Smart City

built by LH

2020.
Smart City built by LH

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01 Smart City Development·Expansion
02 Creation of Smart Ecosystem
03 Creating an Environment for Private Participation
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05 Korea Smart City Overseas Export
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**Company Profile**

**Purpose of Establishment**

Contributing to national economic development by improving the quality of life and the efficient utilization of land
(Launched LH in '09 by integrating Korea Housing Corp. and Korea Land Corp.)

**Main Business**

Acquisition, Development, Stockpiling and Supply of Land
Housing Construction·Supply·Maintenance, Housing Welfare
Urban Development·Regeneration, Land Banking, Inter-Korean Economic Cooperation Projects,
Urban Regeneration, Overseas Projects

**HR·Organization**

Employees: 9,356
Organization:
HQ) 8 Divisions, 1 Research Institute, 50 Departments
Regional) 12 Regional HQs, 2 Project Division
Korea’s Biggest State Owned Company

About LH
As Korea’s largest state-owned corporation, LH has been focusing on promoting housing welfare and pioneering the future of land development. We are taking powerful steps to create future national growth engines.

- Founded: 1962
- Employees: 9,456
- Capital: US$ 41 Bil.
- Assets: US$ 151 Bil.
- Credit Rating: Moody’s Aa2, S&P AA

Vision
LH, your companion through life.

Mission
To enhance the quality of life and guide advancement of the national economy by stabilizing housing and ensuring the efficient use of national land.

Financial Status

<table>
<thead>
<tr>
<th>2019 (U$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assets</td>
</tr>
<tr>
<td>149.4 bil</td>
</tr>
</tbody>
</table>

(2nd Largest Single Company in Korea)
(Financial Liabilities US$ 57.5 billion)

Financial Liabilities Graph

<table>
<thead>
<tr>
<th>Year</th>
<th>Liabilities (U$ bil)</th>
</tr>
</thead>
<tbody>
<tr>
<td>'13</td>
<td>105.7</td>
</tr>
<tr>
<td>'14</td>
<td>98.5</td>
</tr>
<tr>
<td>'15</td>
<td>89.9</td>
</tr>
<tr>
<td>'16</td>
<td>83.1</td>
</tr>
<tr>
<td>'17</td>
<td>76.3</td>
</tr>
<tr>
<td>'18</td>
<td>69.4</td>
</tr>
</tbody>
</table>

Smart City with LH
Better life, Better tomorrow with LH

INTRO
Supplied 15% of total Housing Supply in Korea
Land development of 5.4 times the size of Washington, DC
Smart City built by LH

Improving the Quality of Life of Citizens and Leading National Innovative Growth

Development & Expansion of Smart Cities
- National Pilot City Sejong, Projects Under Development, Phase 3 New Towns, Smartization of Existing Cities, Smart Home

Establish Smart Ecosystem
- SMEs & Startup Commercialization Support (Public Contest, Incubating Center)

Creating Citizen · Private Participation Environment
- Living Lab, Building Governance

Convenient and Safe Eco-friendly Urban Space, Place for Continuous Innovation

Data Driven City Operation
- Establish Data Collection · Processing · Analysis System
- Build LH-type Urban Platform

Linkage to Overseas Export
- Creation of New National Growth · Engines through PPP

Sharing · Expanding Findings
- World Smart City Expo, Smartium, ISO International Certification

Smart City Development Strategy (PCFIR, 2018.1)

Specific Approach for Each Phase of Urban Growth
Customized Technologies Development · Expansion
Citizen · Private Participation
Overseas Export, International Cooperation
LH’s Smart City Development Theme

Development and Expansion of Smart Cities for Each Stage of Urban Growth from New Cities to Existing Cities

**Existing City**

**Phase 3 New Town**
Implementation of Cutting-edge Global Smart City model (5 Project Sites)

**National Pilot Sejong Smart City**
Convergence Test Bed of the 4th Industrial Revolution (MP Supported by LH)

**Projects Under Development**
Commercialization test bed of Smart City Innovation Technology in Korea (39 Project Sites)

**Smart Urban Regeneration**
Introducing smart solutions to revitalize old and declining cities (8 project sites)

**Smart City Challenging Project (Existing City)**
Introduce themed solutions to revitalize local economy and industry (8 districts)
Korea’s Representative Smart City ‘Sejong’

