

Circular economy and GHG mitigation strategies from Japan: Building a Regional Circular and Ecological Sphere to achieve a sustainable society

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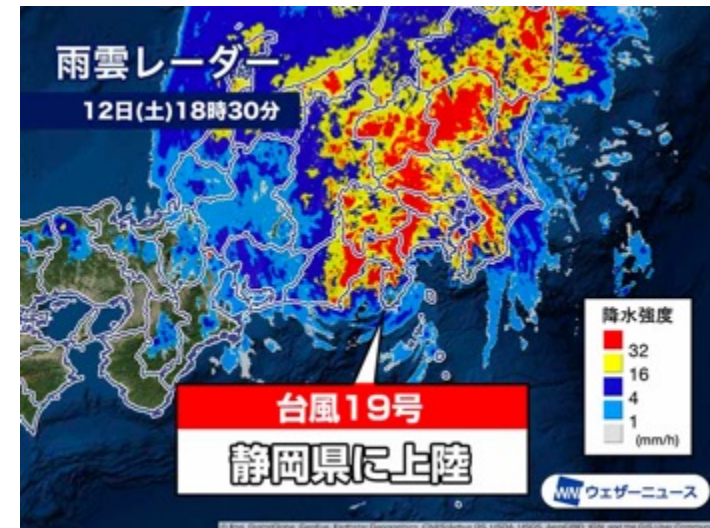
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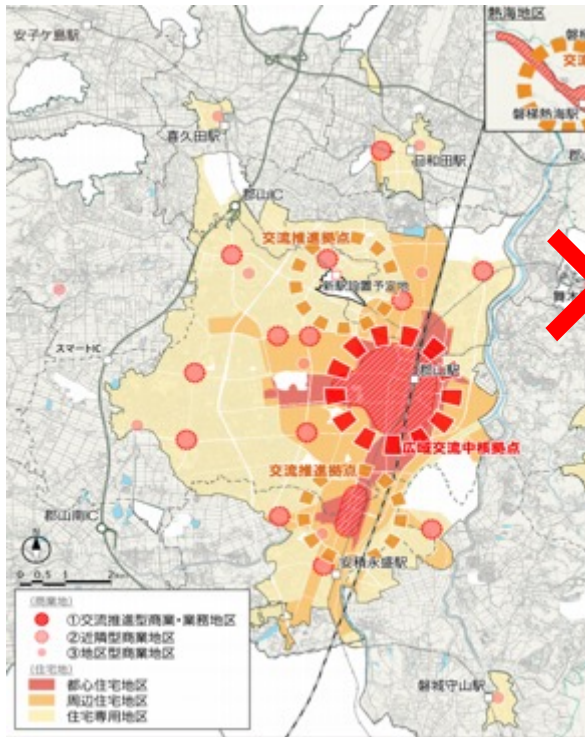
Typhoon Hagibis hits Japan on 12 Oct, 2019, and still has impacts on the wide area of Japan



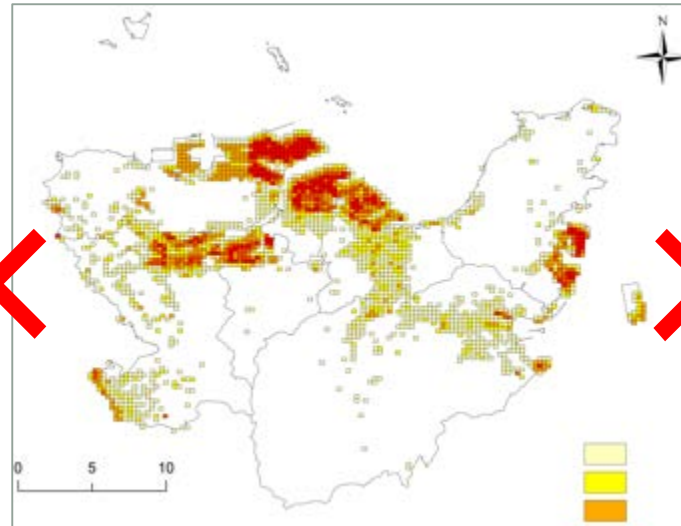
City Planning in consideration with Climate Change

- City planning may adjust with consideration both for regional climate change mitigation actions and regional climate change risk, such as flood, landslides and tsunami.
- Take risk or avoid risk?

