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TESC
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Smart Cities &
The Built Environment

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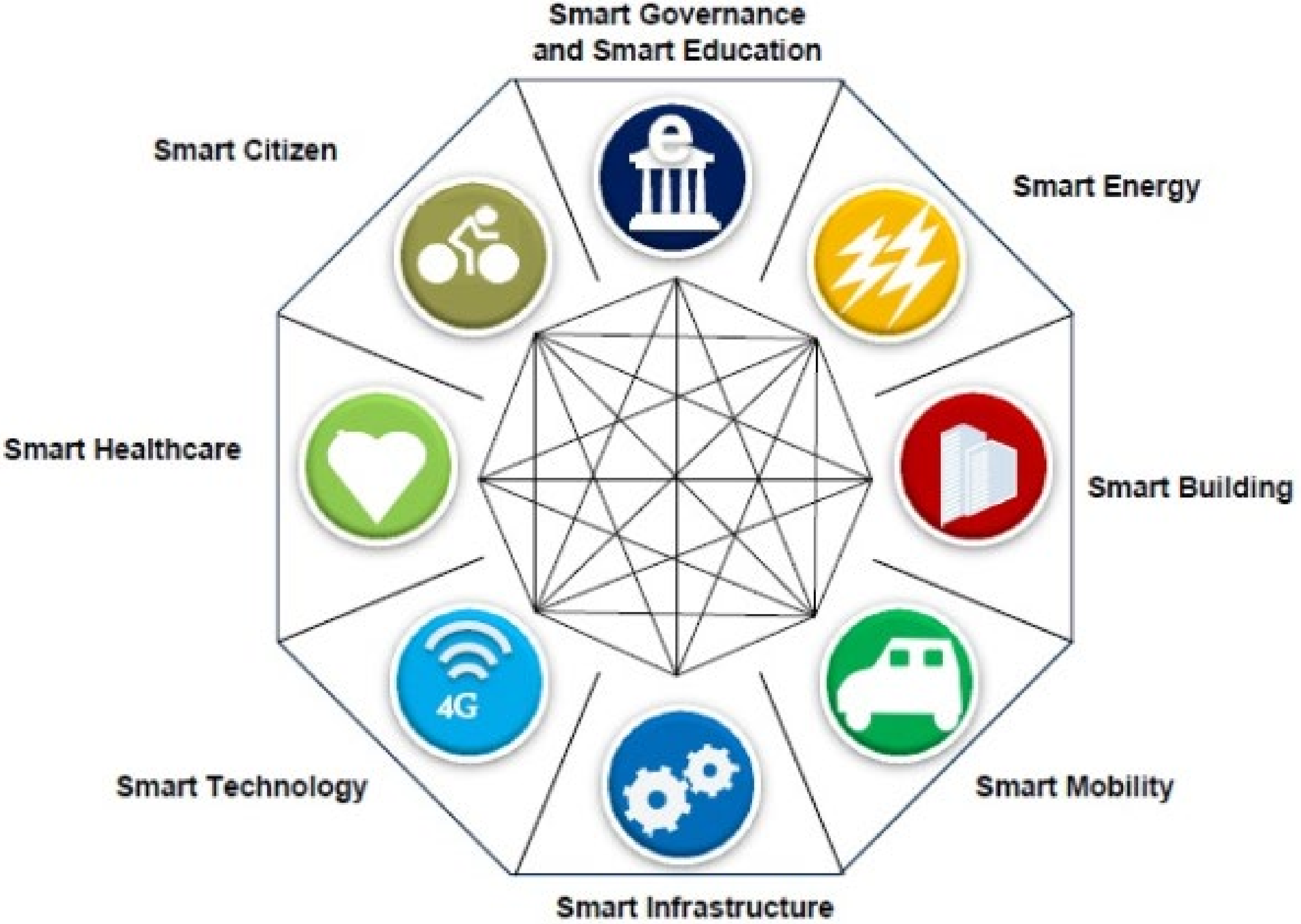
What is a Smart City?

"Smart Cities are places where information technology is combined with infrastructure, architecture, everyday objects, and even our bodies to address social, economic, and environmental problems."

Anthony Townsend, *Smart Cities*


Smart Governance
and Smart Education
Smart Citizen
Smart Energy
Smart Healthcare
Smart Building
4G
Smart Technology
Smart Mobility
Smart Infrastructure

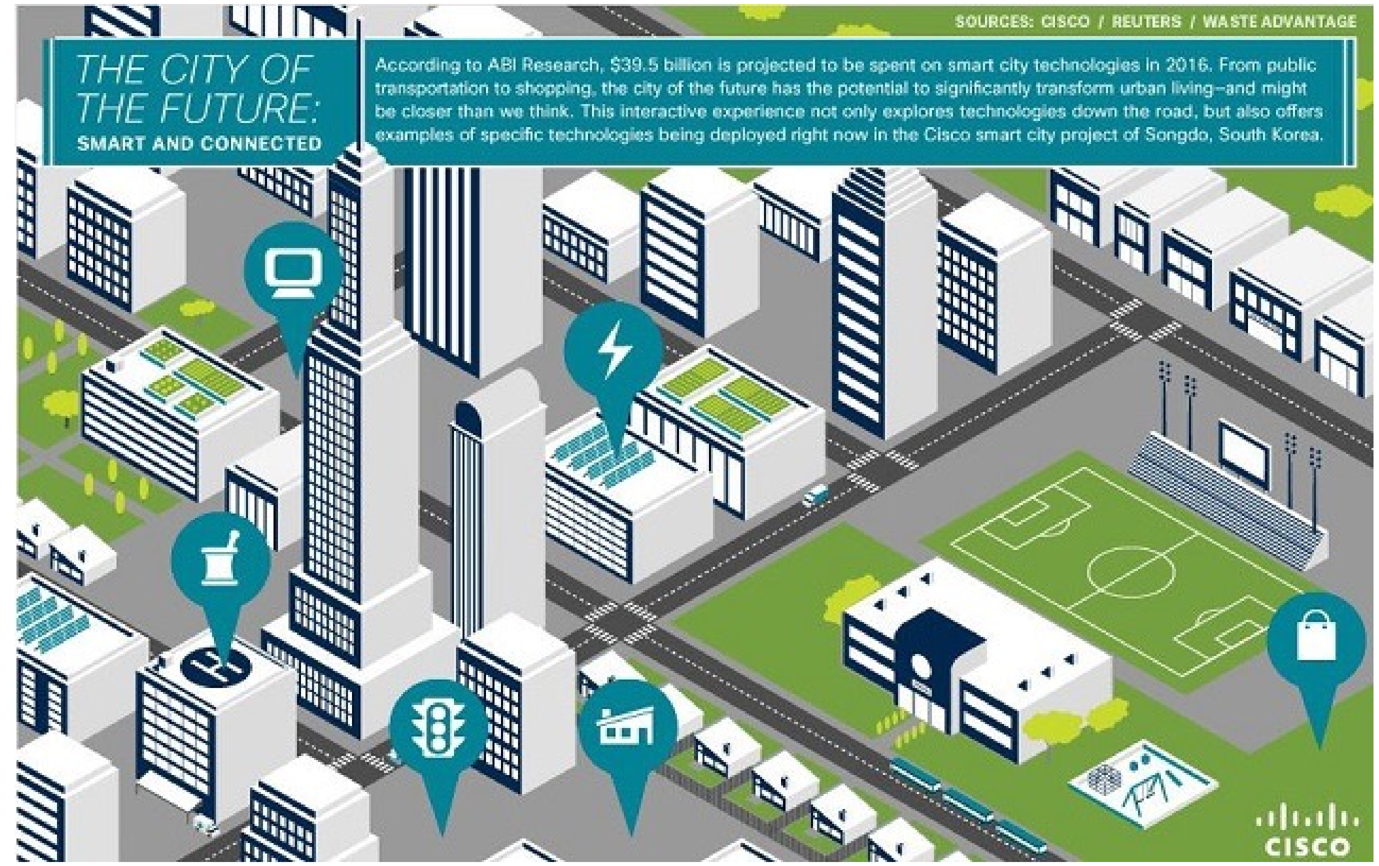
Infrastructure Spending Globally (2015-2025)

