

# Designing Sustainable Cities and Communities in China through Transit; A Green-Oriented Development

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I would like to make a presentation on following issues. The first one is to introduce our experience in sustainable urban design in China. The second one is to introduce recent urban designs with taking plug-in EV(electric vehicle) supported by solar energy into account.

In the 18th century, the urban concentration became obviousness in Europe. Production, consumption and residential houses were all concentrated in the city of London.

In early 20th century, the Garden city was introduced by Ebenezer Howard to improve the concentration in the suburban areas of London. In the garden city, land-owning right was kept by Howard's company to receive increased land value due to development. This is ideal PPP(Public Private Partnership) which we are seeking today.

The Copenhagen Finger Plan (1947) prioritized the use of public transportation for regional and spatial planning. It created a well-balanced multi-polar urban region.

In 1980, the financing of subway construction without any risks for the public sector was successfully used to make the "As-of-Right" zoning scheme around Washington DC area.

In 2007, the forest city concept was introduced in Japan focusing on green and transit in addition to the compactness.

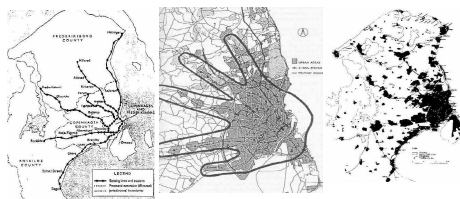
All examples excluding green city are achieved during the urban concentration in population. Garden city and finger plan was before the motorization.



Garden City (UK 1900<sup>th</sup>)



Smart Growth (Washington DC USA 1980<sup>th</sup>)



Finger Plan (Copenhagen 1940<sup>th</sup>)



Forest City (Japan 2000<sup>th</sup>)

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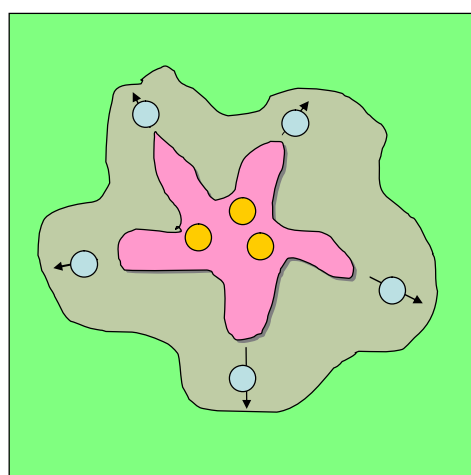
The 21st century may be called as the "urban century" because the urban population will exceed more than 50% of the total population in the world.

In China, it is not exceptional. The urban population will surpass the farm-land population around 2015 and the motorization has already been spreading. In order to resolve the pressure of the population increase, urban redevelopment type(A) and suburban new city development type(B) are undergoing at the same time. I would like to classify the introducing projects as follows.

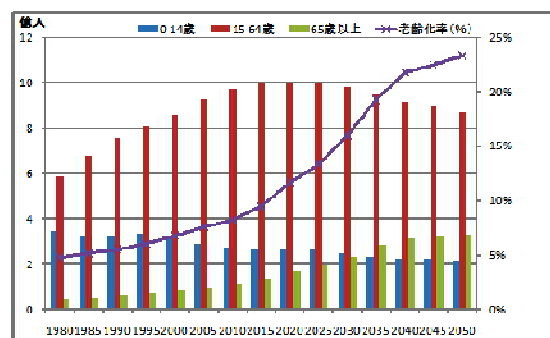
Type A: A high location efficiency project with integration of land use and transportation in the city center considering compact, mixed uses and network connectivity.

Type B: A new urban growth project with public transit served in the suburban area. The public transit connecting the city center is usually constructed by municipal government; the inner transit is constructed by developers.

