payment	Unit	1	120,350	120,350
	Comprehensive operation of measurement and control facilities	Unit	1	40,000	40,000
	Subtotal				884,725
Smart Water Purification Plant Installation work	Instrumentation & Control Facility	Unit	1	30,000	30,000
	Subtotal				30,000
Construction	Common Facilities	Unit	1	9,375	9,375
	Water supply facilities	Unit	1	1,750,000	1,750,000
	Business Facilities	Unit	1	1,500,000	1,500,000
	Subtotal				3,259,375
Construction of Telecommunication	Telephone Construction	Unit	1	56,250	56,250
	Wire & Cable Construction	Unit	1	150,000	150,000
	Conduit construction	Unit	1	81,250	81,250
	Subtotal				287,500
Total					**4,461,600**

• H/W and on-site equipment are subject to the unit price of the Nara market, and transportation, customs clearance, and installation costs (25%) are reflected.
S/W is based on domestic commercial S/W and development unit cost, including localization customization (45%) cost

04 Smart Environment Service Introduction Strategy

Smart trash cans

- A solution that realizes efficient waste collection vehicle operation schedules according to the amount of cargo by transmitting loading data and location information to the operation center in real time through the installation of infrared sensors and GPS in containerized garbage bins in the city.

Current Situation Analysis

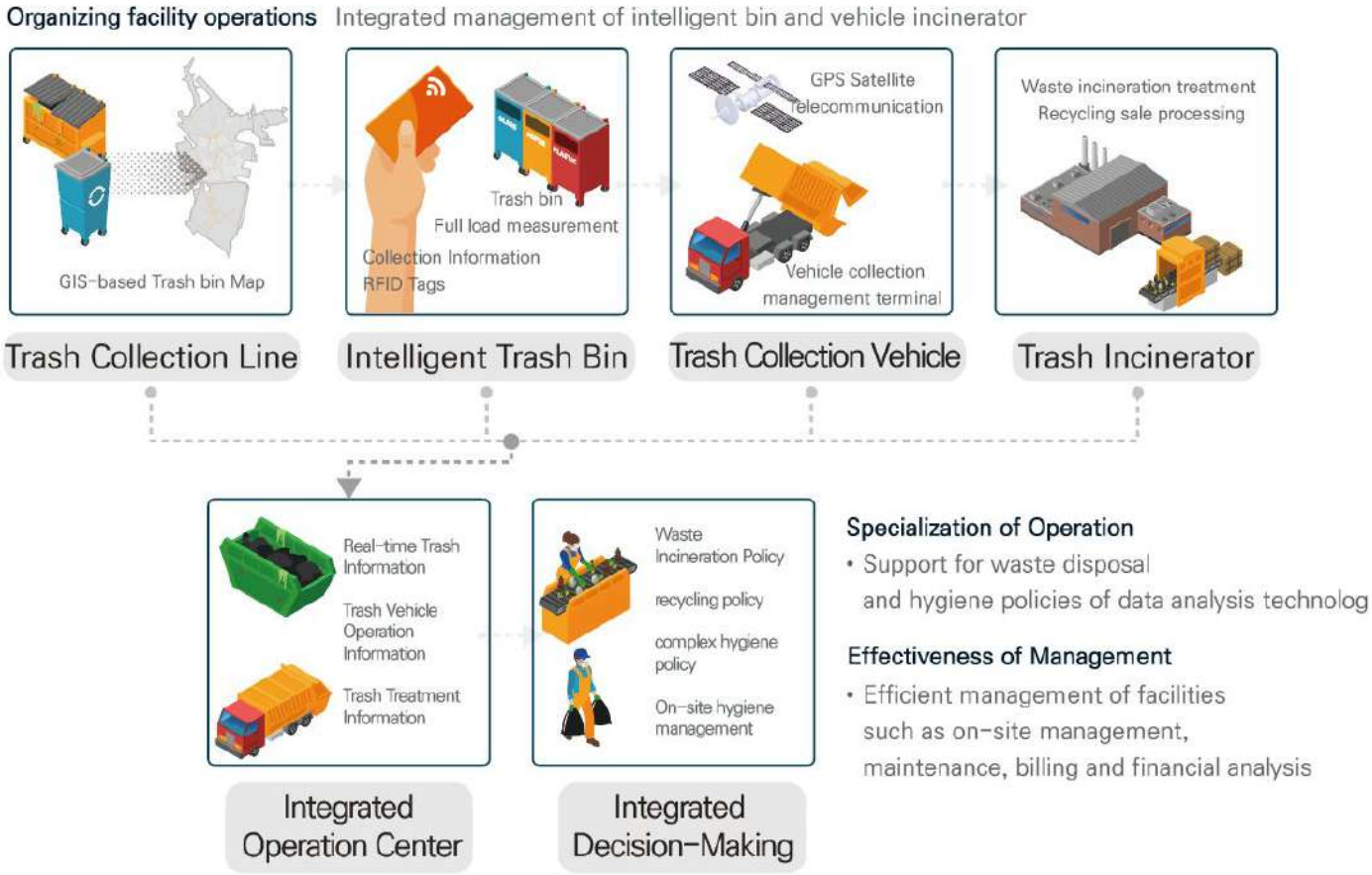
Status	• The amount of garbage generated in Uman is 30,000 tons/year The landfill load is 1.7 million tons, which is 90% of the current capacity. There are 158 household waste storage points, including 420 containers that can collect 434.69㎥ of garbage per day. Garbage collection and disposal is done manually once a week through a waste management service company. Municipal solid waste is thrown into landfills because there are no treatment facilities or other waste disposal sites Every year, more than 100 1.1㎥ containers are installed for visitors during Rosh Hashna
Requirements & Improvements	• Landfill capacity is reaching its limit, so countermeasures need to be taken Mechanisms for waste collection need to be improved and financing measures need to be put in place
Introduction Guide	• The amount of waste generated (30,000 tons/year) is not economically feasible to introduce a recycling solution, and recycling policies can be planned when creating a new landfill and using it jointly with other urban areas. Present smart trash can solutions to prepare efficient garbage collection and urban environment improvement plans
Build & Operate	• Public
Considerations	• It is necessary to negotiate with the billing entity of the supplied constant

Service Overview

1. Clean Cube	2. Clean Cap	3. Clean City Networks	4. Smart Collection Plan	5. Clean environment
Solar compressed trash can compresses garbage using solar power and transmits load data in real time	**The load detection sensor is attached to the trash can to measure the load inside and transmit data in real time**	**Real-time monitoring software, data management, Reports & Collection Provides features such as route optimization**	**Reduced collection Reduced vehicle, fuel, and time required for pick-up and collection, reducing operating costs by 80%**	**Contributing to improving urban aesthetics by resolving concerns about overflowing garbage and carbon dioxide emission**

04 Smart Environment Service Introduction Strategy

Function



Classification	Function Description
Garbage Information	• Trash can collection history information Trash can loading information
Garbage collection vehicle operation Information	• Real-time location information of garbage collection vehicles Garbage collection vehicle loading information
Garbage Incinerator Information	• Garbage incinerator operation information Garbage incinerator facility information Incineration Status Information Recycling tatus Information
Garbage Disposal Information Analysis	• Real-time garbage loading (full load) information Garbage loading (full load) information by region Garbage truck operation history information Trash can management operation information Incineration facility management and operation information
Hygiene Management Policy Decision Support	• Garbage Incineration and Recycling Policy Hygiene Policy On-site Management Policy
Service Management & Operation	• Process company Management Facility Management

04 Smart Environment Service Introduction Strategy

Quantity & Construction Cost

Category		Standard	Quantity	Unit(USD)	Amount(USD)
Center System H/W	Fleet Control Server	Xeon (Rocket Lake), 64GB	1	31,250	31,250
	Trash Can Management Server	Xeon (Rocket Lake), 64GB	1	31,250	31,250
	Operating Terminal	I7(13th), 32GB	1	3,125	3,125
	Subtotal				65,625
Center System S/W	Integrated Operation S/W	Cloud-based trash can management, collection vehicle location management, history management	1	168,200	168,200
	WAS	Trash can vehicle control, trash can management	1	42,050	42,050
	Subtotal				210,250
On-site equipment	dustbin	240 L / 64 gal. 670 x 770 x 1600 mm, Solar/AC	700	500	350,000
	Load Detection Sensor	External Antenna 4G Network	700	313	218,750
	Terminal for collection vehicle	Garbage collection status and real-time location information transmission	20	1,563	31,250
	RFID for Collection Personnel	RFID Handheld reader for tag recognition	40	313	12,500
	Subtotal				612,500
Total					**888,375**

- H/W and on-site equipment are subject to the unit price of the Nara market, and transportation, customs clearance, and installation costs (25%) are reflected. S/W is based on domestic commercial S/W and development unit cost, including localization customization (45%) cost

VI

Smart City Infra Introduction Strategy

01 Urban Integrated Operation Center Introduction Strategy

Urban Integrated Operation Center	▪ A center that connects the entire city into a single communication network and interconnects individual services to provide cutting-edge services and perform situation control functions in an integrated manner. Plays the role of a facility management entity that integrates and manages basic infrastructure and high-tech facilities in the city, and a service management entity that integrates information in each smart service field such as energy, traffic, and crime prevention, and operates services.

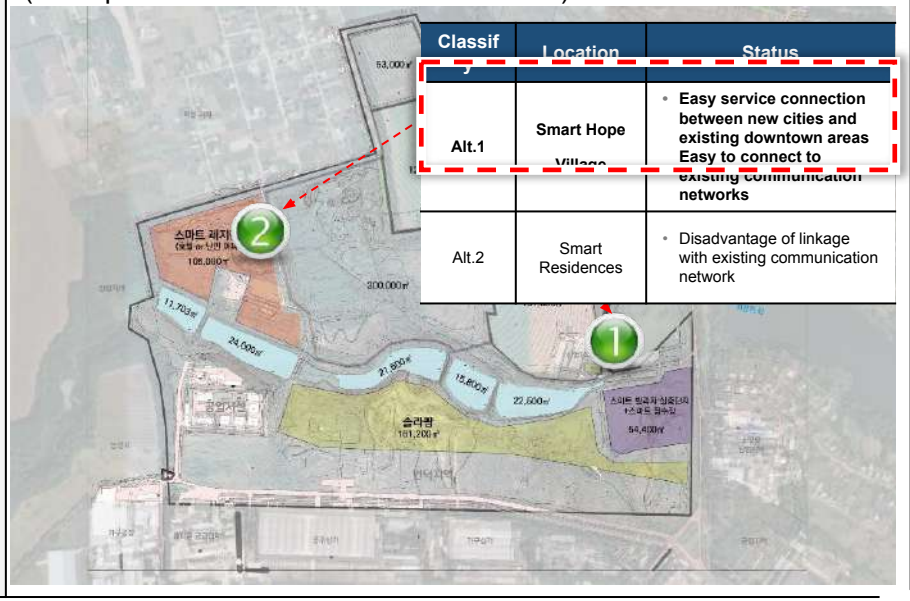
1. Center Overview

Role	• As an essential element for the realization of a smart city, the integrated operation center serves as a hub for efficient management and operation of the city, provision of various smart services that improve the quality of life of citizens, and acceleration of smart city development.
Core Functions	• Smart Service Integrated Operation Management Management of high-tech facilities in the city Urban emergency monitoring and information delivery External Information Linkage Management
Key Technologies	• Integrated Platform security 3D GIS Data Visualization
Center Composition	• The Center's main facilities consist of a physical space configuration, such as a situation control room, for the connection and comprehensive control of related tourism in case of emergency, and an information system for the efficient operation of various smart services in the city. - Space Configuration: Situation control room, computer equipment room, office, conference room, rest room, etc. - Environmental facilities: air conditioning facilities, power supply facilities, UPS, generators, crime prevention facilities, etc. - information system: Consisting of H/W such as servers, storage devices, consoles, and network equipment, and S/W such as integrated platforms

01 Urban Integrated Operation Center Introduction Strategy

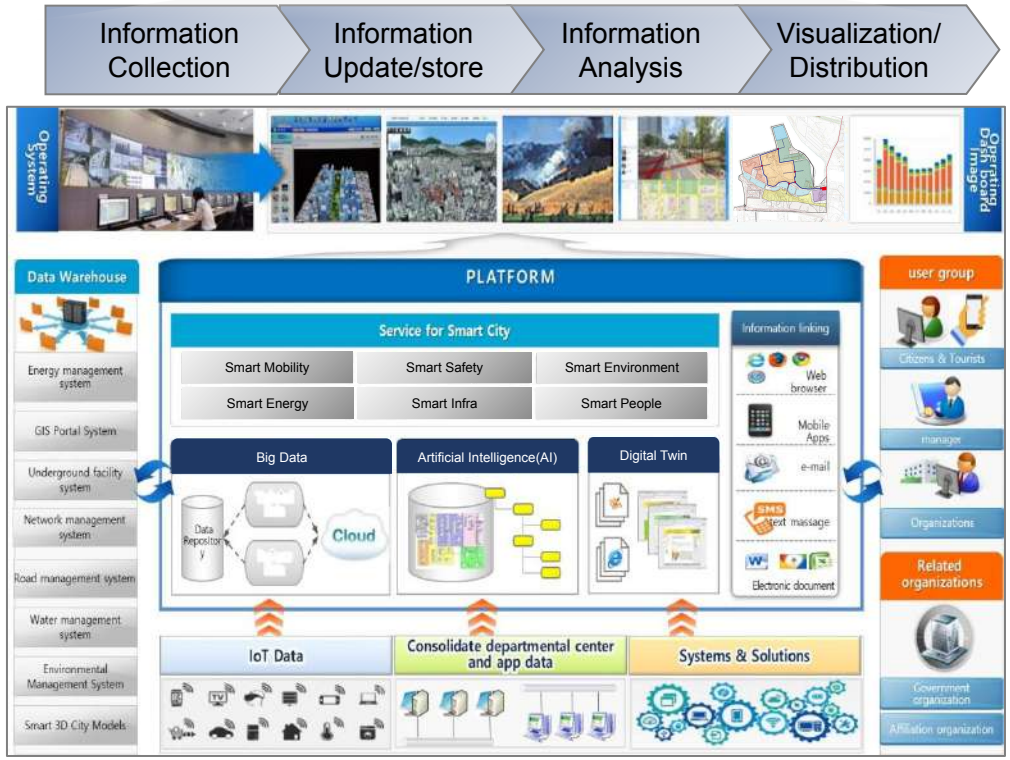
2. Scope of Center Construction

Center Location	• Center Location Selection Criteria - Reliability: Topographically and geographically safe and reliable - Convenience: A place where the connection function with related institutions is smooth - Scalability: Where it is easy to provide/build services when expanding the smart service area and scope • The location of the center is selected to provide smart services in the new city and to connect facilities in the existing city center
Center Size	• The size of the center is determined according to the scope of service integration, and it is calculated by considering the margin rate considering the future scalability of the smart service operation system.
Center Location Candidate Locations	(Examples of candidate centers for location)



Establishment of an integrated platform

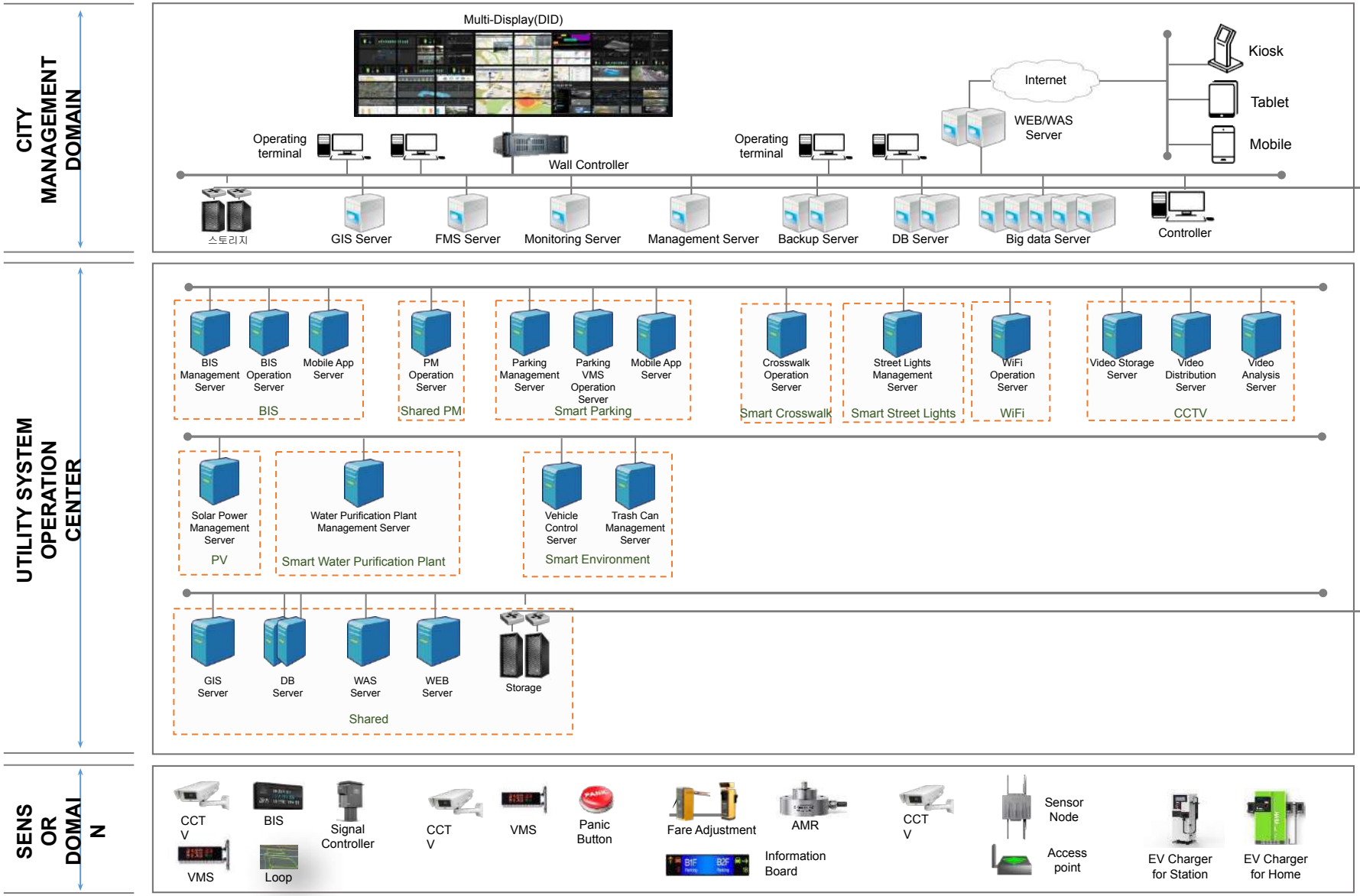
The integrated platform is a core S/W for integrating and controlling and operating various services and solutions in the city.
Process, store, analyze, and distribute a variety of data collected from a variety of sensors and devices



• The integrated platform supports integrated control and linked services so that monitoring and business processing can be done on one screen in connection with smart services.