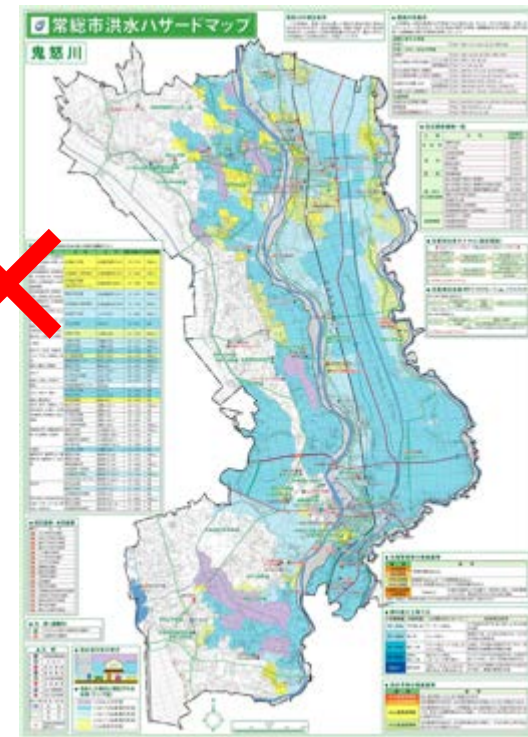
City Planning



Regional Low Carbon Actions

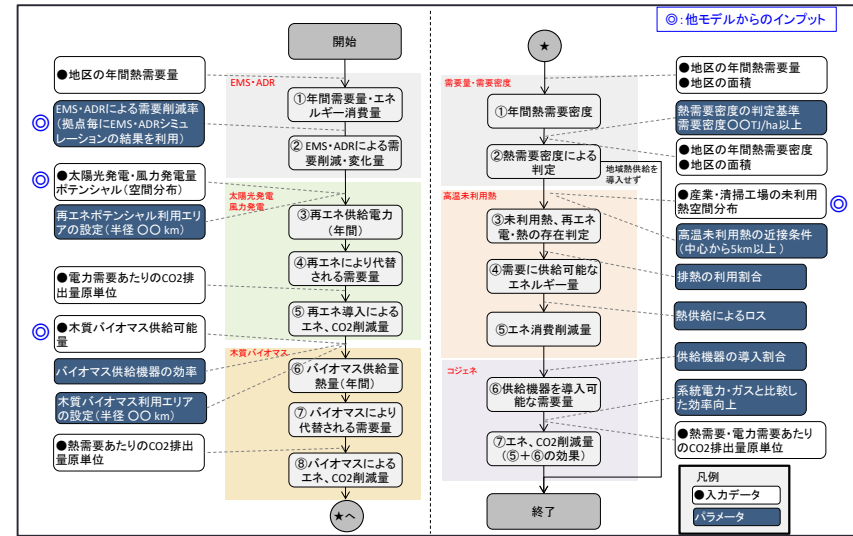


Risk of Flood



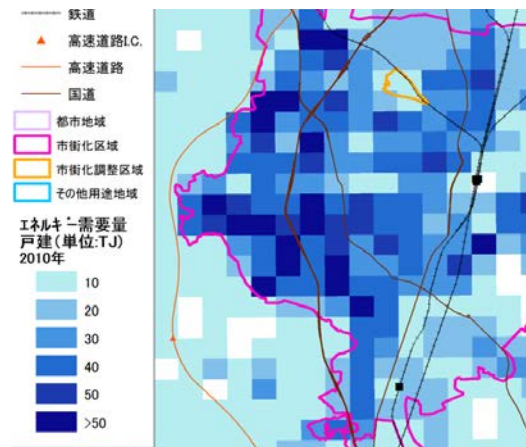
Regional Low Carbon Scenario: AIM with Spatial Info.

- Developed Regional AIM/Enduse could analyze GHG reductions and mid-/long-term scenarios in region in consideration with spatial distribution of energy demand and supply.

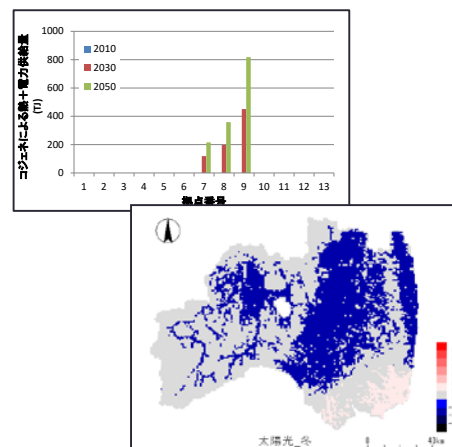


Structure of Regional AIM/Enduse

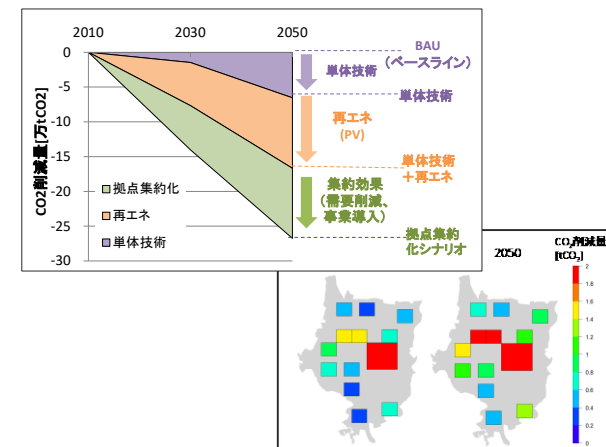
Energy Demand → Energy Resource → GHG reductions



Spatial Distribution of Energy Demand



Energy Resources (CHPs, Renewables)



