



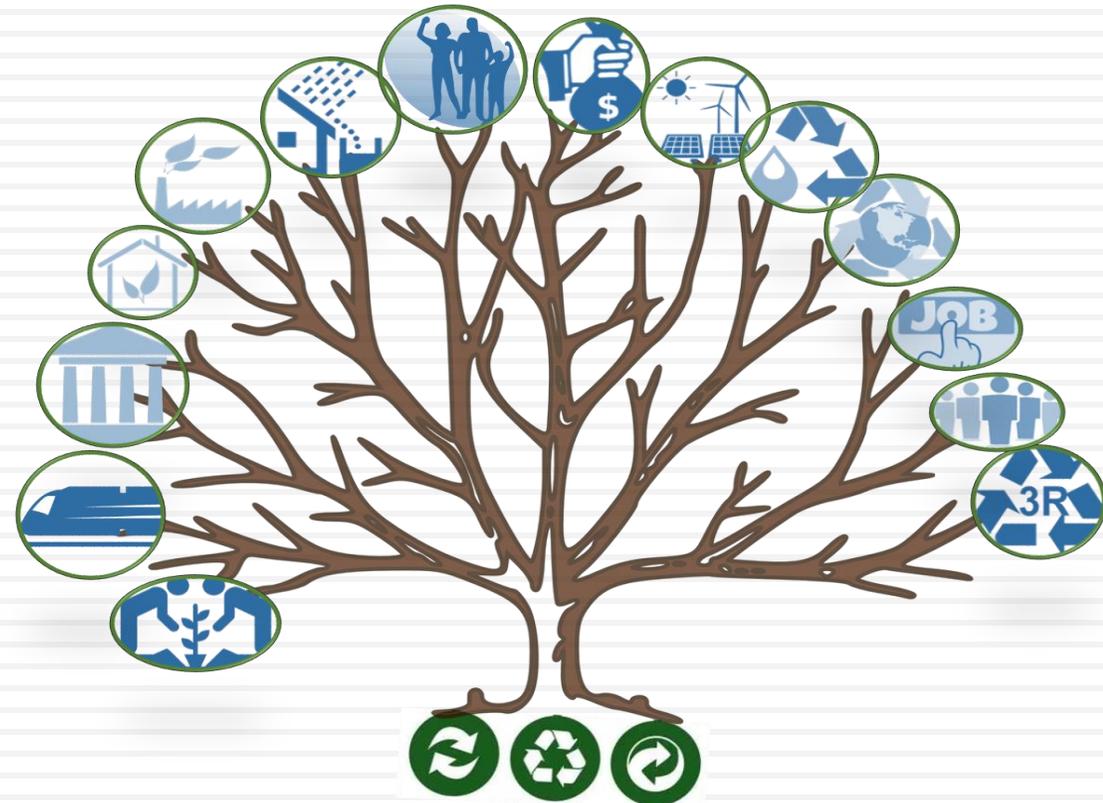
3R and Resource Efficiency Toward Resilient Cities: Implications Toward SDG

Seventh Regional 3R Forum in Asia and the Pacific
2-4 November-2016, Adelaide, SA, Australia