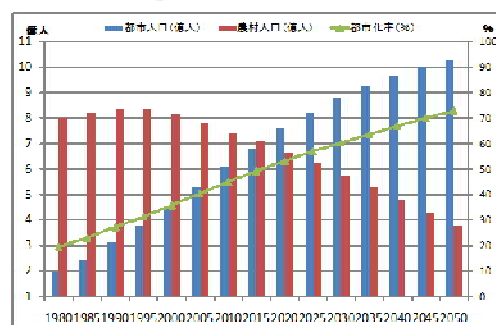
Type C: Urban sprawling area without supporting public transportation due to the rapid population increase and motorization.



- : Redevelopment of town center (A)
- : New town projects (B)
- : Sprawl Area (C)



Population of China



Urban and agricultural population in China

-Type A

Fuzhou is a capital of Fujian province and an ancient city with a history of more than 2100 years. The first subway station and shopping mall are designed underground for reserving historical dwelling area and they are called "3 alley and 7 lane". The area used to be facing to demolishment and is now being under infill redeveloped for commercial facilities and for sightseers. In addition, buildings along 817 street and facing to the historical area are designed in 3-4 stories with roofs and walls covered by green. The shopping mall has underground pedestrian networks in addition to car and bicycle parking. Planning area is 20ha including the mentioned historical area.



-Type A

Landscape of the central axis in Beijing forms a texture in time and space. The design concept is to indicate a future Beijing along the axis reserving the culture and the environment. This project includes a transit mall to regenerate a green historical landscape along the axis. Design area is about 100km<sup>2</sup> and the length is 30km.





## Type B

Jimei New Urban City is a suburb of Xiamen, one of the China's important port cities. The project develops a new suburban city surrounded by lakes and hills. The city is divided into three zones:

a commercial and business zone with beautiful water landscapes, a residential zone in a rich green environment and a leisure zone located between the other two zones consisting of a network of canals which evoke a sense of history and culture

## Walkable City

Gulangyu Island is an old foreign settlement in Xiamen and serves as a symbol of the local people's history and culture. The island is filled with nature, is lack of cars and motorbikes and is easy to walk through. It is truly an advanced urban city in future.

The design of Xiamen Jimei New Urban city was inspired by Gulangyu Island. At the waterfront, underground roads and parking lots are developed to create a walkable city. Public transportation and walking allow pedestrians to move freely and they are very suitable for this urban resort in the "new Gulangyu Island."



Huadong Huan Qiu Commerce and Logistics City is located along the Yantze River in Taicang City near Shanghai. Its concept is to create a new world-class urban city consisting of exhibition centers, commercial centers, logistics facilities, and a residential area.

First of all, we consider that logistics is the heartbeat of economic activity. Opened shipping containers become exhibitions and create entertainment. The entertainment of the urban city heats people up and fills them with joy.

However, heated-up people need healing provided by greenery and water. The greenery and water achieve a Cool Earth not Heat Island. With the great location along the Yangtze River, a new canal network using water from the Yangtze River is used for district heating cooling, which also adopts a renewable energy technology, and creates an advanced low carbon emission city.

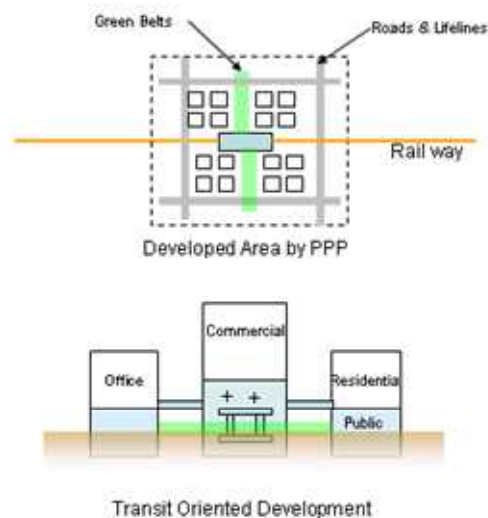
The arrangement of a “Green Core”, a “Grand Canal” and a “Boulevard Ring” creates a main framework of the urban city. This framework connects urban function organically and promotes exchanges of people, business and cultures.



