Chapter 15:
Green ICT Projects

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Outline

1. Introduction
2. **Global Green ICT Policy**
    1. Europe
    2. North America
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Introduction

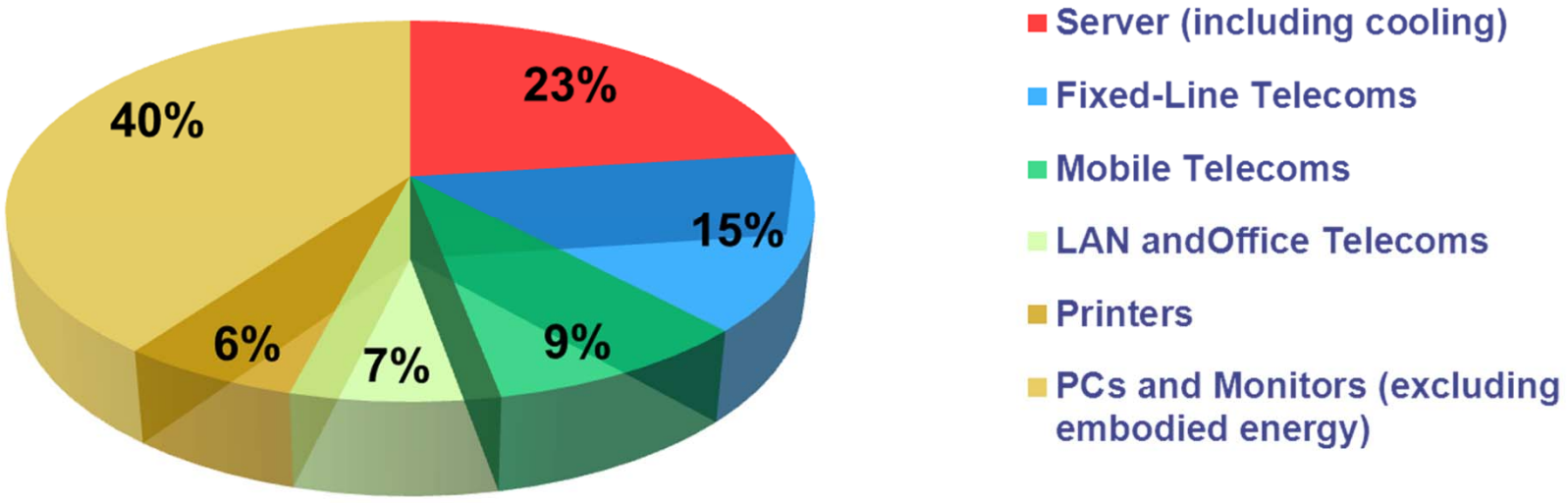
- Global climate change



- The cause of Global Warming:

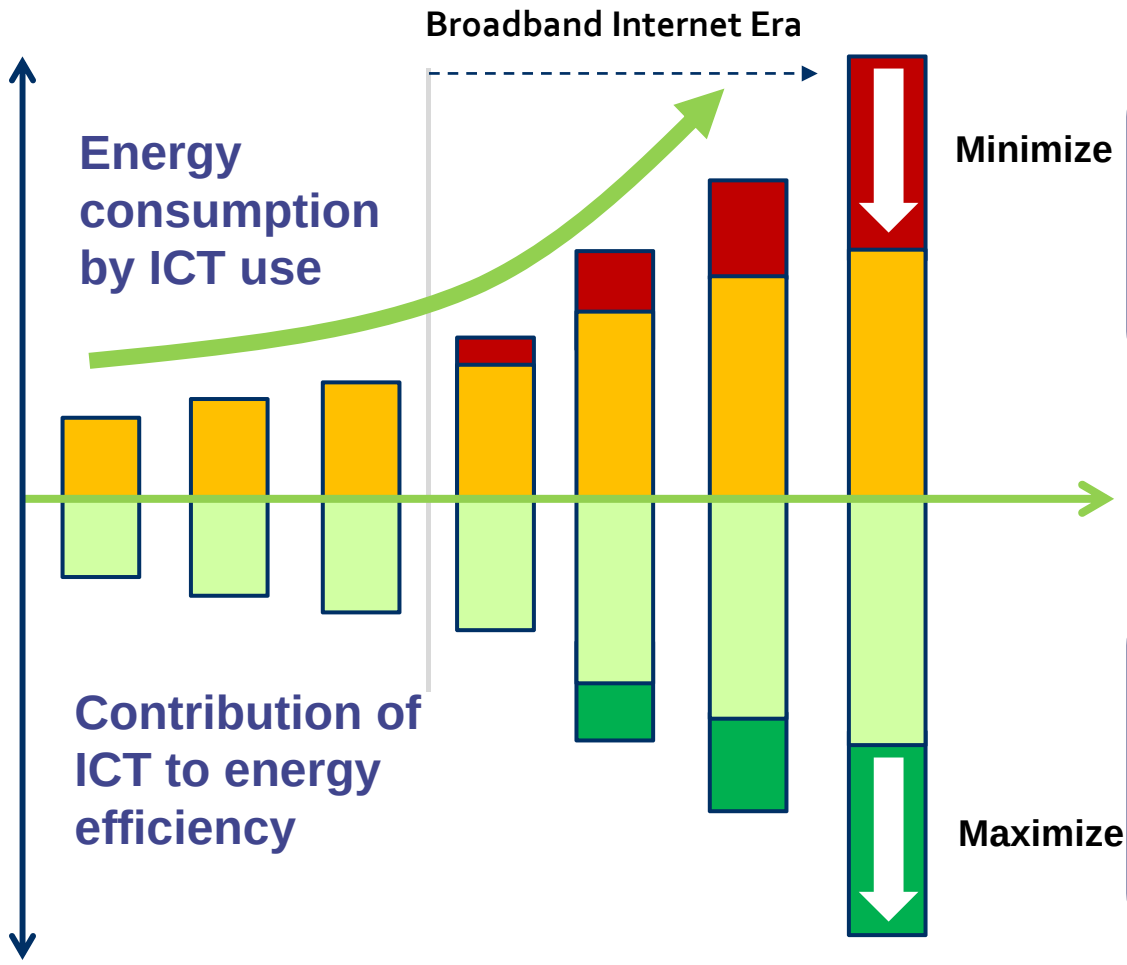
Why Green ICT?

- Information and communication technology (ICT) consumes energy, but is also an important means of conserving energy.
- Global e-sustainable initiative (GeSI) estimates the use of ICTs can help reduce annual global GHGs emission 15 percent by 2020. The reduction corresponds to 7.8 billion tons of CO2 equivalent.



Estimated CO2 emission from ICTs
Source: Gartner Group (2007)

Why Green ICT? (cont.)



Minimize

- Develop innovative energy-saving technologies
- Promote using more energy-efficient products

Sustainable "Green ICT Society"

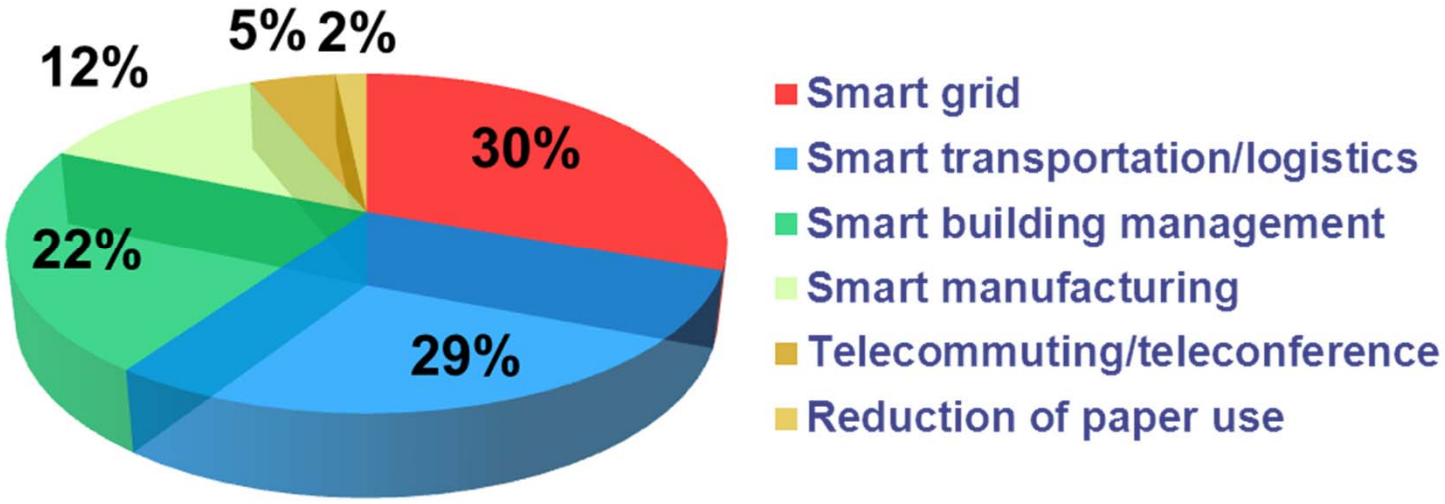
Maximize

- Improve productivity by the introduction of ICT (ex. ERP,SCM, …)
- Introduce ICT-driven energy-saving measures
- (ex. HEMS, BEMS)

How Green ICT?