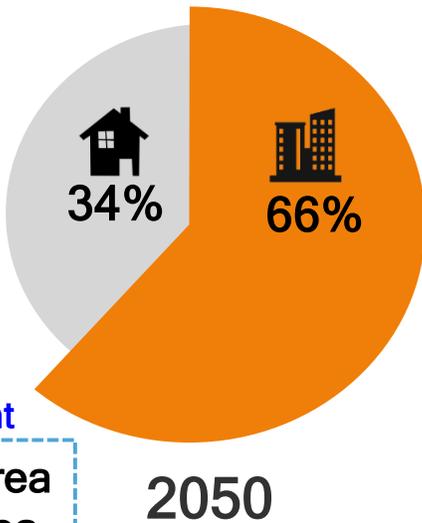
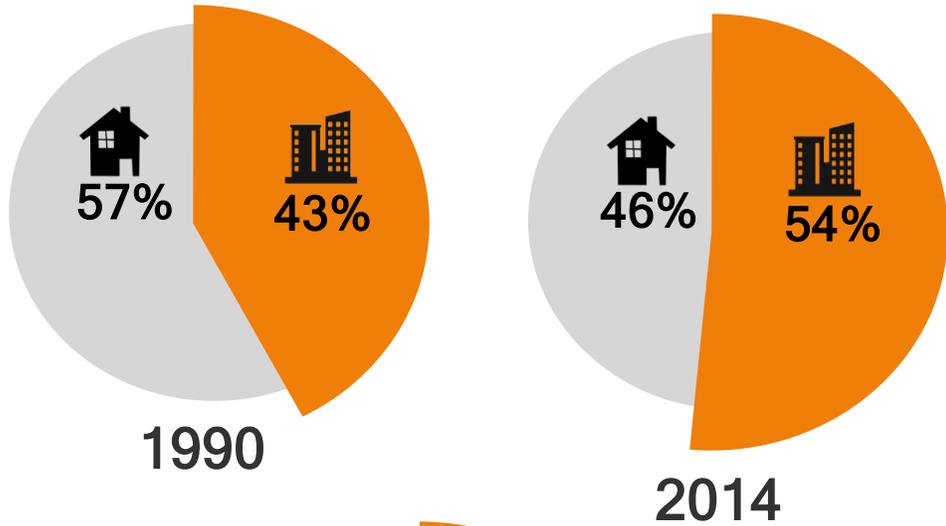
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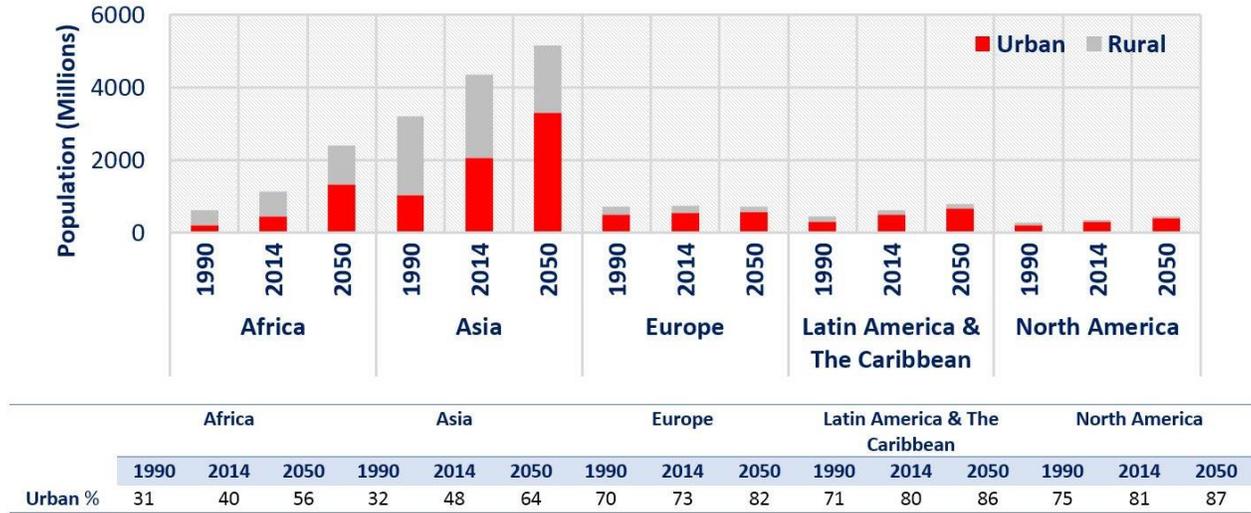