- $250 trillion for roads, bridges, sewers, utilities
- $100 billion for digital smart infrastructure

Companies

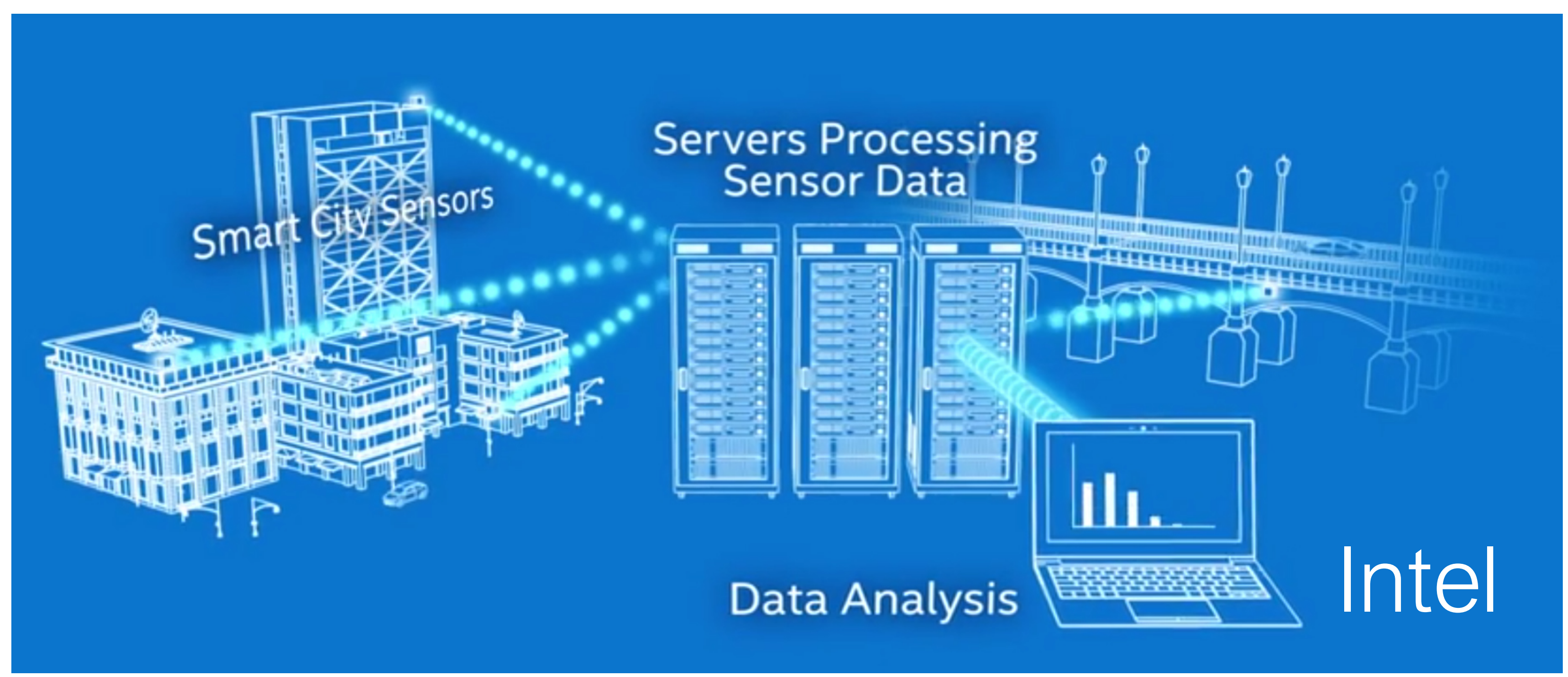
- IBM
- Cisco
- Microsoft
- Intel
- Google
- GE
- Toyota
- Ericsson

IBM

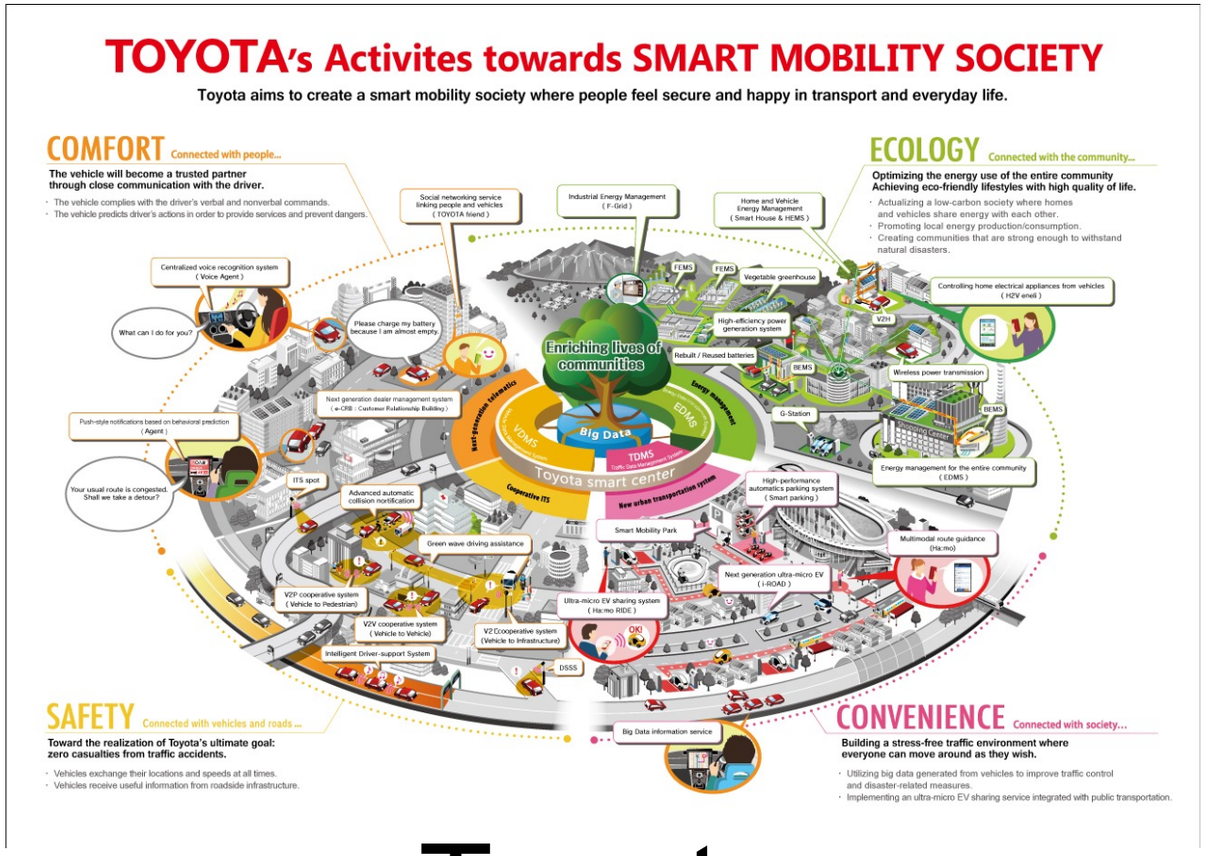


Cisco

Microsoft



Intel



Toyota

Ericsson

GE

Caution #1

“The notion of the Smart City in its full contemporary form appears to have originated with companies rather than with any party, group, or individual recognized for their contributions to the theory and practice of urban planning.”