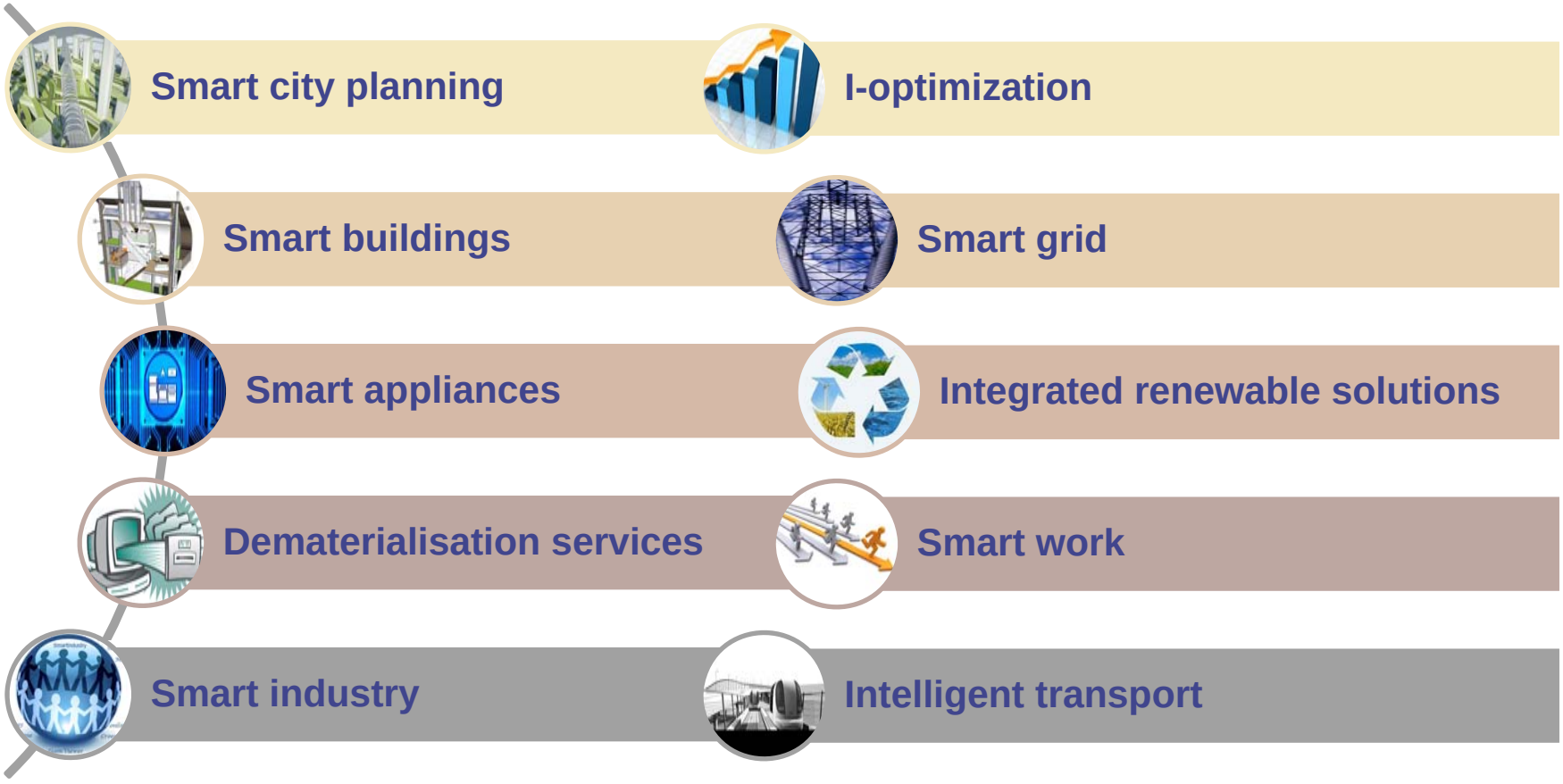
- Green of ICT
  - Making new growth engines from green IT products.
- Green by ICT
  - Designed to help society use less carbon and increase its ability to cope with climate change.

The expected reductions by sectors.

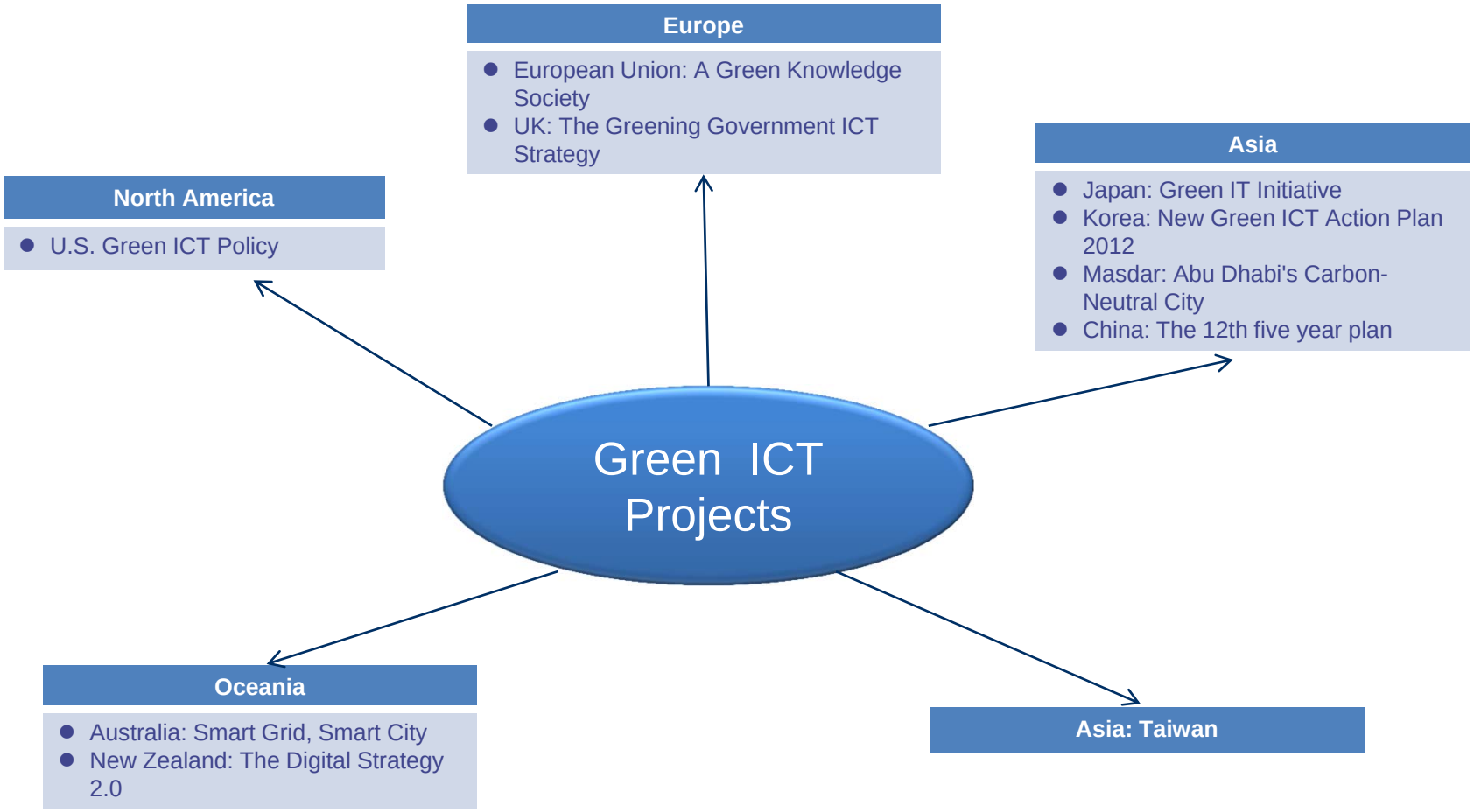


How Green ICT? (cont.)

- World Wildlife Fund (WWF)'s ten solutions areas:



Global Green ICT Policy


Europe
European Union: A Green Knowledge Society
UK: The Greening Government ICT Strategy
North America
U.S. Green ICT Policy
Asia
Japan: Green IT Initiative
Korea: New Green ICT Action Plan 2012
Masdar: Abu Dhabi's Carbon-Neutral City
China: The 12th five year plan
Green ICT Projects
Oceania
Australia: Smart Grid, Smart City
New Zealand: The Digital Strategy 2.0
Asia: Taiwan

Summarization of Global green mobile networks projects

Project	Organizer	Participants	Targets	Working Emphasis
GreenTouch	GreenTouch Consortium	Experts form industry and academia	Telecom networks and mobile networks	• reinvention of telecom networks • sustainable data networks • optical, wireless, electronics, routing, architecture, etc.
Cool Silicon	Silicon Saxony Management	Over 60 global ICT companies and institutes	ICT	• micro-nano-technology • media communication • sensor
Green Grid	8 Main Contributor Companies		Data centers	• data center energy efficiency (design, measurement, metrics)
GSMAMEE	GSM Association Congress	Over 800 mobile operators and 200 companies	200 companies Mobile networks	• benchmarking of mobile energy efficiency networks
Cool IT	GreenPeace	GreenPeace	IT	• leaderboard of IT brands on the contributions to the green IT

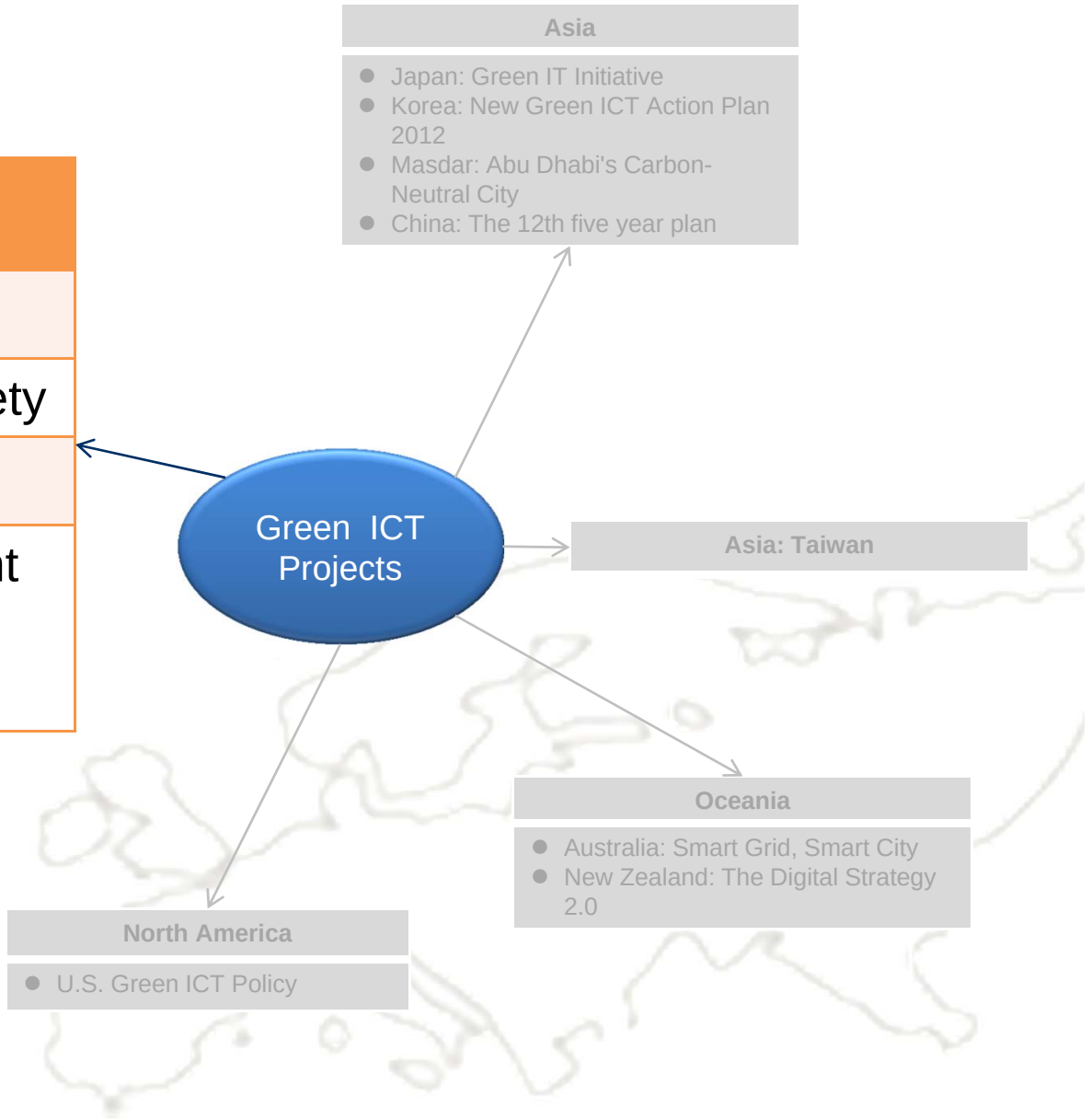
Europe

European Union

- A Green Knowledge Society

UK

- The Greening Government ICT Strategy



European Union: A Green Knowledge Society

- A Green New Deal for Europe :

