

A City with Sustainable Development Goals

Incheon Metropolitan City

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UN OSD *Achieving Climate Change Action and the SDG through more Inclusive, Safe, Resilient Sustainable City*

1 Nov. 2018

Songdo, S. Korea



Agenda

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Introduction 1/1

What is Climate Change?

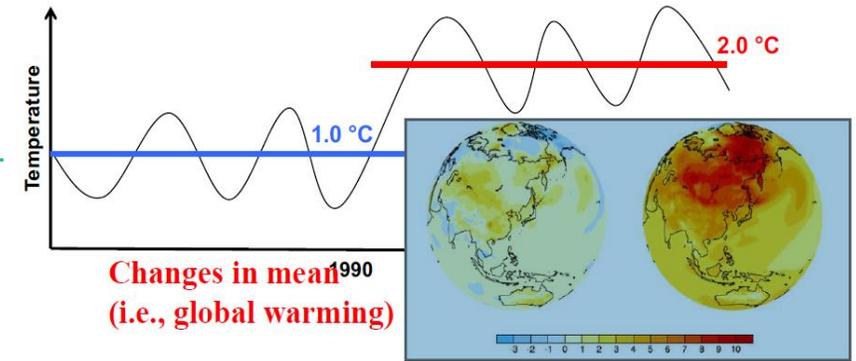
Climate change is a change in the statistical distribution of weather patterns when that change lasts for an extended period of time (i.e., decades to millions of years).

Why urban action play an important role for Climate Change?

Human activities are the **causes** of climate change. There are two domain in human activity. First is **direct** forcing such as green house gas(GHGs) . Second is **indirect** forcing such as land-use(urbanization, deforestation, agricultural intensification).

“**Cities** consume **2/3** of the world **energy** and create over **70** percent of the global **CO₂ emissions**.”

Source: C40, <http://www.c40.org/ending-climate-change-begins-in-the-city>



Literature Review 1/4

Land-use, urban transportation and environment ?