Adam Greenfield
Against the Smart City

3 Thresholds in 2008

- Urbanization
- Untethered from the grid
- The Internet of Things

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- Urbanization
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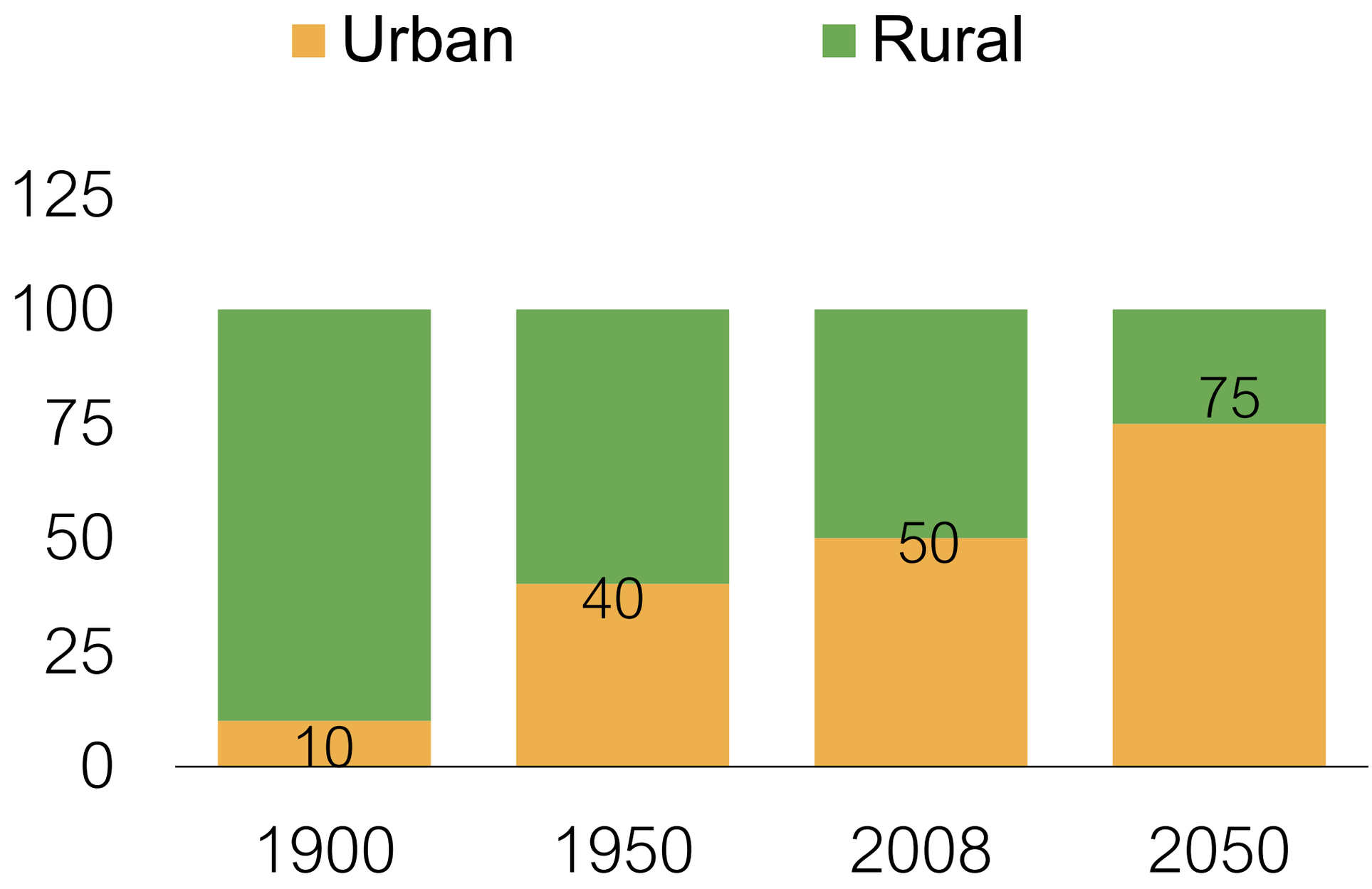
% Global Population




Shenzhen,China

3 Thresholds in 2008

- Urbanization
- Untethered from the grid
- The Internet of Things

In 2008 for the first time wireless connections to the internet surpassed connections by cable, DSL, or fiber.

Mobile Devices

- 1973 1G phone
- 1991 2G phone
- 1993 text messaging
- 1996 Nokia 9000
- 1997 Palm Pilot
- 1998 Blackberry
- 2001 3G phone
- 2007 Apple iPhone
- 2010 4G phone
- 2010 Apple iPad
- 2015 Apple Watch
- 2018 5G phone

Mobile phones in use

- 4.7 billion mobile phones worldwide (2019)
- of which 2.7 billion are smart phones


iPhone

3 Thresholds in 2008

- Urbanization
- Untethered from the grid
- The Internet of Things

The Internet of Things (IoT) is the network of physical objects or "things" embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data.

Internet Milestones

- 1969 ARPANET (DoD)
- 1990 World Wide Web
- 1994 Internet Explorer
- 1994 Amazon
- 1998 Google
- 2004 Facebook
- 2005 YouTube
- 2006 Twitter
- 2007 Netflix Streaming
- 2010 Instagram
- 2011 Snapchat
- and many more

Devices connected to the Internet by 2020

- 26 billion (Gardner, Inc.)
- 30 billion (ABI Research)
- 50 billion (Cisco)

Measuring and recording:

- temperature
- pollution
- traffic
- energy use
- sound
- street lights
- bridge structures
- water use
- water quality
- radiation

Issues with IoT

- cost
- “basket of remotes”
- privacy

CCTV Video Cameras

- 350 million worldwide
- 200 million in China
- 50 million in the US

London has
500,000
cameras

1 for every
14 residents

Capturing and recording:

- traffic congestion
- pedestrians
- crowds
- accidents
- natural disasters
- crime
- terrorism

Capturing and recording:

- traffic congestion
- pedestrians
- crowds
- accidents
- natural disasters
- crime
- terrorism
- and you


16:37:38
11832
11866
11811
11816
11875
11869
11840
11862
11876
11796
11858
11863
11808
11845
11872
11865
11829
11786
11765
11750

Caution #2

Big Brother is watching you.

George Orwell

quotefancy

Big data

Issues with Big Data

- access
- security
- privacy
- ownership
- reliability
- accuracy
- out dated info
- storage
- protocols
- compatibility

Caution #3

“The people it really speaks to are the city managers who can say, ‘It wasn’t me who made the decision, it was the data’.”