01 Urban Integrated Operation Center Introduction Strategy

H/W configuration



01 Urban Integrated Operation Center Introduction Strategy

Quantity & Amount

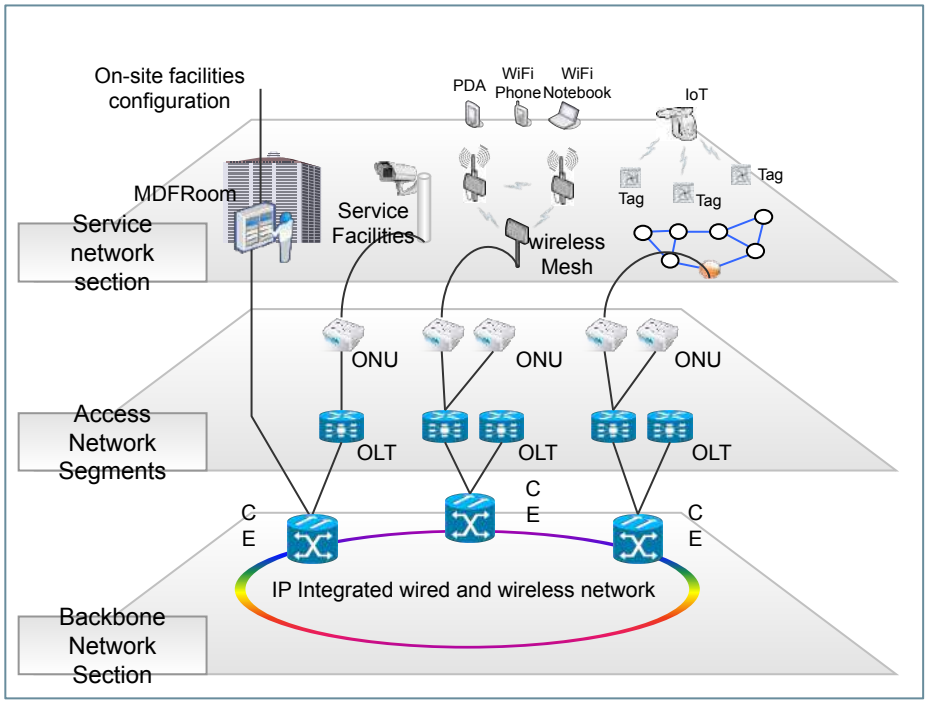
Category		Standard	Quantity	Unit(USD)	Amount (USD)
Center System H/W	55-inch DID for status panel auxiliary screen	Resolution:1,920 x 1,080(FHD)	4	9,259	37,037
	Hybrid Wall Controller	IP Video Input, 16CH Output	2	138,889	277,778
	Integrated Control System	24-inch or larger operator's touch monitor	2	16,667	33,333
	Operating Terminal	Desktop PC	5	3,333	16,667
	Network Management Server	2x Intel Xeon Gold 6246 3.3G, 12C/24T	2	18,519	37,037
	Common Server (GIS, DB, WAS, WEB, Storage)	2x Intel Xeon Gold 6246 3.3G, 12C/24T	10	18,519	185,185
	L2 Switch	Network Switch / 48Port 10/100/1000 + PoE	2	7,778	15,556
	SAN Switch	24Port, 8x16Gbps Fiber Channel Port Speed	2	11,481	22,963
				Subtotal	625,556
Center System S/W	Integrated Operation Platform	Operations Center Integrated Software	1	644,444	644,444
				Subtotal	644,444
Total					**1,270,000**

• H/W and on-site equipment are subject to the unit price of the Nara market, and transportation, customs clearance, and installation costs (25%) are reflected.
S/W is based on domestic commercial S/W and development unit cost, including localization customization (45%) cost

02 IT Communication Introduction Strategy

IT Communication Network	▪ Considering the development of ICT technology, the characteristics of the Uman New Town area, and the demand for smart city services, the optical communication network is planned as the main communication network infrastructure, and the city comprehensive information and communication network is designed to accommodate each service such as the public, enterprises, and private sectors by forming a wired network that is easy to connect with the surrounding area in the future.

1. IT Communication Network Overview



Backbone Network	Access Network	Incoming network
As the backbone that connects to a diverse set of networks, it is the core layer of the entire communication network.	It refers to the network that connects the network, and it is the network layer that connects the backbone network equipment and service terminals.	A network layer that provides a communication network to service terminals and business parks (Wireless network technology can be applied)

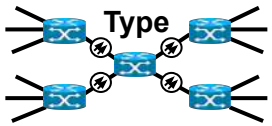
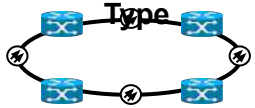
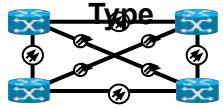
Role	• Collecting and providing information of smart cities, providing a wired and wireless communication environment that can use the Internet anytime, anywhere
Promotion Direction	• Implementation of a network that can be linked to an existing communication network Implementation of broadband network considering the service characteristics of each space Implementation of a network considering economic feasibility and scalability Guarantee of QoS and implementation of standard network that can accept future smart services Implementation of various multimedia service support networks
Key Technologies	• Backbone Network Technology: PTN, DWDM, Carrier Ethernet, MPLS-TP Access Network Technology: AON, E-PON, G-PON, WDM-PON Wireless Network : WLAN, SigFox, Lora, NB-IoT
Information and Communication Network Composition	• Backbone Network - Selected for its ultra-high-speed network, high efficiency, and easy maintenance and expansion - Reliability makes it easy to connect additional access chains - Line/equipment redundancy design in case of system downtime or accidental disconnection • Access Network - Topology enables economical connection between backbone network equipment and service terminals - Installed in the external environment, designed for easy maintenance and stability - Optical cable of appropriate capacity should be applied for each section of the access network, and in the future It is applied in consideration of sufficient margin to secure scalability • Basic Infrastructure - Conduits and tracks are constructed in a form that combines economy, stability, scalability, and constructability

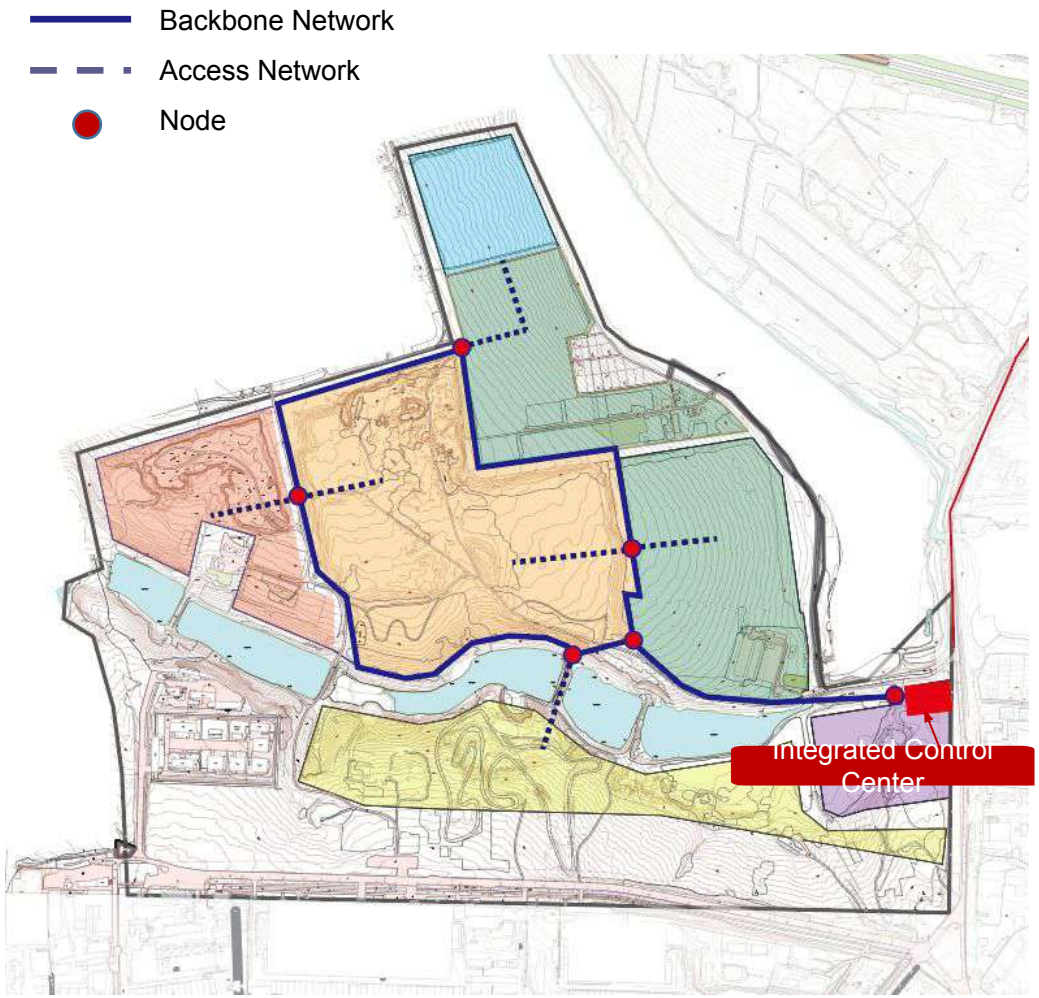
02 IT Communication Introduction Strategy

2. Scope of Information and Communication Network Construction

Construction Plan	• New Urban Area: Establishment of Self-Communication Network - Establishment of backbone network, access network, service network, and basic infrastructure (pipelines, tracks) Existing urban zones: Utilization of operators' rental networks - Establishment of a communication network using the rental network to provide services to the existing downtown area Urban Integrated Operation Center - Providing services by linking new urban areas and existing downtown areas
Transmission Equipment	• Transfer Speed - Backbone network (10~40Gbps), access network (1~2.5Gbps), incoming network (depending on device) Transmission Equipment - Backbone network (PTN or MPLS-TP), access network (E-PON or G-PON), wireless network (WLAN)
Topology	• Topology - Backbone network : Ring Type - Access network : Star(Point-to-Point) Type

Topology Analysis

Star Type	Ring Type	Mesh Type
		
1:1, 1:N connection structure	Cross-point connections	Multi-point random connection



02 IT Communication Introduction Strategy

Quantity & Amount

Category		Standard	Unit	Quantity	Unit(USD)	Amount(USD)	Remarks
Private communication network (Business Area)	Optical Transmission Equipment	COT	EA	2	110,000	220,000	Deploy redundancy
		RT	EA	12	90,000	1,080,000	Deploy redundancy
	Communication Lines	Trunk network (Backbone)	Km	2.4	90,000	216,000	96Core
		Access Network	Km	1.2	75,000	90,000	12Core
Total						1,606,000	

Self-communication network: Installed an integrated operation center in the new city area to enable service linkage between the new urban area and the existing on-site equipment in the downtown area

※ Utilization of rental network to connect existing downtown areas: The connection cost needs to be discussed separately with the telecommunications service provider

- Depending on various factors such as the location of the on-site facility and the existing network connection, the quantity may change.
  The installation method of communication lines is calculated by assuming underground weight.
  This amount is an estimate and may change when the implementation plan is established.

VII

Follow-up Business Promotion Strategy

01 Uman City's Opinion after Interim Report

Uman City Proposal for Follow-up Project Site Utilization

1. Industrial Park

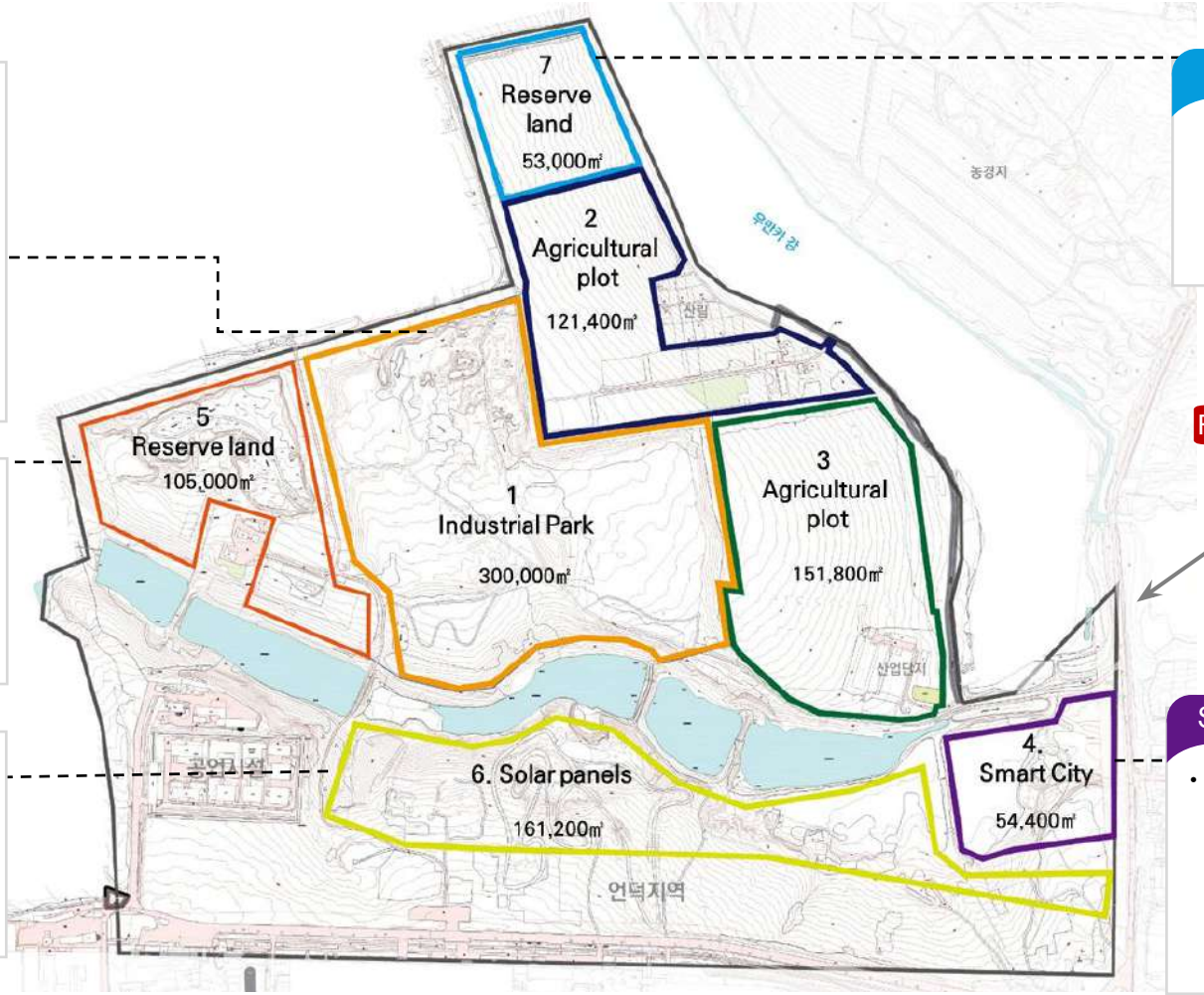
- The Ukrainian government is currently working on a program to guarantee investments against military threats and reward investments in the development of industrial parks.
  After the completion of the program, it will be provided to representatives of Korean companies who want to participate in the development of Uman Smart City

5. Reserve land

- Proposed as an additional area for expanding the capacity of industrial complexes or smart refugee camps

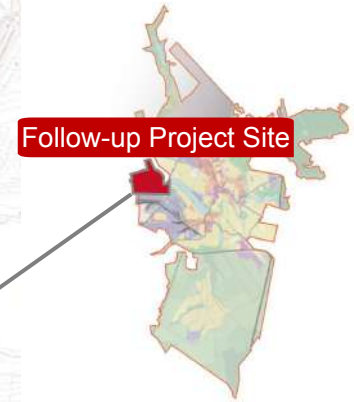
6. Solar panels

- Proposal to use it as a site for solar power generation



7. Reserve land

- Preservation hope with reservation



Smart Hope Village

- The site pointed out in the interim report is a site owned by the Ministry of Education, which has its own development strategy.
  Instead, it is easy to access the lake and since it is located near the center of Uman, we propose plot 4, which is the best place

In addition to preparing implementation plans for each service in MP, we hope to provide an opportunity to prepare future funding and expansion plans by presenting pilot project plans that can implement empirical cases.

02 ODA Project Promotion Plan

ODA Business

- Review of reconstruction projects using the Ukraine project loan

Smart Hope Village

For the resettlement of Ukrainian Refugees Complex Composition

Smart Water Purification Plant

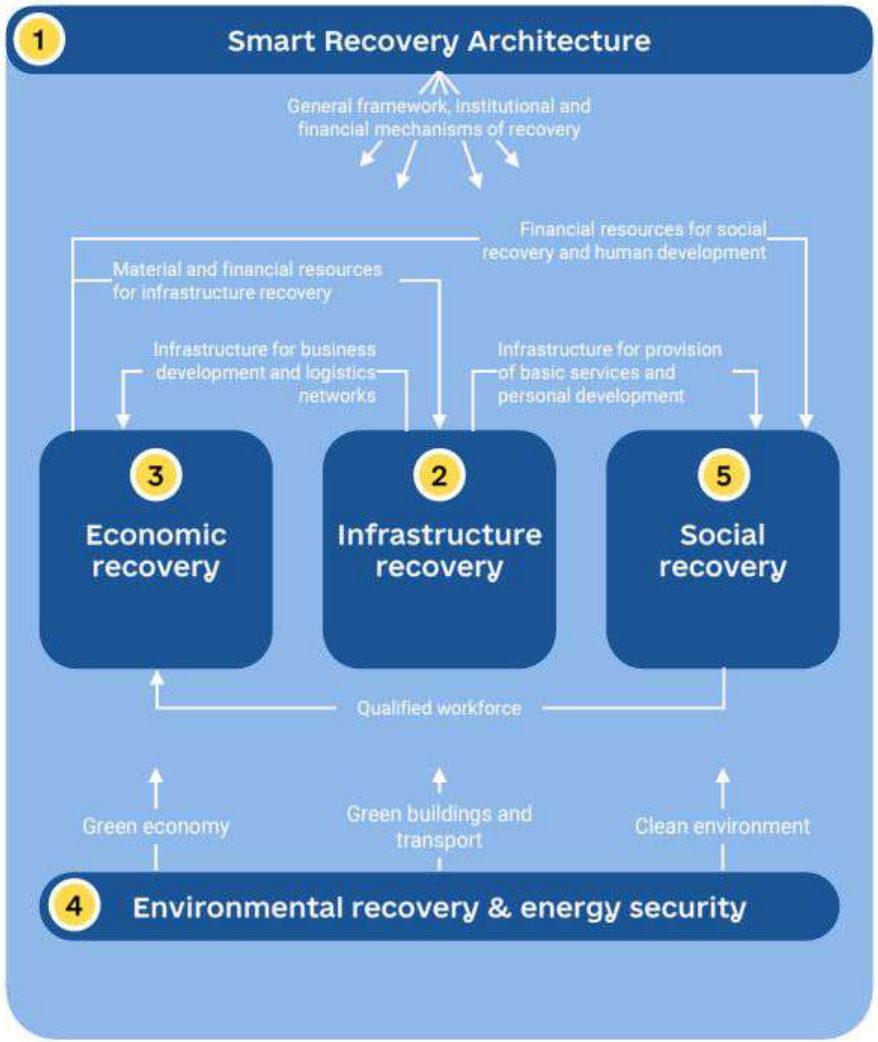
Self-treatment of water sources in the city center Vertical Water Treatment System

Smart Services Pilot

Priority installation of intelligent CCTV and smart street lights among smart services

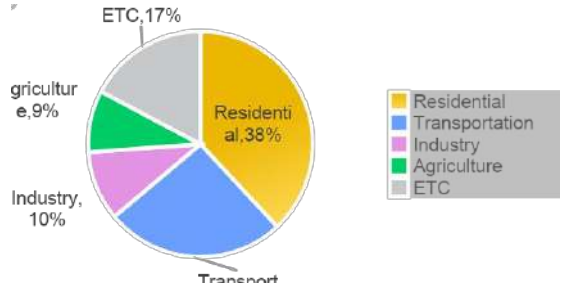
02 ODA Project Promotion Plan

Realization of Smart Recovery Architecture in Ukraine through the ODA program of the Korean government



1. Direction of the Ukrainian Government's Reconstruction Project

- The President's National Reconstruction Conference, which was launched in April 2022, decided on the direction of the three National Assembly reconstruction projects.
  - ① **Strengthen resilience**
  - ② **Driving recovery**
  - ③ **Modernization-oriented**



2. Large-scale influx and settlement of population, expected to increase demand for urban infrastructure

- As of 2022, the total number of refugees in Ukraine is estimated at 7,976,980, and the number of refugees and repatriates is gradually increasing.
- It is expected that the demand for housing and urban infrastructure will increase rapidly after the war, such as the urban settlement of reverse refugees.