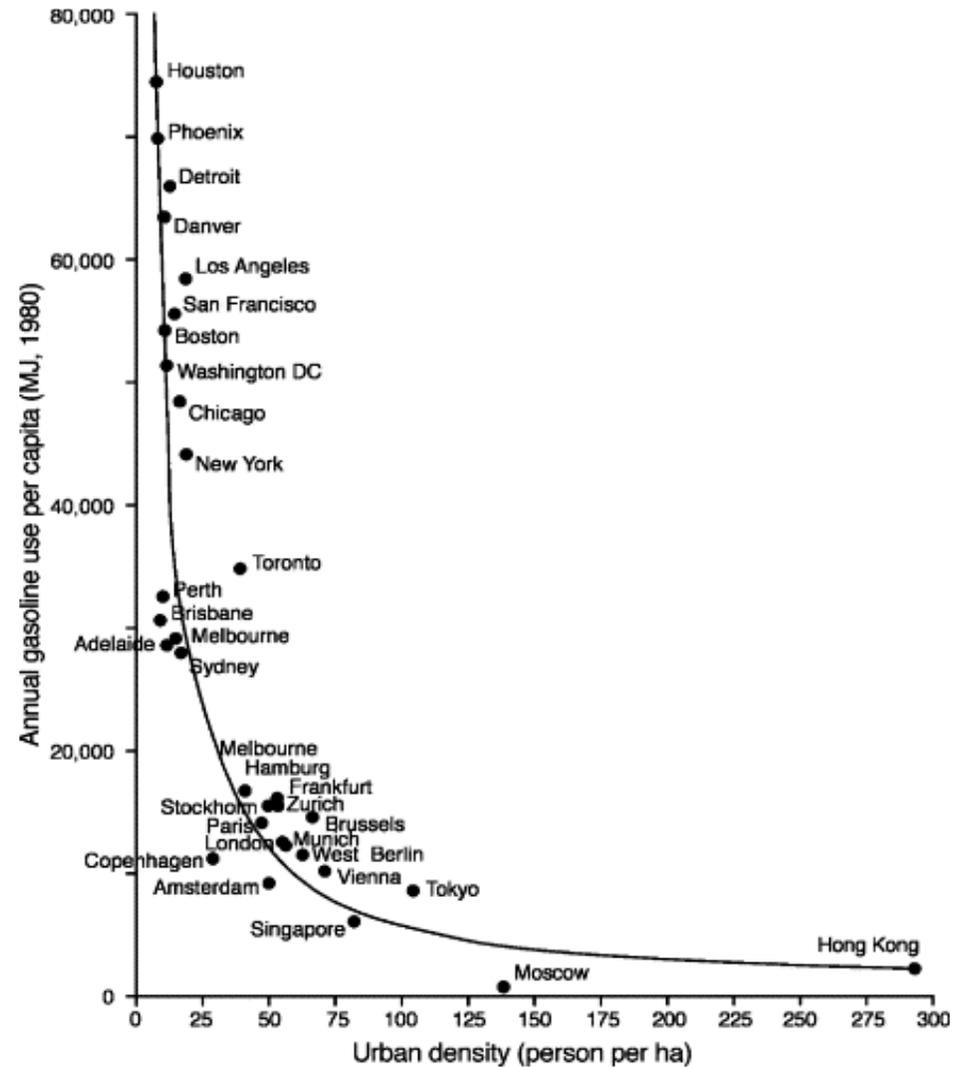
Hypotheses

Raising urban densities is expected to lead to a decrease in **energy consumption** and consequently enables a reduction in **pollutant emission**.

Understanding the connection between **land-use and transportation** can be promoted by analyzing the urban **spatial structure**. Spatial structure have changed with introduction of **private cars**: an outward expansion of the metropolitan boundary, a density decline in all forms of land.

The **United Nations(1993)** focused on means to **reduce CO2 emissions** by reducing the **vehicle-miles traveled (VMT)**. Most recommended methods were based on the often implicit, hypothesis that levels of **urban transportation energy consumption** are **negatively** correlated with **urban density** . (See Fig1)

Literature Review 2/4



Kenworthy's *Cities and Automobile Dependence* (1989).

Literature Review 3/4

❖ Land-Use Policy as a demand management tool

1. The logic of Density

Planning for high density has two main goals in the context of transport energy consumption:

- 1) Reducing **trip length** and **total mobility** by concentrating residential, employment and services areas (Cervero, 1988).
- 2) Changing the **modal split** to reduce the share of the private car use in relation to public transportation, walking and cycling

2. The Logic of Mixed Land

A second major policy initiative is planning for higher density in conjunction with planning for **mixed land-use** (Black, 1996). Numerous hypotheses which suggest that mixed land-use is likely to reduce **trip length**, and change the distribution of trips during the day, have been proposed.

A major behavioral change in modal split, diverting trips from the private car to public

Literature Review 4/4

3. Priority to public transportation

The **purpose** of giving priority to public transportation, whether **rail or bus**, is to shift passengers from **private cars** to more **environmentally friendly travel modes**.

This shift is supposed to be achieved by creating an attractive and competitive public transportation system (Feitelson et al., 1998).

4. Priority to non-motorized modes of transport

The underlying goal of providing priority to non-motorized modes such as **walking and cycling** is to reduce energy consumption (Plane, 1995). Policy makers propose this course to support the fast growing, yet small, demand for these modes which replace the private car in dense urban areas