The knowledge economy	• driver of future wealth
The knowledge society	• participation for all
Green ICT	• support for an eco-efficient economy
Next generation infrastructure	• balancing investment with competition
Soft infrastructure	• investing in social capital
SMEs and ICT	• supporting Europe's small enterprises
A single information market	• enabling cohesion and growth
Revolutionizing eGovernment	• rethinking delivery of public services
Online trust	• a safe and secure digital world
Clear leadership	• rethinking the EU's policy-making process

European Union: A Green Knowledge Society (cont.)

- Three guiding objectives for the Green Knowledge Society set short, medium and long-term directions in each area:
  - short-term: Provide a short-term boost in response to the current economic crisis, laying the platform for a long term more competitive economy, based on knowledge assets.
  - medium-term: Build an inclusive society for all.
  - long-term: Give impetus to the urgent pursuit of a sustainable, eco-efficient economy.

European Union: A Green Knowledge Society (cont.)

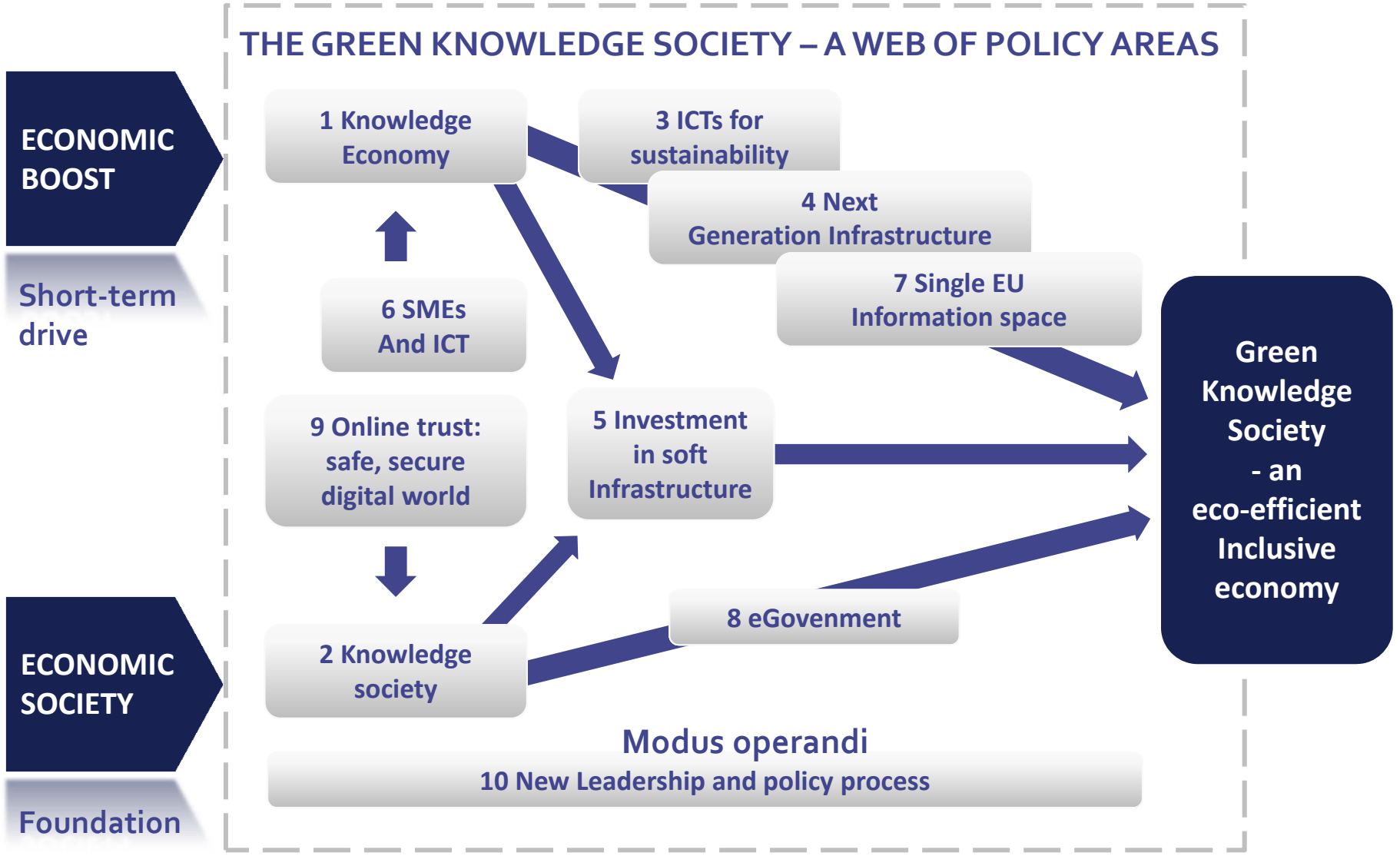


Figure 1. The Green Knowledge Society: its three main goals and supporting policy areas

UK: The Greening Government ICT Strategy

- Targets:
  - In line with the existing Sustainability on the Government Estate (SOGE) targets and SOGE definition for carbon neutrality, the energy consumption of government ICT on the office estate will be carbon neutral by 2012.
  - Government ICT will be carbon neutral across its lifecycle by 2020.
- Detail key activities for the Green ICT Delivery Unit through to 2020, including:
  - the development of common measures of delivery
  - work to be undertaken internationally to agree common product standards and requirements, and
  - the development of mandatory minimum green standards for ICT products and services.

UK: Green Radio

- Given the worldwide growth in the number of mobile subscribers, the move to higher data rate mobile broadband and the increasing contribution of information technology to the overall energy consumption of the world, there is a need on environmental grounds to reduce the energy requirements of radio access networks
- Targets:
  - Base station and handsets of mobile data service
- Working Emphasis:
  - power amplifier, power efficient processing
  - backhaul redesign, multi-hop routing, relaying
  - resource allocation, dynamic spectrum access

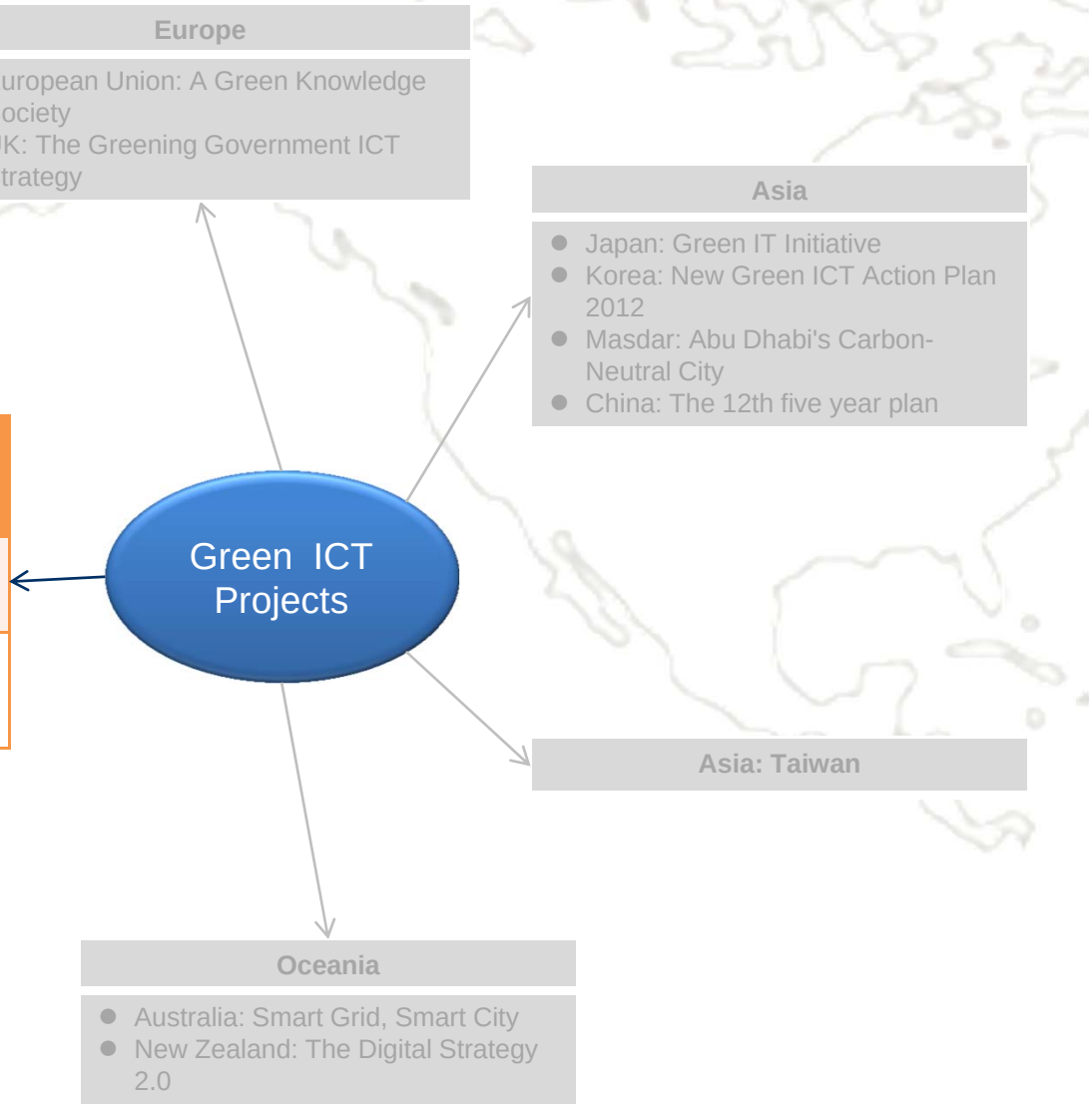
Europe

Project	Organizer	Participants	Targets	Working Emphasis
EARTH	European Commission FP7 IP(3 years / 15 million)	European main mobile operators and research organizations	Mobile networks	• energy aware radio and network technology • energy-efficient deployment, architecture, adaptive management • multi-cell cooperation
OPERA-Net	CELTIC / EUREKA(3 years / 5 million)	European main mobile operators	Mobile networks	• heterogeneous broadband wireless network • mobile radio access network • link-level power efficiency, amplifier, test bed
GREEN-T	CELTIC(3 years / 6 million)	European main mobile operators	Mobile networks(particularly 4G)	• multi-standard wireless mobile devices • cognitive radio and cooperative strategies • QoS guarantee

North America

U.S.