Global Urbanization Trend



World Settlement

- Urban area
- Rural area



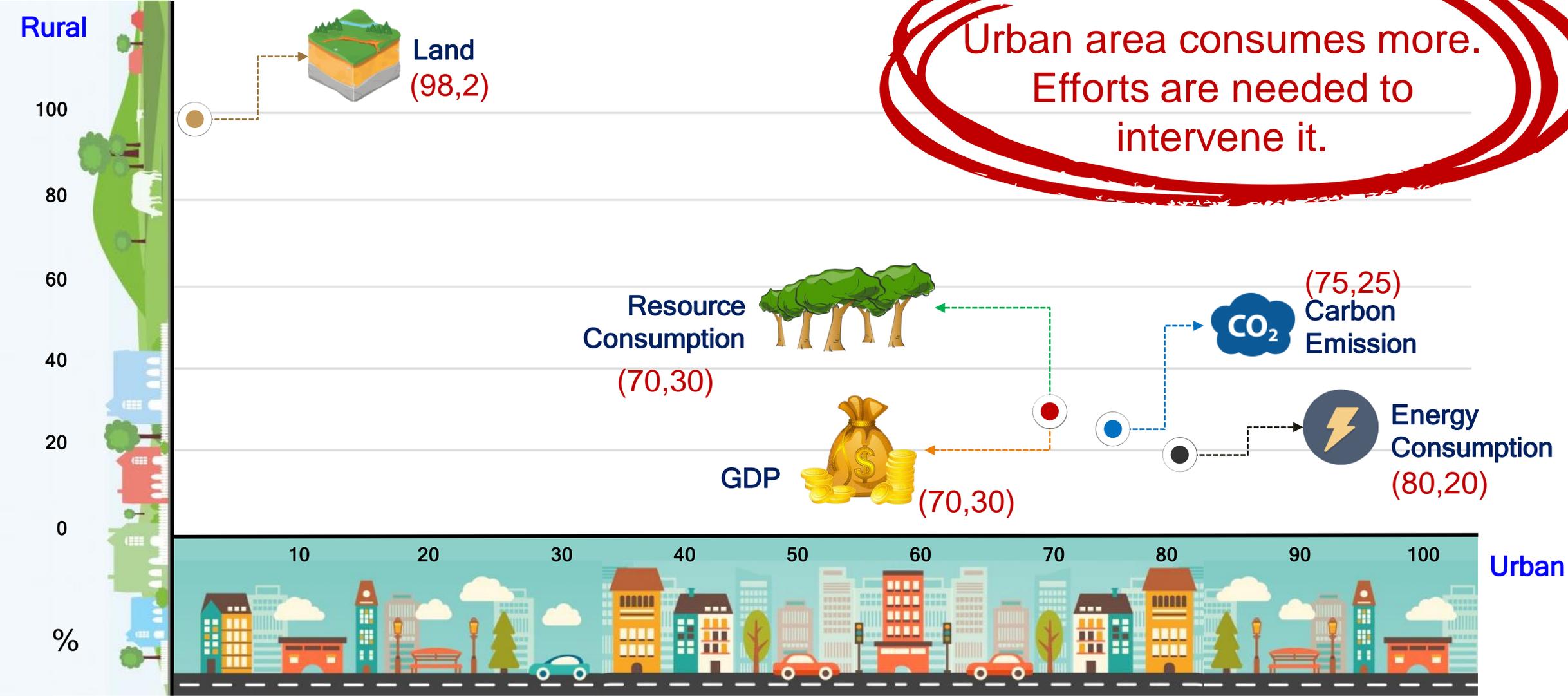
66% of the population will reside in urban areas by 2050

In Asia 64% will reside in cities by 2050

Are We Prepared Yet?

Are We Growing Sustainably?

Resource Consumption of Cities



Poor Resilience: Bad for Business & Communities

 **\$3.3 Billions**
Economic loss

 **\$19 Billions**
Economic loss



100,000 residents
Permanently relocated from Louisiana to Texas



Flooding

Superstorm Sandy

Hurricane Katrina


Business


Transportation


Buildings

- Population of Louisiana **fell by 5%**.
- The city of New Orleans **lost 50% of its population** immediately following the storm.
- 7 years later, the city **remained at around 80% of its pre-Katrina population**.