3. Preparation of a plan for post-war reconstruction of Ukraine through ODA projects

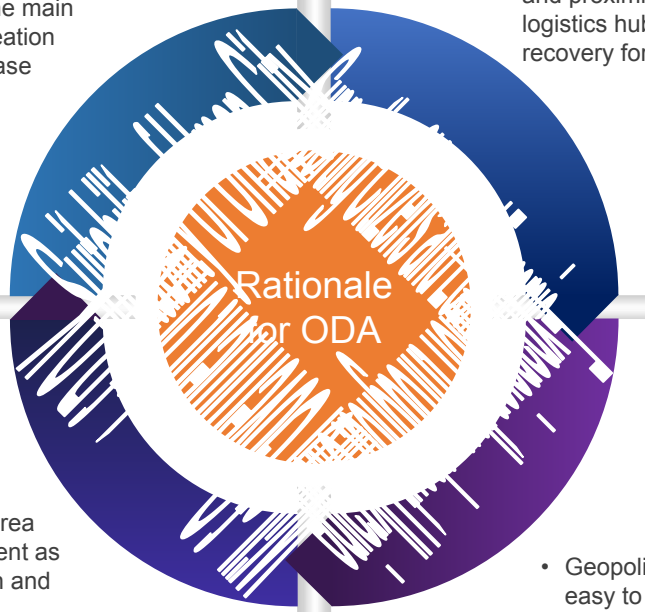
Preparing for Housing Demand	Economic Recovery and Job Creation Opportunities	Infrastructure Recovery and Improvement	Preparing for a Sustainable Economic Transition
			
Rapid housing supply and urban infrastructure creation model	**Opportunities to create employment jobs through the development of smart farm and agricultural secondary processing industrial complexes and agricultural distribution complexes**	**Prepare a plan to recover from the damage of existing infrastructure and create a new smart infrastructure, mainly water supply**	**Establishing a direction for energy independence and creating a low-carbon environment through the introduction of new and renewable energy and energy conversion policies**

02 ODA Project Promotion Plan

Rationale for the promotion of the Uman ODA project

Suitability of Uman City as an ODA project site

- Urban problems such as infrastructure and housing shortages are expected along with the increase in unemployment due to the influx of refugees and resettlers centered on large cities
  When the settlement project(Hope Town) is carried out on a pilot basis in Uman City, the labor force necessary for agriculture, the main industry of Uman City, is incorporated, resulting in job creation opportunities without establishing a separate industrial base



Humanitarian & Industrial Support

- Moving into Hope Town helps refugees, settlers, and citizens heal from the mental devastation caused by the prolonged war, and provides a safe place of rest and hope.
  It is located in an industrial area and is advantageous in job creation and proximity to employment.. Planning smart farms and agricultural logistics hubs to provide opportunities for job creation and economic recovery for resettled populations

The will of the Government of ROK

- In September 2023, the government of the Republic of Korea signed a donation agreement with the Ukrainian government as a way to cooperate with the government for reconstruction and announced six leading projects.
  The Uman Smart City Master Plan in Ukraine is one of the six leading projects
  As a result of the master plan, a follow-up project for the construction of Hope Town is proposed

Ease of expansion throughout Ukraine

- Geopolitically, the city of Uman is located in an area where it is easy to expand logistics, distribution, and services necessary for the reconstruction of Ukraine.
- In order to build a small-scale, cost-effective smart complex test bed and verify its effectiveness, Uman City can provide an appropriate scale for the pilot project to expand to large cities in the future.

Need for support from the Ukrainian government to promote the Uman ODA project

02 ODA Project Promotion Plan

Smart Hope Village (Draft 1) (1/3)

Smart Hope Village

Location and area

- **Located in the west of Uman, about 2.3km from downtown Uman**
  Total area: 5.42ha

Site

- **Easy to secure water sources adjacent to the Chykanka River on the east and west sides**
  Adjacent to the city outskirts on the

Housing for Uman citizens and refugees

Promotion of ODA support projects

Supplied Households

- **A total of 100 households (A type: 62 households, B type: 38 households))**

Type A

- 1Room / 1 Bath
- 2Floor, 36 total㎡

Type B

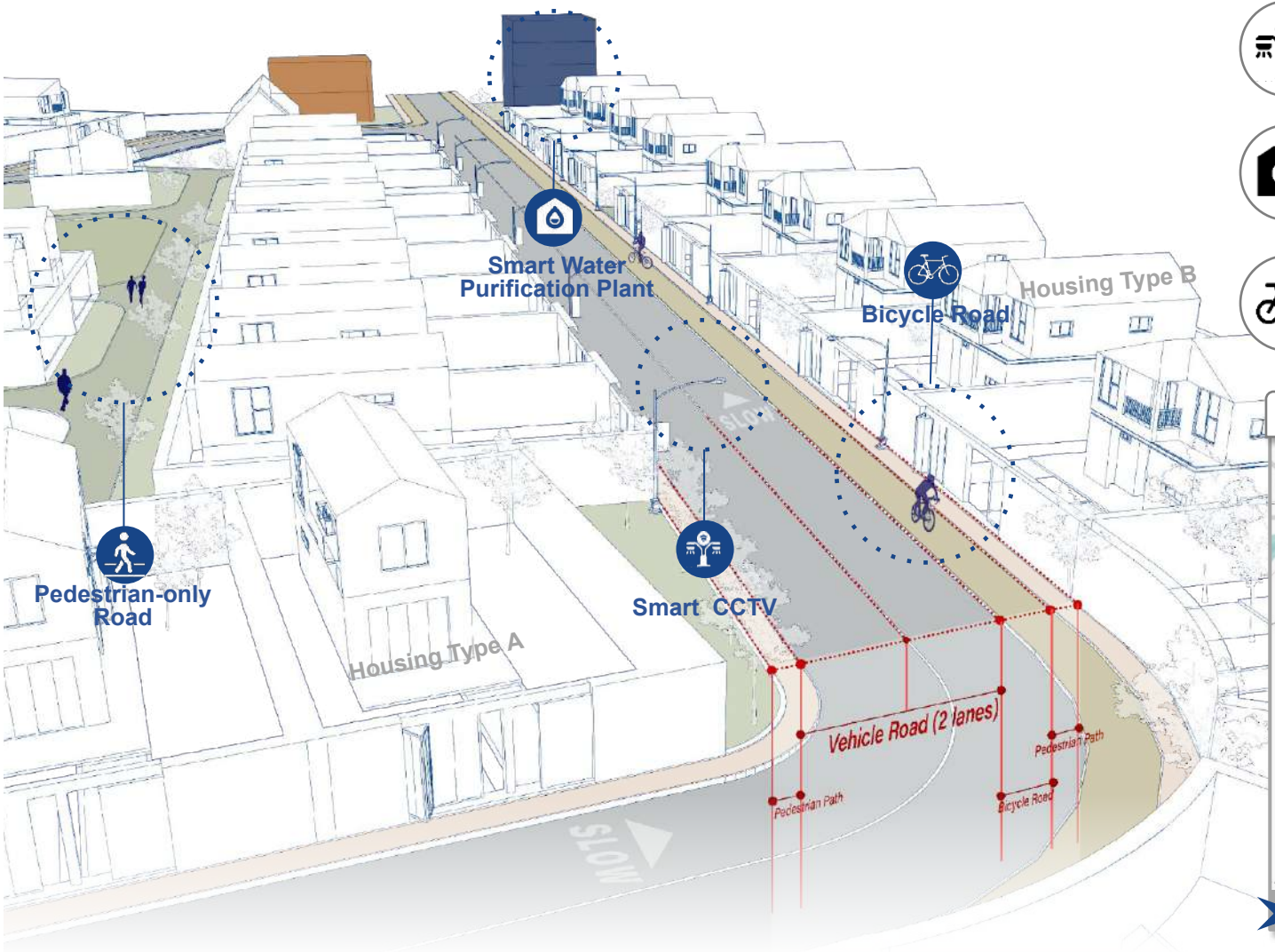
- 2Room /1 Bath
- 2Floor total 60 ㎡

Building floor area

use	Gross floor area
Residential	4,512㎡
Commercial	510㎡
Supporting Facilities	2,524㎡
Total	7,545㎡

02 ODA Project Promotion Plan

Smart Hope Village (Draft 1) (2/3)



Smart CCTV

Introduction of smart CCTV for housing complex security and management

Smart Water Purification Plant

Introduction of smart water purification plant to streamline water supply in the complex

Pedestrian & Bicycle Road

Creating a pleasant living environment by separating bicycles, walking, and vehicle roads

Walkway and road planning within the complex

Implementing Smart Hope Village pilot project such as smart water purification plants through free ODA supports and creating bicycles or pedestrian-only roads in the complex

02 ODA Project Promotion Plan

Smart Hope Village (Draft 1) (3/3)

Preparing the foundation for the future housing reconstruction project in Uman city
through the supply of Smart Hope Village demonstration complexes for Uman citizens and war refugees

02 ODA Project Promotion Plan

Smart Hope Village (Draft 2) (1/2)

Smart Hope Village

Location and area

- Located in the west of Uman, about 2.3km from downtown Uman
  Total area: approx. 5.42hectares

Site Characteristics

- Adjacent to the Chikanka River on the east and west sides, it is easy to secure a water source
  Adjacent to the city outskirts on the east side

Housing for Uman citizens and refugees

Promotion of ODA support projects

Supplied Households

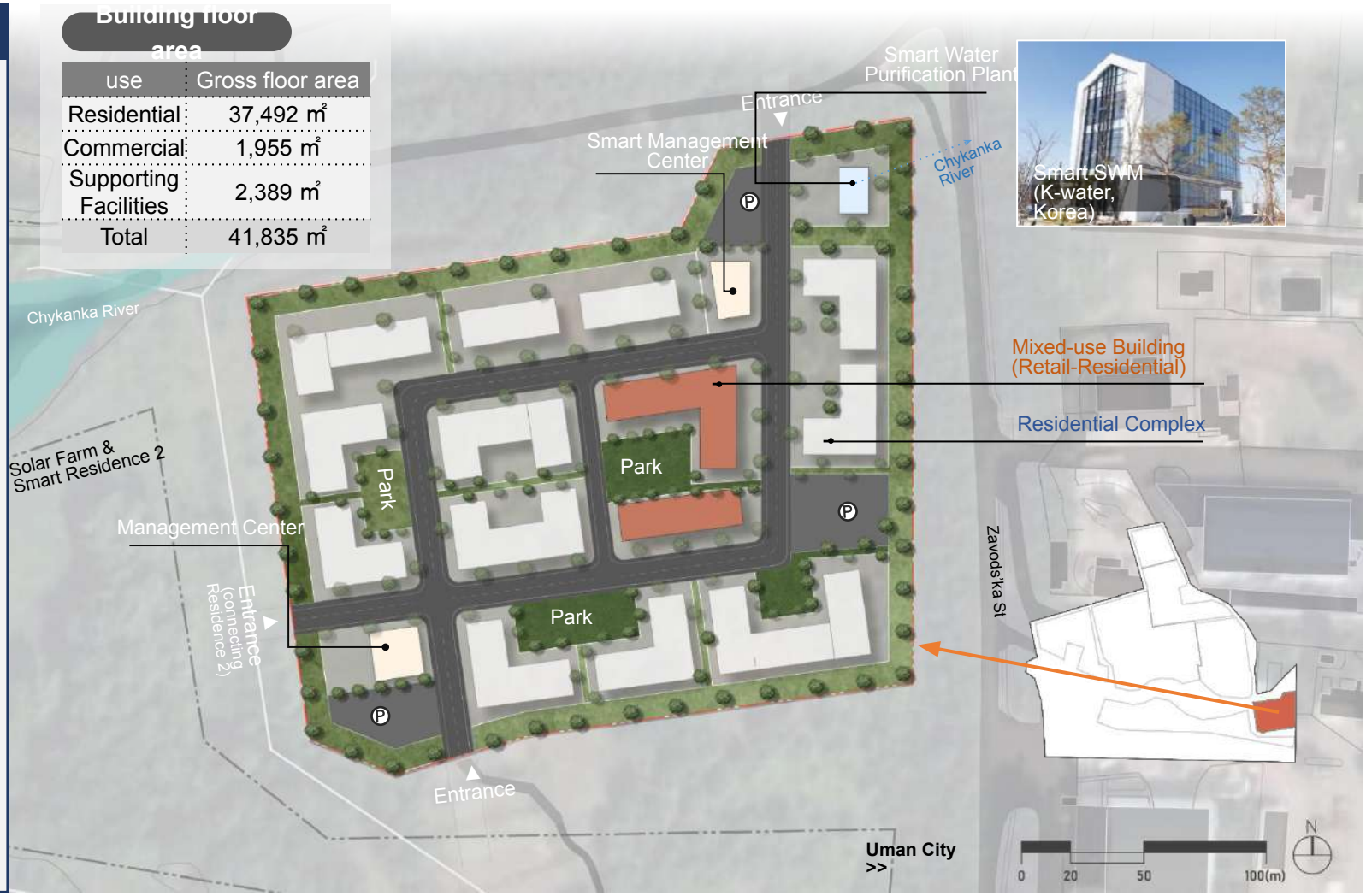
- Residential facilities: approx. 386 rooms (5 floors, 14 buildings)

Main Facilities

- Smart integrated control center and management center
- Smart water purification plant
- Retail shops on the 1floor of residential-commercial buildings

Building floor area

use	Gross floor area
Residential	37,492 ㎡
Commercial	1,955 ㎡
Supporting Facilities	2,389 ㎡
Total	41,835 ㎡



Planning an alternative of Smart Hope Village as an apartment complex that will expand housing supply to about 386 rooms
to support the increase of war refugees and resettlement in Uman City

02 ODA Project Promotion Plan

Smart Hope Village (Draft 2) (2/2)

Expanding the scale of housing support for war refugees in Uman City and
Creating a safe and comfortable complex environment through smart pilot projects

02 ODA Project Promotion Plan

Smart Water Purification Plant

purpose

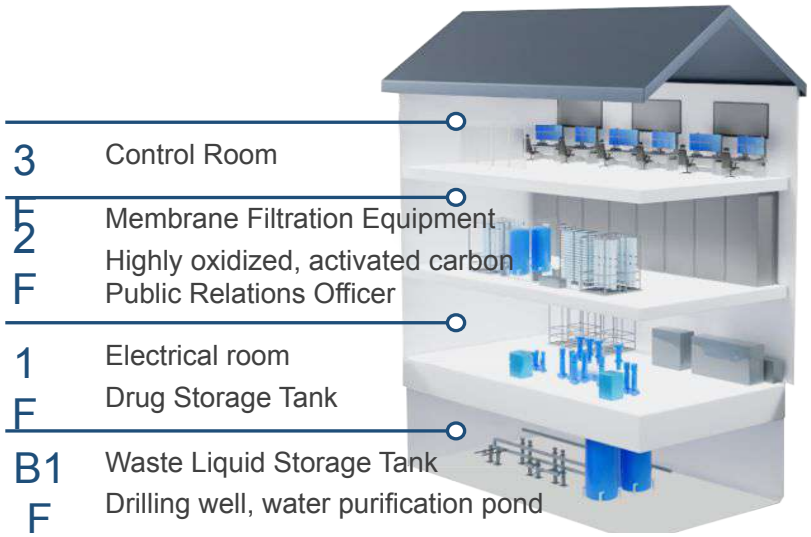
- A smart water purification plant built as a state-subsidized project in Busan Eco Delta is reinstalled in a Smart Hope Village in Ukraine after demolition

EDC Smart Water Purification Plant Business Overview

- Project period: 2020~2026 (Smart Village Living Lab linkage)
  Total project cost 11,070 million won (K-water: 4,170 million won / treasury: 6,900 million won)
  Facility Capacity: 100㎥/day (based on membrane filtration)
  Project Areas : 1 water intake and water purification facility, 2.1km of provincial water transmission pipeline
  Target area: Smart Village (56 households)

Promotion Plan

- Financing plan: Reuse of smart water purification plant through ODA project and connection to living lab



Operation and monitoring control of facilities, working space for workers

Membrane Filter and active Carbon / Main Filter facility and PR room

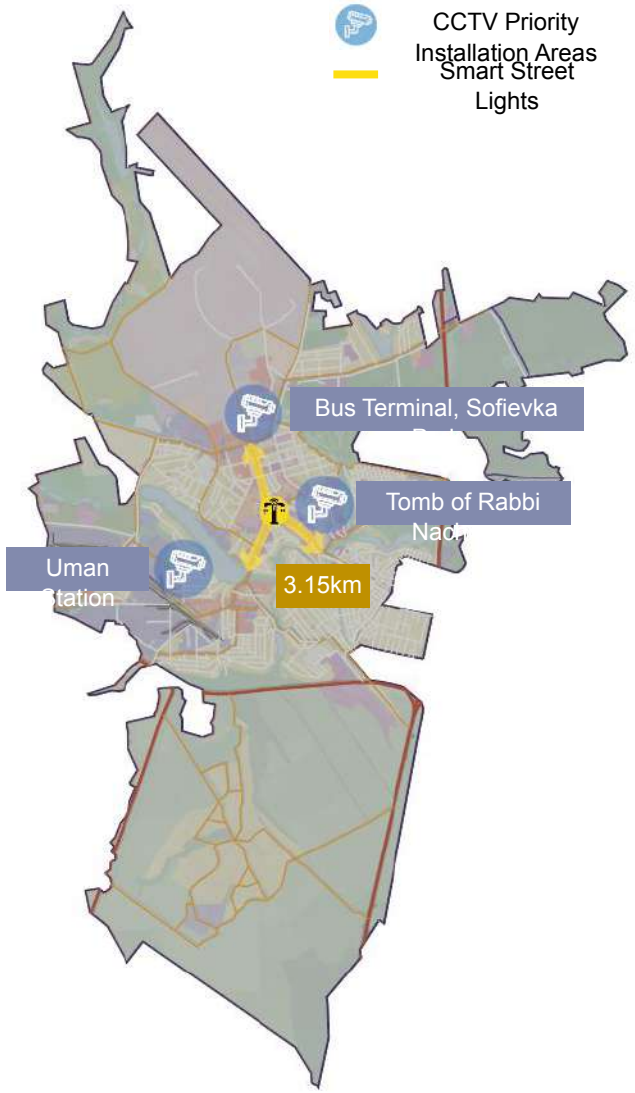
High-pressure pump and electrical facilities for membrane filtration process

Heavy Facility of Intake, filtering, chemical tank.