- Green ICT Policy



U.S. Green ICT Policy

- Telecommunications Industry Association (TIA)
  - ICT is in a “sweet spot” because it both decreases operating costs and carbon emissions.
  - Most significant business opportunities follow where ICT is part of the solution.
  - Government policy is significantly shaping the Green ICT market. TIA is actively engaged in the policy making process.
- TIA Green standards
  - Smart Grid
  - Smart devices
  - Cabling and data centers

U.S. Green ICT Policy (cont.)

- Obama's Smart Grid plans
  - Building the 21st Century Electric Grid
  - Information networks applied to applications to dynamically optimize the operation, maintenance, and planning of electrical systems.
- The American Recovery and Reinvestment Act (ARRA) contains investments critical to spurring the Smart Grid development process.

U.S. Green ICT Policy (cont.)

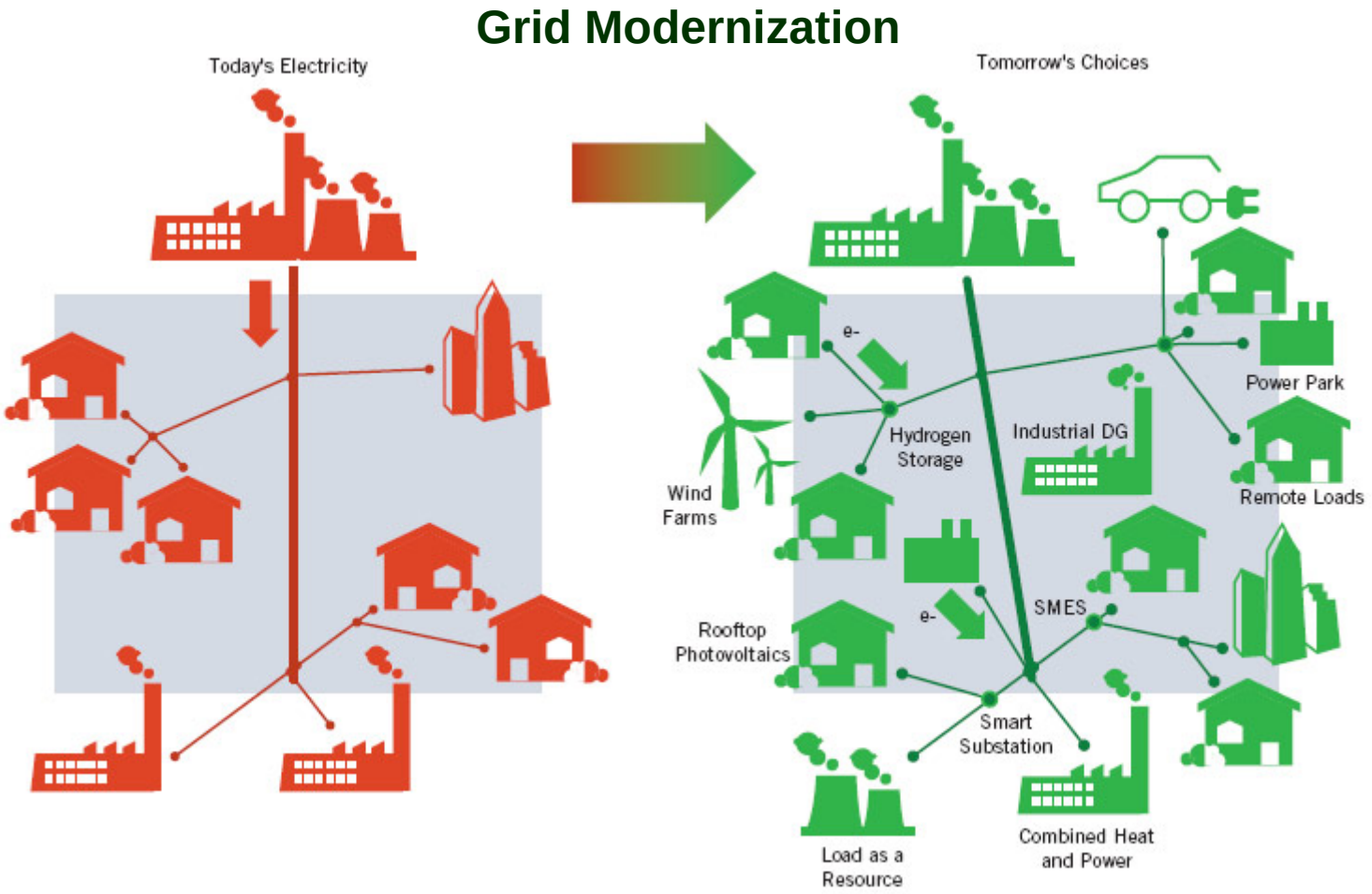


Figure 1. The IEEE's version of the Smart Grid involves distributed generation networks, and coordination, a drastic change from the existing utility configurations.

U.S. Green500

- To provide a ranking of the most energy-efficient supercomputers in the world.
- For decades, the notion of “performance” has been synonymous with “speed”, led to the emergence of supercomputers：
  - consume egregious amounts of electrical power
  - produce so much heat that extravagant cooling facilities must be constructed to ensure proper operation
  - reliability, availability, and usability to be largely ignored
- The Green500 offers lists to encourage supercomputing stakeholders to ensure that supercomputers are only simulating climate change and not creating climate change.

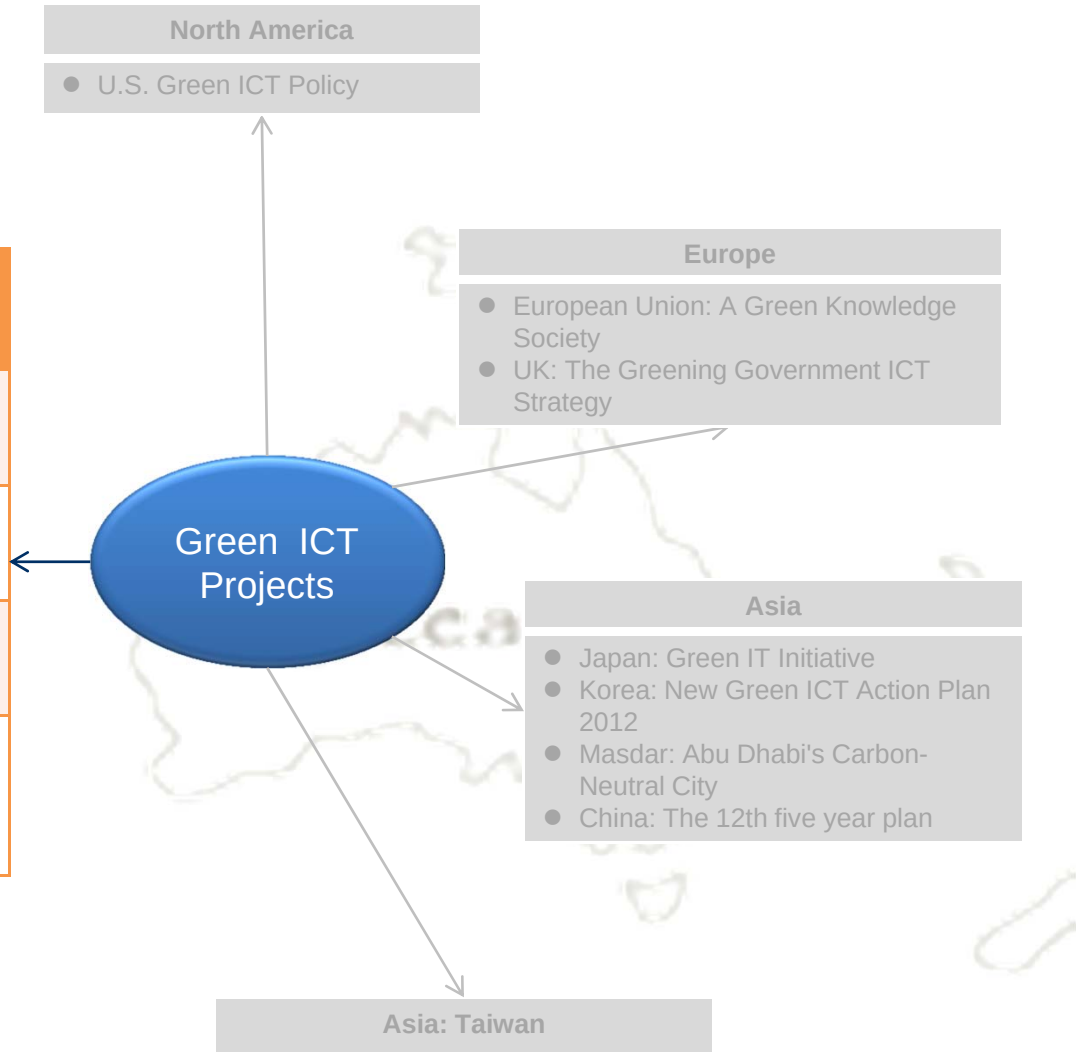
Oceania

Australia

- Smart Grid, Smart City

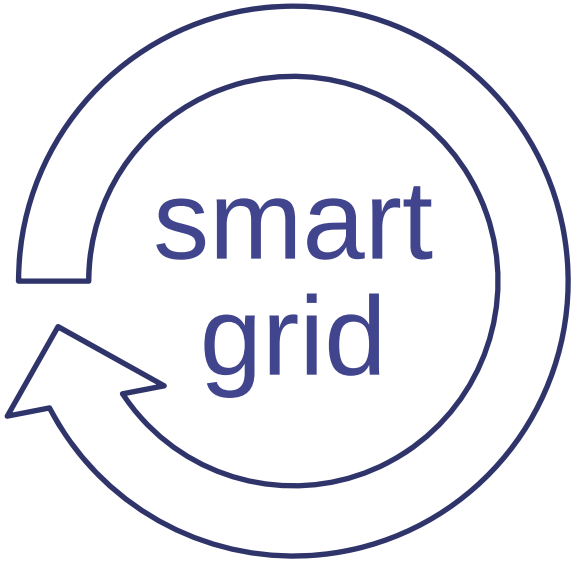
New Zealand

- The Digital Strategy 2.0



Australia: Smart Grid, Smart City

- Australia ‘s issues
  - installed generation capacity and network infrastructure
  - line loss and fault detection, isolation and restoration
  - highest per-capita greenhouse gas emission rates