The railway, green and water networks contribute to increase the real estate value around the area. It is true that the increased value shall be returned to investors, however, it usually takes a long time to recover (or is impossible to recover) the cost. So it is sometimes judged as infeasibility for private sectors to include them. So that, it may cause high carbon cities without public transportation.

So ,it is necessary to minimize tax and to give a fruit to improve the private sectors' financing status even if they construct railway, green and water networks. I would like to propose that some developing rights shall be transferred to the private sectors to make a financial balance in PPP.

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## Type C

I would like to introduce technical solutions for already sprawled area and/or sprawling area C.

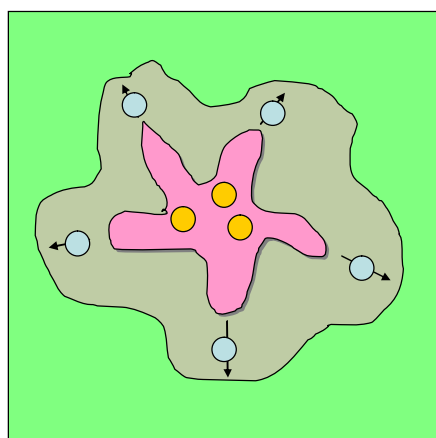
Main reasons to avoid suburban sprawl have been as follows:

Increase in construction and maintenance cost of infrastructure network

Increase in energy consumption by transportation

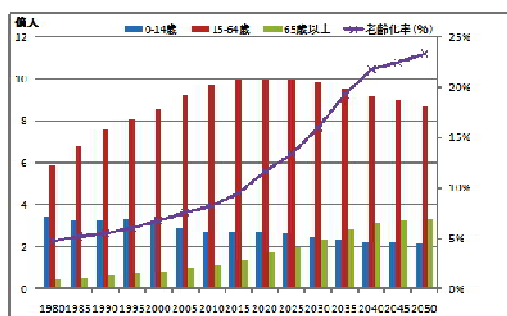
Inefficiency of information transmission and weakening community recognition

However, solar panels may be a solution for the items 1 and 2. In other words, large-scale lifeline networks will not be necessary if each house can be supplied energy from the sky. Therefore, compact city supported by the lifeline and traffic network may not be always our target in this technology innovative era.

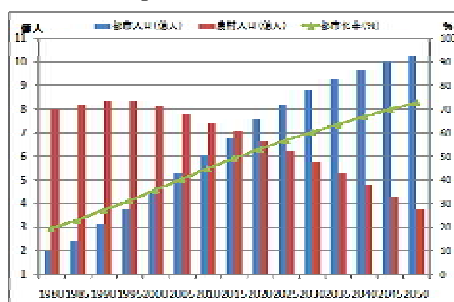


- : Redevelopment of town center (A)
- : New town projects (B)
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Population of China