Usman Hague
Umbrellium

Five Smart City Deployments

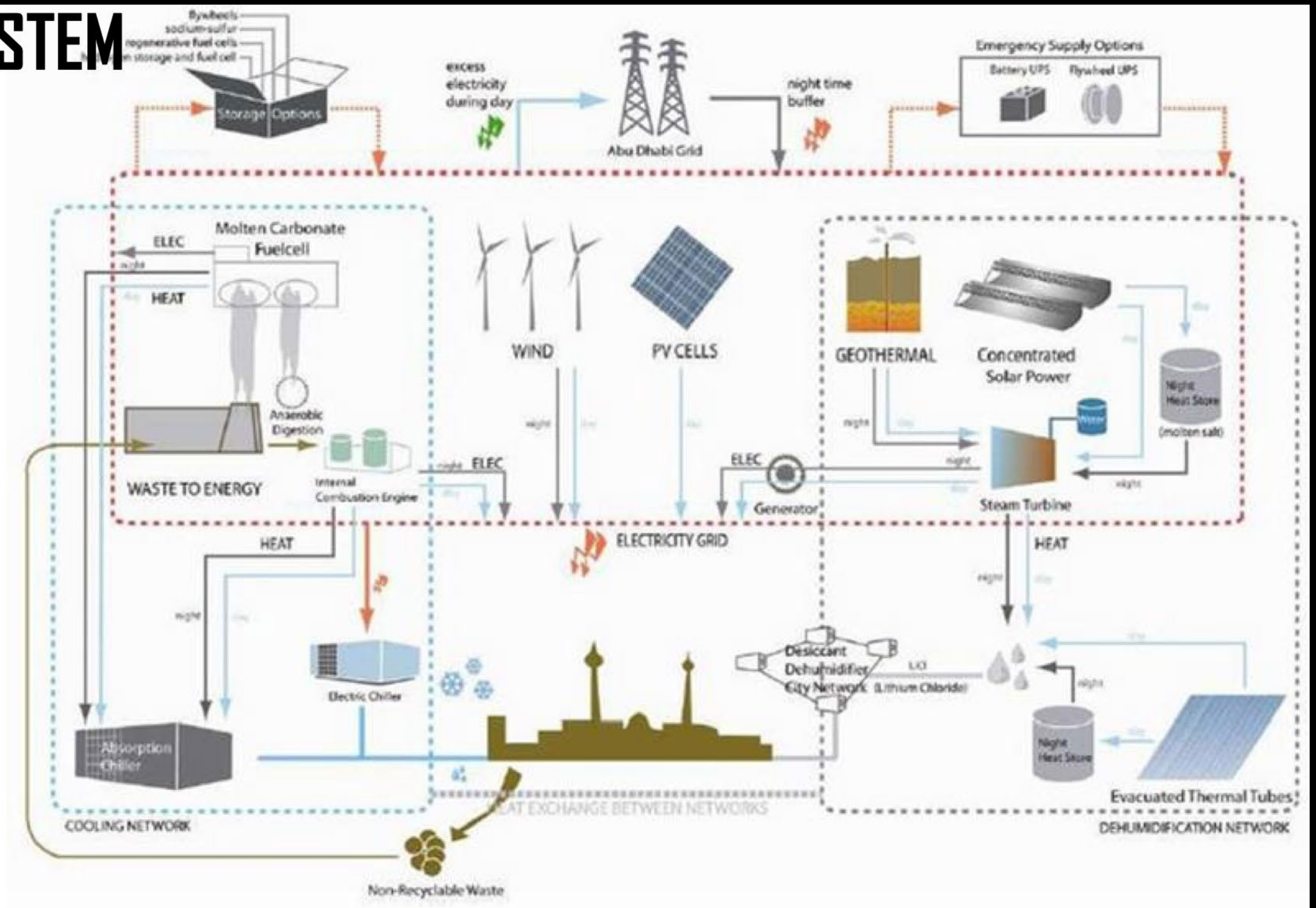
- Masdar City, Abu Dhabi
- Hangzhou, China
- Hammarby, Sweden
- Songo, South Korea
- Toronto, Canada


CYPRUS
SYRIA
LEBANON
ISRAEL
JORDAN
IRAQ
IRAN
AFGHANISTAN
KUWAIT
BAHRAIN
QATAR
UNITED
ARAB EMIRATES
Abu Dhabi
EGYPT
SAUDI ARABIA
OMAN
YEMEN
SUDAN
ERITREA
DJIBOUTI
Masdar City