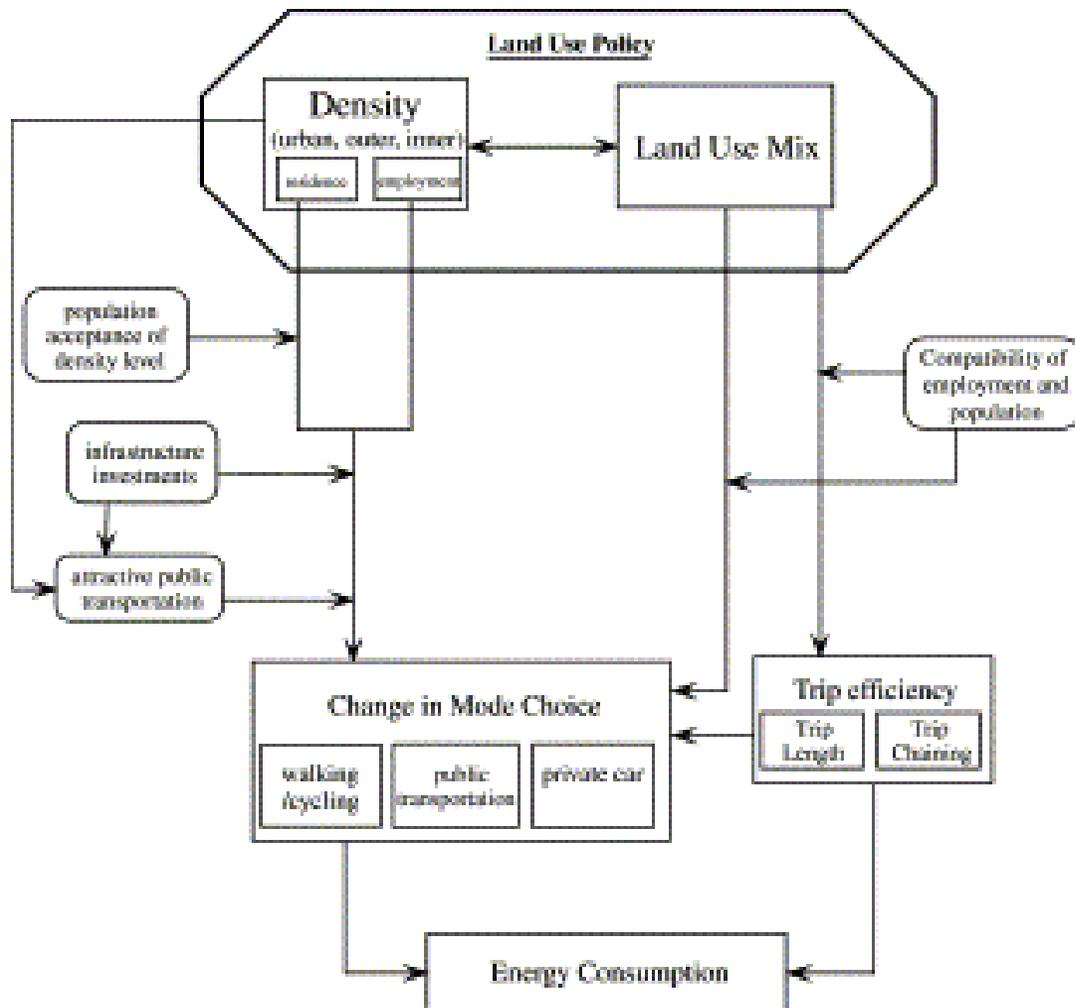


Fig. 3 illustrates the hypotheses regarding changes in the level of **energy consumption**. Each stage of the conceptual model consists of a **limiting factor**.

The social factors:

- (1) The **willingness** of the population to accept high levels of density
- (2) The **social-economic** status of the population. The target is to influence non-captive users of transportation,
- (3) Compatibility of **employment** supply

The policy factors:

- (1) **land-use policy** regarding mix patterns and density and the location in which it is applied.
- (2) Infrastructure and public transportation **investments**