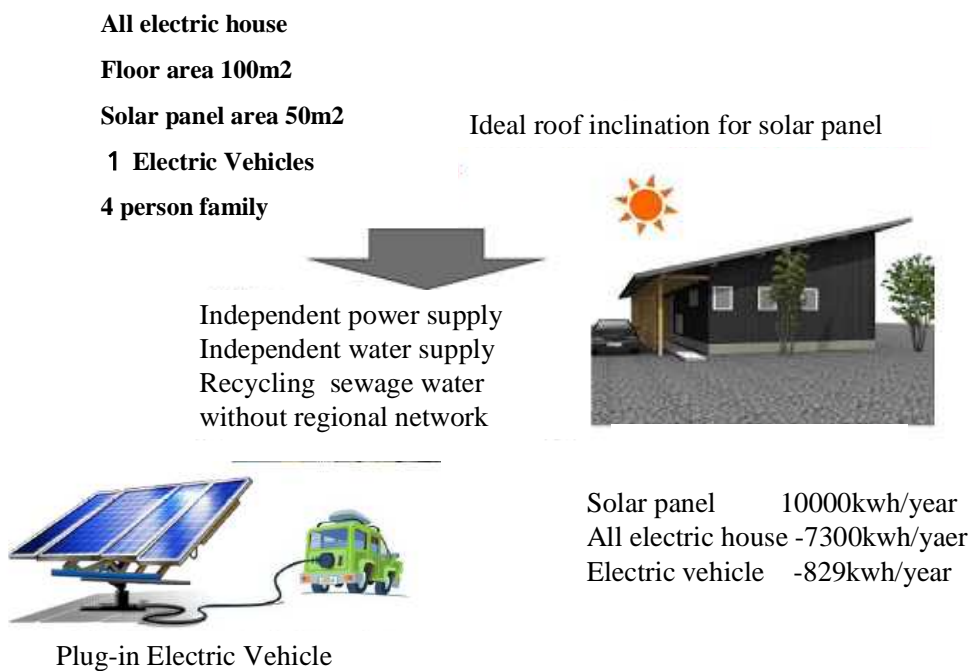
Urban and agricultural population in China



I will give an example about zero emission house independent from the large power network. The house is a typical suburban 1-storey residential house. The area of roof solar panel is 50m<sup>2</sup>. Annual generated power is 10000kWh/yr and it can cover all electricity for the household including EV. Of course, this is based on the assumption that the household can afford plug-in EV and the batteries can store several-week power.

Sprawling area (C)

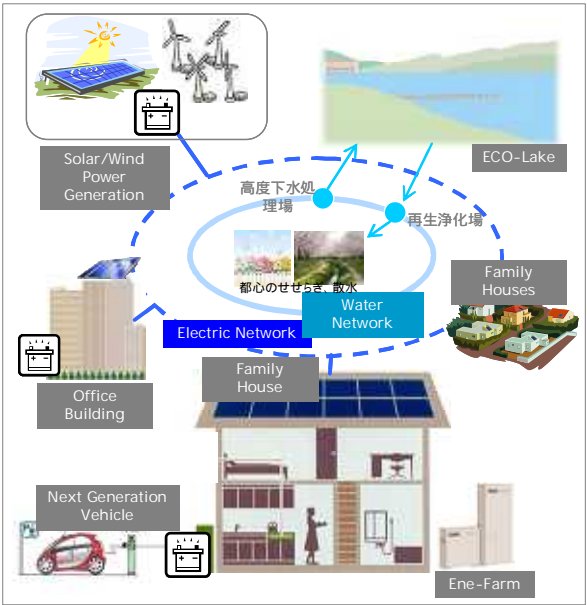
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Smart electricity and water network can connect 100,000 people in aspects of usage of energy and water. One cluster consists of 10,000 -20,000 people. This is a conceptual planning and urban design in Dalian.



District Cluster(人口 約10万人)におけるスマートネットワーク



スマートネットワークのイメージ

The photo taken in Hangzhou shows that rent-a-cycle and electrical cycle is spreading. The electrical ones are plug-in type. If these are connected to solar panels, it will reduce CO2 emission to zero. It relies on electrical bicycle for a moment. Then, energy charging facility will be installed both at parking areas and roads at the same time as plug-in EV spreading.

Seamless transportation network will consists of integration of public transportation and personal electric vehicle. So, urban planning has to consider not only efficient locations in transportation and land-use but also energy consumption, community cluster and global environment.



EV with satellite navigation



This case shows a resort city in Panjin City, China and surrounded by a large reed field. There are wetland museum, hot spring, hotel, and housing. Heat from underground hot-spring is utilized in addition to the solar and wind energy.