Abu Dhabi
Masdar
CITY

ENERGY SYSTEM

- Zero Waste
- Emission Free

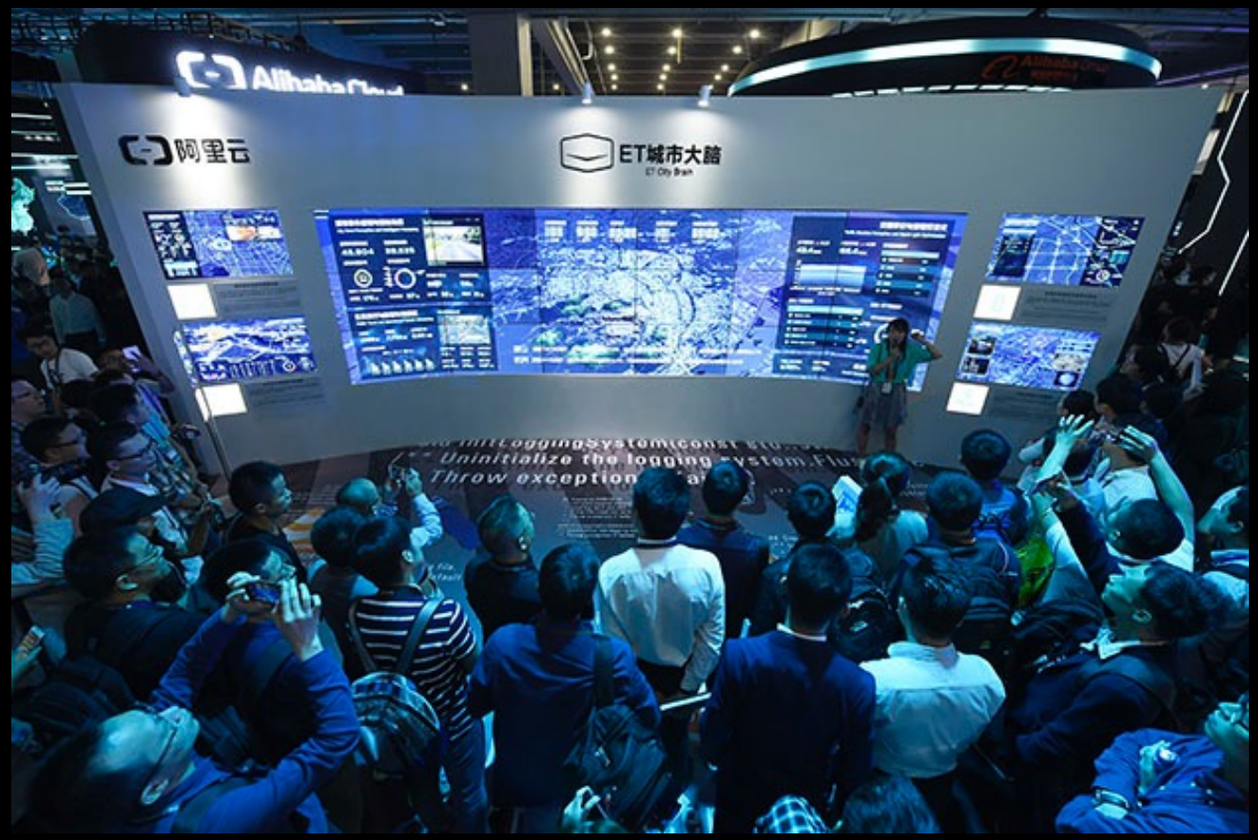


Hangzhou, China

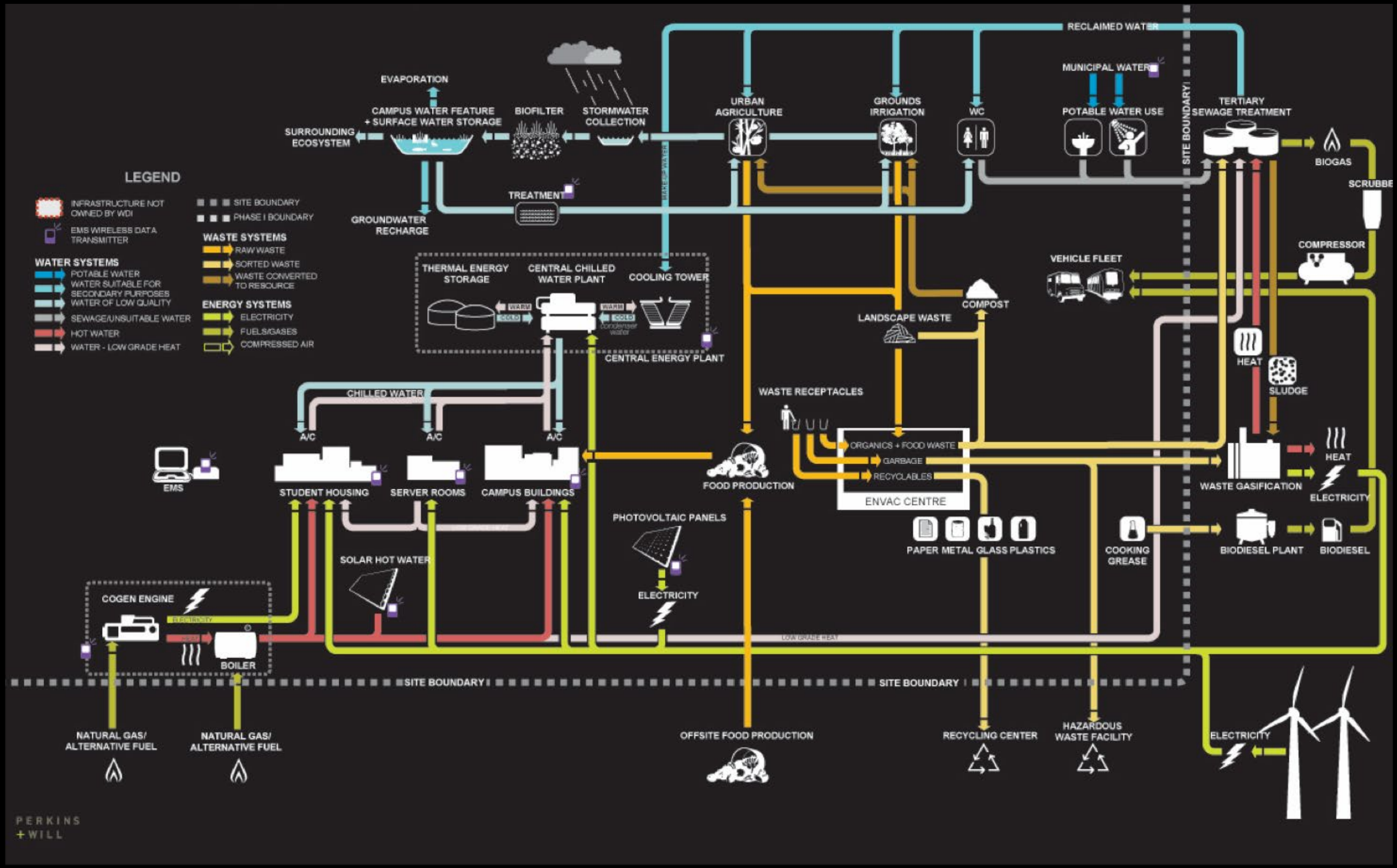

Jian Wang
(Alibaba)
BEING ONLINE

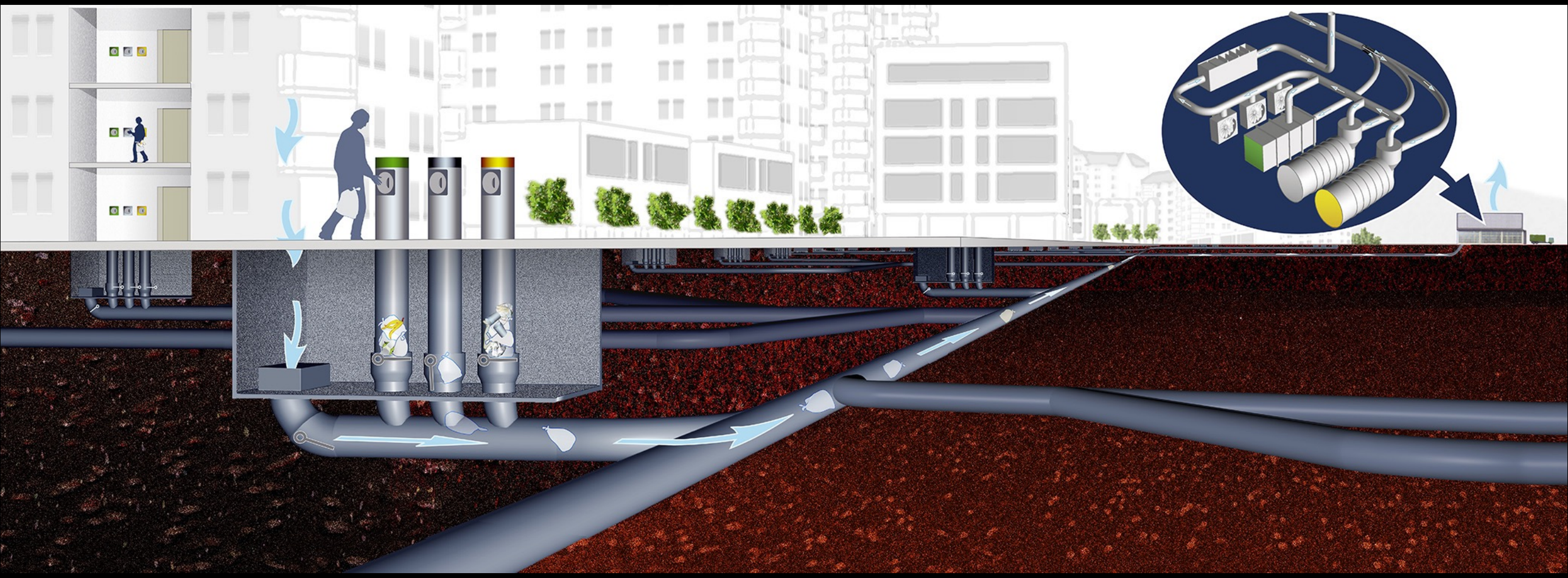

Hangzhou

CITY BRAIN


阿里云
ET城市大脑
ET City Brain

Hammarby
Stockholm, Sweden


LEGEND
INFRASTRUCTURE NOT OWNED BY WDI
EMS WIRELESS DATA TRANSMITTER
SITE BOUNDARY
PHASE I BOUNDARY
WATER SYSTEMS
POTABLE WATER
WATER SUITABLE FOR SECONDARY PURPOSES
WATER OF LOW QUALITY
SEWAGE/UNSUITABLE WATER
HOT WATER
WATER - LOW GRADE HEAT
WASTE SYSTEMS
RAW WASTE
SORTED WASTE
WASTE CONVERTED TO RESOURCE
ENERGY SYSTEMS
ELECTRICITY
FUELS/GASES
COMPRESSED AIR
RECLAIMED WATER
MUNICIPAL WATER
EVAPORATION
CAMPUS WATER FEATURE + SURFACE WATER STORAGE
BIOFILTER
STORMWATER COLLECTION
SURROUNDING ECOSYSTEM
URBAN AGRICULTURE