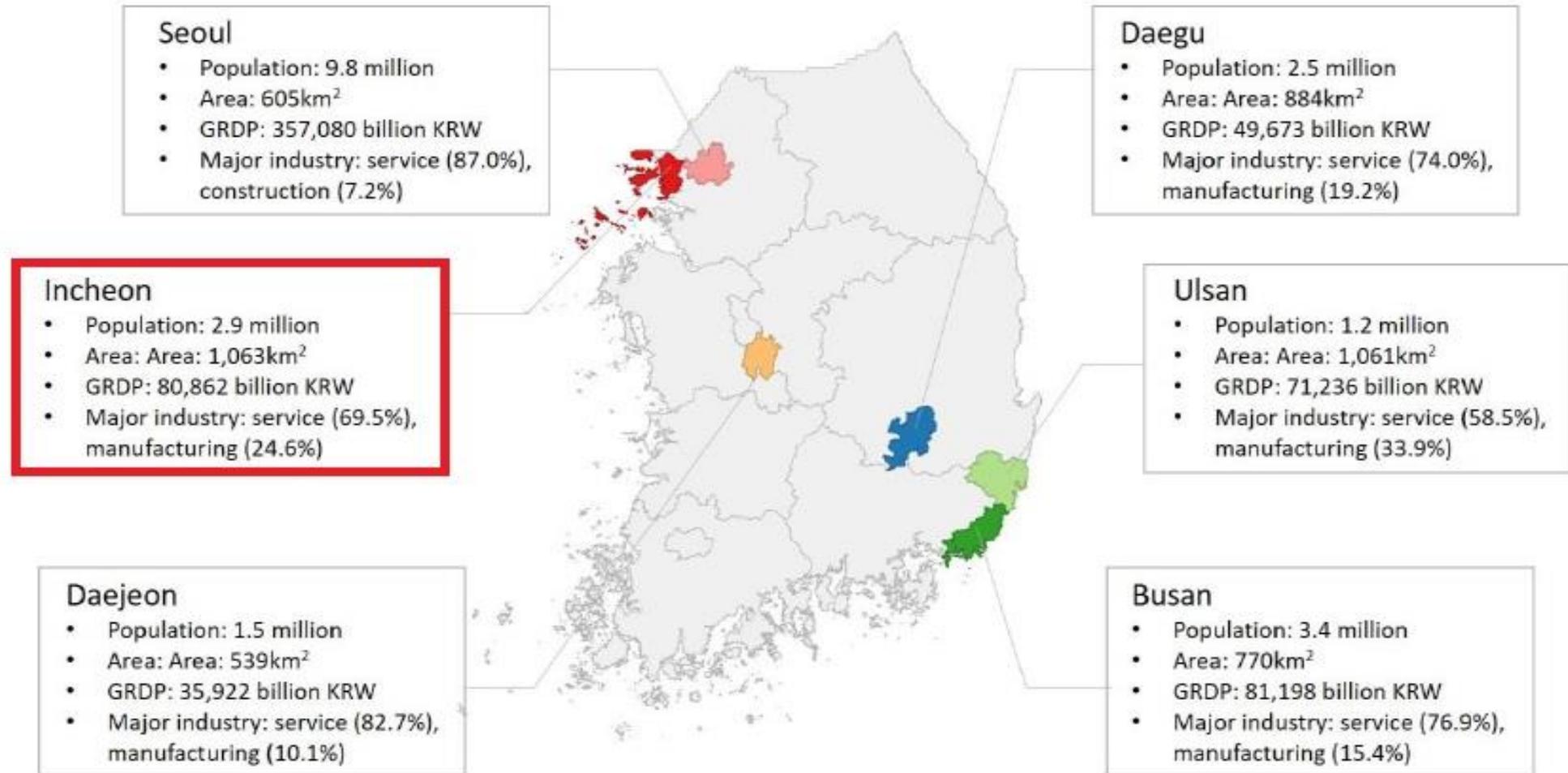
Fig. 3. Conceptual model of the set of factors influencing urban transportation energy consumption

Incheon Metropolitan City 1/2

- **Historical Marine City**
 - Trade point for 1,000s years
 - 168 Treasure Islands
- **International Logistic Hub**
 - Largest port in the west coast
 - Incheon International airport, the Hub of Northeast Asia
- **The Heart of Economic Capital(IFEZ)**
- **Center of Green Growth it Korea**
 - 10 UN organizations
 - 4 international organizations
 - Secretariat of Green Climate Fund (GCF)



Incheon Metropolitan City 2/2



Main Challenges of Climate Change 1/1

Severe Drought, "Farmers using wastewater in farmland"



Gangwhado - Drought(2015.10)

Threats of Fine Dust, China is not the only victim



Songdo - Fine Dust(2017.3)

Flood Risk, Citizens were unprepared



Namgu - Flooding(2018.4)