Smart City Full-Package, where people-oriented Smart Services are Serviced Throughout the City
Korea’s Representative Smart City ‘Sejong’

Smart City Full-Package, where people-oriented Smart Services are Serviced Throughout the City
City of Innovation where Future Values are Continuously Created

Convergence testbed of the 4th Industrial Revolution technology, ‘Sejong’

Private-led Smart City freely developed by a consortium with smart-related technologies selected through public tender
※ Mixed Use (Residential+Commercial+School+Parks+Roads)

Urban Infrastructure Development, City Integrated Operation Management

Creation of New Business Model through Open Data

Linkage to Overseas Export
‘Sejong’, the World’s First Internationally Certified City where LH’s Capabilities are Concentrated

‘Global Top Smart City’ from Urban Development to Management System

Strengthen Global Status by Acquiring the World’s First Smart City International Certification (ISO37106)
- Only 1 of the 5 Largest Pilot Cities in the World (Sejong, Cambridge, Dubai, Melbourne, Moscow)
‘LH’s on-going Smart City Projects’

‘Smart Brand-New City’ where Smartness is serviced in everyday life

17 Primary Projects
Currently in the process of occupancy (until ’20) thus, visible outcomes of smart city services can be realized

Focus on Citizen-centered services, including 7 leading services

- Smart Streetlight
- Crosswalk
- Parking
- Shared-Bicycle
- 5 Safety Network
- Actuated Signal Control
- Public WIFI

22 Public Land Development Projects
Introduce smart solution that reflects citizen’s needs from planning through analysis of urban living trend

- Fine Dust Reducing Forest
  Seonun 2, Gwangju

- Autonomous Shuttle
  Geumto, Seongnam

- Smart Farm
  Bubuk, Miryang

- Smart School Streets
  Daeim, Gyeongsan

39 testbeds for commercialization of smart innovation technologies in Korea
The 1st, 2nd Phase New Towns (1989~Present)

  Constructed five new cities in close proximity to Seoul to resolve housing shortages and stabilize housing prices in Seoul in the late 1980s (Bundang, Ilsan, Pyeongchon, Jungdong and Sanbon)

- The 2nd Phase New Towns (2001~Present)
  Constructed 2nd phase new towns to stabilize housing prices in the Seoul metropolitan area, prevent uncoordinated development, and provide high-quality residential environment in accordance with income growth (Aim to secure self-sufficiency and eco-friendly development, launch of U-City the Foundation of Smart City)

<table>
<thead>
<tr>
<th>Category</th>
<th>Business District</th>
<th>Area (km²)</th>
<th>Households (Thousand)</th>
<th>Population (Thousand)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st-Phase</td>
<td>5</td>
<td>50.1</td>
<td>292</td>
<td>1,168</td>
</tr>
<tr>
<td>2nd-Phase</td>
<td>10</td>
<td>124.1</td>
<td>608</td>
<td>1,560</td>
</tr>
</tbody>
</table>
Cutting-edge Global Smart City ‘Phase 3 New Town’

Achieving sustainable future city by introducing proven national innovative technologies and attracting innovative growth sector

Energy Self-Sufficiency
- Smart Grid
- ESS
- Zero Energy Town

Eco-Friendly Infrastructure
- Hydrogen Charging Station
- Smart Clean Bus Shelter
- LID

Job Creation
- Enterprise Support Hub, Entrepreneurship Housing

Reduced Commute Time
- Super-BRT

Incheon Gyeyang
- 3.35mil.㎡
- 17,000 units

Goyang Changleung
- 8.13mil.㎡
- 38,000 units

Bucheon Daejang
- 3.43mil.㎡
- 20,000 Units

Namyangju Wangsuk
- 11.34mil.㎡
- 66,000 units

Hanam Gyosan
- 6.49mil.㎡
- 32,000 units
Current Status of Existing Cities

Poor Future Sustainability due to Demographic cliff, Urban Degradation

Population Decrease and Aging

Urban deterioration and Doughnut Effect

Loss of Growth Engine

City require active and dramatic change

Declining Workforce (15-64)

Decrease of 300K ~ 400K on Average

Low Interest Rate

Low Consumption

Low Growth
‘Smart Urban Regeneration’
to Revitalize Old and Declining Cities with Smart Solutions