02 ODA Project Promotion Plan

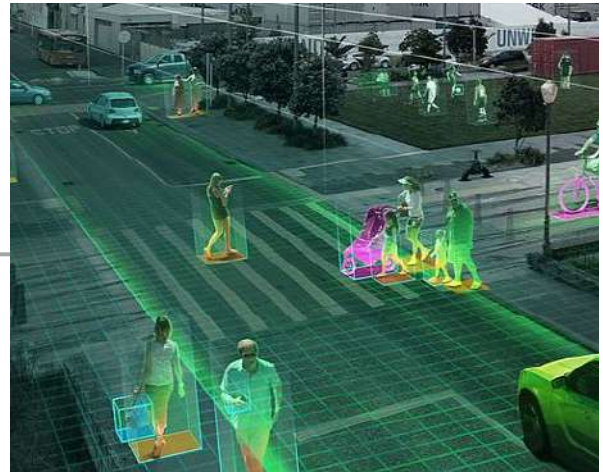
Smart Services Pilot

Priority Areas



Intelligent CCTV PILOT Business Direction

200m, and if two fixed and one rotating type are installed per CCTV, the surveillance range can be calculated to be about 400m.
Installed as a pilot of Uman City Smart Service at the Uman Bus Terminal, near the Tomb of Rabbi Nachman, and centered on Uman Station
Reduced scale compared to the existing planned section (a total of 30 CCTVs installed)



Smart Street Light Business Promotion Direction

First of all, it is presented in a way that it is installed around the main roads of Uman City and then spreads.
The first installation is a total route length of 3.15 km, and smart street lights and CCTV are installed every 50 meters.
(1. Bus Terminal ↔Tsentral'nyi park ↔ Love Fountain, 2. Tsentral'nyi park ↔ Monument to John of Gaunt and iron ore Maxim)
Installed by reducing the scale compared to the existing planned section (a total of 50 smart street lights)

03 PPP Project Promotion Plan

PPP Business	▪ Smart residence demonstration project and Solar Farm, which generates profits, are promoted through PPP

Smart Residences

Supplying smart residences for tourists

Solar Farm

Realization of an eco-friendly energy self-reliant city based on solar energy

03 PPP Project Promotion Plan

Smart Residence (Draft 1) (1/3)

Smart Residence

Location and area

- Located in the west of Uman, about 3km from downtown Uman
  Total area: approx. 10.5 hectares

Site Characteristics

- Plan as waterfront residential complex adjacent to the Chykanka River in the south
  Adjacent to the existing settlement on the north side and the Smart Hope Village on the east

Uman City Visitor-Oriented Housing and Housing Supply

Promotion of PPP business

Number of rooms supplied

- About 28 buildings, 400 rooms

Main Facilities

- Community & Management Center
  Street-type retail shops

Modular Apartment

Community Facilities

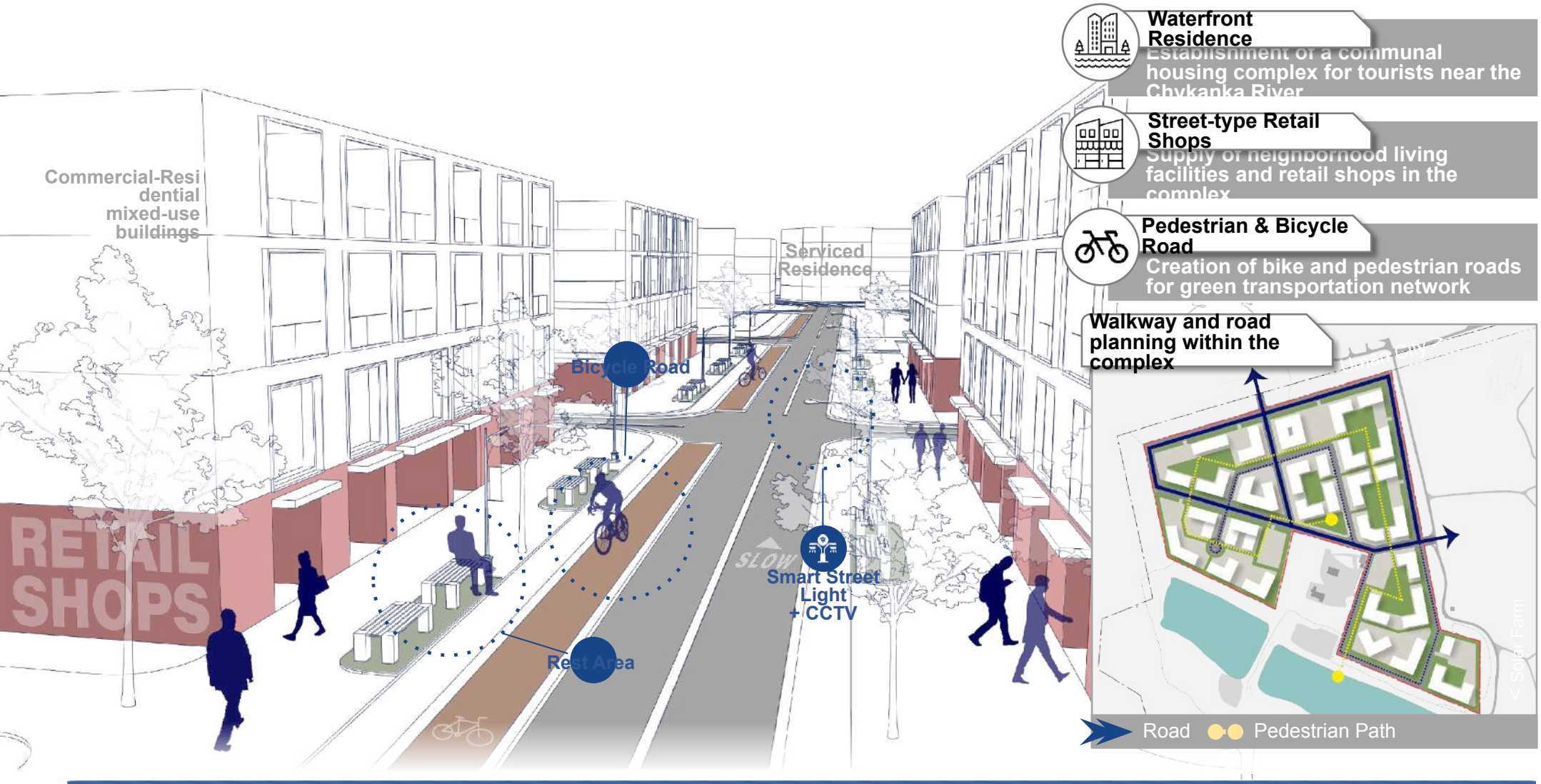
Retail Shops

Building floor area

use	Gross floor area
Residential	50,050 ㎡
Commercial	3,659 ㎡
Supporting Facilities	3,232 ㎡
Total	56,941㎡

03 PPP Project Promotion Plan

Smart Residence (Draft 1) (2/3)



Improving accessibility and convenience of each facility within the Smart Residence
by supplying street-type commercial facilities and the creation of a green transportation network

03 PPP Project Promotion Plan

Smart Residence (Draft 1) (3/3)

Solving urban problem by providing accommodations for visitors to Uman City and Presenting future housing models such as smart home and modular apartment houses

03 PPP Project Promotion Plan

Smart Residence (Draft 2)

Smart Residence (Draft 2)

Location and Area

- Western side of Smart Hope Village
  Location of the Industrial Park and Uman Railway Station in the South
- Total Area : approx. 16.2

Site Characteristics

- Site adjacent to the Chykanka River on the north side and Plan as a residential complex using the waterfront
  It is necessary to secure a large buffer green area with the distribution of industrial complexes in the south

Uman City Visitor-Oriented Housing and Housing Supply

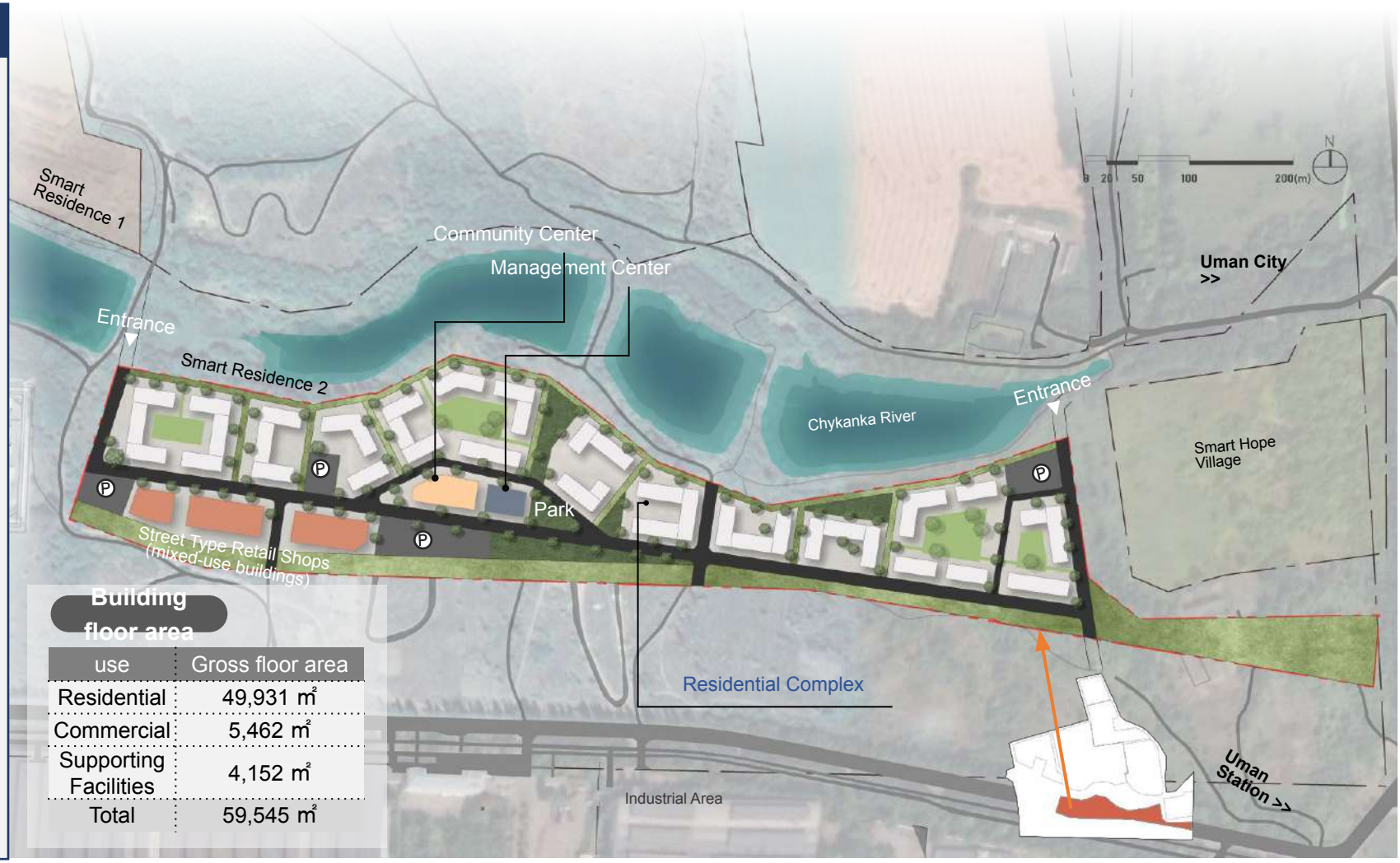
Promotion of PPP business (Combined development with Smart Residence 1 site)

Number of rooms

- Residence 1: 28 buildings, about 400 rooms
  Residence 2: 23 buildings, about 400 rooms
  Total: approx. 800 rooms

Main Facilities

- Community & Management center
  Street-type retail shops
  Central Park, etc.



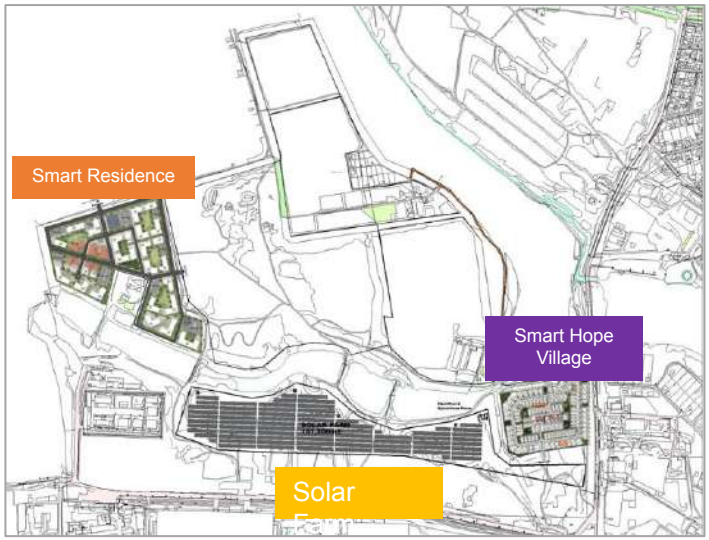
Building floor area

use	Gross floor area
Residential	49,931 ㎡
Commercial	5,462 ㎡
Supporting Facilities	4,152 ㎡
Total	59,545 ㎡

Planning an alternative that expand Smart residence site by replacing the Solar Farm to improve the profitability of the follow-up business and to expand accommodation facility supply about 800 rooms

03 PPP Project Promotion Plan

Solar Farm



Solar Farm Overview

- Calculation standard: Calculation of solar power generation system capacity based on the number of households supplying electricity (1,866 households) and power production per module
- Solar Farm area : 161,200㎡
- Production : 161,200㎡ x 70% / 12,000(1MW/m2)= 9.4MW
- Number of installed modules: 144unit (6m x 24m)
- Solar power generation operating expenses: 2.7%

- Solar Farm Profitability Analysis

(Unit : USD)

Category	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Aggregate Costs	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000
Aggregate Operational	0	418,770	837,540	1,256,310	1,675,080	2,093,850	2,512,620	2,931,390	3,350,160	3,768,930	4,187,700	4,606,470	5,025,240	5,444,010	5,862,780	6,281,550	6,700,320	7,119,090	7,537,860	7,956,630	8,375,400
Aggregate cost sum	15,510,000	15,928,770	16,347,540	16,766,310	17,185,080	17,603,850	18,022,620	18,441,390	18,860,160	19,278,930	19,697,700	20,116,470	20,535,240	20,954,010	21,372,780	21,791,550	22,210,320	22,629,090	23,047,860	23,466,630	23,885,400
Aggregate revenue	0	1,637,844	3,275,688	4,913,532	6,551,376	8,189,220	9,827,064	11,464,908	13,102,752	14,740,596	16,378,440	18,016,284	19,654,128	21,291,972	22,929,816	24,567,660	26,205,504	27,843,348	29,481,192	31,119,036	32,756,880
Aggregate Income	**-15,510,000**	**-14,290,926**	**-13,071,852**	**-11,852,778**	**-10,633,704**	**-9,414,630**	**-8,195,556**	**-6,976,482**	**-5,757,408**	**-4,538,334**	**-3,319,260**	**-2,100,186**	**-881,112**	337,962	1,557,036	2,776,110	3,995,184	5,214,258	6,433,332	7,652,406	8,871,480

VIII Financial Analysis

01 Feasibility Analysis Plan

Feasibility Study Plan

STEP 01 — Establish an appropriate business promotion method by confirming the type and size of the introduced facility, collecting market information, etc., and reviewing the possibility of generating profits.

1. Purpose Price Survey	• Survey of price status such as sales price and rent by use
2. How the project is carried out establish	• Review of the possibility of generating revenue by facility and according to the ability to generate revenue and investment cost proposal of financing method and promotion plan

STEP 02 — Conduct a rough business feasibility review based on the characteristics of the building being introduced (modular, etc.) and operation method (sale or operation).

3. Establishing a major home	• Establishment of assumptions of major sales items such as sale price and rent reflecting the facility plan Establishment of assumptions of major expense items such as construction costs, operating costs, finance costs, and taxes Establishment of major schedules such as development schedule, sales and operation start schedule
4. Calculation of business expenses and derivation of cash flow	• Calculation of project expenses including construction costs, operating costs, finance costs, etc. Derivation of cash flow by year by applying key assumptions
5. Establishment of capital structure	• Calculation of fund size and ODA financial conditions such as EDCF or local financial conditions, etc. Establishment of capital structure through / Establishment of capital injection schedule according to capital structure
6. Feasibility study of the project	• Project feasibility study (IRR, etc.) / Review of the possibility of repayment of principal and principal / Financial review by investment type (Equity IRR, etc.)

Calculation of project expenses

development schedule — Considering the local special situation (war, etc.), establish an appropriate project promotion schedule

- Since there are uncertainties such as when the war will end, we will approach the development schedule from a mid- to long-term perspective.
  Considering the inflation rate (CPI, PPI) and estimating the appropriate construction cost at the time of project commencement

Land Fee — Review of land expropriation costs according to the scope and scale of project site development

- Confirmation of the scale and scope of development of the project site
  It is necessary to confirm the concession conditions for the free provision of the city government
  If necessary, calculate the use and facility area for each business site and calculate the price per area
  Calculation of land expropriation cost according to development area

Construction Cost — Review of construction costs considering local development conditions and construction unit cost levels by sector

- Review of construction cost standards in consideration of similar development cases and local development conditions
  Calculation of construction costs taking into account the cost of materials, labor, and prices in Ukraine
  Calculation of appropriate quantity and cost through review of self-cutting price, procurement method, and local construction cost calculation standards

Sales·Operating Costs — Estimation of sales/operating expenses for sales/operation facilities, etc.

- Estimation of sales/operating expense ratio through case analysis of existing development projects
  Calculation of sales/operation cost compared to direct site development cost (construction cost + site cost, etc.)

finance cost — Calculation of other capital raising ratio and cost to derive appropriate leverage

- Derivation and application of optimal D/E ratio considering profitability and loan repayment stability
  Confirmation of the level of financing expenses such as interest expenses during the business period

02 Promotion Type by Business

	Public-led projects		Follow-up business	
Promotion Type	① Uman City Smart City Public Service	② Uman Smart City Public Infrastructure	③ ODA Promotion Projects	④ Public Private Partnership (PPP)
Promotion Way	By reviewing the current status, issues, and regional characteristics of Uman, Uman customized smart city public services to grow Uman into a sustainable city	A center that connects the entire business site with a single communication network and interconnects individual services to provide cutting-edge services and perform situation control functions in an integrated manner.	Review of reconstruction projects using the Ukraine project loan	Smart residence demonstration project and profit-generating Solar Farm are promoted through a public-private partnership corporation (SPC)
Promotion Content	Smart Mobility Services • Smart Bus Shelter & BIS Shared PM & EV Station Smart roadside parking Smart Safety Services • Smart Crosswalk Intelligent CCTV Smart Environment Services • Smart trash cans	• Urban Integrated Operation Center Network	• Smart Water Purification Plant Smart Hope Village	Draft 1 • Smart Residence (400 rooms) Solar Farm Draft 2 • Smart Residence (800 rooms)

Proposal of financing method and business promotion plan according to the ability to generate revenue by service or facility and the scale of investment cost

03 Public-led projects

Smart City Services & Infrastructure – Scale and Scope of Deployment

Smart Bus Shelter / Bus Information System (BIS)
- Calculate stops at least 2 of the 18 bus routes in Uman City and at major points

Shared PM Stations
- Central bus terminal and 5 public places, consisting of 30 cradles and PM devices

EV Charging Stations
- Construction of 50 electric chargers (10 rapid and 40 slow) on the parking lot site

Smart Parking
- Construction of 3 parking lots with a maximum capacity of 100 vehicles

Smart Crosswalk
- Installed in 10 locations near schools and major downtown intersections

Smart poles (50m intervals)
- The total route length is about 17.47km, and a total of 700 smart street lights are built every 50m

Intelligent CCTV
- Based on the monitoring range of about 400m, a total of about 241 locations are installed to minimize blind spots in the target area.