3R, Resource Efficiency Resilience and SDG Goals

GOAL 11



MAKE CITIES AND HUMAN SETTLEMENTS INCLUSIVE, SAFE, RESILIENT AND SUSTAINABLE

SUSTAINABLE DEVELOPMENT GOALS
More at sustainabledevelopment.un.org/sdgsproposal

GOAL 12



ENSURE SUSTAINABLE CONSUMPTION AND PRODUCTION PATTERNS

SUSTAINABLE DEVELOPMENT GOALS
More at sustainabledevelopment.un.org/sdgsproposal

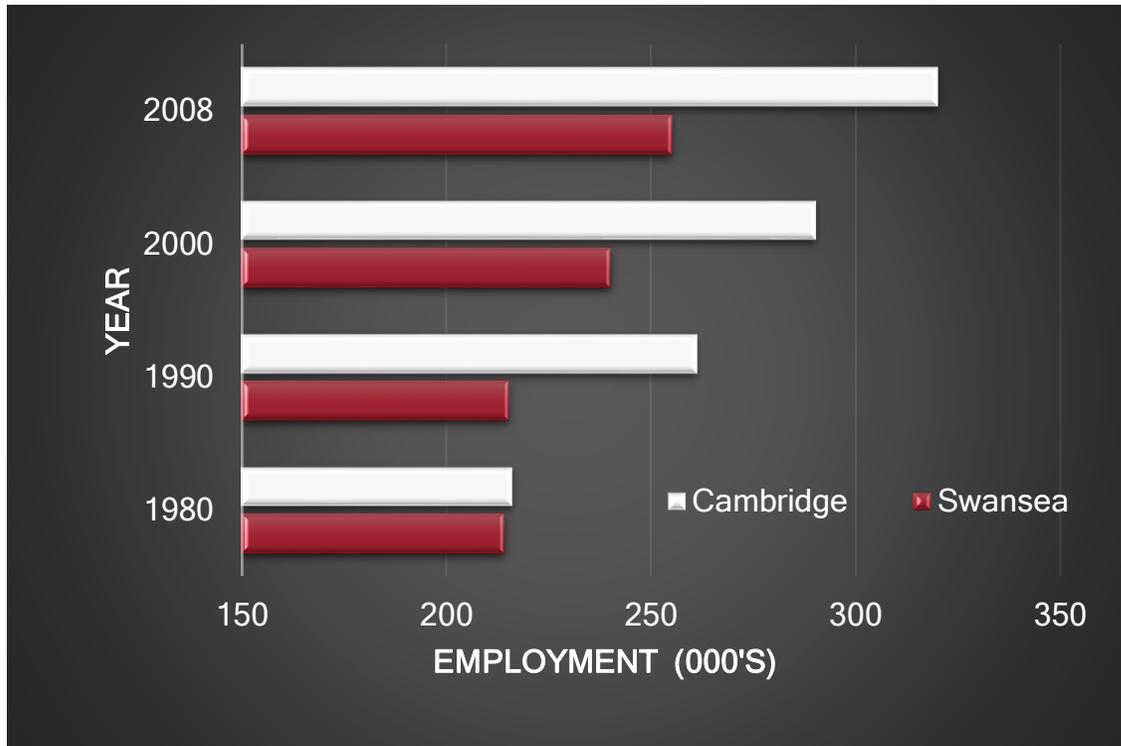


RESOURCE EFFICIENCY
Using less, living better



An illustration featuring a globe of the Earth, a green gear with a tree inside, and other colorful gears.