GROUNDS IRRIGATION
WC
POTABLE WATER USE
TERTIARY SEWAGE TREATMENT
SITE BOUNDARY
BIOGAS
SCRUBBER
TREATMENT
GROUNDWATER RECHARGE
RAINWATER
THERMAL ENERGY STORAGE
CENTRAL CHILLED WATER PLANT
COOLING TOWER
WARM
COLD
condenser water
CENTRAL ENERGY PLANT
VEHICLE FLEET
COMPRESSOR
COMPOST
LANDSCAPE WASTE
HEAT
SLUDGE
CHILLED WATER
A/C
A/C
A/C
WASTE RECEPTACLES
ORGANICS + FOOD WASTE
GARBAGE
RECYCLABLES
ENVAC CENTRE
EMS
STUDENT HOUSING
SERVER ROOMS
CAMPUS BUILDINGS
FOOD PRODUCTION
WASTE GASIFICATION
HEAT
ELECTRICITY
PHOTOVOLTAIC PANELS
ELECTRICITY
PAPER METAL GLASS PLASTICS
COOKING GREASE
BIODIESEL PLANT
BIODIESEL
SOLAR HOT WATER
COGEN ENGINE
ELECTRICITY
HEAT
BOILER
LOW GRADE HEAT
SITE BOUNDARY
SITE BOUNDARY
NATURAL GAS/ ALTERNATIVE FUEL
NATURAL GAS/ ALTERNATIVE FUEL
OFFSITE FOOD PRODUCTION
RECYCLING CENTER
HAZARDOUS WASTE FACILITY
ELECTRICITY
PERKINS + WILL