Smart trash cans
- 700 locations across the city centered on parks and public spaces instead of residential areas

Integrated Operation Center
- Installed in a location that can connect the follow-up project site and existing urban facilities

03 Public-led projects

Smart City Services & Infrastructure – Construction & Operating Costs

(Unit : USD)

Category		Total	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Smart Bus Shelter/ BIS	Construction	4,270,465	1,407,903	318,063	318,063	318,063	318,063	318,063	318,063	318,063	318,063	318,063
	Operation	1,407,903	140,790	140,790	140,790	140,790	140,790	140,790	140,790	140,790	140,790	140,790
Personal Mobility (PM)	Construction	831,710	615,148	24,063	24,063	24,063	24,063	24,063	24,063	24,063	24,063	24,063
	Operation	615,148	61,515	61,515	61,515	61,515	61,515	61,515	61,515	61,515	61,515	61,515
EV Station	Construction	1,388,875	320,125	118,750	118,750	118,750	118,750	118,750	118,750	118,750	118,750	118,750
	Operation	320,125	32,013	32,013	32,013	32,013	32,013	32,013	32,013	32,013	32,013	32,013
Smart roadside parking	Construction	2,555,938	939,988	179,550	179,550	179,550	179,550	179,550	179,550	179,550	179,550	179,550
	Operation	939,988	93,999	93,999	93,999	93,999	93,999	93,999	93,999	93,999	93,999	93,999
Smart pedestrian crossing	Construction	689,310	264,623	47,188	47,188	47,188	47,188	47,188	47,188	47,188	47,188	47,188
	Operation	68,931	26,462	4,719	4,719	4,719	4,719	4,719	4,719	4,719	4,719	4,719
Smart streetlight	Construction	9,279,390	1,955,640	813,750	813,750	813,750	813,750	813,750	813,750	813,750	813,750	813,750
	Operation	1,955,640	195,564	195,564	195,564	195,564	195,564	195,564	195,564	195,564	195,564	195,564
Intelligen tCCTV	Construction	4,072,990	3,186,411	98,509	98,509	98,509	98,509	98,509	98,509	98,509	98,509	98,509
	Operation	3,186,411	318,641	318,641	318,641	318,641	318,641	318,641	318,641	318,641	318,641	318,641
Smart dustbin	Construction	888,375	337,125	61,250	61,250	61,250	61,250	61,250	61,250	61,250	61,250	61,250
	Operation	337,125	33,713	33,713	33,713	33,713	33,713	33,713	33,713	33,713	33,713	33,713
Urban Integration Operation Center	Construction	1,270,000	1,270,000	-	-	-	-	-	-	-	-	-
	Operation	635,000	63500	63500	63500	63500	63500	63500	63500	63500	63500	63500
	Construction	1,606,000	1,606,000	-	-	-	-	-	-	-	-	-

Taking into account budget reductions during the war and the city budget, the plan was established on a 10-year phased basis.

04 ODA Projects

Smart Hope Village – Single home type

Site Plan

Land Use Plan

category	Site area (㎡)	Compostion
Residential Facility Site	26,129	48%
Commercial Facility Site	1,809	3%
Management Facility Site	1,426	3%
Smart Water Purification Plant	538	1%
Parks & Sports Facility Site	2,715	5%
Greenery	9,416	17%
Parking lot	831	2%
road	11,328	21%
Total	**54,192**	**100%**

Construction Costs

type	Cost of construction (per unit)	num	Cost
Type A (58㎡)	USD 62,289	62	USD 3,861,952
Type B(112㎡)	USD 115,420	38	USD 4,385,993

Site development cost

category		Smart Hope Village
Business Area		**54,400㎡**
Civil engineering	Unit cost	1.76 USD
	Construction Cost	96,087 USD
Stormwater Construction	Unit cost	3.68 USD
	Construction Cost	200,393 USD
Sewage construction	Unit cost	1.30 USD
	Construction Cost	73,561 USD
Waterworks	Unit cost	1.30 USD
	Construction Cost	70,820 USD
Pavement	Unit cost	6.70 USD
	Construction Cost	364,883 USD
Landscaping	Unit cost	7.11 USD
	Construction Cost	386,844 USD
Electrical construction	Unit cost	5.65 USD
	Construction Cost	307,441 USD
Street lighting construction	Unit cost	1.96 USD
	Construction Cost	106,644 USD
Subtotal		1,606,674 USD
Ancillary construction	Unit cost	22.50%
	Construction Cost	361,502 USD
Composition Contrast	Unit cost	1.12%
	Construction Cost	17,995 USD
Subtotal		379,496 USD
Total		1,986,170 USD

Building composition

Category				Gross floor area (㎡)	Number of buildings	Total gross floor area(㎡)
Residential facilities	Type A	40	2	58	62	3,605
	Type B	78	2	112	38	4,269
Total						7,874
commerce facilities	Central Shopping Street (right)	510	3	1,529	1	1,529
Total						1,529
support facilities	Community 1 (center left)	346	2	692	1	692
	Community 2 (west side of site)	200	2	400	1	400
	Buildings in the sports park (east side)	189	2	378	1	378
	Smart Management Facility (Site North Side)	193	2	386	1	386
	Management Facility (South Side of Site)	281	2	561	1	561

04 ODA Projects

Smart Hope Village – Apartment type

Site Plan

④ Smart city plot

Land Use Plan

Category	Site Area (㎡)	Composition
Residential Facility Site	22,908	42%
Commercial Facility Site	3,827	7%
Management Facility Site	1,993	4%
Smart Water Purification Plant	1,185	2%
Parks & Sports Facility Site	2,854	5%
Greenery	10,286	19%
Parking lot	2,723	5%
road	8,460	16%
Total	54,235	100%

Construction Costs

type	Price per m²	num	price
5th Floor Residences	USD 1,111	12	USD 36,445,556
5th Floor Residences (Residential-commercial complex)	USD 1,111	2	USD 5,212,222

Site development cost

Category		Smart Residences
Business Area		**54,400㎡**
Civil engineering	Unit cost	1.76 USD
	Construction Cost	96,087 USD
Stormwater Construction	Unit cost	3.68 USD
	Construction Cost	200,393 USD
Sewage construction	Unit cost	1.30 USD
	Construction Cost	73,561 USD
Waterworks	Unit cost	1.30 USD
	Construction Cost	70,820 USD
Pavement	Unit cost	6.70 USD
	Construction Cost	364,883 USD
Landscaping	Unit cost	7.11 USD
	Construction Cost	386,844 USD
Electrical construction	Unit cost	5.65 USD
	Construction Cost	307,441 USD
Street lighting construction	Unit cost	1.96 USD
	Construction Cost	106,644 USD
Subtotal		1,606,674 USD
Ancillary construction	Unit cost	22.50%
	Construction Cost	361,502 USD
Composition Contrast	Unit cost	1.12%
	Construction Cost	17,995 USD
Subtotal		379,496 USD
Total		1,986,170 USD

Building composition

Category		(…)		Gross floor area (㎡)	Number of buildings	Total gross floor area(㎡)
Residential facilities	3rd Floor	6,560	5	32,801	12	32,801
	5th Floor	1,173	4	4,691	2	4,691
	Total					37,492
Commerce facilities	Flue type mall	1,955	1	1,955	2	1,955
	Total					1,955
Support facilities	Community & Smart Management	738	1	738	2	1,476
	Administration Building	228	4	913	1	913
	Total					2,389
Total						41,835

04 ODA Projects

Smart Water Purification Plant

Water Purification Plant Overview

Introduction of a 'distributed water supply system' that can treat various water sources in urban areas

category	content
Facility Capacity	100㎥/Day
Business Details	1 water intake and water purification facility, 2.1km of water pipeline
Eligible Areas	Target for Smart Hope Village in the follow-up project site

Overall construction costs

item	amount(USD)
Smart Water Purification Plant	884,725
Construction & Facility Setting Construction	3,289,375
Information & Communication Cost	287,500
Subtotal	**4,461,600**

Smart Water Purification Plant Details

item	amount(USD)
Central Control Room	597,500
Water Purification Plant	58,750
Water intake site	58,750
Supplier	9,375
S/W Engineering Business Fee	120,350
Comprehensive commissioning of control equipment	40,000
Subtotal	**884,725**

Construction & Facility Installation Work Details

item	amount(USD)
Control Equipment Facility	30,000
Common Facilities	9,375
Water Supply Facilities	1,750,000
Business Facilities	1,500,000
Subtotal	**3,289,375**

Information & Communication Construction Details

item	amount(USD)
Communication construction	56,250
Wire & Cable Construction	150,000
Wire Lighting Construction	81,250
Subtotal	**287,500**

❖ The cost of reinstallation after demolition will be calculated after the project is confirmed.

04 ODA Projects

Smart service pilot test

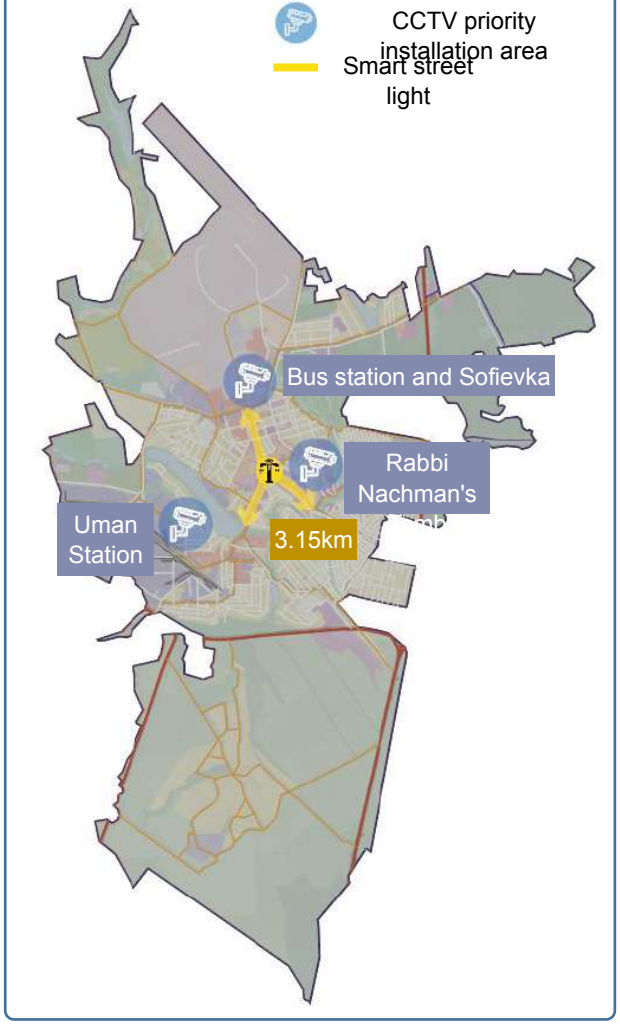
Intelligent CCTV

Category		Standard	Quantity	Unit	Amount
Center system H/W	Video Storage & Distribution Server	Xeon (Rocket Lake), 16GB	4	28,125	112,500
	Video Analysis Server	Xeon (Rocket Lake), 16GB	2	28,125	56,250
	Video Storage Storage	100TB, 1024Mbps, UHD Simultaneous storage of 128 cameras	2	112,500	225,000
	L2 switch	Control system configuration and center integrated system linkage	3	233	698
	SAN switch	For image storage storage	3	2,850	8,550
	Crime Prevention Operation Terminal	I7(13th), 16GB	3	2,850	8,550
	Subtotal				411,548
Center system S/W	Video Storage Distribution S/W	Video storage, monitoring, and retrieval	5	9,135	45,675
	Video Analysis S/W	Real-time object recognition and abnormal situation detection	20	1,044	20,880
	DBMS	Server DBMS	5	19,140	95,700
	Integrated Operation S/W	Integrated operation of security CCTV and intelligent video analysis	1	252,300	252,300
	Subtotal				414,555
On-Site Equipment	Crime PreventionCCTV(PTZ)	Fixed 200 Milion pixels	20	1,875	37,500
	Security CCTV (General)	Speed dome camera 130 Million pixels, zoom possible	30	625	18,750
	Emergency bell/microphone	Direct connection to the center in case of emergency	20	375	7,500
	speaker	Direct connection to the center in case of emergency	20	213	4,260
	Pillar	Φ190.7×6000×3mm	20	375	7,500
	Subtotal				75,510
Total					**901,613**

Smart street light

Category		Standard	Quantity	Unit	Amount
Center sys H/W	SSL Management Server	SSL Management,Engine/Adaptor S/W installation	1	8,550	8,550
	SSL NVR	64CH, HDD 6bay (48TB)	1	8,550	8,550
	WiFi controller	1AP 50User per unit	1	28,425	28,425
	WiFi Management Server	Dashboard/Integrated Authentication/Integrated Portal Installation	1	8,550	8,550
	Subtotal				54,075
Center sys S/W	SSL Management S/W	Core Code NYX Managemant Ent	1	52,809	52,809
	SSL Sensor Management Engine	Core Code Ent	1	65,946	65,946
	SSL Sensor Management Adaptor	Core Code Adaptor	2	13,224	26,448
	WiFi Dashboard	WiFi Operations Dashboard	1	32,973	32,973
	WiFi Integrated Authentication	WiFi Single sign-on	1	32,973	32,973
	WiFi Integrated Portal	WiFi Unified Portal	1	32,973	32,973
	SSL protocol	Development fee included	2	26,448	52,896
	Subtotal				297,018
On-site equipment	Smartpole	6M, 1st Class (Aluminum)	50	5,625	281,250
	SSL Luminaire (100W)	Smart Node Connectivity module provided	50	1,500	75,000
	SSL Street Light Enclosure	SSL Fixture care	5	2,000	10,000
	SSL Power Meter	Identify electricity usage by group	5	375	1,875
	SSL Control Collection Server	Outdoor Servers by Group	5	4,750	23,750
	SSL communication gateway	Main AP	5	2,875	14,375
	SSL Smart Node	NXY serise	50	625	31,250
	WiFi AP	Free Wifi provided	50	2,875	143,750
	Subtotal				581,250
Total					**932,343**

Priority service area



The pilot test smart service prioritizes the installation of intelligent CCTV and smart street lights.

Smart service pilot test installation centered on key areas of Uman

05 PPP Business

Smart Residence (Draft 1) – Key Assumptions

Facility Name	Key Assumptions		Content	Remarks
Smart Residence	Development Schedule		• Draft 1: 1 year of project preparation, 2 years of construction work	• Preparations start January 2024, completion January 2027
			• Draft 2: 1 year of project preparation, 2 years of construction work	
	Land Cost		• Land purchase fee: USD 0/m^2	• Free concession of state land
	Construction	Direct Costs	• Infrastructure cost: USD 36.51/m^2	• Based on total project land area
		Indirect Costs	• 5.00% of direct costs	• Labor costs, development fees, reserve costs, etc.
	Financing	Capital Structure	• Equity 30% : Debt 70%	• Review of similar cases
		Interest Rate	• 10.0%	• Interest rates on loans from local financial institutions
		Maturity	• 5 years	
		Repayment	• Prioritize debt repayment than paying dividends with Overall Cash Flow	• Withdrawal and redeposit when there is insufficient resources to repay principal and interest
	Revenue	Residential	• USD 55.5 per room (USD 0.74/m^2)	• Start of operation after completion, review of similar cases
		Commercial	• USD 0.74/m^2	• Start of operation after completion, review of similar cases
		Utilization Rate	• 1st year 60%, 2nd year 70%, 3rd year 75%, 4th year and onward 80%	• Review of similar cases
	OPEX	Fixed	• 10% of half of potential gross income	• Review of similar cases
		Variable	• 10% of effective gross income	• Review of similar cases
Common	Tax		• 18% of profit before tax	
	CPI		• 5.5%	

05 PPP Business

Smart Residences (Draft 1) - Architectural plan

Site Plan

⑤ Reservesd Plot

Land Use Plan

Category	Site Area (㎡)	Composition
Residential Facility Site	37,008	68%
Commercial Facility Site	8,007	15%
Management Facility Site	1,913	4%
Parks & Sports Facility Site	1,386	3%
Greenery	26,614	49%
Parking lot	9,065	17%
road	21,002	39%
Total	**104.994**	**100%**

Construction Costs

Type	Price per m²	num	Cost
3rd Floor Residences	₩1,500,000 (USD 1,111)	21	**₩51,147,990,000** (USD 37,887,400)
5th Floor Residences	₩1,500,000 (USD 1,111)	7	**₩23,926,500,000** (USD 17,723,333)

Site development cost

Category		Smart Residences
Business Area		**105,000㎡**
Civil engineering	Unit cost	1.76 USD
	Construction Cost	185,461 USD
Stormwater Construction	Unit cost	3.68 USD
	Construction Cost	386,789 USD
Sewage construction	Unit cost	1.30 USD
	Construction Cost	141,983 USD
Waterworks	Unit cost	1.30 USD
	Construction Cost	136,694 USD
Pavement	Unit cost	6.70 USD
	Construction Cost	704,278 USD
Landscaping	Unit cost	7.11 USD
	Construction Cost	746,667 USD
Electrical construction	Unit cost	5.65 USD
	Construction Cost	593,406 USD
Street lighting construction	Unit cost	1.96 USD
	Construction Cost	205,839 USD
Subtotal		3,101,117 USD
Ancillary construction	Unit cost	22.50%
	Construction Cost	697,751 USD
Composition Contrast	Unit cost	1.12%
	Construction Cost	34,733 USD
Subtotal		732,484 USD
Total		3,833,600 USD

Building composition

Category		Building Area (㎡)	Floors	Gross floor area (㎡)	Number of buildings	Total gross floor area(㎡)
Residential facilities	3rd Floor	11,366	3	34,099	21	34,099
	5th Floor	3,190	5	15,951	7	15,951
Total						50,050
commerce facilities	Flue type mall	3,659	1	3,659	4	3,659
Total						3,659
support facilities	Community & Smart Management	1,430	2	2,860	1	2,860
	Administration Building	373	1	373	1	373
Total						3,232
Total						**56,941**

05 PPP Business

Smart Residence (Draft 1) – Project Cash Flow

(Unit: USD)

Category	Total	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Cash Inflow	313,425,909	-	-	-	6,825,531	8,424,108	9,496,233	10,686,428	11,274,182	11,926,849	12,548,446	13,238,610	13,966,734	14,775,274	15,545,324	16,400,317	17,302,334
Residence	292,073,335	-	-	-	6,360,532	7,850,204	8,849,289	9,958,400	10,506,112	11,114,315	11,693,566	12,336,712	13,015,231	13,768,688	14,486,277	15,283,023	16,123,589
Rent	292,073,335	-	-	-	6,360,532	7,850,204	8,849,289	9,958,400	10,506,112	11,114,315	11,693,566	12,336,712	13,015,231	13,768,688	14,486,277	15,283,023	16,123,589
Commercial	21,352,574	-	-	-	464,999	573,904	646,944	728,028	768,069	812,533	854,880	901,899	951,503	1,006,586	1,059,047	1,117,294	1,178,745
Rent	21,352,574	-	-	-	464,999	573,904	646,944	728,028	768,069	812,533	854,880	901,899	951,503	1,006,586	1,059,047	1,117,294	1,178,745
Cash Outflow	151,120,120	-	31,109,714	31,109,714	1,780,166	2,225,993	2,532,606	2,872,989	3,057,102	3,261,550	3,456,266	3,672,460	3,900,545	4,153,820	4,395,038	4,662,864	4,945,421
Land Cost	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Construction Cost	62,219,428	-	31,109,714	31,109,714	-	-	-	-	-	-	-	-	-	-	-	-	-
Operating Cost	51,188,692	-	-	-	1,251,347	1,444,133	1,582,706	1,736,545	1,832,055	1,938,113	2,039,122	2,151,274	2,269,594	2,400,982	2,526,115	2,665,052	2,811,629
SPC Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tax	37,712,001	-	-	-	528,818	781,861	949,900	1,136,444	1,225,048	1,323,438	1,417,143	1,521,186	1,630,950	1,752,838	1,868,923	1,997,813	2,133,792
Project Net Cash Flow	162,305,789	-	(31,109,714)	(31,109,714)	5,045,366	6,198,114	6,963,628	7,813,439	8,217,079	8,665,298	9,092,180	9,566,151	10,066,189	10,621,454	11,150,286	11,737,453	12,356,913
Cumulative		-	(31,109,714)	(62,219,428)	(57,174,062)	(50,975,947)	(44,012,320)	(36,198,880)	(27,981,801)	(19,316,503)	(10,224,323)	(658,172)	9,408,017	20,029,471	31,179,758	42,917,210	55,274,123