Socio-Ecological Resilience: Transformation of Cities

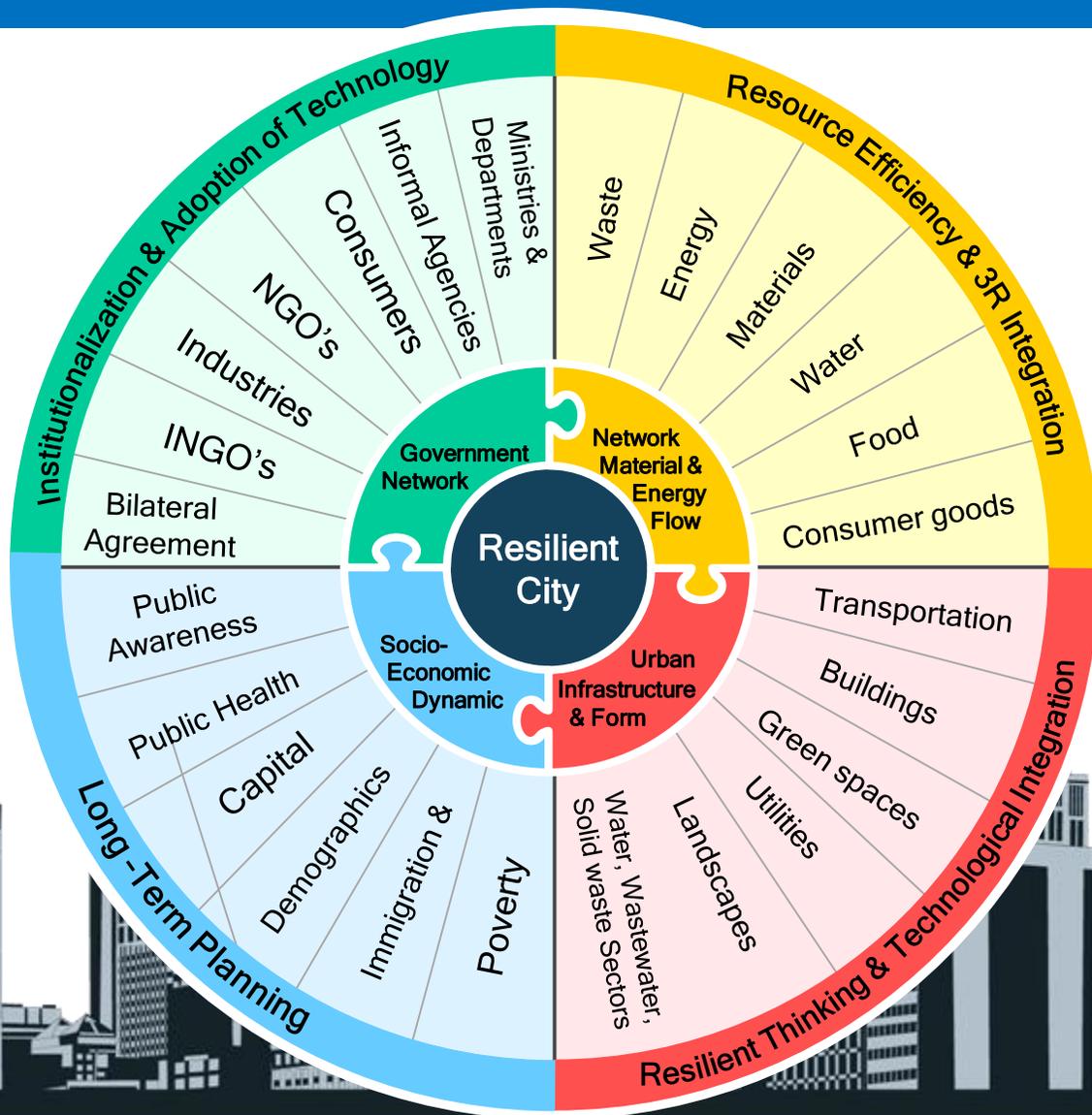


- Hard hit by the declining mining industries in 1980s
- Cambridge and Swansea decided to move to the technology-based economy but took a different approach.
- Swansea invited the Foreign Direct Investment (FDI) from Japanese technological giants
- Cambridge built a science park and capitalized on local entrepreneurship and universities' capacity to innovate.
- Cambridge developed more successfully as a high-tech economy and provided more jobs

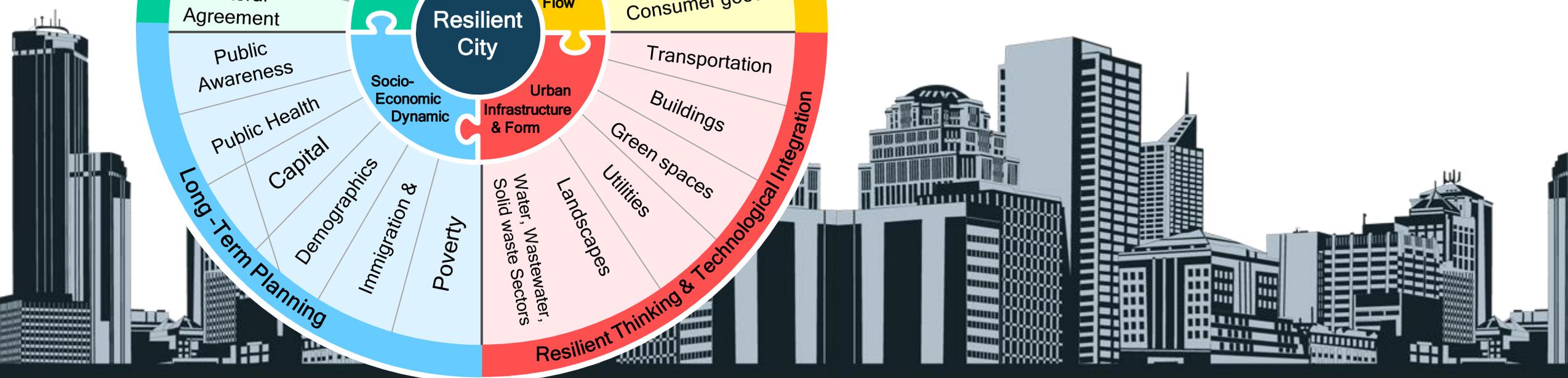


Transformation will be the key for the cities to develop resilience.