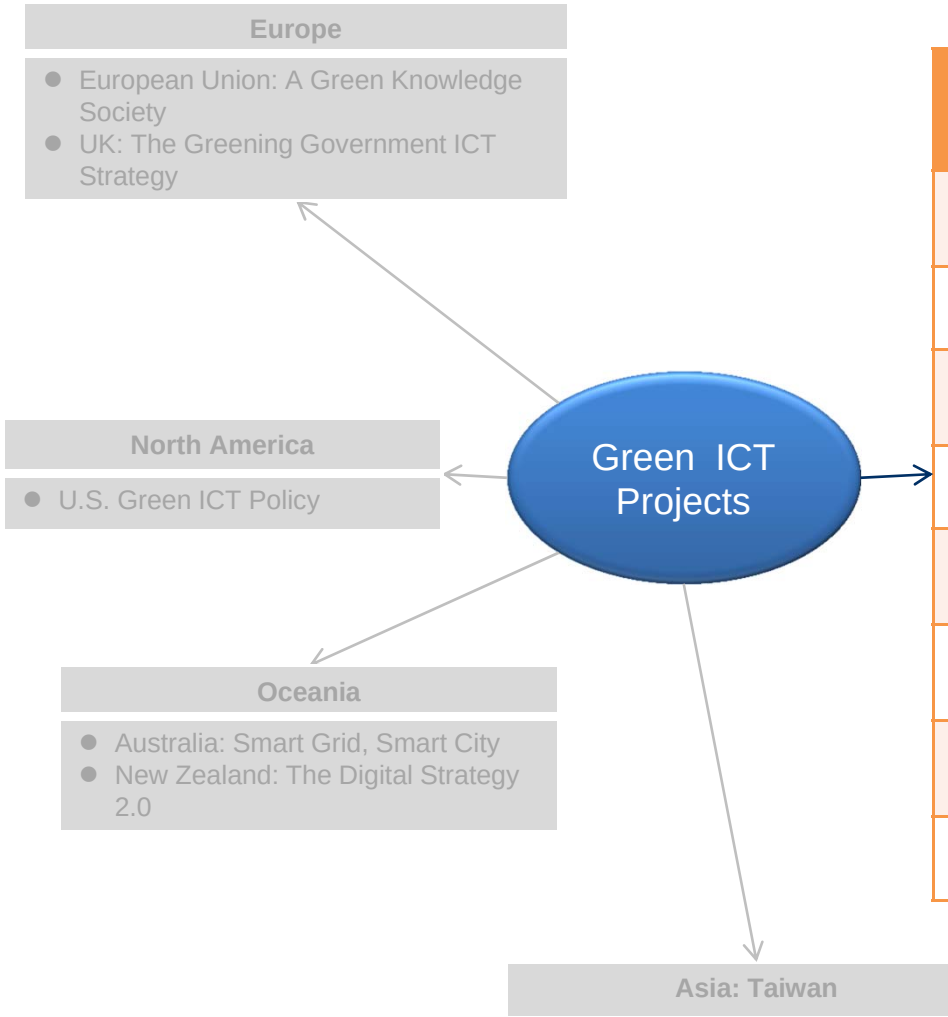
- Direct financial impact
- Reliability
- Environmental
- Customer empowerment

New Zealand: The Digital Strategy 2.0

- Smarter through digital:
  - the economy
  - the environment
    - Increase uptake of teleworking across government and businesses.
    - Accelerate the adoption of videoconferencing.
    - Advisory guidelines for advanced Meter infrastructure (aMi) systems.
    - Promote energy-efficient ICT products.
  - communities and culture

Global Green ICT Policy

- Europe
- North America
- Oceania
- Asia
  - Japan: Green IT Initiative
  - Korea: New Green ICT Action Plan 2012
  - Masdar: Abu Dhabi's Carbon-Neutral City
  - China: The 12th five year plan
- Asia: Taiwan



Asia

Japan:

- Green IT Initiative

Korea

- New Green ICT Action Plan 2012

Masdar

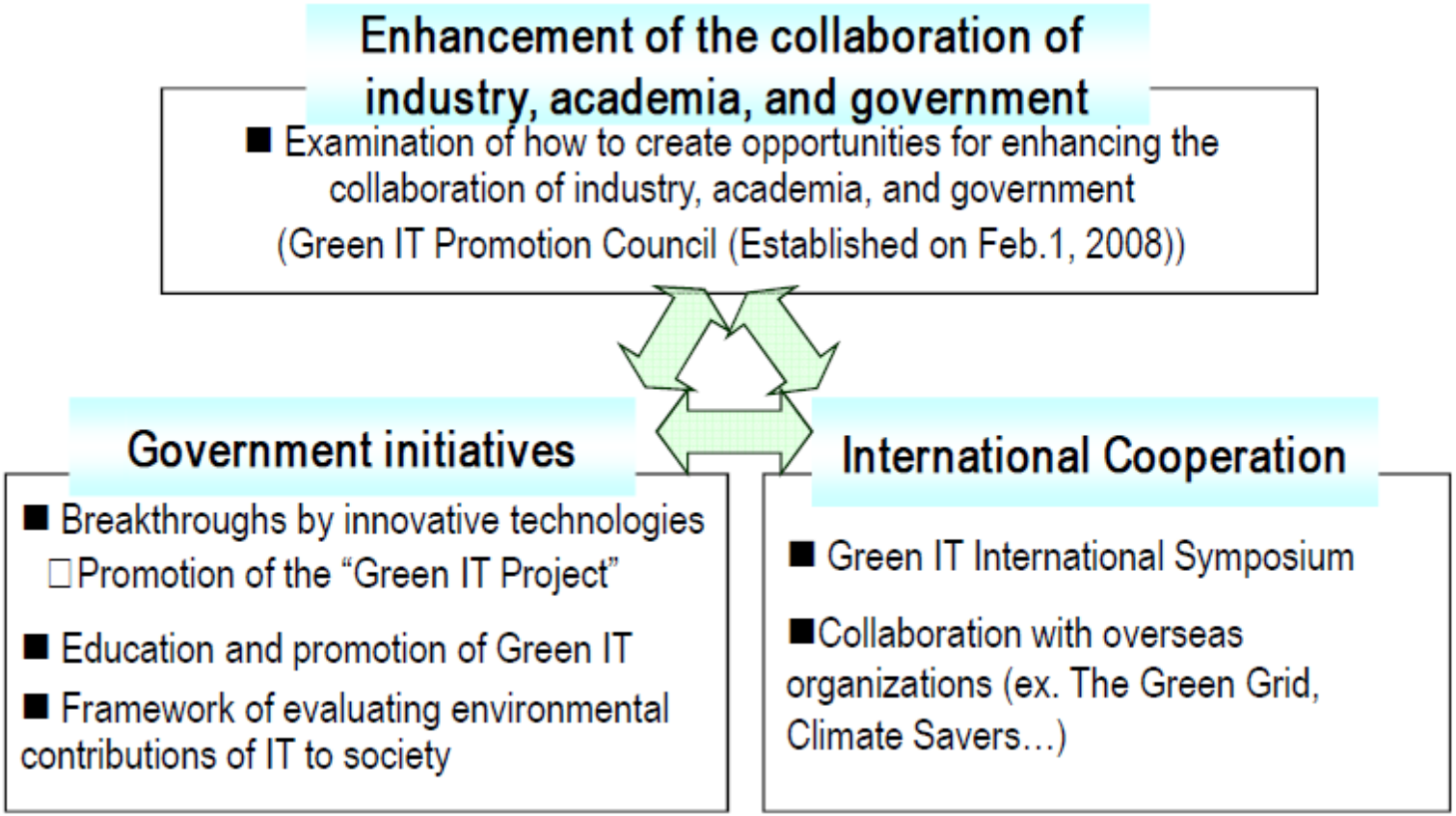
- Abu Dhabi's Carbon-Neutral City

China

- The 12th five year plan

Japan: Green IT Initiative

- Japan's "Green IT" concept focuses on both Saving energy of IT and Energy-efficient society by IT.