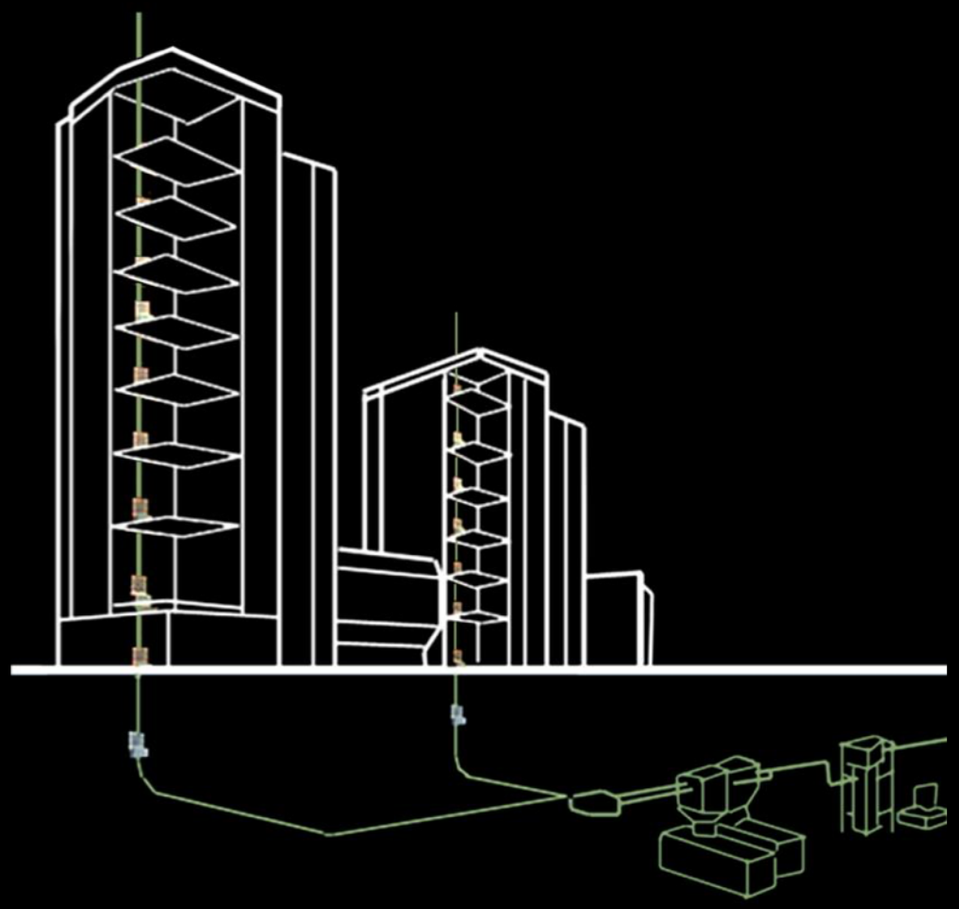


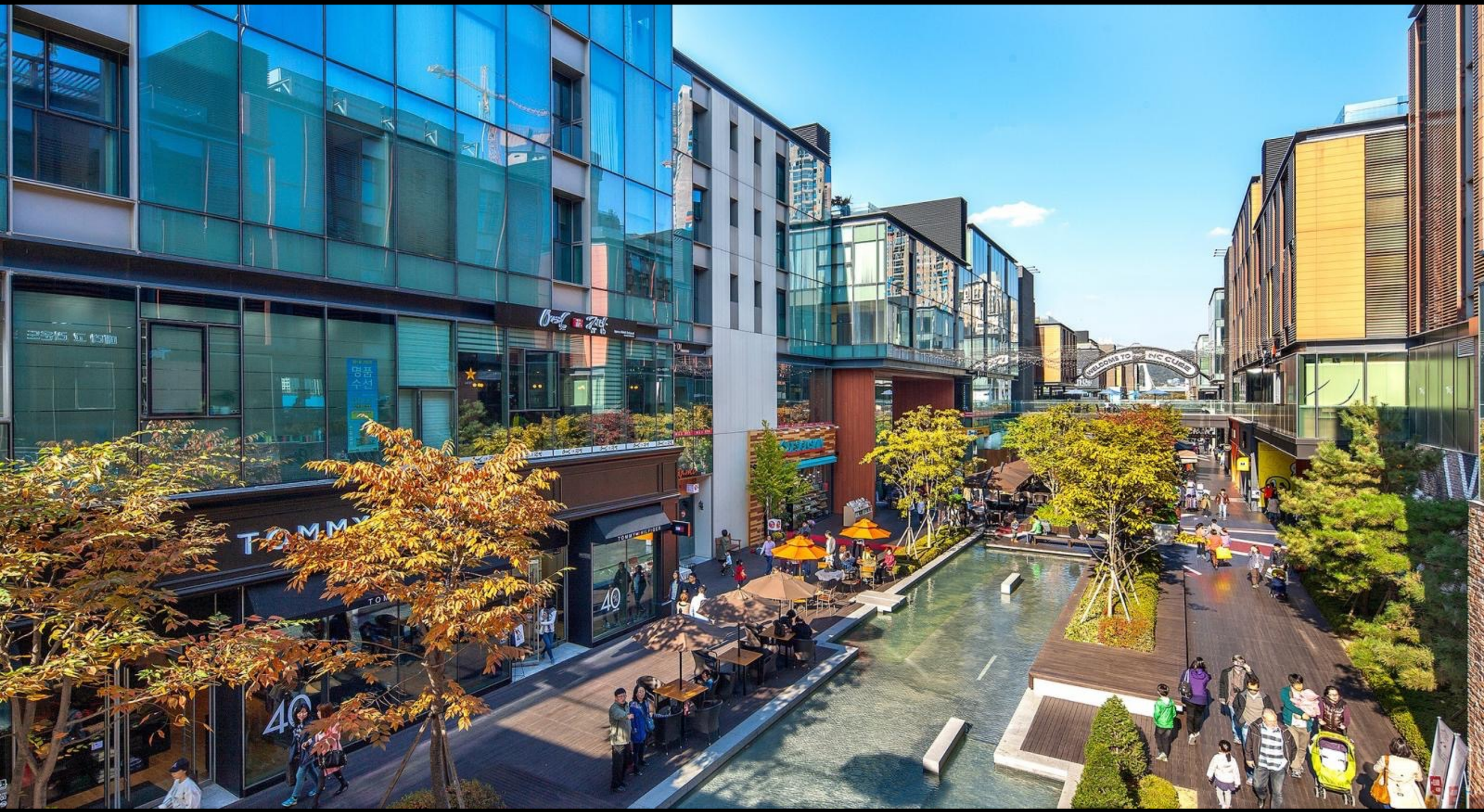

TIDNINGAR


Pyongyang
NORTH KOREA
Incheon
Seoul
Gangneung
Songdo International Business District
SOUTH KOREA
Jeonju
Daegu
Gwangju
Busan
© MailOnline

Songdo International Business District (Songdo IBD)