**Busan Gamcheon-dong**
Linking Small Town Renewal-type Urban Regeneration project with smart city project

- Selected as success case of Smart Urban Regeneration project

**Namyangju Geumgok-dong**
Slow & Smart City,
Geumgok-dong Historical & Cultural Village

- Resolve Security & Parking in deteriorated residential area, improving the utilization of tourism resources

**Pohang Juangang-dong**
A new start, a future city we build together
Revival of Old City Center of Jungang-dong

- Creation of youth startup space and cultural art hub

First model in Korea(‘17)

Internalization through the Urban Renewal New Deal Projects(‘18~)
‘Smart Change of Existing City : Gamcheon-Dong’

Smart Facilities
Smart Change of Existing Cities

‘Smart City Challenge Project (Themed-type Specialized Complex)’, providing smart services optimized for local demands to existing cities

2018
- Daejeon (Re-New Science Village)
- Bucheon (Micro Dust Clean)
- Gimhae (History Culture)
- Chungcheongbukdo (Energy)

2019
- Seongdong District, Seoul (Wangsimni, Transportation Center)
- Busan Suyeong District (Gwanganri, Beach You Want to Return to)
- Tongyoung (Revitalizing Traditional Markets)
- Gongju-Buyeo (Cultural Heritage)

MOLIT
PM, Budget Support

LH
Public Tender, MP, Infrastructure(support)

Selected Local Govt
MP, Infrastructure(Developer)
Providing Foundation for SMEs to Grow

Regularization of various programs to support innovative Technology development, demonstration and initial release

<table>
<thead>
<tr>
<th>Smart Up! Start Up!</th>
<th>Customized Smart Technology Contest</th>
<th>New town-type Demo Complex Specialized Contest</th>
<th>Happy City Experience Zone</th>
<th>LH Technology Innovation Partner Mall</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 4th Industrial Revolution Development (R&amp;D), Providing demonstration opportunity at the National Pilot City</td>
<td>• Matching and demonstrating technologies that have high ripple effects such as Smart Crosswalk to project sites</td>
<td>• Service contest that fits the theme of the complex such as Pangyo (Entertainment) and Godeok (Safety)</td>
<td>• Private Smart City Technology Test Zone to enhance citizen experience</td>
<td>• Eliminate barriers to market entry for companies with smart technologies</td>
</tr>
<tr>
<td>• Provide purchase benefits to superior technology for 3 years</td>
<td>• Support Amount: KRW 10 bil/yr</td>
<td>• Support Amount: KRW 500 mil</td>
<td>• Expand to other project sites based on citizen evaluation</td>
<td>• Provide opportunity to the creative and innovative technologies, without track records</td>
</tr>
<tr>
<td>• Support Amount: KRW 2.5 bil/yr</td>
<td></td>
<td></td>
<td>• Supported 18 technologies, 4 billion won up to date</td>
<td>• Applied 11 new technologies</td>
</tr>
</tbody>
</table>

Provide support for SMEs and startups to overcome Death Valley and Darwin’s Sea
‘Incubating Center’, an Innovative Space where Smart Technologies and Jobs are Created

- 170 offices for Entrepreneurship - Startups
- Co-working Space, Maker Space, Shared Spaces such as Conference Hall, Meeting Rooms
- 280 Units (Public Rental)

Leading Innovation Growth and Expanding the base for New Industries by laying the foundation for Smart City

Youth Job Creation Establish Innovative Startup Ecosystem

Dongtan2
- Commercial, Rest Area, Leisure (Culture/Sports) and administrative support facilities
Inclusive City created by Citizens and the Private Sector

‘Living Lab’ where citizens find urban problems and solve them with private smart technologies

Form Citizen Focus Group
- Group: 46 ppi (Sejong 1-4 Residents)
- Eligibility: Any adult men or women
- Roles: Identifying Urban Problems, Selection of Services and Evaluation

Select Urban Problem
- Identify Urban Problems through Citizen Work Shop
  - Prevention of crosswalk and intersection accidents
  - Fine dust level measurement
  - Prevention of illegal littering

Propose Private Service
- Discover Private Solution and Propose
  - Night light lighting, Push alarm for Nearing Car Info
  - Fine Dust Signal and App
  - Logo light/ Voice Guidance

Select and Test the Service
- Confirm installation locations and demo
- Citizen Work shop
- Service improvement during demo period
- Citizen User-Test

Project Evaluation & Distribution
- Evaluation of Service effect by citizens
- Improvement effect, satisfaction survey
- Review Service Distribution