Japan: Kurihara Green ICT Project

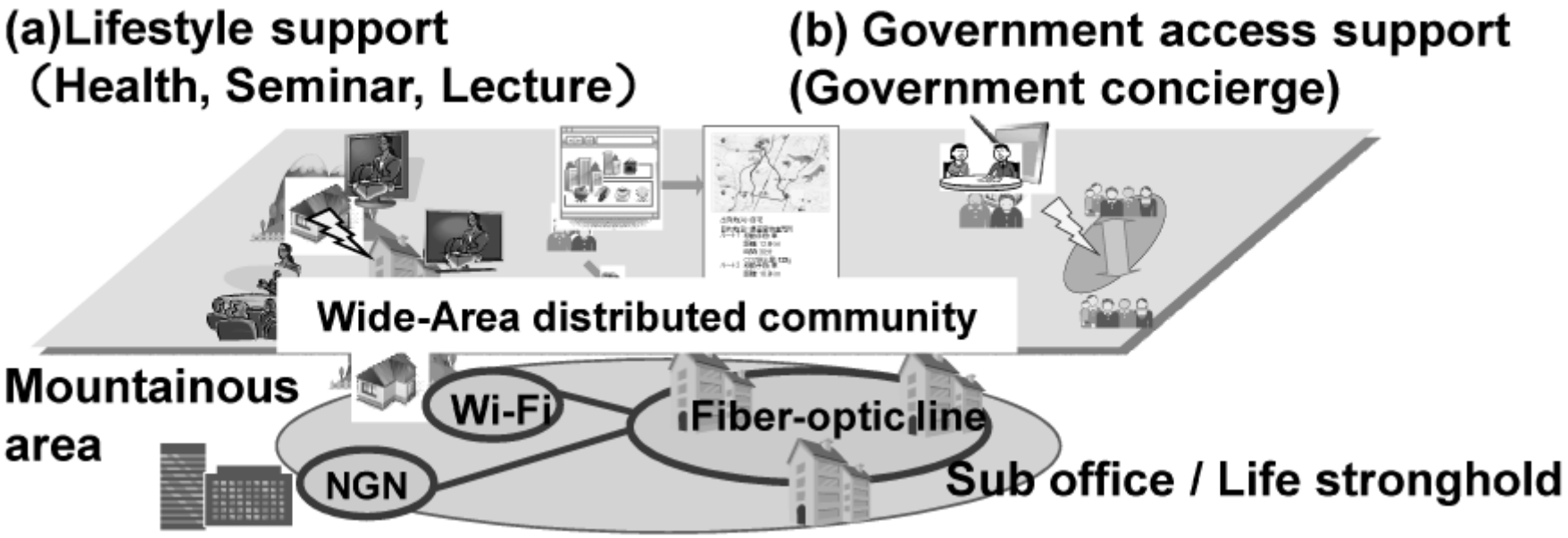
- To conduct a real-world experiment in the community based field to test the technical specification of necessary communication protocol.
- To realize network integration control system aimed at community development to reduce environmental burden in the wide-are distributed community.

urban area

rural area

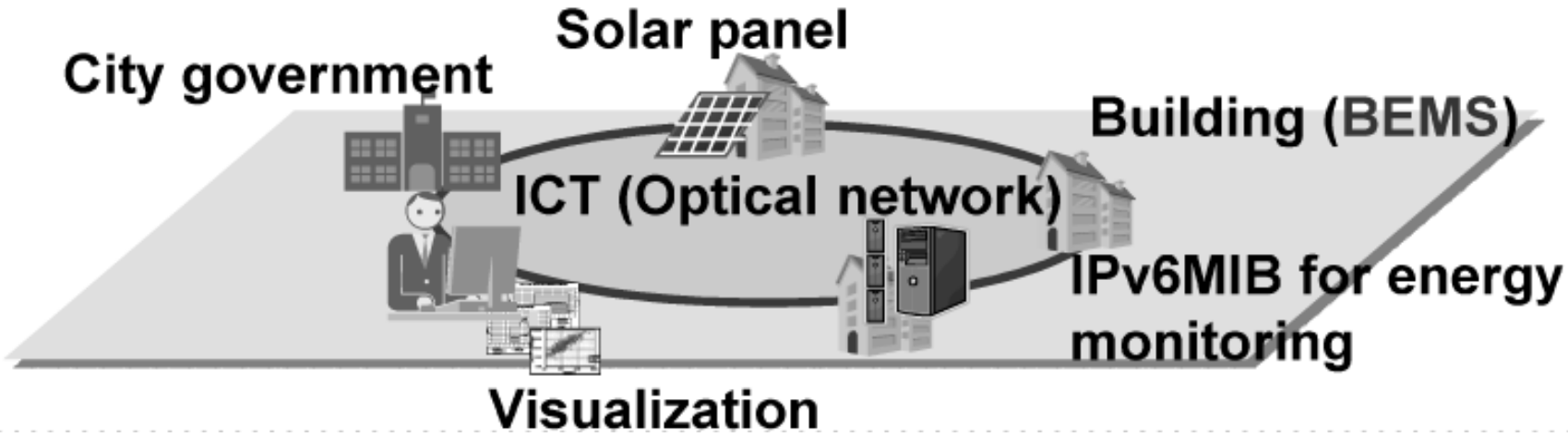
Objectives

- Theme 1: Integrated system that can enable smooth cooperation among various type of network in a wide-area distributed community/offices.



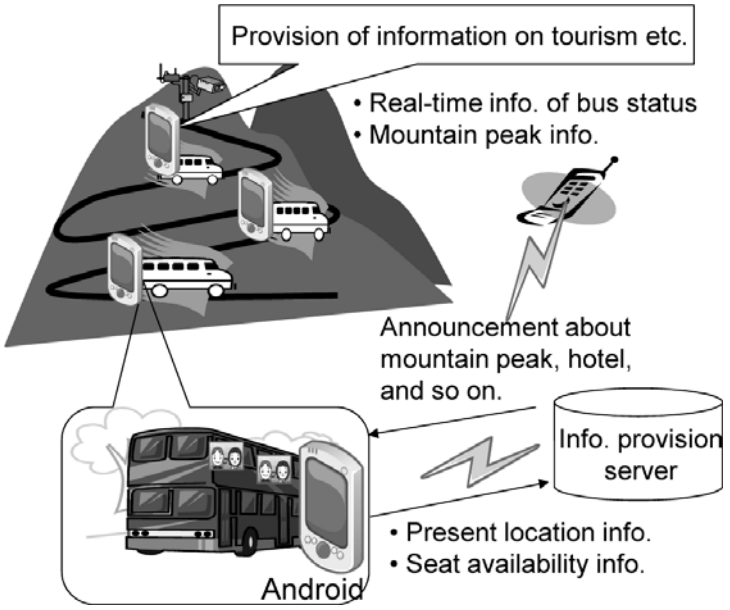
Objectives (cont.)

- Theme 2: Network management system for reducing environmental burden of wife-area distributed community.



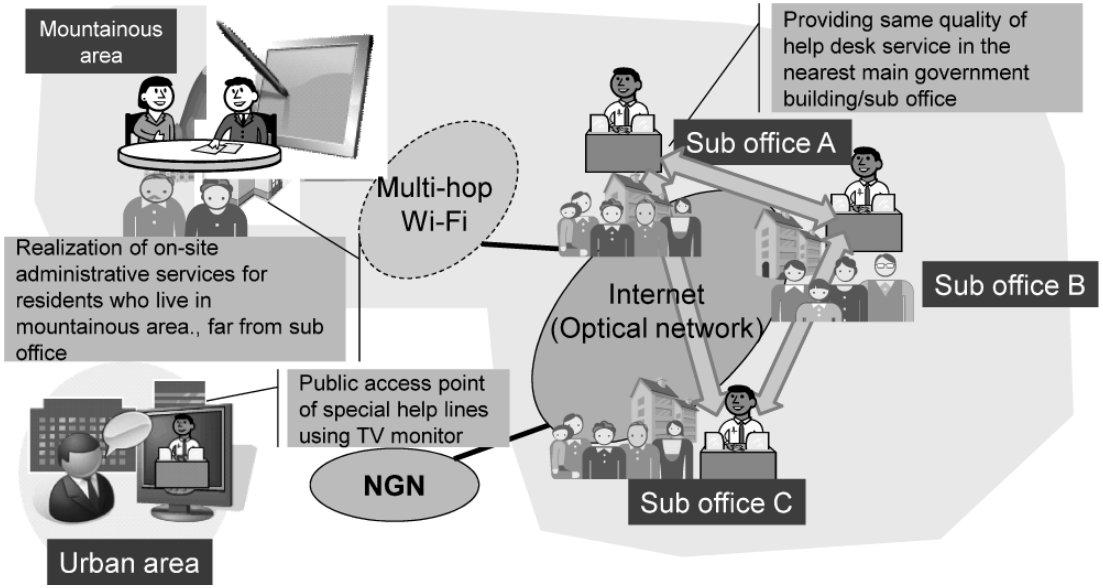
Lifestyle Support Network System

- Multivendor Interconnection of HD Video Conference System
  - Reduction of CO_2, produced by mobility of people with cars
- Park-and-Ride System
  - Reduce traffic jams.
  - Promotion of utilization of public transportation to neighborhood places.
  - Reduce CO_2 emissions.



Administrative Access Support Network System

- Support network system provides administrative concierge services.
- Reducing geographical distance by moving the help-desk service.
- Minimizing environmental burden by reducing the traveling of people in terms of both distance and frequency.



Network Management System

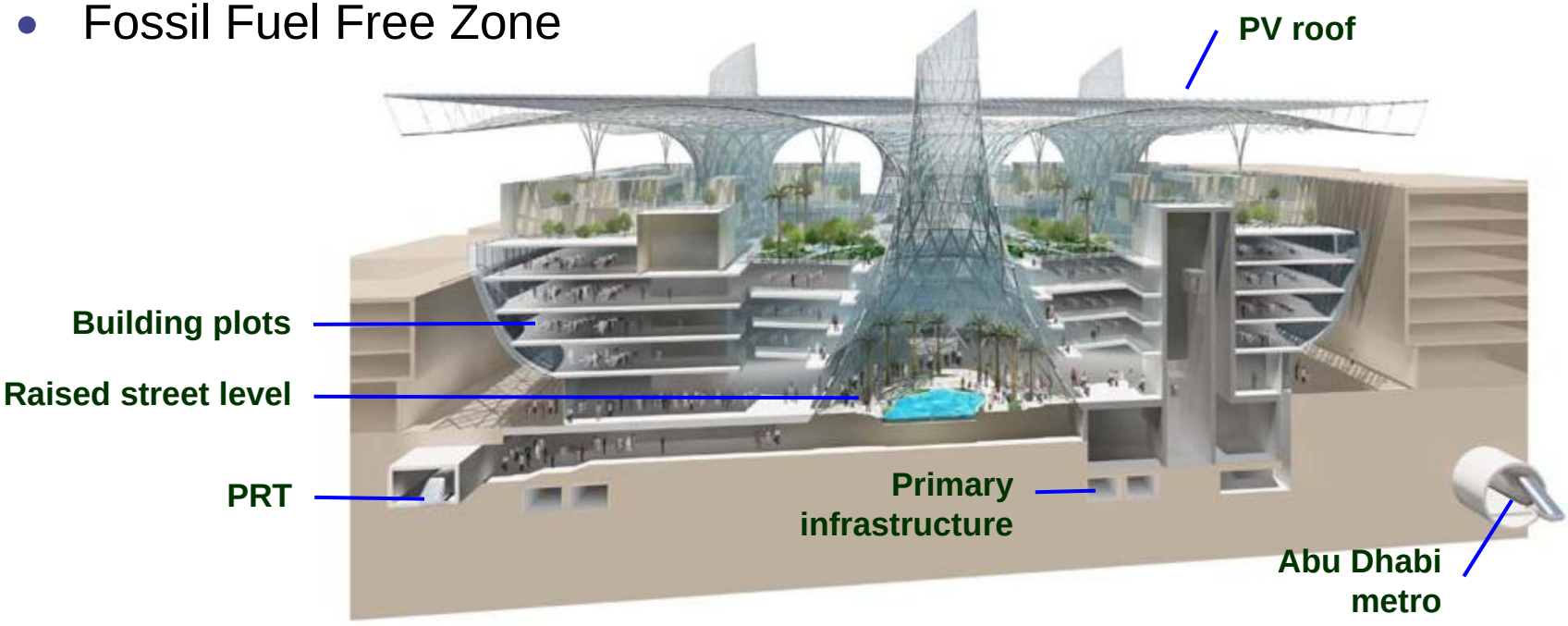
- To reduce the environmental load of distributed widely spread area.
- Monitoring energy consumption of
  - ICT by IPv6 MIB (Management Information Base).
  - Consumption of the building.
- IPv6-MIB for Energy Monitoring Power Consumption of ICT System
- Energy Consumption Monitoring System of Building
- Data Integration System of ICT Devices and Buildings

Korea: New Green ICT Action Plan 2012

- The Korean government's Ministry of Public Information and Security issued a "Green ICT Action Plan 2012" 15 January 2009. This aims for a 10% reduction of carbon emissions by 2012.
- Major (Education) Contents:
  - Promote making information resources green.
  - Realize IT-based green government in the public government offices and in the administrative works.
  - Promote the transformation toward the green society.
  - Establish the basis of green information society .