Components of Resilient City



- In addition of a strong 3R policies and plans, cities also need a long term vision.
- Technological integration and capacity to absorb the technology in the existing framework is needed.
- Institutionalization further needs long term leadership role



Vertical Farming: Sustainable solution to Cities Food Security



- Sky Green in Singapore runs a vertical farm
- Reduces 95% water and 75% pesticides compared to traditional farming

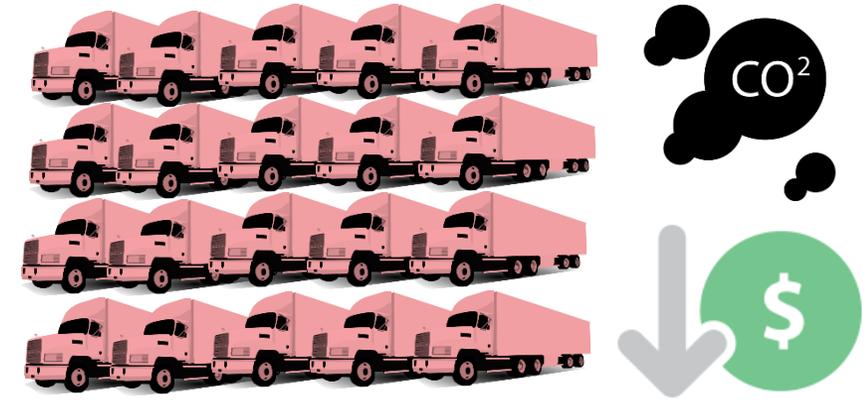
- Farming in cities has advantages
- Firstly it reduces dependency over resources
- Reduces resources lost during the transportation
- Ensures food security
- Fresh food for customers
- Creates jobs within cities
- Improves economy of the city



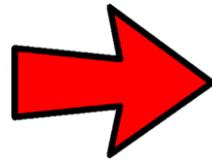
Technological Transformation: Railport of Gothenburg



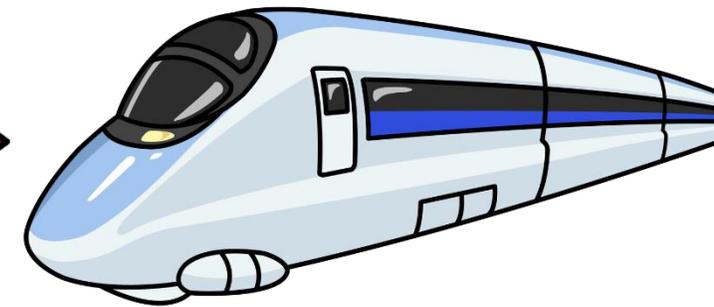
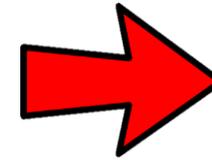
- Port of Gothenburg handles 60% of Sweden container traffic
- Use of rail port has reduced the energy usage by 70%
- 700 trucks has been replaced
- Co-benefit: Cleaner environment, reduced traffic congestion, better commuters health



Trade In



Port of Gothenburg



Transportation of goods by Electric Train

Opportunity of 3R

Opportunities of Resource Efficiency and 3R

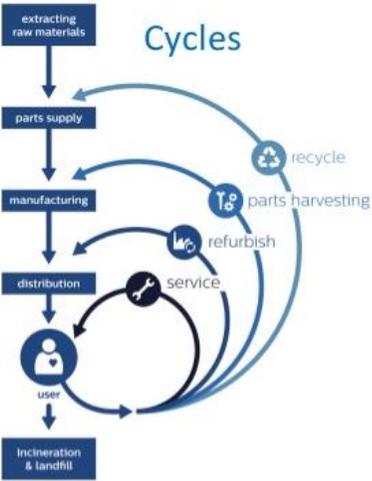
Increased Jobs



Reduced Environmental Impacts



New Business Models



Sustainable Consumption & Production



Independency over Virgin Materials



Increased Jobs



Landfill

6 Jobs

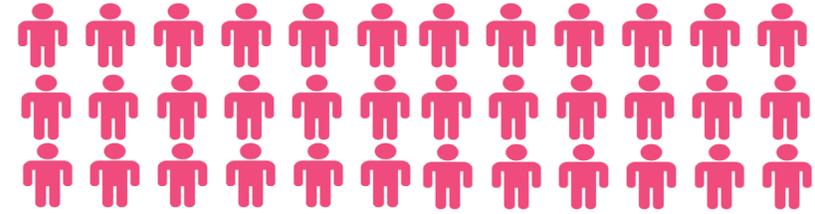
Methane Emission

Bad Odor

Leachate Management

10,000 tons of Waste

36 Jobs



Recycling

Recycling

Reduce Resource Dependency

Low Environmental Pollution

Dragon Bridge, Vietnam: Product as a service

- In Asian culture Dragon is the symbol of power
- Locate in Da Nang: The bridge is in the shape of the dragon and is 610 meter long
- Lighting cost?
- Logistic management cost?
- Maintenance cost?
- Energy cost?
- Location of failed light?
- Skill manpower?