Practical Governance where Civil Innovation and Social Innovation are Realized
- Continuous Expansion to Other Project Sites -
Big data pilot analysis to solve urban problems (’18)

LH·Sejong-si·Hwaseong-si Collaboration

1. Deriving Urban Problem
   Traffic, Safety, Environment, Energy, etc.

2. Verifying and servicing
   Data Collection & Analysis

3. Selection and Execution of Analysis Task
   Improvement performance management

Derivation of Analysis Services

<table>
<thead>
<tr>
<th>Sejong</th>
<th>Hwaseong</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis of Carbon Emission</td>
<td>Optimization of Crosswalk Pedestrian Signals</td>
</tr>
<tr>
<td>Analysis of Urban Polarization</td>
<td>Analysis of Traffic Flow through CCTV</td>
</tr>
<tr>
<td>Common Service</td>
<td>Create and analyze Greenview Indexes</td>
</tr>
</tbody>
</table>

Analysis Result

Optimization of Pedestrian Crossing Time to protect and ensure safety of pedestrians
- Establishment of data for pedestrian crossing signal light time adjustment influencing factors
- Application of distance-based spatial analysis algorithm according to the weight of each influencing factor
- Calculation of adjustment time by applying entry time of 7 seconds, crossing time of 0.8m/1 sec
- Propose rational signal cycle

Expected Benefits: Securing safety of the underprivileged and resolving traffic inconvenience of citizens

Green view based on urban street tree canopy cover Index Creation and Analysis
- Observation point selection using traffic spatial information (standard node link)
- 360-degree image extraction of distance based on public data (GVI) rather than using satellite imagery
- Estimation of GVI (Green View Index) using computer vision algorithm
- Compare GVI with other cities

Expected Benefits: Support for establishing climate measures through the design and implementation of urban greening

Establishment and Analysis of Urban Polarization Index Model through convergence of financial big data and spatial big data
- Convergence analysis of financial big data and spatial big data based on economically active population for urban polarization analysis
- Analysis of urban polarization patterns and influencing factors
- Apply acton-based model methodology
- Analysis of income gap and calculation of spatial separation index

Expected Benefits: Measurement of urban polarization degree according to spatial separation index
Citizen-led urban problem solving with Cloud Sourcing Based

1. Request Urban Problem Resolution
2. Recruit Participants
3. Provide Data
4. Solution, Competition, Cooperation
5. Compensation
6. Problem Solving

LH Solution Competitive Platform
- Data Filtering and Processing, De-identification
- Problem Solving Consulting

Participants
- Individual, Universities, Research Institutes, Startups
Build LH-type Urban Platform

LH-type Urban Platform

LH Urban Integrated Management Technology

- Transportation
  - Smart Traffic System
  - Bus Info System
  - Traffic Card
  - Illegal Parking Mgmt
  - Public Transportation Info
  - Incident Management Speed, signal violation

- Environment
  - Auto Clean Net
  - Food Waste Recycling
  - Fine Dust Alarm
  - Water Pollution Mgmt
  - Water Quality Mgmt
  - Soil Pollution Mgmt
  - Tree Mgmt

- Energy
  - Urban Energy Mgmt
  - Building Energy Mgmt
  - Smart Street Light
  - Energy Telemetry
  - Solar Energy
  - Geothermal/Sewage Heat Cooling /Heating

- Infrastructure
  - Water Supply Facility Management
  - Sewage Facility Mgmt
  - Public Facility Mgmt
  - Infrastructure Maintenance
  - Bridge/Tunnel
  - Slope Slope Mgmt
  - GIS-based City Info

- Safety
  - 5 Safety Network
  - School zone safety
  - Safe Commute
  - Elderly Living Care
  - Tracking criminal Location
  - River Flood Management
  - Smart Crosswalk

- Living
  - Public WIFI
  - Shared Bicycle
  - Smart Parking
  - Local Community
  - Information
  - Land Info Inquiry
  - Remote Medical Service
  - U-Library

Digital Twin, Big Data Platform + AI
Future capability for Sustainable Cities

Master Planner Combining Urban Infrastructure and Smart City Technologies

Develop into a new Korean-wave product
Urban Development of 30,170km² required worldwide by 2030

2030 ••• Global Population Growth of 1.1 billion
>>> Emerging countries future demand for urban development increases