Heat Wave Death, 70 years old man dies



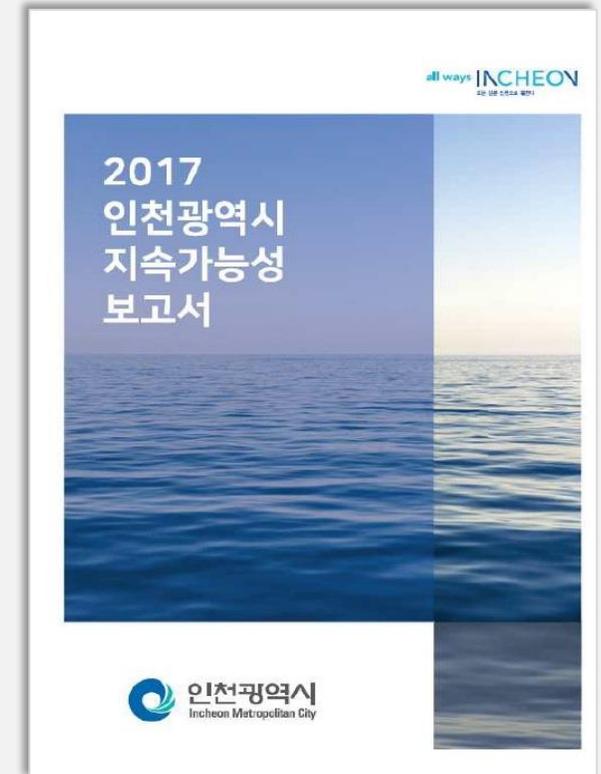
Gangwha - Heat Wave(2016.8)

Sustainable Development Goals 1/4

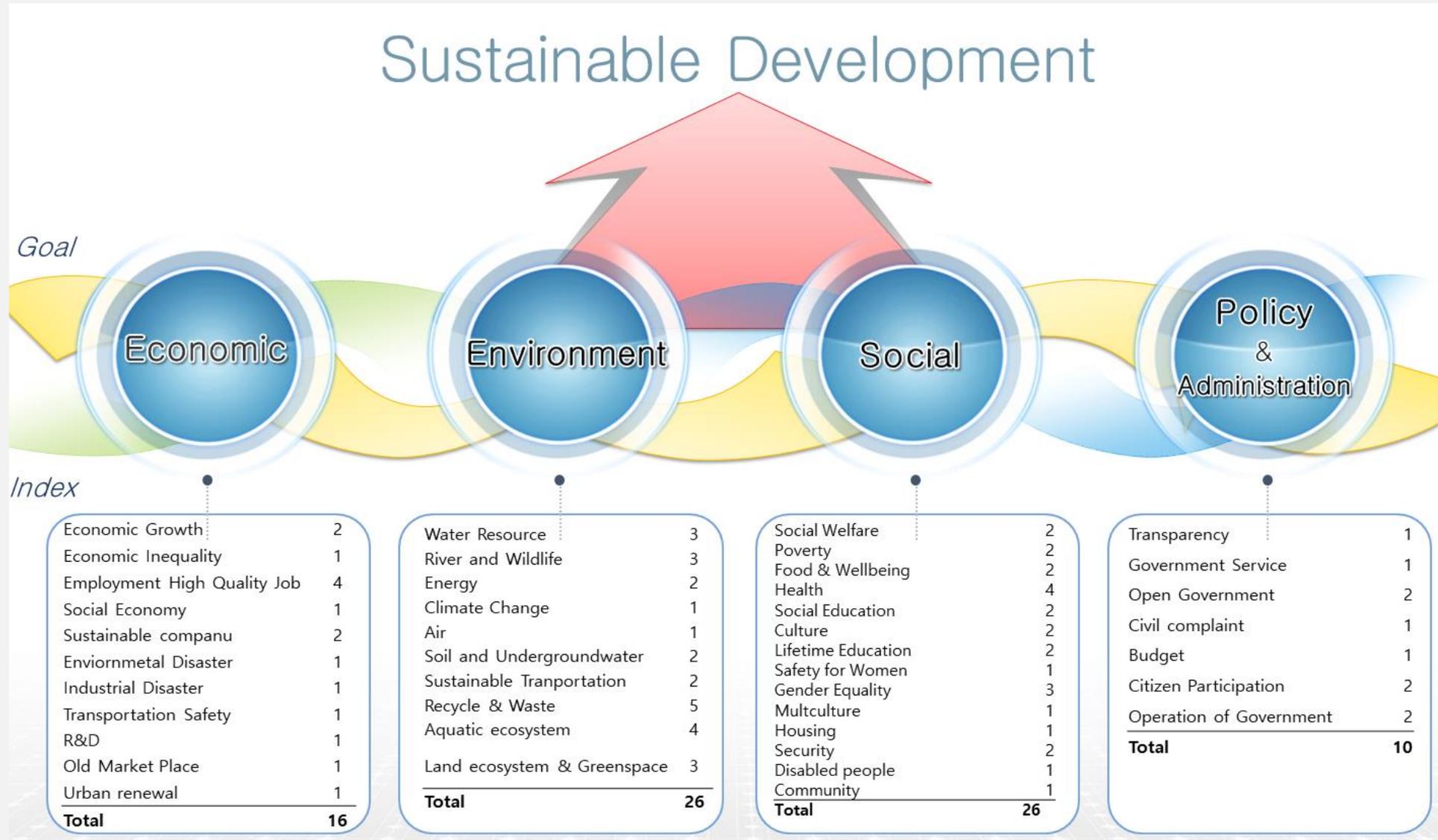
Incheon Metropolitan City has worked hard to take responsibility for creating “sustainable development.”