Category	2040	2041	2042	2043	2044	2045	2046
Cash Inflow	18,303,974	19,257,931	20,317,117	21,434,558	22,675,414	23,857,199	25,169,345
Residence	17,056,990	17,945,958	18,932,985	19,974,299	21,130,620	22,231,895	23,454,649
Rent	17,056,990	17,945,958	18,932,985	19,974,299	21,130,620	22,231,895	23,454,649
Commercial	1,246,984	1,311,973	1,384,132	1,460,259	1,544,794	1,625,305	1,714,697
Rent	1,246,984	1,311,973	1,384,132	1,460,259	1,544,794	1,625,305	1,714,697
Cash Outflow	5,259,185	5,558,012	5,889,802	6,239,841	6,628,538	6,998,733	7,409,763
Land Cost	-	-	-	-	-	-	-
Construction Cost	-	-	-	-	-	-	-
Operating Cost	2,974,396	3,129,414	3,301,532	3,483,116	3,684,755	3,876,795	4,090,019
SPC Costs	-	-	-	-	-	-	-
Tax	2,284,789	2,428,598	2,588,270	2,756,725	2,943,784	3,121,938	3,319,744
Project Net Cash Flow	13,044,789	13,699,919	14,427,315	15,194,718	16,046,875	16,858,467	17,759,583
Cumulative	68,318,912	82,018,831	96,446,146	111,640,864	127,687,739	144,546,206	162,305,789

05 PPP Business

Smart Residence (Draft 1) – Shareholders' Cash Flow

(Unit: USD)

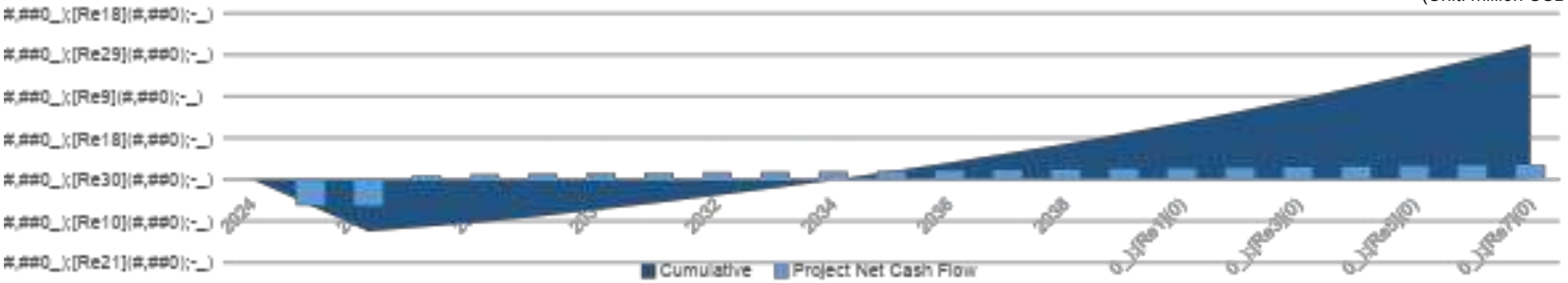
Category	Total	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Equity Inflow	139,535,661	-	-	-	-	-	-	-	-	-	-	-	-	4,397,472	10,621,454	11,150,286	11,737,453
Equity Outflow	19,772,287	-	19,772,287	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Equity Net Cash Flow	119,763,374	-	(19,772,287)	-	-	-	-	-	-	-	-	-	-	4,397,472	10,621,454	11,150,286	11,737,453
Cumulative		-	(19,772,287)	(19,772,287)	(19,772,287)	(19,772,287)	(19,772,287)	(19,772,287)	(19,772,287)	(19,772,287)	(19,772,287)	(19,772,287)	(19,772,287)	(15,374,815)	(4,753,361)	6,396,926	18,134,378

Category	2040	2041	2042	2043	2044	2045	2046
Equity Inflow	12,356,913	13,044,789	13,699,919	14,427,315	15,194,718	16,046,875	16,858,467
Equity Outflow	-	-	-	-	-	-	-
Equity Net Cash Flow	12,356,913	13,044,789	13,699,919	14,427,315	15,194,718	16,046,875	16,858,467
Cumulative	30,491,291	43,536,080	57,235,999	71,663,314	86,858,032	102,904,907	119,763,374

Smart Residences (Draft 1) – Key Financial Indicators

Criteria	Result
Before-T Project IRR	14.202%
After-T Project IRR	12.386%
Project Payback Period	11

(Unit: million USD)



05 PPP Business

Smart Residence (Draft 2) – Key Assumptions

Facility Name	Key Assumptions		Content	Remarks
Smart Residence	Development Schedule		• Draft 1: 1 year of project preparation, 2 years of construction work	• Preparations start January 2024, completion January 2027
			• Draft 2: 1 year of project preparation, 2 years of construction work	
	Land Cost		• Land purchase fee: USD 0/m^2	• Free concession of state land
	Construction	Direct Costs	• Infrastructure cost: USD 36.51/m^2	• Based on total project land area
		Indirect Costs	• 5.00% of direct costs	• Labor costs, development fees, reserve costs, etc.
	Financing	Capital Structure	• Equity 30% : Debt 70%	• Review of similar cases
		Interest Rate	• 10.0%	• Interest rates on loans from local financial institutions
		Maturity	• 5 years	
		Repayment	• Prioritize debt repayment than paying dividends with Overall Cash Flow	• Withdrawal and redeposit when there is insufficient resources to repay principal and interest
	Revenue	Residential	• USD 55.5 per room (USD 0.74/m^2)	• Start of operation after completion, review of similar cases
		Commercial	• USD 0.74/m^2	• Start of operation after completion, review of similar cases
		Utilization Rate	• 1st year 60%, 2nd year 70%, 3rd year 75%, 4th year and onward 80%	• Review of similar cases
	OPEX	Fixed	• 10% of half of potential gross income	• Review of similar cases
		Variable	• 10% of effective gross income	• Review of similar cases
Common	Tax		• 18% of profit before tax	
	CPI		• 5.5%	

05 PPP Business

Smart Residence (Draft 2) - Architectural plan

Site Plan

⑥ Solar panels plot

Land Use Plan

category	Site Area (㎡)	Composite
Residential Facility Site	**62,125**	**39%**
Commercial Facility Site	**10,961**	**7%**
Management Facility Site	**5,215**	**3%**
Parks & Sports Facility Site	**7,879**	**5%**
Greenery	**46,457**	**29%**
Parking lot	**8,137**	**5%**
road	**20,090**	**12%**
Total	**160,856**	**100%**

Construction Costs

type	Price per m²	No of buildings	price
3floorResidences	₩1,500,000 (USD 1,111)	20	**₩65,064,600,000** (USD 48,196,000)
5floor Residences	₩1,500,000 (USD 1,111)	3	**₩9,831,600,000** (USD 7,282,667)

Site development cost

category		Smart Residence 2 Draft
Business Area		**162,000㎡**
Civil engineering	Unit cost	1.76 USD
	Construction Cost	286,140 USD
Stormwater Construction	Unit cost	3.68 USD
	Construction Cost	596,820 USD
Sewage construction	Unit cost	1.30 USD
	Construction Cost	219,120 USD
Waterworks	Unit cost	1.30 USD
	Construction Cost	210,960 USD
Pavement	Unit cost	6.70 USD
	Construction Cost	1,086,660 USD
Landscaping	Unit cost	7.11 USD
	Construction Cost	1,152,060 USD
Electrical construction	Unit cost	5.65 USD
	Construction Cost	915,600 USD
Street lighting construction	Unit cost	1.96 USD
	Construction Cost	317,580 USD
Subtotal		4,784,940 USD
Ancillary construction	Unit cost	22.50%
	Construction Cost	1,076,612 USD
Composition Contrast	Unit cost	1.12%
	Construction Cost	53,591 USD
Subtotal		1,130,203 USD
Total		**5,915,143 USD**

Building composition

category		Building Area (㎡)	Floors	Gross floor area (㎡)	Number of buildings	Total gross floor area(㎡)
Residential facilities	3rd Floor	14,459	3	43,376	20	43,376
	3rd floor (1st floor of flue-type commercial building + 2nd floor of residence)	3,277	2	6,554	3	6,554
Subtotal						49,931
commerce facilities	Flue type mall (1st floor)	5,462	1	5,462	3	5,462
Subtotal						5,462
support facilities	Administration Building	952	1	952	1	952
	Community Facilities	1,600	2	3,200	1	3,200
Subtotal						4,152
Total						**59,545**

05 PPP Business

Smart Residence (Draft 2) – Project Cash Flow

(Unit: USD)

Category	Total	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Cash Inflow	636,679,020	-	-	-	13,865,071	17,112,346	19,290,213	21,707,920	22,901,856	24,227,653	25,490,338	26,892,306	28,371,383	30,013,814	31,578,059	33,314,852	35,147,169
Residence	583,452,229	-	-	-	12,705,942	15,681,743	17,677,538	19,893,123	20,987,245	22,202,205	23,359,328	24,644,092	25,999,517	27,504,639	28,938,112	30,529,708	32,208,842
Rent	583,452,229	-	-	-	12,705,942	15,681,743	17,677,538	19,893,123	20,987,245	22,202,205	23,359,328	24,644,092	25,999,517	27,504,639	28,938,112	30,529,708	32,208,842
Commercial	53,226,791	-	-	-	1,159,129	1,430,604	1,612,675	1,814,797	1,914,610	2,025,448	2,131,009	2,248,215	2,371,867	2,509,175	2,639,947	2,785,144	2,938,327
Rent	53,226,791	-	-	-	1,159,129	1,430,604	1,612,675	1,814,797	1,914,610	2,025,448	2,131,009	2,248,215	2,371,867	2,509,175	2,639,947	2,785,144	2,938,327
Cash Outflow	306,972,710	85	63,190,874	63,190,874	3,616,251	4,521,885	5,144,723	5,836,162	6,210,162	6,625,468	7,021,004	7,460,171	7,923,492	8,437,983	8,927,983	9,472,033	10,046,006
Land Cost	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Construction Cost	126,381,579	-	63,190,789	63,190,789	-	-	-	-	-	-	-	-	-	-	-	-	-
Operating Cost	103,982,361	-	-	-	2,541,930	2,933,545	3,215,036	3,527,537	3,721,552	3,936,994	4,142,180	4,370,000	4,610,350	4,877,245	5,131,435	5,413,663	5,711,415
SPC Costs	1,102	85	85	85	42	42	42	42	42	42	42	42	42	42	42	42	42
Tax	76,607,668	-	-	-	1,074,279	1,588,298	1,929,645	2,308,582	2,488,568	2,688,432	2,878,782	3,090,129	3,313,099	3,560,696	3,796,506	4,058,327	4,334,549
Project Net Cash Flow	329,706,311	(85)	(63,190,874)	(63,190,874)	10,248,820	12,590,461	14,145,490	15,871,758	16,691,693	17,602,185	18,469,334	19,432,136	20,447,892	21,575,831	22,650,076	23,842,819	25,101,162
Cumulative		(85)	(63,190,959)	(126,381,833)	(116,133,013)	(103,542,552)	(89,397,062)	(73,525,304)	(56,833,610)	(39,231,425)	(20,762,092)	(1,329,956)	19,117,935	40,693,766	63,343,842	87,186,661	112,287,823

Category	2040	2041	2042	2043	2044	2045	2046
Cash Inflow	37,181,853	39,119,678	41,271,260	43,541,179	46,061,796	48,462,421	51,127,854
Residence	34,073,425	35,849,246	37,820,955	39,901,107	42,210,999	44,410,930	46,853,531
Rent	34,073,425	35,849,246	37,820,955	39,901,107	42,210,999	44,410,930	46,853,531
Commercial	3,108,428	3,270,431	3,450,305	3,640,072	3,850,797	4,051,491	4,274,323
Rent	3,108,428	3,270,431	3,450,305	3,640,072	3,850,797	4,051,491	4,274,323
Cash Outflow	10,683,371	11,290,395	11,964,378	12,675,430	13,465,013	14,217,009	15,051,956
Land Cost	-	-	-	-	-	-	-
Construction Cost	-	-	-	-	-	-	-
Operating Cost	6,042,051	6,356,948	6,706,580	7,075,442	7,485,042	7,875,143	8,308,276
SPC Costs	42	42	42	42	42	42	42
Tax	4,641,278	4,933,405	5,257,756	5,599,946	5,979,929	6,341,823	6,743,637
Project Net Cash Flow	26,498,482	27,829,283	29,306,882	30,865,749	32,596,782	34,245,412	36,075,898
Cumulative	138,786,305	166,615,588	195,922,470	226,788,219	259,385,001	293,630,413	329,706,311

05 PPP Business

Smart Residence (Draft 2) – Shareholders' Cash Flow

(Unit: USD)

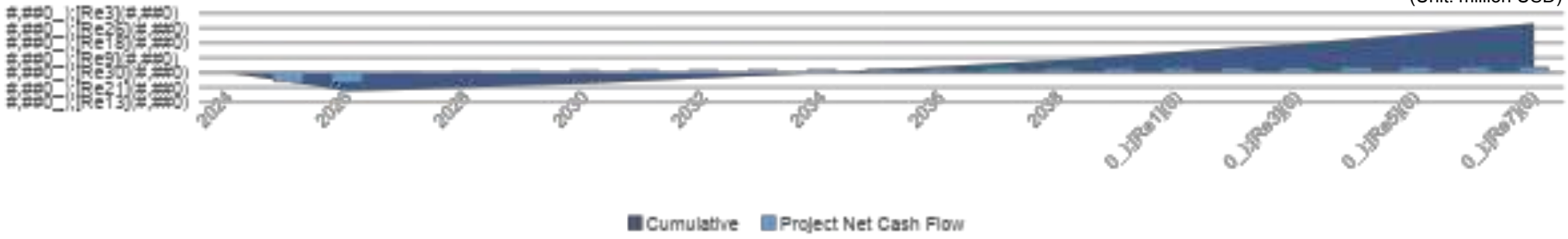
Category	Total	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Equity Inflow	283,457,681	-	-	-	-	-	-	-	-	-	-	-	-	8,944,779	21,575,873	22,650,118	23,842,861
Equity Outflow	40,161,940	-	40,161,940	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Equity Net Cash Flow	243,295,741	-	(40,161,940)	-	-	-	-	-	-	-	-	-	-	8,944,779	21,575,873	22,650,118	23,842,861
Cumulative		-	(40,161,940)	(40,161,940)	(40,161,940)	(40,161,940)	(40,161,940)	(40,161,940)	(40,161,940)	(40,161,940)	(40,161,940)	(40,161,940)	(40,161,940)	(31,217,160)	(9,641,287)	13,008,831	36,851,692

Category	2040	2041	2042	2043	2044	2045	2046
Equity Inflow	25,101,205	26,498,524	27,829,325	29,306,924	30,865,791	32,596,825	34,245,454
Equity Outflow	-	-	-	-	-	-	-
Equity Net Cash Flow	25,101,205	26,498,524	27,829,325	29,306,924	30,865,791	32,596,825	34,245,454
Cumulative	61,952,897	88,451,421	116,280,746	145,587,671	176,453,462	209,050,287	243,295,741

Smart Residence (Draft 2) – Key Financial Indicators

Criteria	Result
Before-T Project IRR	14.202%
After-T Project IRR	12.387%
Project Payback Period	11

(Unit: million USD)



05 PPP Business

Solar Farm – Key Assumptions

Facility Name	Key Assumptions		Content	Remarks
Solar Farm	Development Schedule		• Draft 1: 1 year of project preparation, 2 years of construction work	• Preparations start January 2024, completion January 2027
	Land Cost		• Land purchase fee: USD 0/m^2	• Free concession of state land
	Construction	Direct Costs	• Infrastructure cost: USD 106/m^2	• Based on gross floor area
		Indirect Costs	• 5.00% of direct costs	• Labor costs, development fees, reserve costs, etc.
	Financing	Capital Structure	• Equity 30% : Debt 70%	• Review of similar cases
		Interest Rate	• 10.0%	• Interest rates on loans from local financial institutions
		Maturity	• 22 years	
		Repayment	• Prioritize debt repayment than paying dividends with Overall Cash Flow	• Withdrawal and redeposit when there is insufficient resources to repay principal and interest
	Revenue	Operation	• Electricity Tariff: USD 0.156/kWh	• Starts operation after completion
	OPEX	Variable	• 2.7% of sales	
common	Tax		• 18% of profit before tax	

05 PPP Business

Solar Farm – Project Cash Flow

(Unit: USD)

Category	Total	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Cash Inflow	32,600,880	-	-	-	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044
Solar Farm	32,600,880	-	-	-	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044
Sell	32,600,880	-	-	-	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044
Cash Outflow	21,074,184	-	8,543,600	8,543,600	199,349	199,349	199,349	199,349	199,349	199,349	199,349	199,349	199,349	199,349	199,349	199,349	199,349
Land Cost	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Construction Cost	17,087,200	-	8,543,600	8,543,600	-	-	-	-	-	-	-	-	-	-	-	-	-
Operating Cost	884,436	-	-	-	44,222	44,222	44,222	44,222	44,222	44,222	44,222	44,222	44,222	44,222	44,222	44,222	44,222
SPC Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tax	3,102,548	-	-	-	155,127	155,127	155,127	155,127	155,127	155,127	155,127	155,127	155,127	155,127	155,127	155,127	155,127
Project Net Cash Flow	11,526,696	-	(8,543,600)	(8,543,600)	1,430,695	1,430,695	1,430,695	1,430,695	1,430,695	1,430,695	1,430,695	1,430,695	1,430,695	1,430,695	1,430,695	1,430,695	1,430,695
Cumulative		-	(8,543,600)	(17,087,200)	(15,656,505)	(14,225,810)	(12,795,116)	(11,364,421)	(9,933,726)	(8,503,031)	(7,072,336)	(5,641,642)	(4,210,947)	(2,780,252)	(1,349,557)	81,138	1,511,832

Category	2040	2041	2042	2043	2044	2045	2046
Cash Inflow	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044
Solar Farm	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044
Sell	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044	1,630,044
Cash Outflow	199,349	199,349	199,349	199,349	199,349	199,349	199,349
Land Cost	-	-	-	-	-	-	-
Construction Cost	-	-	-	-	-	-	-
Operating Cost	44,222	44,222	44,222	44,222	44,222	44,222	44,222
SPC Costs	-	-	-	-	-	-	-
Tax	155,127	155,127	155,127	155,127	155,127	155,127	155,127
Project Net Cash Flow	1,430,695	1,430,695	1,430,695	1,430,695	1,430,695	1,430,695	1,430,695
Cumulative	2,942,527	4,373,222	5,803,917	7,234,612	8,665,307	10,096,001	11,526,696

05 PPP Business

Solar Farm – Shareholders' cash flow

(Unit: USD)