Treated water from rainwater and wastewater is used in each facility and excess water is stored in a surrounding pond. The pond creates a beautiful landscape with boating. Although this city is a tourism resort, it also shows an experimental city including future dispersed lifestyle in advance





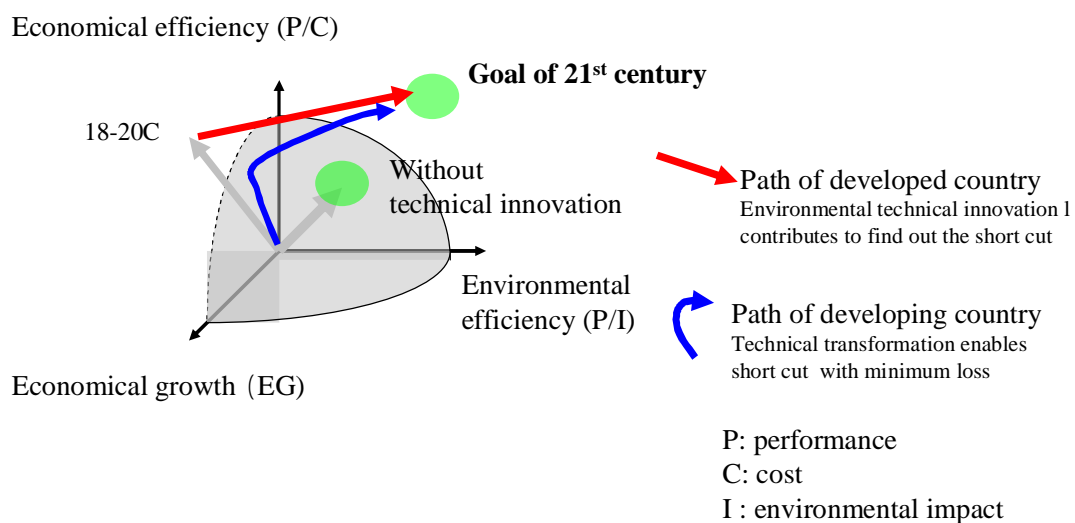
In the 20th century, economic efficiency and economic growth were prioritized without recognizing environmental constraints. There is an opinion that consumption of resources and energy by human beings could be reaching 1.4 times of the sustainable level.

The unique way to break through the limit is the technology innovation. This is the point we are aiming for. Dropping the current quality of life is the last choice to satisfy environmental constraints.

The facing problem in urban planning is that environmental technology innovation occurs in a shorter period than the urban planning. In general, a technology innovation needs several years to implement, however, an urban planning needs 10 to 20 years to be realized and the global environment needs 50 to 100 years for change.

Ten years ago, the first hybrid car was introduced in the market. But at present, plug-in hybrid and EV cars are already evolved. Also, battery storage facility and upgrading of battery performance are being improved year by year.

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## Conclusion

### PPP

1. In the cities in China, the urban redevelopment and new suburban development currently undergoing are connected by subway and/or highway. In addition to traffic networks, green networks are also planned in many cities to achieve higher service level of infrastructure.

2. Profit from development should be returned to the public sectors rather than individual investors so that urban planning becomes financially feasible even if it includes enough public space and transportation.

3. PPP (Public Private Partnership) method is effective in urban and transportation facilities that are unified with building structures such as metro stations, underground shopping mall, and underground roads and green network.

### Technical Innovation

1. It is expected that Electric vehicle (EV) will be globally used in the near future. It is possible to supply enough energy for household and EV by solar panels.

2. Maintenance cost of lifeline network will be remarkably reduced by solar panel in addition to membrane technology for water. This means that zero-emission could be achieved in suburban independent houses.

3. Garden City is the concept born in the railway era. Compact city is the concept born in the automobile era. At the starting moment of the EV era, it is difficult to simply judge that urban sprawl should be avoided. We may have to consider community unit based on both traffic and energy network unit.

## Conclusion

PPP could make private developers to contribute high level urban public facilities. Solar panel indicates that urban sprawl may be a solution to save energy.

At the moment of innovation in both of project implementation and technology, it is necessary for us to observe the innovation so that the project direction could be periodically reviewed for fitting the innovation change.