Incheon **sustainability report** has been published to extrapolate on Incheon city’s sustainability policies, from **economic, social, and environmental and policy and administrative perspectives.**

Its **purpose** is to lay the groundwork for sustainable development by bringing to light administrative policies and how they have performed economically, socially, and environmentally.



Sustainable Development Goals 2/4



SDG11 Inclusive Safe, Resilient Sustainable City 3/4

<p>11 SUSTAINABLE CITIES AND COMMUNITIES</p> 	<h2>Make Cities more Inclusive Safe, Resilient Sustainable</h2>	
	<h3>Incheon Sustainable Development Index</h3>	<h3>Related Index</h3>
	<ul style="list-style-type: none"> • Percent of households with below minimum housing Standards • Share of public transportation • Distance of bike route • Percentage of vacant residential houses remodeled • Car accident death rate 	<ul style="list-style-type: none"> ▪ Percent of green space ▪ Green space area per capita ▪ Healthiness of stream ecosystem ▪ Number of crime per 1,000 people ▪ Damage of disasters(number of victims, estimated damage in money terms) ▪ Average concentration of PM2.5, PM10

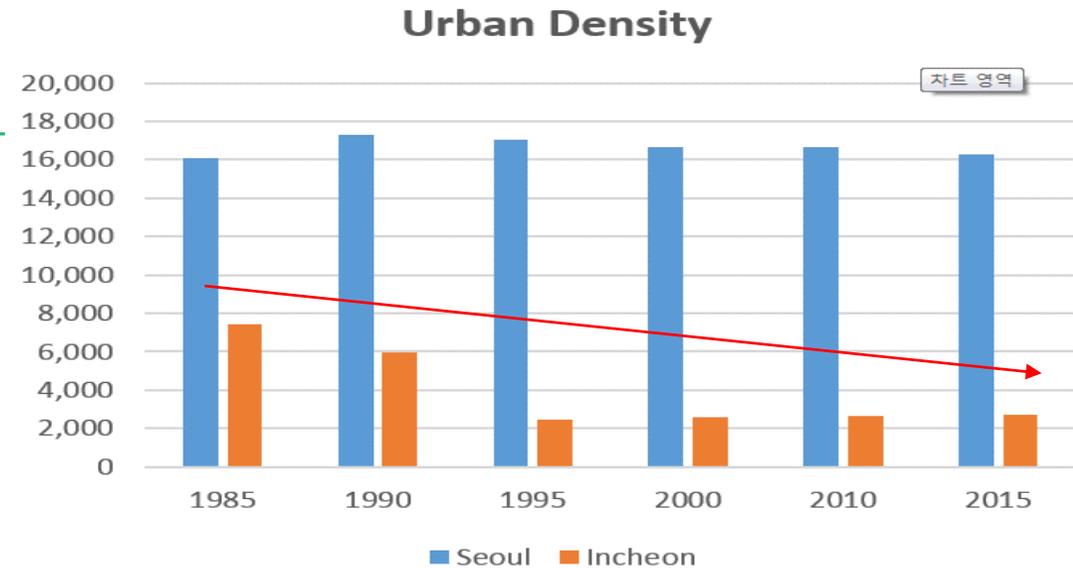
SDG13 Take urgent action to combat climate change and its impacts 4/4