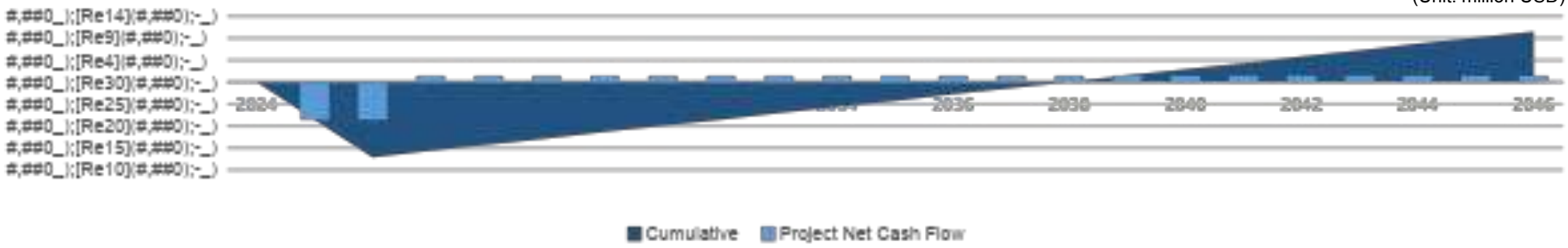
Category	Total	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Equity Inflow	3,567,282	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Equity Outflow	5,430,025	-	5,430,025	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Equity Net Cash Flow	(1,862,742)	-	(5,430,025)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cumulative		-	(5,430,025)	(5,430,025)	(5,430,025)	(5,430,025)	(5,430,025)	(5,430,025)	(5,430,025)	(5,430,025)	(5,430,025)	(5,430,025)	(5,430,025)	(5,430,025)	(5,430,025)	(5,430,025)	(5,430,025)

Category	2040	2041	2042	2043	2044	2045	2046
Equity Inflow	-	-	-	-	705,893	1,430,695	1,430,695
Equity Outflow	-	-	-	-	-	-	-
Equity Net Cash Flow	-	-	-	-	705,893	1,430,695	1,430,695
Cumulative	(5,430,025)	(5,430,025)	(5,430,025)	(5,430,025)	(4,724,132)	(3,293,437)	(1,862,742)

Solar Farm – Key Financial Indicators

Criteria	Result
Before-T Project IRR	6.382%
After-T Project IRR	5.197%
Project Payback Period	14

(Unit: million USD)



06 Key matters discussed to improve business feasibility

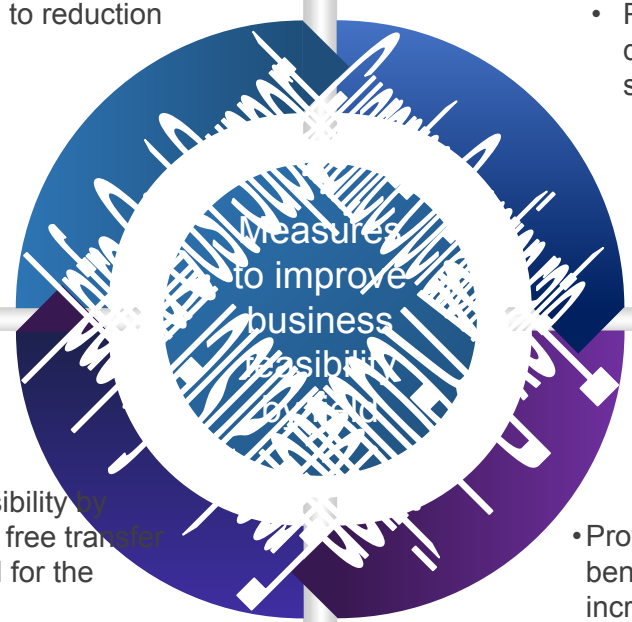
Analysis of business feasibility improvement measures by business field

Infrastructure construction cost support

- Reduction in the scale of private financing through partial financial support for site development costs
- Improvement of investment accessibility due to reduction in private financing

Minimum operation rate guaranteed for residence

- Sharing demand risk with operators by guaranteeing minimum operation rate for long-term rental demand
- Private investor risk tolerance can be adjusted depending on the degree of demand risk sharing.



Free transfer of state-owned land

- With the purpose of improving business feasibility by reducing land costs, negotiate conditions for free transfer rather than the concept of investment in kind for the project site.
- There is a need to review the possibility of increasing revenue due to an increase in the publicly announced price of land near the project site.

Corporate and local tax reduction

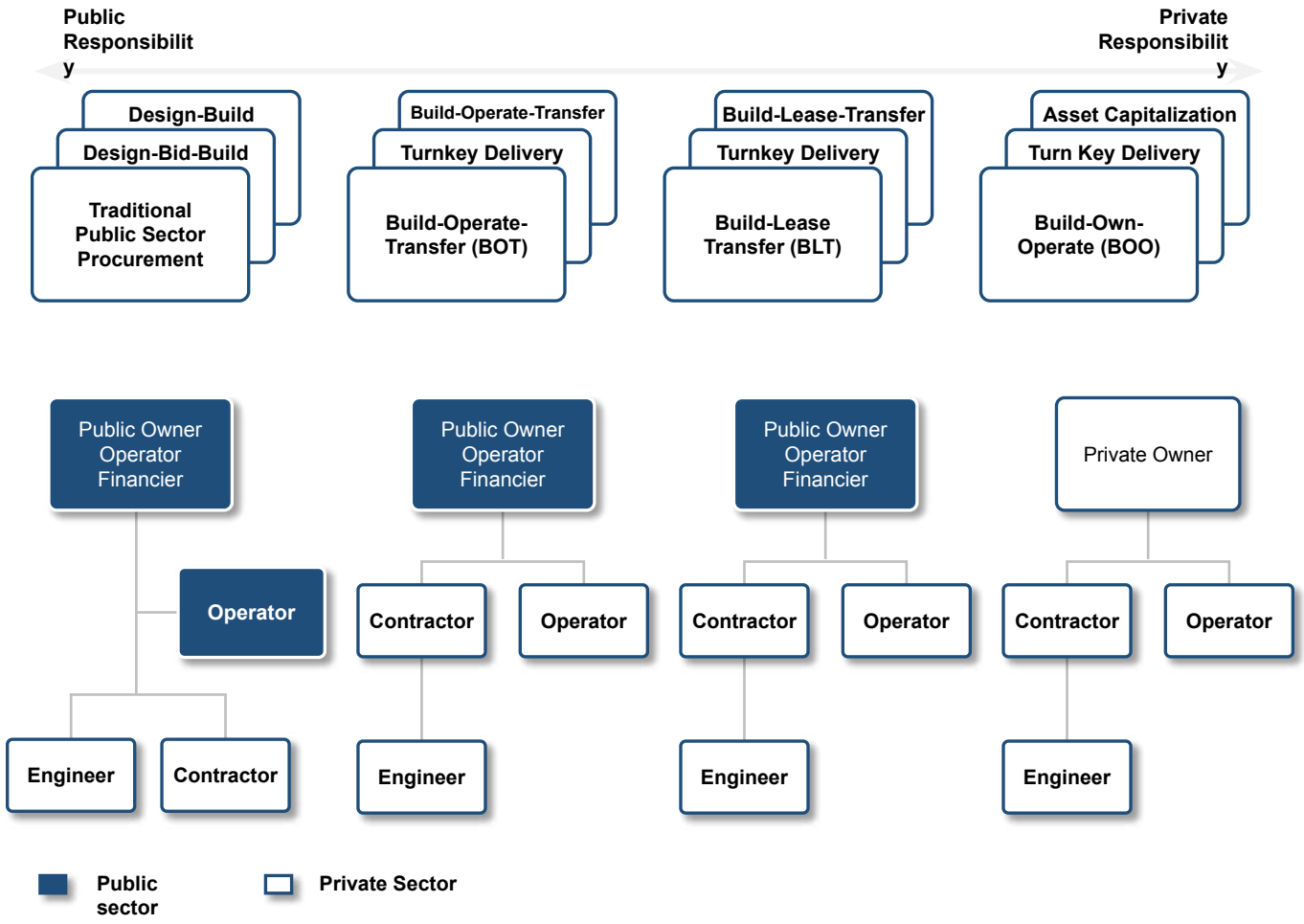
- Providing corporate tax and some local tax reduction benefits to business corporations based on increased tax revenue due to the increase in long-term rental guests
- Depending on the level of government burden, the period and rate of tax reduction must be discussed.

Efforts are needed to improve business feasibility in various business fields to increase the possibility of recruiting private investors.

IX Financing Plan

01 Smart City Services & Infrastructure

Smart City Service Infrastructure Construction Plan



A. Traditional Public Contract

In the case of public infrastructure projects, which are very large in size, such as roads and underground facilities, and whose effect is generally social, they are led by governments or public institutions.

B. BOT (Build- Operation – Transfer)

Private sector invests design, engineering, construction to the profitable public project and operate a certain period for return of investment. Project is transferred to the client when the operating period ends

C. BLT (Build- Lease – Transfer)

Private sector invests to build public facilities, and at the completion of the facility, acquires the usage and revenue authority of the facility for a certain time instead of transferring ownership to the government through donation.
The private sector rents the facility to the government and receives the rent fee to recover the investment cost of the facility

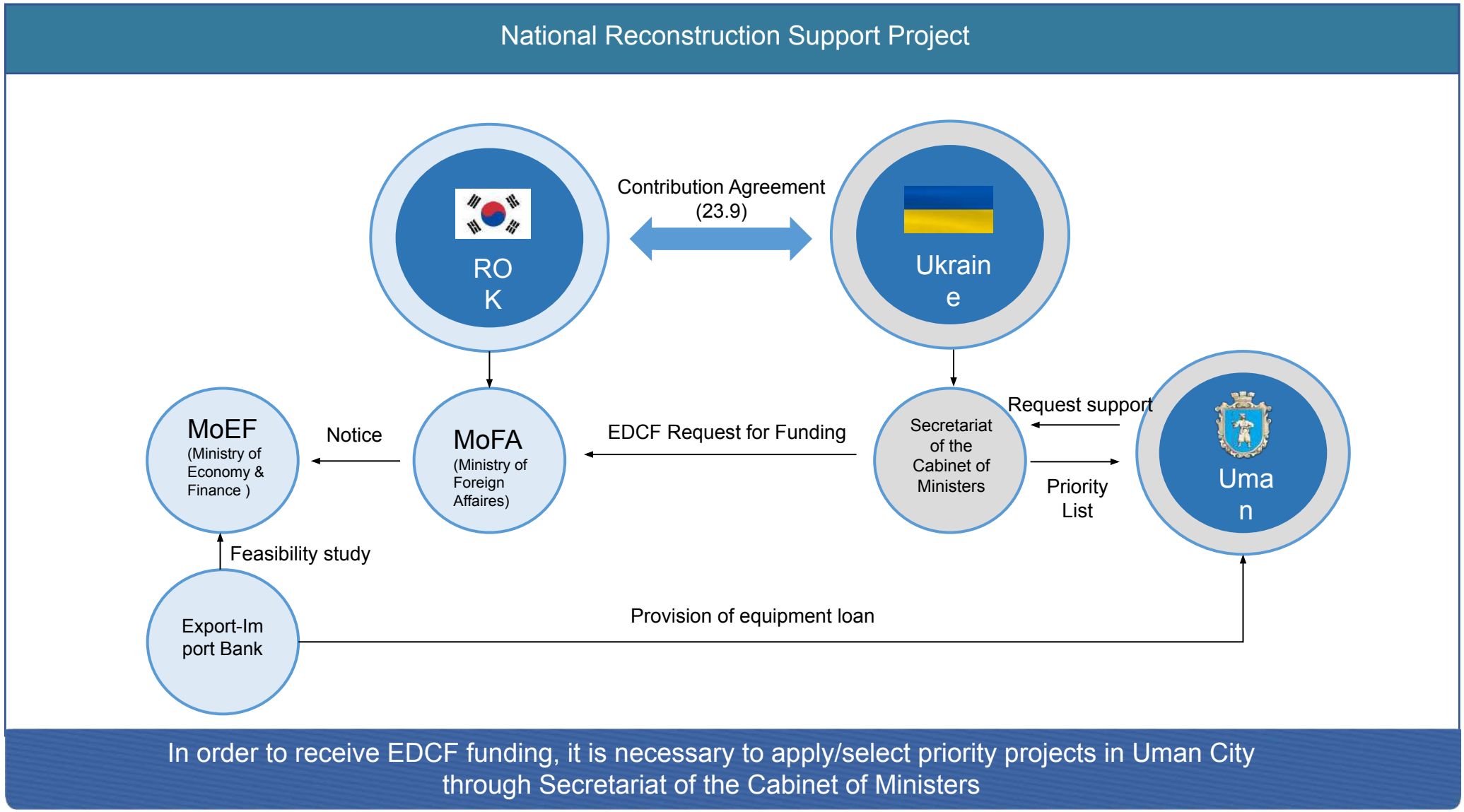
D. BOO(Build- Own- Operate)

Private partner invests to social infrastructure and has ownership including operating light

According to the ability to generate profits, it is divided into fiscal business, BOT, BLT, BOO, etc., and low-profit business can adopt the rest of the methods if it is profitable with government finance.

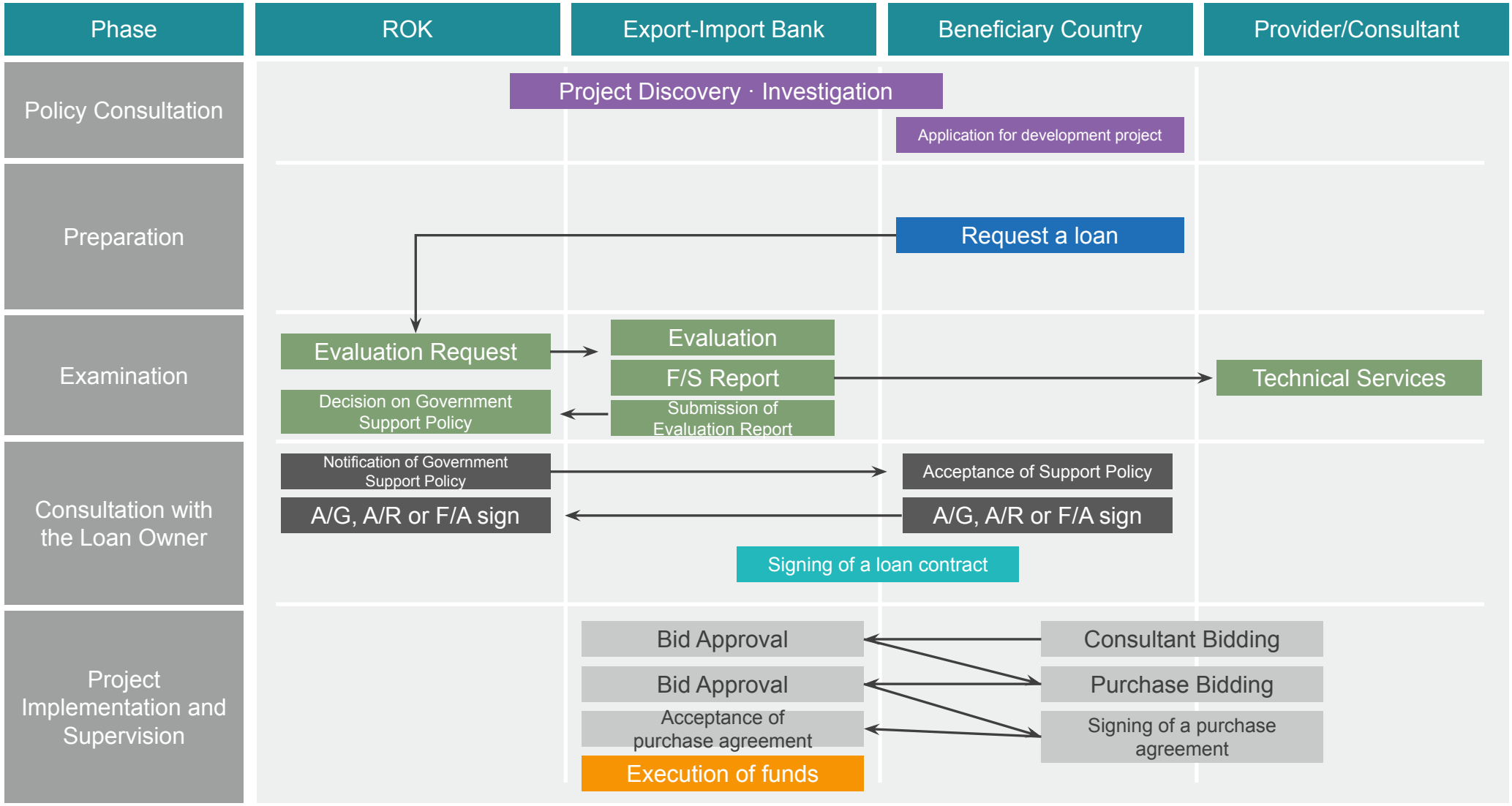
02 Paid ODA Projects

Follow-up project promotion system using EDCF Fund



02 Paid ODA Projects

EDCF Project Promotion Procedure



In order to receive EDCF funding, the bidding stage must be completed after applying for the project, screening and signing of a loan contract.

03 ODA Projects

ODA Promotion of follow-up projects

Paid · Free Aid Linkage Support Strategy

- In the case of Master Plan establishment and project feasibility review, the use of grant aid funds such as ODA of Land & Transport, or KOICA is considered
- After establishing a commercialization strategy, the funds available in the project selection and implementation stage will be reviewed for both grant and paid aid. In the case of grant aid, the use of ODA project of Land & Transport will be reviewed. In the case of paid aid, the EDCF will be reviewed based on the conclusion of the Korea-Ukraine donor agreement in 2023

Project Promotion Process for Beneficiary Country

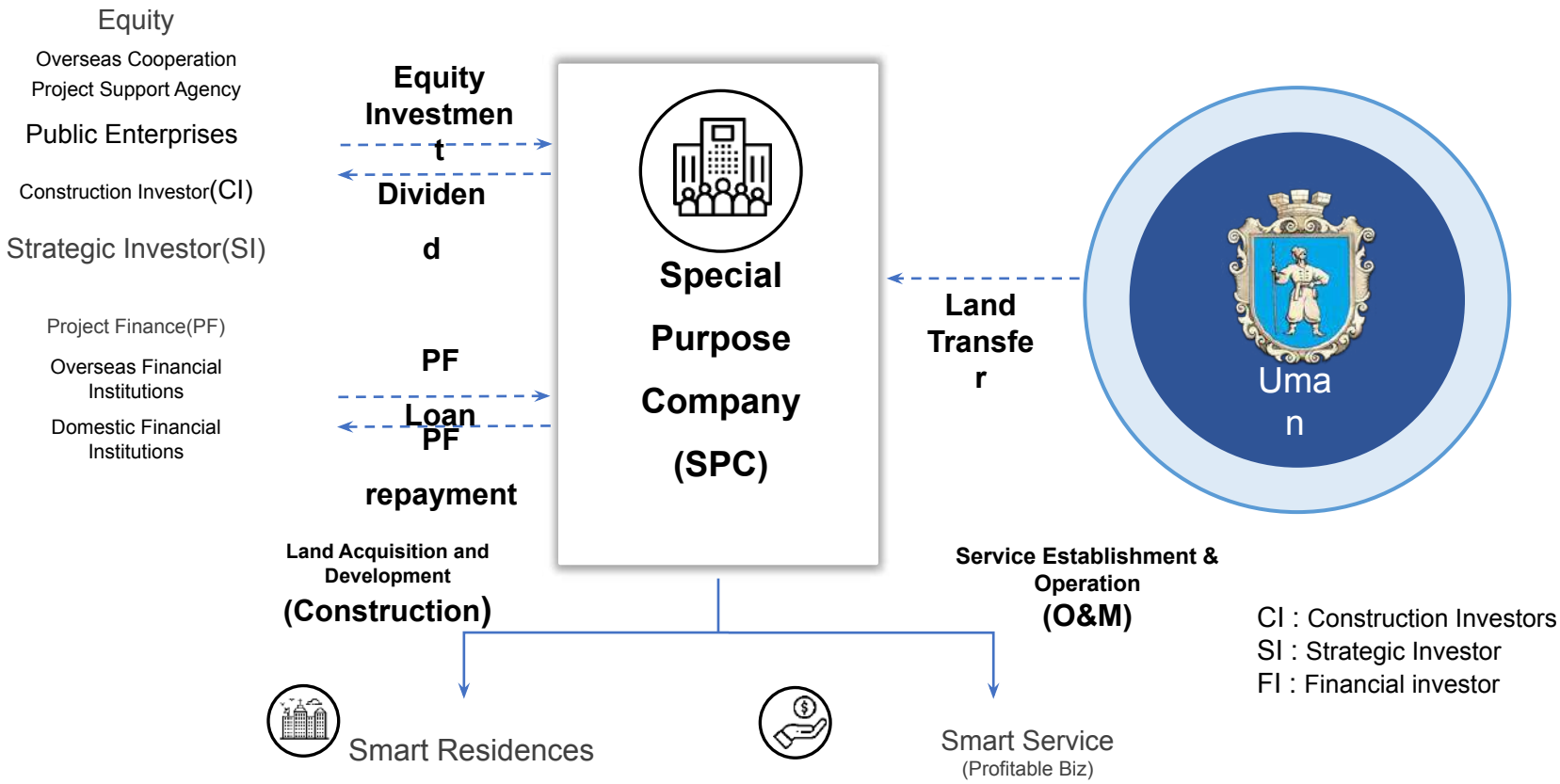
	MP Establishment and feasibility study	Project Selection and Execution (Securing the relevant budget)	
Project Promotion Resources	Free Aid (MoLIT ODA, KOICA, etc.)	Free Aid (Land Transport ODA, KOICA, etc.)	Paid Aid (K-EXIM EDCF, etc.)
Program type	Development Consulting (Establishment of infrastructure master plan and Financing Plan Consulting)	Project Type (Infrastructure construction, equipment support, invitational training, etc.)	Development Loan, etc. (Economic Development Projects Loans to the government or corporations)
Remarks	MoLIT ODA • Ukraine is the 3rd Phase Key Partner • Transportation, city, water resources, etc. KOICA • Business development consulting, expert dispatch, etc.	Plan to utilize • It is used for infrastructure development such as roads, communications, water supply and sewerage, which are essential for the development of processing and distribution centers. • If necessary, technology transfer and competency enhancement programs are also provided.	Plan to utilize • 2023 Korea-Ukraine EDCF Contribution Agreement (A/G) Signed • Funds necessary for the implementation of economic development projects, such as roads, environmental facilities, and factory facilities, can be provided

The ODA linkage method is planned to minimize the burden on the recipient country by matching ODA funds suitable for the project stage.