Masdar: Abu Dhabi's Carbon-Neutral City

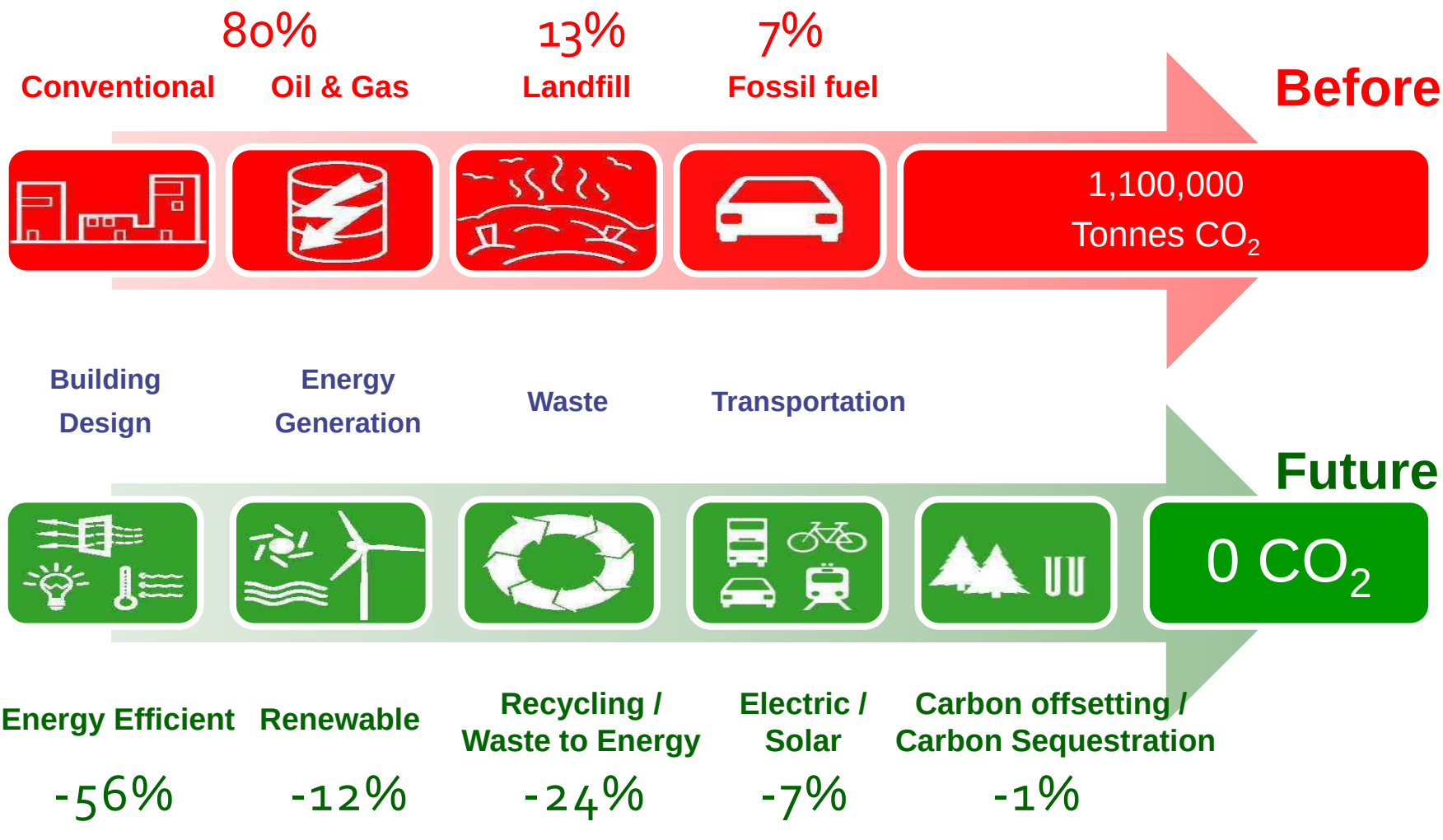
- A Sustainable City providing the highest quality of life with the lowest environmental footprint.
  - 100% Renewable Energy
  - Zero Waste
  - Net Zero Carbon
  - Fossil Fuel Free Zone



Masdar: Abu Dhabi's Carbon-Neutral City (cont.)

- New technologies in :

Masdar: Abu Dhabi's Carbon-Neutral City (cont.)



China: The 12th five year plan

- WWF's 12th five-year plan project has three objectives to
  - To provide information about the process and structure for the formulation of China's Major Plans and Programs 2008-2010 and onwards.
  - To clarify where in the process formal input for the different plans and programs are to be expected.
  - To clarify when Chinese decision makers might look for different kinds of information .
- In order to illustrate the different plans and projects two fictive cases will be used.
  - Sustainable building: Special focus on Export opportunities from solutions and equipment associated to sustainable buildings.
  - Videoconferencing/Virtual meeting service: Export opportunities sustainable ICT solutions

China: Low Carbon of China

- National Pilot Program on Low-Carbon Provinces and Cities.
  - five provinces –Guangdong, Liaoning, Hubei, Shaanxi and Yunnan
  - eight cities – Tianjin, Chongqing, Shenzhen, Xiamen, Hangzhou, Nanchang, Guiyang and Baoding

China: Low Carbon of China (cont.)

include work on climate change in their local five-year plans and formulate low-carbon development plans

formulate supporting policies to facilitate low carbon development

accelerate the establishment of low-carbon industrial structure

establish a statistics and information management system for GHG emissions

actively promote low-carbon lifestyle and consumption patterns in order to reduce GHG emissions

Asia

- Japan: Green IT Initiative
- Korea: New Green ICT Action Plan 2012
- Masdar: Abu Dhabi's Carbon-Neutral City
- China: The 12th five year plan

Europe

- European Union: A Green Knowledge Society
- UK: The Greening Government ICT Strategy

Green ICT Projects

North America

- U.S. Green ICT Policy

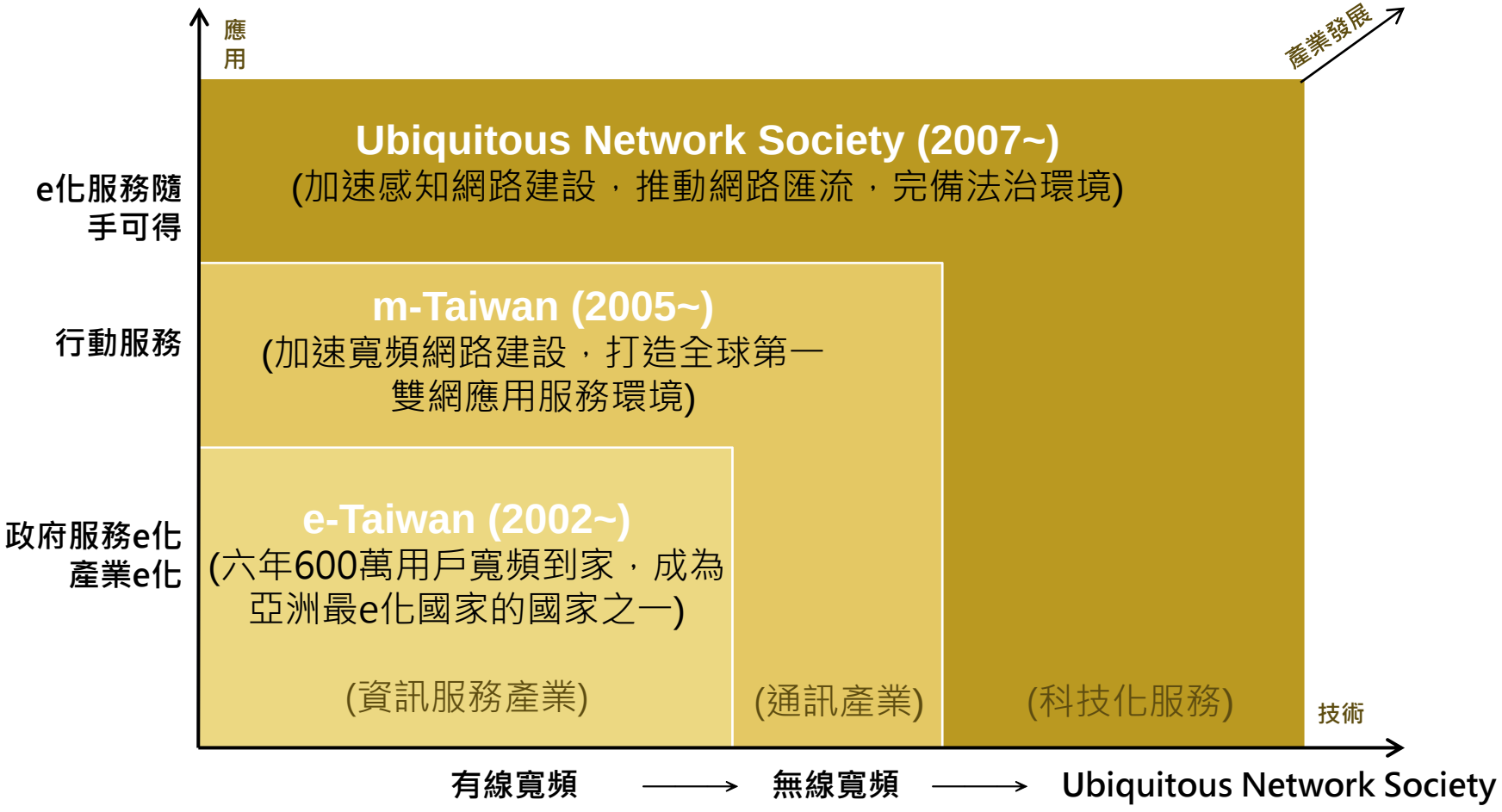
Oceania

- Australia: Smart Grid, Smart City
- New Zealand: The Digital Strategy 2.0

Asia: Taiwan

Asia: Taiwan

- 台灣資通訊建設發展：從 e 到 m 到 U



Asia: Taiwan

建設智慧化資訊基礎

- 寬頻匯流網路
  - 高速無線寬頻網路
  - 匯流網感知網路
  - 物件無縫速網

推動智慧化生活創新應用

- 主動貼心服務
  - 使用者觀點
  - 重視非PC族群
  - 科技化服務解決生活議題
- 綠色節能減炭
  - 環保建築
  - ICT創新科技提升生活品質與產業效能