13 CLIMATE ACTION 	Take urgent action to combat climate change and its impacts	
	Incheon Sustainable Development Index	Related Index
	<ul style="list-style-type: none">• Average concentration of PM2.5, PM10• GHG Emission per capita• Number of disasters, number of victims, scale of the damage	<ul style="list-style-type: none">▪ Energy consumption per capita▪ Proportion of renewable energy among primary energy supply

Case Study 1/6

Land use - Coastline expansion

From 1985 to 2015, Incheon **urban density** decreased from 7,459/km² to 2,736/km².



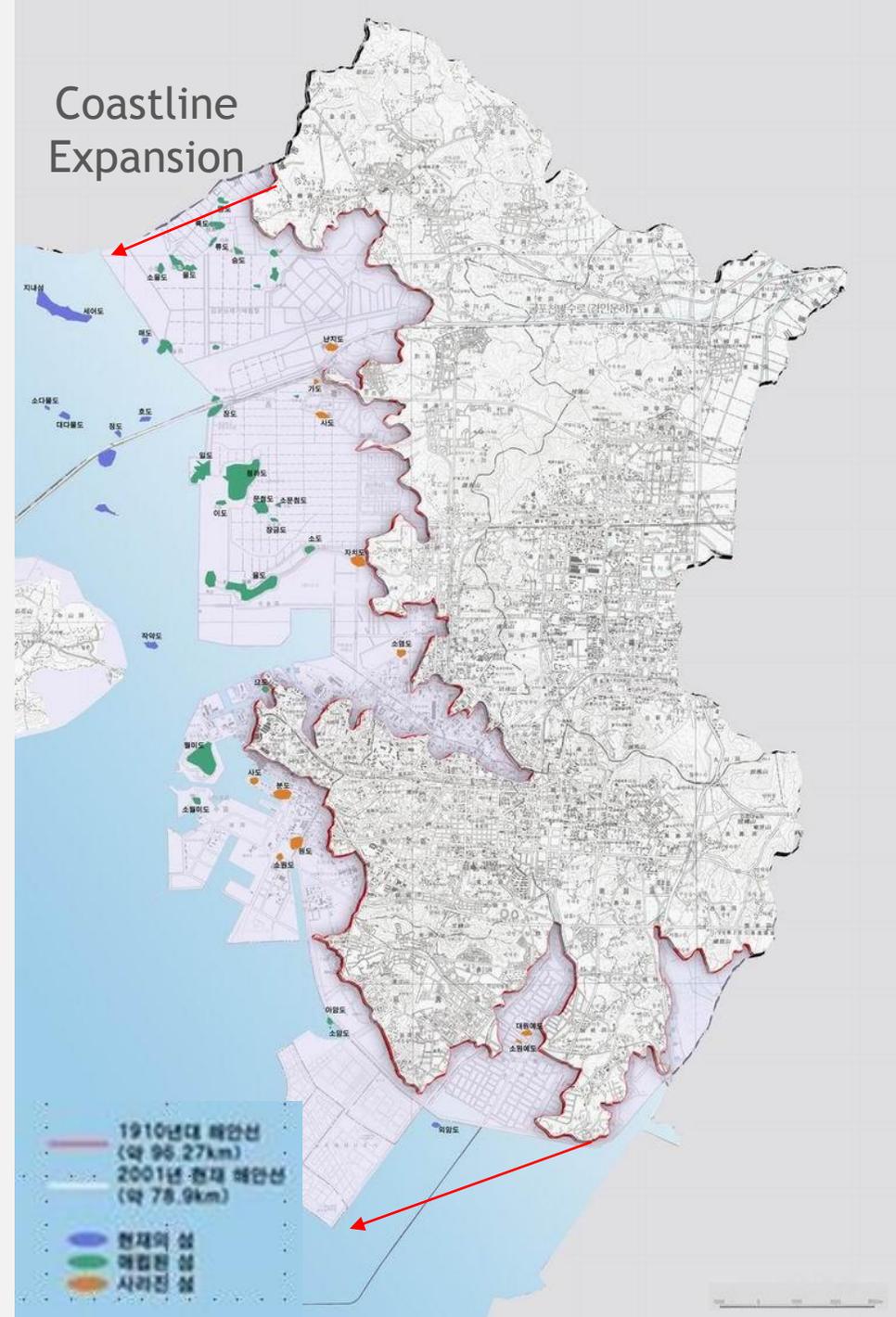
The main reason is coastline expansion for urbanization.