Solution:

Circular Business Model



<http://www.lighting.philips.com/main/cases/cases/bridges-monuments-facades/dragon-bridge.html>

Dragon Bridge: Vietnam



- Da Nang authorities collaborated with Philip to solve this issue
- Philip has installed 2500 intelligent LED lights to lighten the Dragon in different colors
- The dragon can be lighted differently for holidays and festivals
- Philip provided energy efficient and long lasting solution to the Da Nang
- Philip uses remote monitoring, smart asset management, smart dimming by scene setting and intelligent energy metering
- Lighting as a service: Pay for performance

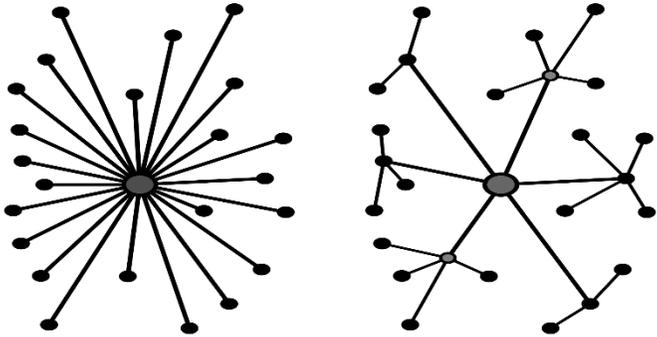
<http://www.telegraph.co.uk/sponsored/lifestyle/innovations/11015933/dragon-bridge-da-nang-vietnam.html>