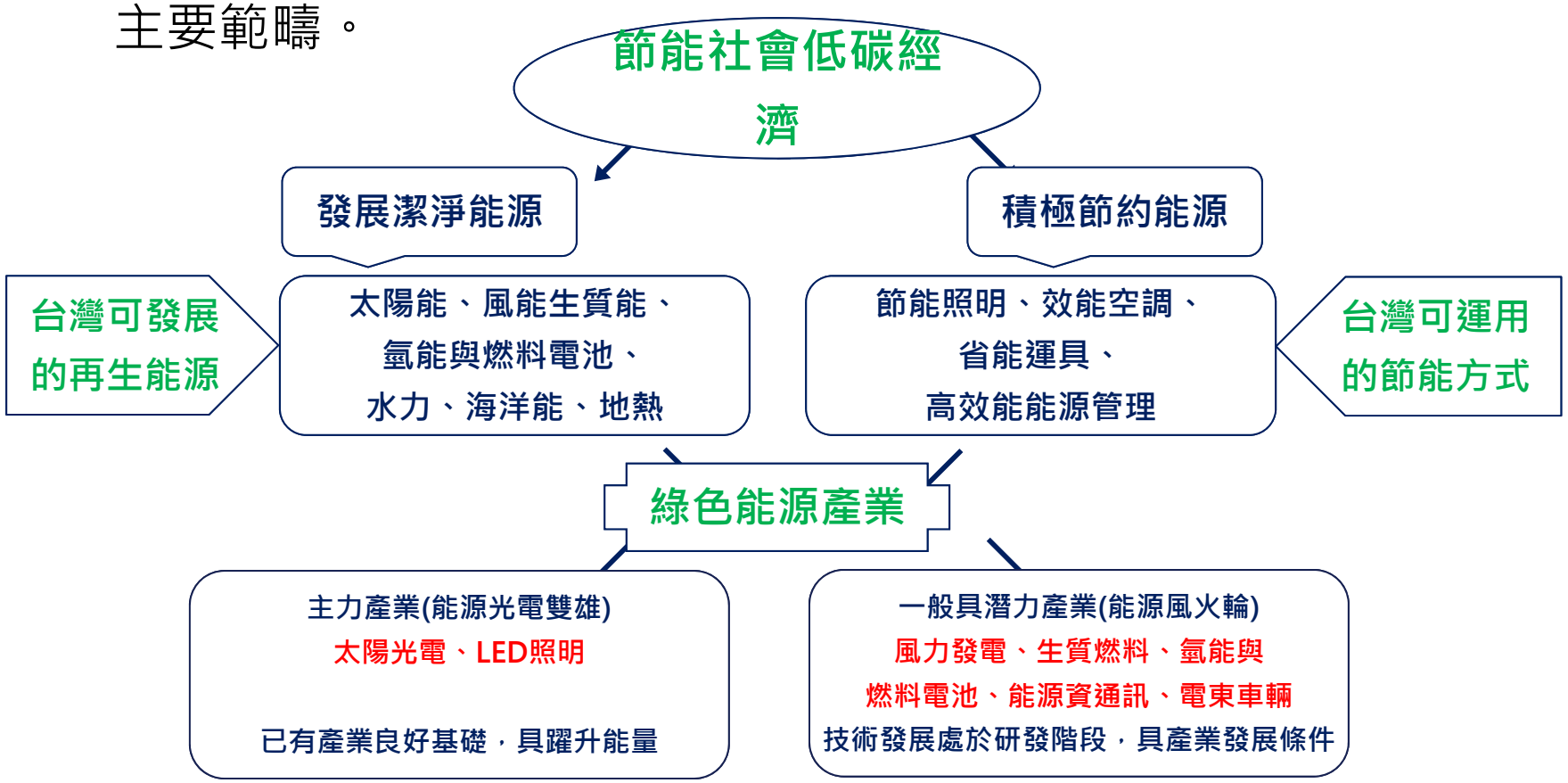
落實文化創意與人才培育

- 文化生活美學
  - 提升民眾生活內涵與素養
  - 深耕美感環境
  - 結合文化、觀光與科技
- 落實適性育才
  - 充實產業所需多元人才
  - 推動終身學習

智慧台灣核心概念

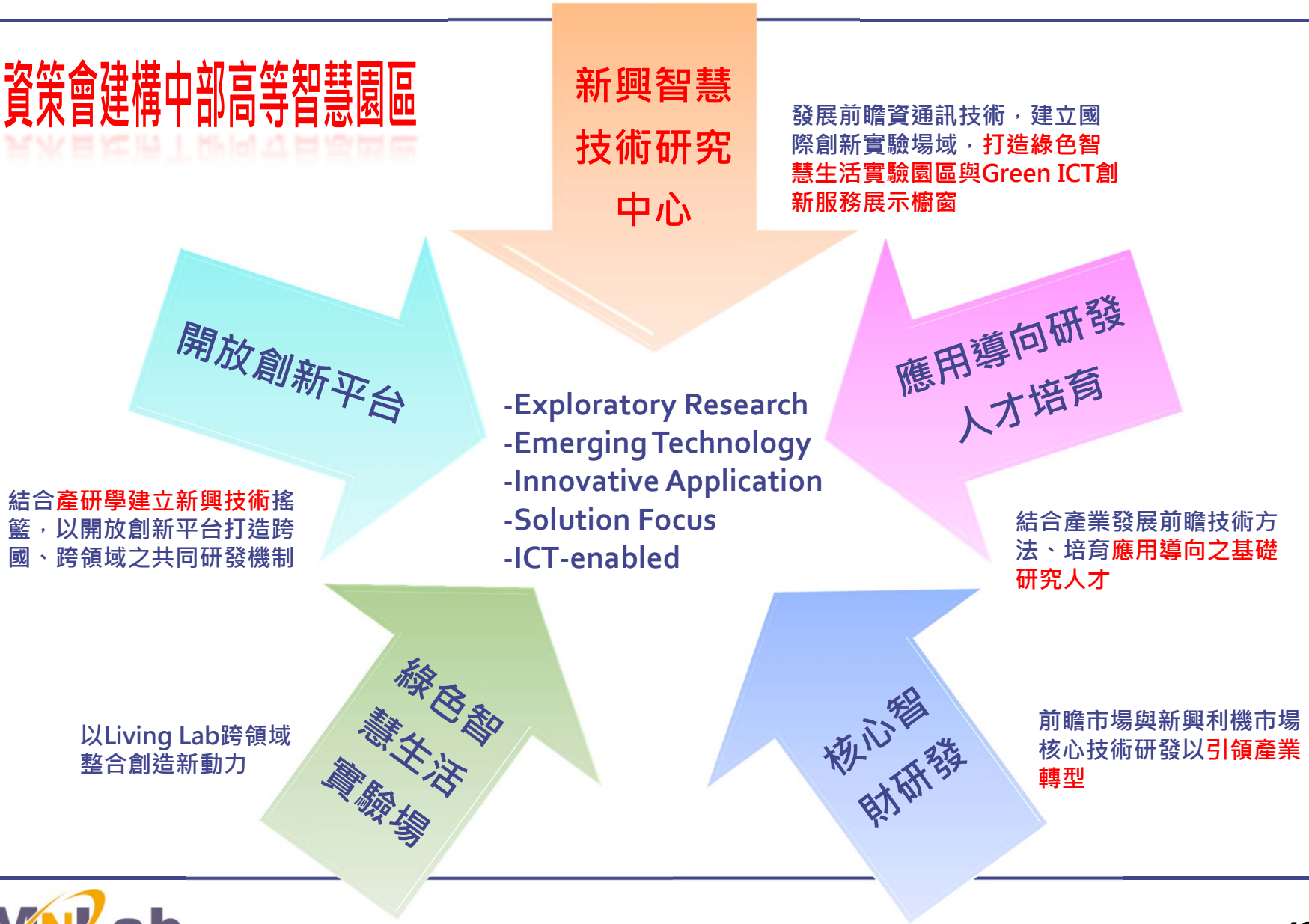
Asia: Taiwan (cont.)

- 2009 年經濟部能源局成立「綠色能源產業服務團」，並設置「綠色能源產業資訊網」，依太陽光電、LED照明、風力發電、生質燃料、氫能與燃料電池、能源資通訊、電動車輛七項綠能領域為主要範疇。



Asia: Taiwan

資策會建構中部高等智慧園區



Asia: Taiwan

- 2009年全國能源會議：建設「智慧型電網及電表」。結合資通訊系統，建立電力用戶的能源管理平台，達成節能減碳願景。
- 國內市場現況與趨勢：台電公司已著手台灣智慧電網的規劃與推動，並於 2008 年開始建設計畫的推動，是台灣智慧電表市場成長的重要契機，該計畫預計分為三階段推動：
  - 第一階段 (2008~2009 年)：
    以特高壓用戶為主，並納入高壓和低壓用戶各 300 戶。
  - 第二階段 (2010~2011 年)：
    完成高壓用戶共約 23,000 戶之自動讀表系統建置。
  - 第三階段 (2011 年~未定)：
    檢討評估低壓用電戶系統推動方式，逐步推動建置。
- 目前台電所規劃的方案仍以工業及商業用戶為主，佔總電表市場 97% 的表燈用戶 (營業/非營業用) 尚未納入規劃中。

Question

1. List five solutions of green ICT and describe them.
2. What is the theme of Japan's "Kurihara Green ICT Project"?
3. What make Masdar being a Carbon-Neutral City ?(five area)