The urban and rural population of the world, 1950-2050

<table>
<thead>
<tr>
<th>World Average</th>
<th>Comparative Indicator</th>
<th>Major Emerging Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.4%</td>
<td>Economic Growth</td>
<td>India</td>
</tr>
<tr>
<td>54.0% (‘15)</td>
<td>Urbanization Rate (Current)</td>
<td>Vietnam</td>
</tr>
<tr>
<td>66.4% (‘50)</td>
<td>Urbanization Rate (Future)</td>
<td>Myanmar</td>
</tr>
<tr>
<td>2025</td>
<td>Estimation of Urban Development Demand</td>
<td></td>
</tr>
</tbody>
</table>
Smart City Overseas Export Strategy

Set up a Smart City Fund, Encouraging Private Participation using ODA Funds

**Set Up Global Smart City Fund**
- Set up funds of 1.5 trillion won to support the export of smart city export
  - Close cooperation with KIND and LH Public Institutions under the MOLIT
  - Emerging countries with risks are also included

**Infrastructure ODA Project**
- Establishment of Smart City MP through ODA Projects
  - Smart city strategy establishment and feasibility study
  - (LH) Private participation in establishing a master plan for building smart cities such as Bolivia
  - Pilot projects such as Smart Infrastructure
    - Possible to propose follow-up pilot project of master plan

**Strengthen Overseas Cooperation**
- Smart City Project as World Bank cooperation project
  - Sharing technologies, development experience, policies, with emerging countries
    - Smart City Solution, Provide Consulting Services by private experts, Case study tour
- Strategic promotion to target countries Through Global Smart City Event and Tour Programs
# LH Smart City Overseas Projects

## Establishment of customized Smart City project model by Country

<table>
<thead>
<tr>
<th>Country</th>
<th>City</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kuwait</td>
<td>South Saad Al-Abdullah New City</td>
<td>Desert new town, Middle Eastern Culture, High temperature, lack of water resources, Maximum power consumption and waste disposal, High economic level (led by High income nationals)</td>
</tr>
<tr>
<td>India</td>
<td>Kalyan Dombivli</td>
<td>Poor infrastructure such as electricity and transportation, MODI'S 100 Smart Cities, Korea-India Startup Exchange, Maintain solid economic growth</td>
</tr>
<tr>
<td>Myanmar</td>
<td>Nyaung Hnitpin</td>
<td>Frequent Power Outage due to lack of power shortage, Poor public transportation, Rohingya crisis, K-wave, Increasing gap between rich and poor due to rapid growth</td>
</tr>
<tr>
<td>Malaysia</td>
<td>Kota Kinabalu</td>
<td>Transit hub of ASEAN countries, Popular tourism destination with 4 million visitors per year, MOU signing of Korea-Malaysia Smart City Cooperation '19.3, Under Concept Development (LH)</td>
</tr>
<tr>
<td>Vietnam</td>
<td>Hanoi, Hung Yen</td>
<td>Post China, Selected Smart City as the main sector of 4th Industrial Revolution, Income level are on the rise but the infrastructure is poor.</td>
</tr>
<tr>
<td>Bolivia</td>
<td>Santa Cruz</td>
<td>‘Korea Street' in Bolivia for sharing the new town development knowledge, Increasing interest in Smart City, Middle class growth, Willingness to expand infrastructure</td>
</tr>
</tbody>
</table>
Promoting the excellence of Smart Cities in Korea and building a global network

**2019 WSCE World Smart-City EXPO**

Korea’s First Smart City International Event
- Global Conference, Exhibition, Biz Matching, etc.
- Positioned as the Asia-Pacific Representative Event
  - (3rd) 25,000 Participants from 50 Countries
- Strengthening G2G Cooperation, Focusing on Korean companies overseas expansion

**The Smartium**

Korea’s First Smart City Experience Center
- Experience 150 Smart City Technologies
- 1,500 visitors / month since the opening in ‘17.4
- Must-visit place for emerging countries Biz matching of domestic and overseas companies

**Global Certification ISO, BSI**

ISO, BSI Global Certified city ‘Sejong’ Global Promotion
- (BSI) British Standard Institution
- Expanding global influence through joint research and participation in smart city international certification
- Continue to expand international certification of LH businesses
Together Everyone Achieves More

Government / Private / Public will form a TEAM to build Smart City