Resilience Model for Cities



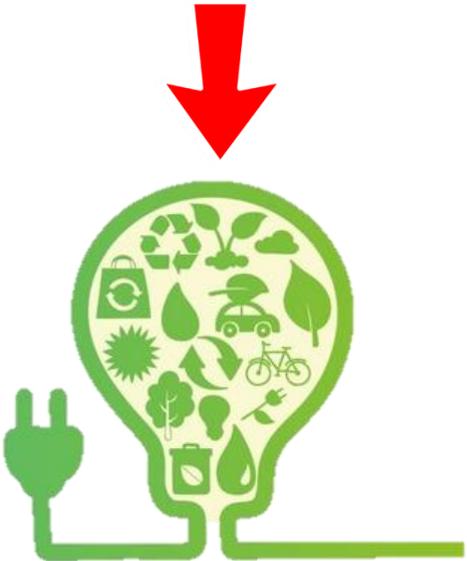
Renewable-Energy City



Distributed City



Carbon Neutral City



Eco-Efficient City



Biophillic City

Renewable-Energy City: City of Adelaide



28% GDP growth



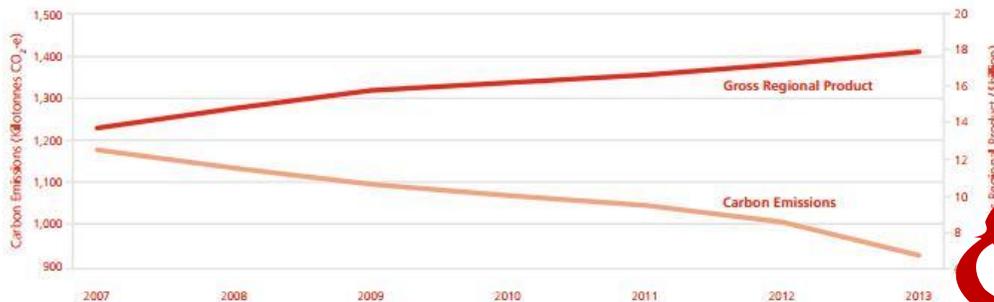
20% GHG reduction



27% Population growth

From 2007 to 2013

CITY OF ADELAIDE 2007 TO 2013 CARBON EMISSIONS AND GROSS REGIONAL PRODUCT



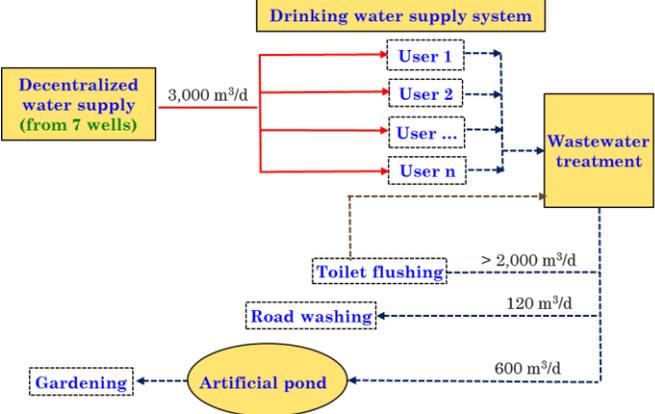
- City focuses on the renewable energy
- Strategy to use clean energy for stationary and transportation sector
- Electric railway
- Community bicycle
- Gas and biodiesel in the bus
- Electric bus
- City produce 41% of electricity from renewable energy

Renewable Energy City focuses on the renewable energy

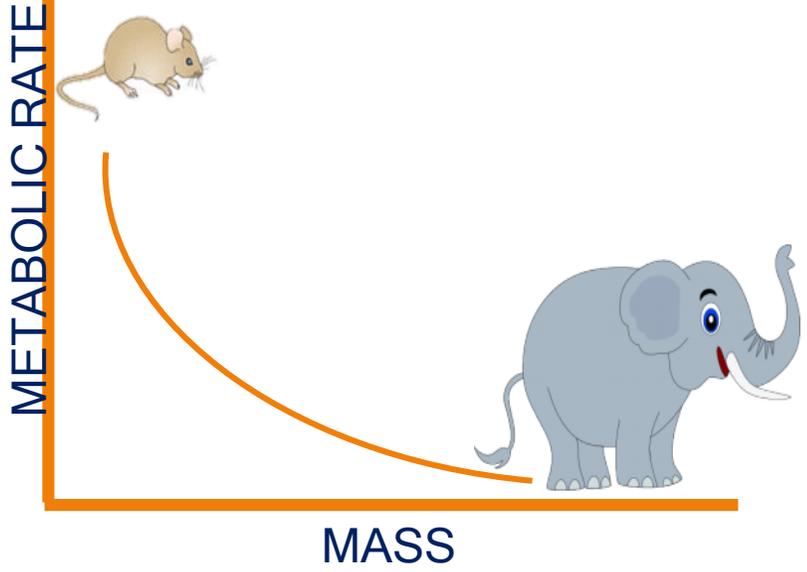
Distributed City: Decentralizing utilities



Household Composting of Organic Waste in Nepal



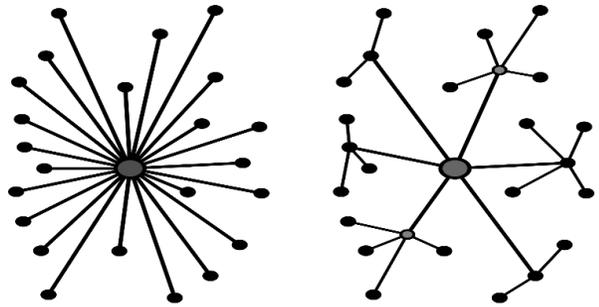
Reuse and recycling of water at Siyuan College



Advanced water treatment



Japan's Fujisawa Sustainable Smart Town



Decentralizing to increase efficiency and reduce risk and cost

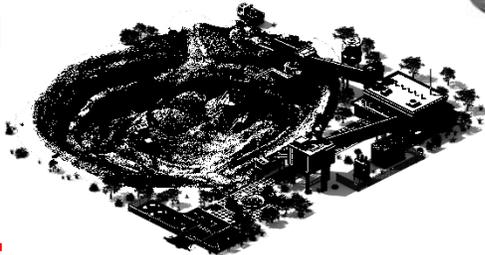
Way Forward... From 3E to 3 R



Elevate consumption



Eliminate used goods to landfill



Exhaust raw resources



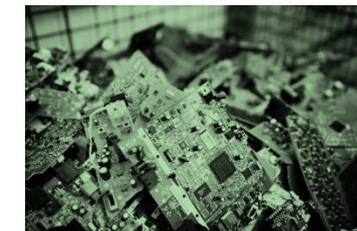
Reduce Consumption



Reuse the goods



Recycle Waste



3E → Vulnerable, polluted and unhealthy Cities

3R → Resilient, clean and healthy Cities



Way Forward: Hurdles to 3R and RE in cities

Behavioral Changes and Policy Developments

Institutionalization

Replication of Technology

Mapping of Resources and Integration of Resource Efficiency

Supporting the Role of Private Sectors



Thank You!