04 Public-private partnership (PPP)

Public Private Partnership(PPP) Draft

PPP business



Promotion of smart residence demonstration projects and the introduction of profit-generating smart services through a public-private partnership corporation (SPC)

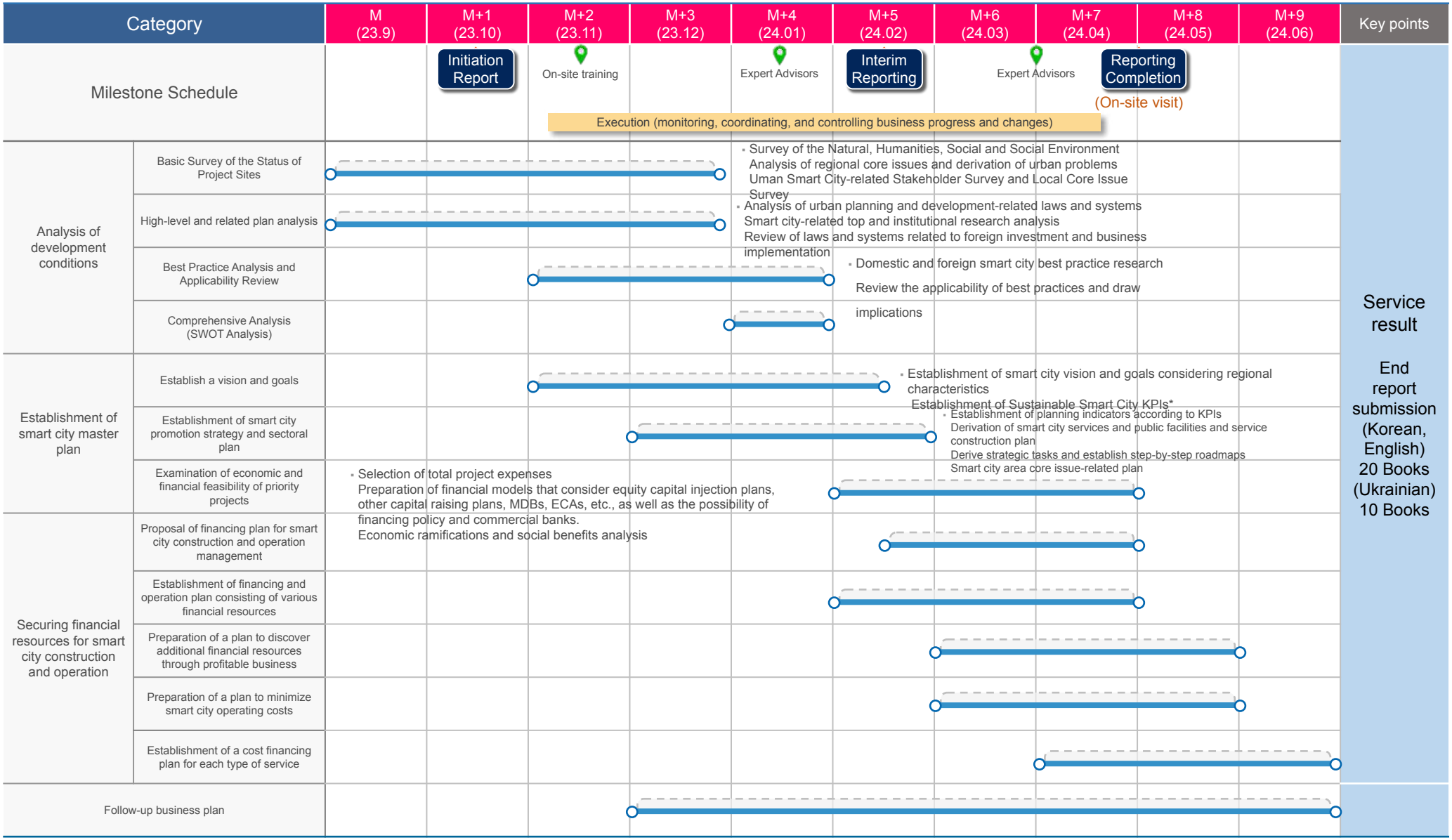
X

Future plans

01 Plans for future tasks

01 Plans for future tasks

Task scheduling



ANNEX

01 Smart City Service Construction Cost

01 Smart City Service Construction Cost

Smart Bus Shelter / Bus Information System (BIS) Yearly Budget Analysis

Calculation Criteria

- Utilizing general-purpose servers and operating terminals, and developing with future scalability in mind
  Review based on 25 bus stops in Uman, and in the case of selected bus stops, based on bus stops with 2 or more routes
  Bus provision for BIS: Based on 100 buses in Uman
  It is necessary to prepare a plan for cooperation with private bus transport operators to install OBE terminals on buses

Feasibility Analysis

(unit : USD, US$: KOR 1,350 won exchange rate)

category	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Construction Costs	1,407,903	318,063	318,063	318,063	318,063	318,063	318,063	318,063	318,063	318,063
CenterHW	134,000	-	-	-	-	-	-	-	-	-
Center SW	955,840	-	-	-	-	-	-	-	-	-
On-site equipment	318,063	318,063	318,063	318,063	318,063	318,063	318,063	318,063	318,063	318,063
Operational	140,790	140,790	140,790	140,790	140,790	140,790	140,790	140,790	140,790	140,790
Total Sum	1,548,693	458,853	458,853	458,853	458,853	458,853	458,853	458,853	458,853	458,853

Total investment (based on 10 years): **5,678,368 USD**

01 Smart City Service Construction Cost

Personal Mobility (PM) Budget Analysis by Year

Calculation Criteria

- Application of PM service system design standards in the city
  Central bus terminal and 5 public places, consisting of a rack that can accommodate 30 cars and a PM (bicycle and electric kickboard) device
  Standard: 20 bicycles, 6 electric kickboards per 1 place
- Sales : 258,181 USD (1year) = $\frac{\text{Uman PM (130 EA) x Number of uses in Seoul (43,195,618/year)}}{\text{Seoul City PM(43,500 EA)}}$ x 2 USD/day x 1year

(For the number of PM uses, please refer to the number of uses in Seoul)

Feasibility Analysis

(unit : USD, US$: KOR 1,350 won exchange rate)

category	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Construction Costs	615,148	24,063	24,063	24,063	24,063	24,063	24,063	24,063	24,063	24,063
CenterHW	272,375	-	-	-	-	-	-	-	-	-
Center SW	318,710	-	-	-	-	-	-	-	-	-
On-site equipment	24,063	24,063	24,063	24,063	24,063	24,063	24,063	24,063	24,063	24,063
Operational	61,515	61,515	61,515	61,515	61,515	61,515	61,515	61,515	61,515	61,515
Total Sum	676,662	85,577	85,577	85,577	85,577	85,577	85,577	85,577	85,577	85,577

Total investment (based on 10 years): 1,446,858 USD

01 Smart City Service Construction Cost

EV Station Budget Analysis by Year

Calculation Criteria

- Establishment of electric chargers on the site of the parking lot
  Quantity : 50 electric chargers (10 rapid, 40 slow)
  Installation size : Approximately 1,000㎡ or more
- Sales: 183,024 USD (1year) = $\frac{\text{Uman City Population}_{(82,000)}}{\text{4 persons}}$ X 5% (2023 Electric vehicle penetration rate) x 0.12 USD/Kwh(Charge amount) x 62Kwh x 24Charging / year x 1year
  (In the case of the use rate of electric vehicles, it will be adjusted according to the penetration rate in the future)

Feasibility Analysis

(unit : USD, US$: KOR 1,350 won exchange rate)

category	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Construction Costs	320,125	118,750	118,750	118,750	118,750	118,750	118,750	118,750	118,750	118,750
CenterHW	27,375									
Center SW	174,000									
On-site equipment	118,750	118,750	118,750	118,750	118,750	118,750	118,750	118,750	118,750	118,750
Operational	32,013	32,013	32,013	32,013	32,013	32,013	32,013	32,013	32,013	32,013
Total Sum	352,138	150,763	150,763	150,763	150,763	150,763	150,763	150,763	150,763	150,763

Total investment (based on 10 years): **1,709,000 USD**

01 Smart City Service Construction Cost

Smart roadside parking lot annual budget analysis

Calculation Criteria

- Based on 3 smart parking lots, the basic amount is calculated based on the standard that can accommodate up to 100 vehicles per parking lot
  It uses general-purpose servers and operating terminals and is developed in consideration of future scalability
  Calculation Formula: Hourly Rate × Hours of Use × Number of Parking Spaces × Vacancy Rate × Number of Parking Days ×
  Revenue : 164,250 USD/year (0.25 USD/hour × 12hours × 100 pages × 365 days × 50% vacancy rate × 3 locations)

Feasibility Analysis

(unit : USD, US$: KOR 1,350 won exchange rate)

category	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Construction Costs	939,988	179,550	179,550	179,550	179,550	179,550	179,550	179,550	179,550	179,550
Center HW	129,688	-	-	-	-	-	-	-	-	-
Center SW	630,750	-	-	-	-	-	-	-	-	-
On-site equipment	179,550	179,550	179,550	179,550	179,550	179,550	179,550	179,550	179,550	179,550
Operational	93,999	93,999	93,999	93,999	93,999	93,999	93,999	93,999	93,999	93,999
Total Sum	1,033,986	273,549	273,549	273,549	273,549	273,549	273,549	273,549	273,549	273,549

Total investment (based on 10 years): 3,495,925 USD

01 Smart City Service Construction Cost

Smart crosswalk annual budget analysis

Calculation Criteria

- The quantity is based on the linkage of the local window office, and the unit price is based on the quotation price.
  Quantity standard: Based on 1 set of crosswalks (2 two-way ground and floor traffic lights)
  Installation standard: 10 places (smart crosswalk near schools and major center intersections)

Feasibility Analysis

(unit : USD, US$: KOR 1,350 won exchange rate)

category	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Construction Costs	264,623	47,188	47,188	47,188	47,188	47,188	47,188	47,188	47,188	47,188
Center HW	93,750	-	-	-	-	-	-	-	-	-
Center SW	123,685	-	-	-	-	-	-	-	-	-
On-site equipment	47,188	47,188	47,188	47,188	47,188	47,188	47,188	47,188	47,188	47,188
Operational	26,462	4,719	4,719	4,719	4,719	4,719	4,719	4,719	4,719	4,719
Total Sum	291,085	51,906	51,906	51,906	51,906	51,906	51,906	51,906	51,906	51,906

Total investment cost (based on 10 years) : **758,241 USD**

01 Smart City Service Construction Cost

Smart Street Light Yearly Budget Analysis

Calculation Criteria

- Centered on the main roads of Uman City, it is presented in a way that is first installed and then spread.
  Calculation standard: Total route length of 17.47km, installed every 50m, total of 700 smart street lights on both sides
  Construction cost: 13,256 USD for 1 smart street light (including LED lights, public WiFi, and remote control)
  Calculation formula for electricity cost savings = number of street lights in Wuman × operating hours (based on 10 hours) × Street light power consumption/× × public electricity bill in Wuman 365 days × reduction rate (51.5%)
  Annual Sales : 49,343 USD (700 × 10hr × 250W/unit × 0.15USD(6UAH)/kW·h/1000 × 365 × 0.515)

Feasibility Analysis

(unit : USD, US$: KOR 1,350 won exchange rate)

category	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Construction Costs	1,955,640	813,750	813,750	813,750	813,750	813,750	813,750	813,750	813,750	813,750
Center HW	118,625	-	-	-	-	-	-	-	-	-
Center SW	1,023,265	-	-	-	-	-	-	-	-	-
On-site equipment	813,750	813,750	813,750	813,750	813,750	813,750	813,750	813,750	813,750	813,750
Operational	195,564	195,564	195,564	195,564	195,564	195,564	195,564	195,564	195,564	195,564
Total Sum	2,151,204	1,009,314	1,009,314	1,009,314	1,009,314	1,009,314	1,009,314	1,009,314	1,009,314	1,009,314

Total investment (based on 10 years): 11,235,030 USD

01 Smart City Service Construction Cost

Intelligent CCTV Yearly Budget Analysis

Calculation Criteria

- Calculation standard: Based on the visual distance of CCTV (about 400m when installing 2 fixed types and 1 rotating type), it is possible to minimize blind spots when installing about 241 places
  Unit price standard: Compliance with LH urban informatization facility design standard unit price, transportation cost and local construction cost
  Construction cost: 16,900 USD for 1 smart street light (including 2 fixed types, 1 rotating type, emergency bell, speaker)

Feasibility Analysis

(unit : USD, US$: KOR 1,350 won exchange rate)

category	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Construction Costs	3,186,411	98,509	98,509	98,509	98,509	98,509	98,509	98,509	98,509	98,509
Center HW	1,305,563	-	-	-	-	-	-	-	-	-
Center SW	1,782,340	-	-	-	-	-	-	-	-	-
On-site equipment	98,509	98,509	98,509	98,509	98,509	98,509	98,509	98,509	98,509	98,509
Operational	318,641	318,641	318,641	318,641	318,641	318,641	318,641	318,641	318,641	318,641
Total Sum	3,505,052	417,150	417,150	417,150	417,150	417,150	417,150	417,150	417,150	417,150

Total investment (based on 10 years): **7,259,401 USD**

01 Smart City Service Construction Cost

Solar Power Generation Yearly Budget and Profitability Analysis

Calculation Criteria

- Calculation standard: Calculation of solar power generation system capacity based on the number of households supplying electricity (1,866 households) and power production per module
  Solar Farm Area: 161,200㎡
  Number of modules to be installed : 144 (6m x 24m)
  Operating cost of solar power generation : 2.7%

Feasibility Analysis

(unit : USD, US$: KOR 1,350 won exchange rate)

category	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Aggregate Construction Costs	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000	15,510,000
Aggregate Operational	0	418,770	837,540	1,256,310	1,675,080	2,093,850	2,512,620	2,931,390	3,350,160	3,768,930	4,187,700	4,606,470	5,025,240	5,444,010	5,862,780	6,281,550	6,700,320	7,119,090	7,537,860	7,956,630	8,375,400
Aggregate cost sum	15,510,000	15,928,770	16,347,540	16,766,310	17,185,080	17,603,850	18,022,620	18,441,390	18,860,160	19,278,930	19,697,700	20,116,470	20,535,240	20,954,010	21,372,780	21,791,550	22,210,320	22,629,090	23,047,860	23,466,630	23,885,400
Aggregate revenue	0	1,637,844	3,275,688	4,913,532	6,551,376	8,189,220	9,827,064	11,464,908	13,102,752	14,740,596	16,378,440	18,016,284	19,654,128	21,291,972	22,929,816	24,567,660	26,205,504	27,843,348	29,481,192	31,119,036	32,756,880
Income	-15,510,000	-14,290,926	-13,071,852	-11,852,778	-10,633,704	-9,414,630	-8,195,556	-6,976,482	-5,757,408	-4,538,334	-3,319,260	-2,100,186	-881,112	337,962	1,557,036	2,776,110	3,995,184	5,214,258	6,433,332	7,652,406	8,871,480

Total construction and operating costs: 23,885,400 USD

Sum of Revenue: 32,756,880 USD

Cumulative P&L: 8,871,480 USD

01 Smart City Service Construction Cost

Smart Water Purification Plant Yearly Budget Analysis

Calculation Criteria

- Based on the cost of installing the Korea Eco Delta City Smart Water Purification Plant
  In addition to water purification plant facilities, construction work, information and communication construction, and software engineering costs are included.

Feasibility Analysis

(Unit:USD, US$: 1,350 Exchange Rate)

category	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Construction Costs	4,461,600	-	-	-	-	-	-	-	-	-
Center HW	4,301,250	-	-	-	-	-	-	-	-	-
Center SW	160,350	-	-	-	-	-	-	-	-	-
Operational	446,160	446,160	446,160	446,160	446,160	446,160	446,160	446,160	446,160	446,160
Total Sum	4,907,760	446,160	446,160	446,160	446,160	446,160	446,160	446,160	446,160	446,160

Total investment (based on 10 years): **8,923,200 USD**

01 Smart City Service Construction Cost

Smart trash bin annual budget analysis

Calculation Criteria

- 700 units will be installed throughout the city, focusing on parks and public spaces instead of residential areas.
  Nara Market Intelligent Trash Can Development Service Order Price Reference

Feasibility Analysis

(unit : USD, US$: KOR 1,350 won exchange rate)

category	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Construction Costs	337,125	61,250	61,250	61,250	61,250	61,250	61,250	61,250	61,250	61,250
Center HW	65,625	-	-	-	-	-	-	-	-	-
Center SW	210,250	-	-	-	-	-	-	-	-	-
On-site equipment	61,250	61,250	61,250	61,250	61,250	61,250	61,250	61,250	61,250	61,250
Operational	33,713	33,713	33,713	33,713	33,713	33,713	33,713	33,713	33,713	33,713
Total Sum	370,838	94,963	94,963	94,963	94,963	94,963	94,963	94,963	94,963	94,963

Total investment cost (based on 10 years) : **1,225,500 USD**

Thank
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