The Coastline expansion lowered **urban densities** as the city grown, negatively affecting the sustainability of urban development- increase in **energy consumption** and consequently increases **emission**.

Policy makers should understand the that land-policy can change the level of energy consumption.



Coastline Expansion



Case Study 2/6

Transportation : Bike routes

Policy makers in Incheon proposed **attractive bike lane** in new city like Songdo, which is to replace private car.

The total length of bike road in Songdo is **20km**, and was constructed near 6 subway station in 2009.

There is almost 120 citywide **bike rental system** in Incheon where people can rent public bike and return at the public bike station nearby.

Non-motorized mode such as walking and cycling **reduce energy consumption**(Plane, 1995).



Case Study 3/6

IFEZ Smart City : Disaster Monitoring System

Disaster can occur any time either it is natural or human made. To make city safe and resilient from urban crime and disaster, IFEZ introduced **Cloud technology** in the public sector.

Big data-Cloud technology : traffic, environment, crime, communication, 3D spatial data technology

If a crime occurs. IFEZ CCTV will detect the location and report emergencies to the nearest police station.



Case Study 4/6

Sewage heat recovery system

Songdo Sewage heat recovery system , a heat pump used to capture the **warmth of wastewater** and transfer it district heat

Heat recovery system produces 7.7(Gcal/h) and the IFEZ will benefit over 1.15millin dollars annually.

Incheon is also planned roadmap to increase **renewable energy share** at 11% by 2035.



Case Study 5/6

Zero Energy Building

To avoid the worst effects of climate change we need to drastically cut back on the emissions associated with the operation of **new buildings**.

In Incheon, **28 Buildings** including Northeast Asia Trade Tower, Songdo Convensia was built Eco-friendly Building certified by **LEED-NC** (Leadership in Energy and Environment Design, *LEED*)

National Institute of Environmental Research (2011)



BIPV(Solar Battery)



Case Study 6/6

Incheon City is a leader in lowering greenhouse gas emissions though 2015-2016.

According to Ministry of Environment Korea

Incheon was awarded 1st place for Public Sector GHG & Energy Goal Management Excellence Award Ceremony

The city reduced GHG to **42.6%** (reduction of 12,959 tons of CO₂-eq) compared to the standard emission of 33,422 tons of CO₂-eq. It was recognized the highest reduction rate among 243 local governments (17 wide-area and 226 basic).

The city focused on improving facilities such as **renewable power generation facility**, operation of **LED lighting** equipment, improvement and replacement of **high-efficiency facilities** to reduce greenhouse gas emissions.

Conclusion



Cities are key actors in efforts to respond to climate change



Incheon Metropolitan City government has put effort to take responsibility for creating Sustainable development.



Government cannot address those issue alone. Wide range of actors: central government, civil society, private sector and international community should work together,

Thank You!

For more information visit, <http://climate.idi.re.kr/>

Continue the conversation with us online, follow:

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