Automated Waste Management

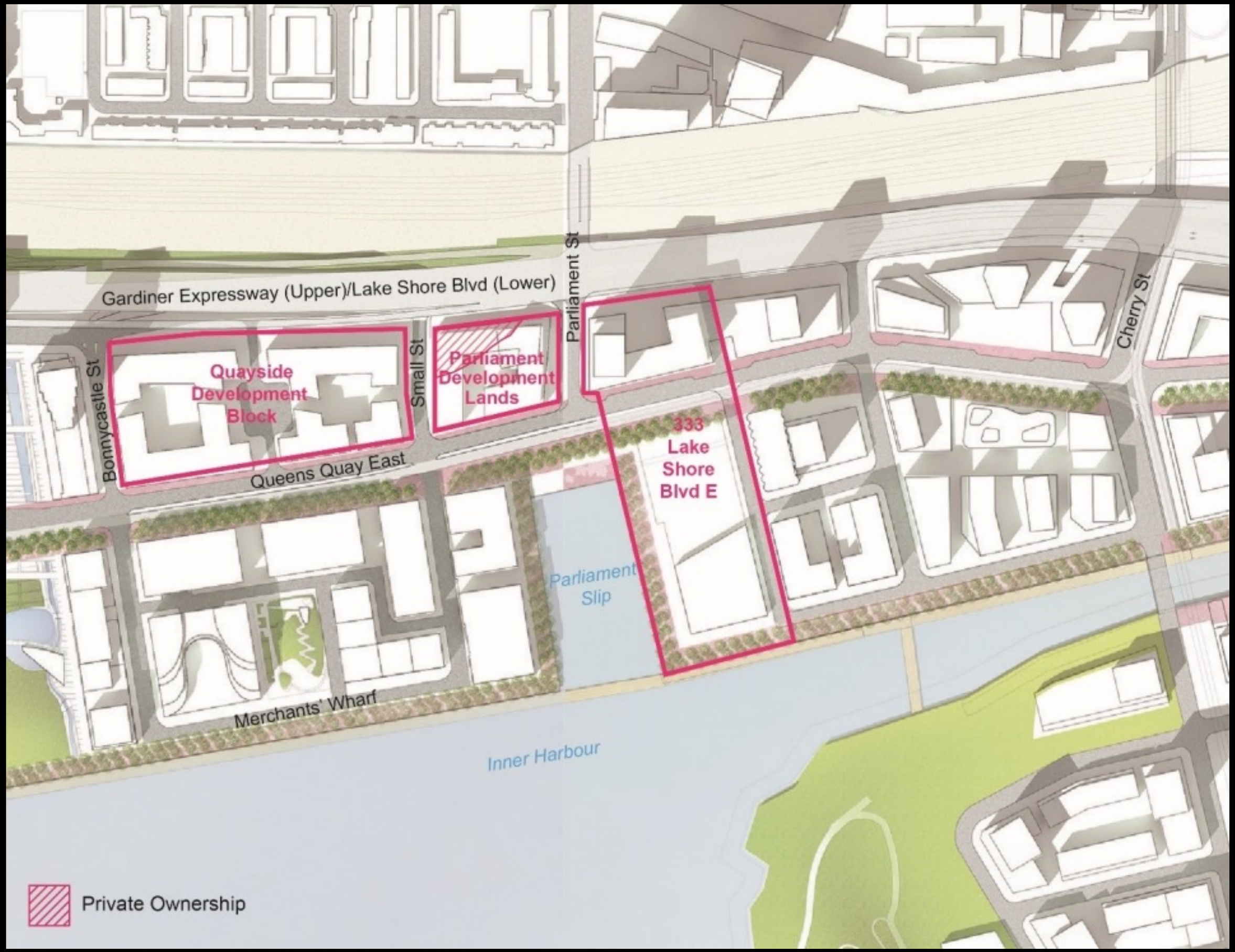



TOMMY
40
WELCOME TO NC CUBE


305

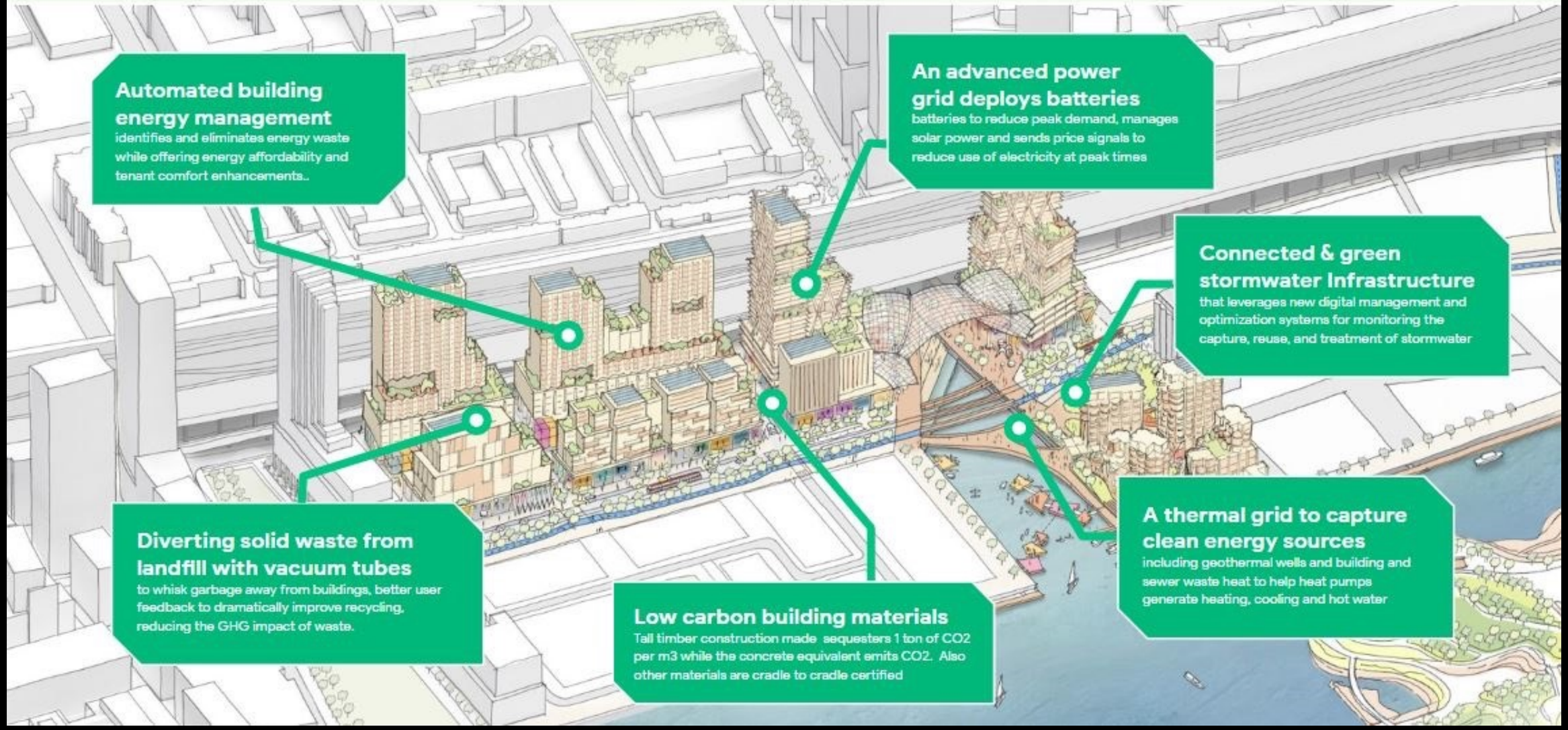
Toronto, Canada


SIDEWALK LABS


Gardiner Expressway (Upper)/Lake Shore Blvd (Lower)
Parliament St
Cherry St
Bonnycastle St
Small St
Quayside Development Block
Parliament Development Lands
333 Lake Shore Blvd E
Queens Quay East
Parliament Slip
Merchants' Wharf
Inner Harbour
Private Ownership

Creating a Blueprint Climate Positive Neighbourhood

SIDEWALK TORONTO



Digital Layer

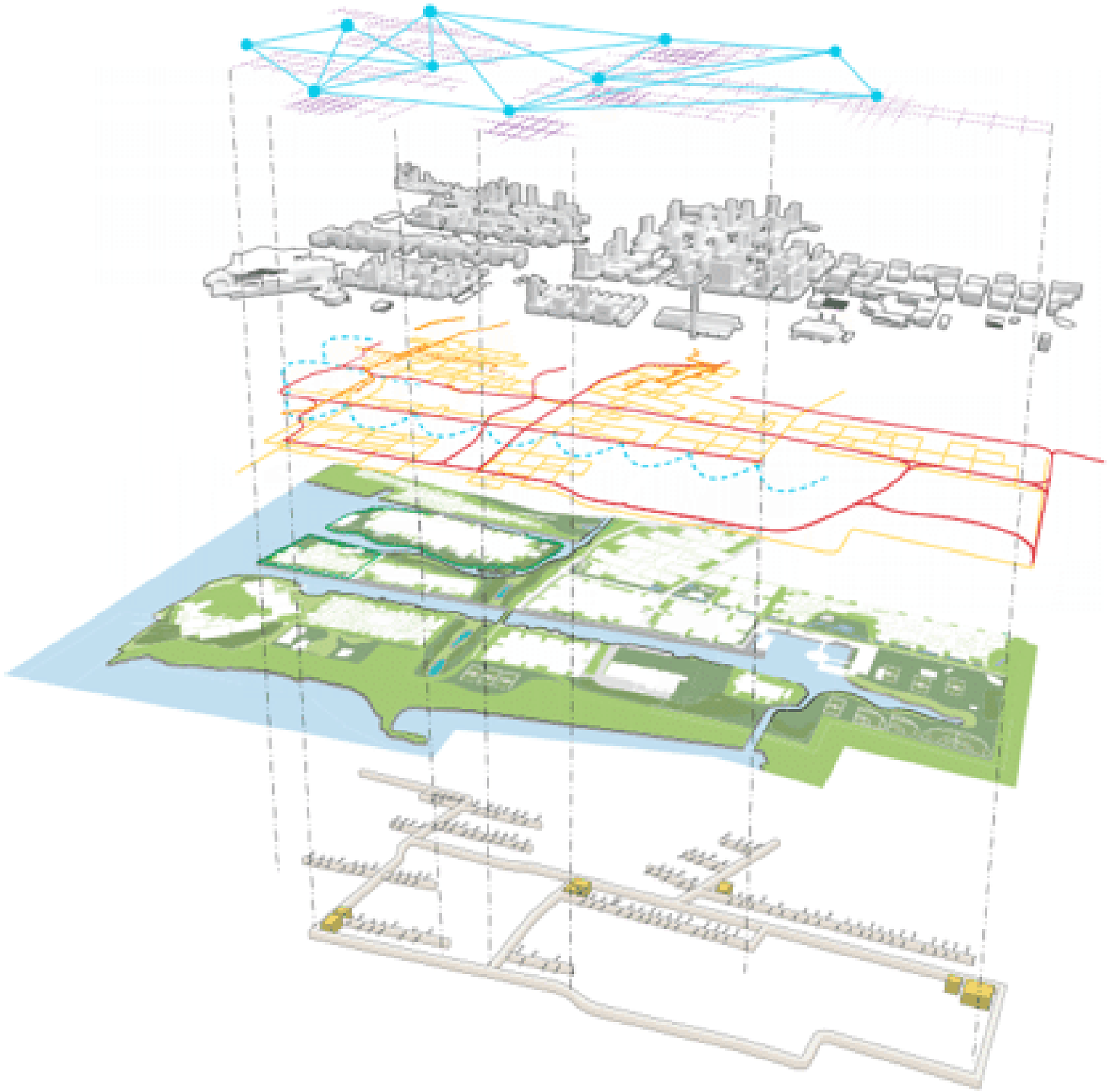
PHYSICAL LAYER

Buildings

Mobility

Public Realm

Infrastructure



Surveillance City?


Bianca Wylie

“Data produced by the public should be publicly owned and managed transparently.”

“A lot of the urban problems that smart-city projects propose to address don’t require a technological solution.Toronto’s affordable housing crisis isn’t going to be solved with more data.”

A final caution

“The more successful smart cities programs become, the more they risk diverting resources into problems that can be solved with technology, rather than grappling with issues that can't be easily with fixed with an app.”

Courtney Humphries
The Too-Smart City
The Boston

So it’s not all about technology and artificial intelligence.

Market Square
Pittsburgh

“What is the city but the people?”

William Shakespeare

Coriolanus, Act III, Scene 1

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