GHG reductions in region

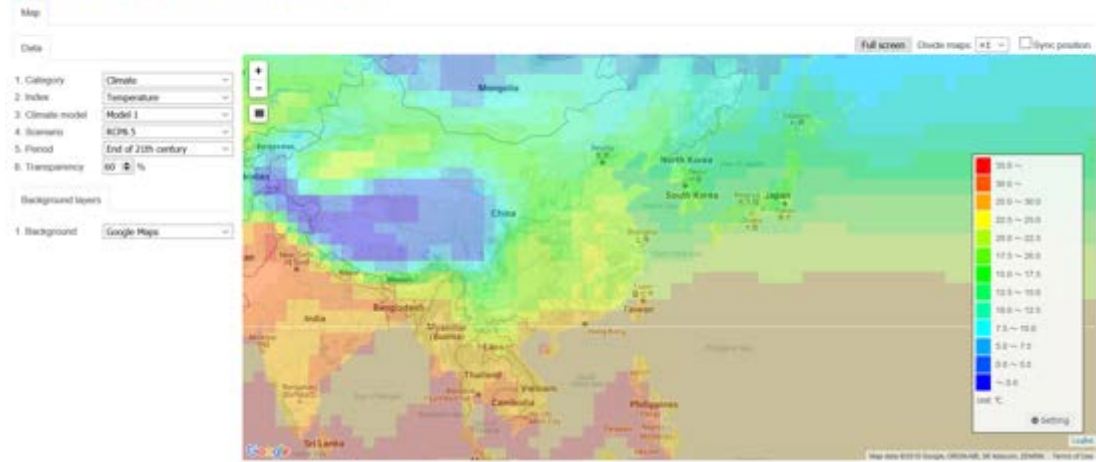
Regional CC Impact/Adaptation: A-PLAT/AP-PLAT

Annual mean temperature

AP-PLAT CLIMATE IMPACT VIEWER



** The data presented here are for demonstration purposes only **

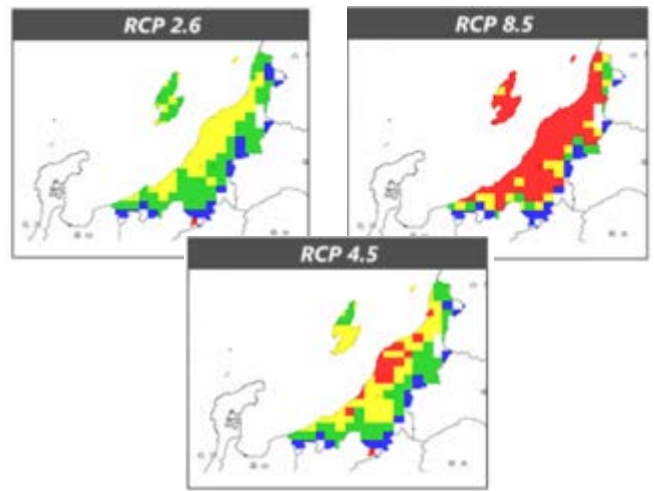


A-PLAT CLIMATE CHANGE ADAPTATION PLATFORM, JAPAN
 気候変動適応情報プラットフォーム
 Adaptation for the future.

AP-PLAT
 Asia-Pacific Climate Change Adaptation Information Platform

Water-stressed population

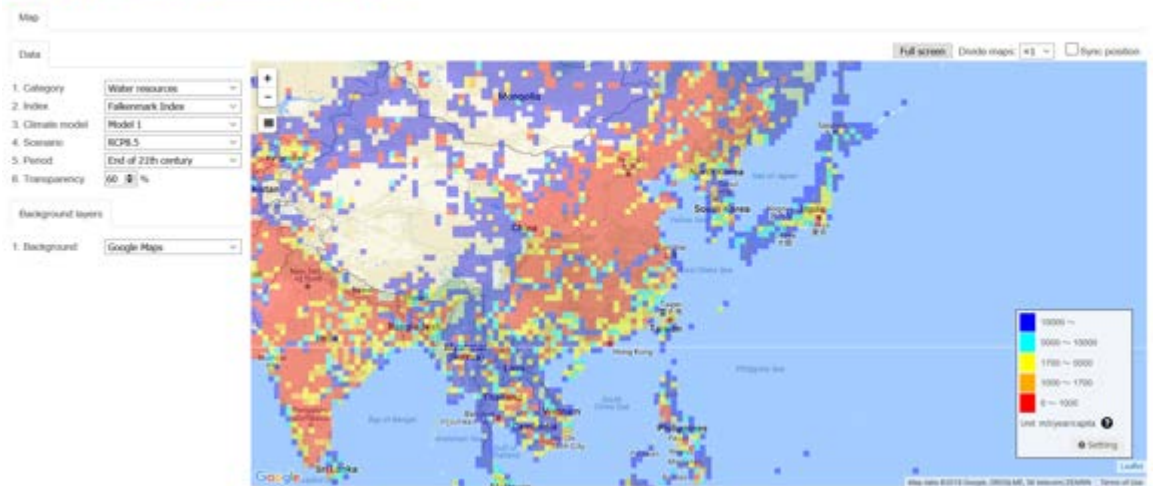
CC Impacts by RCPs



AP-PLAT CLIMATE IMPACT VIEWER

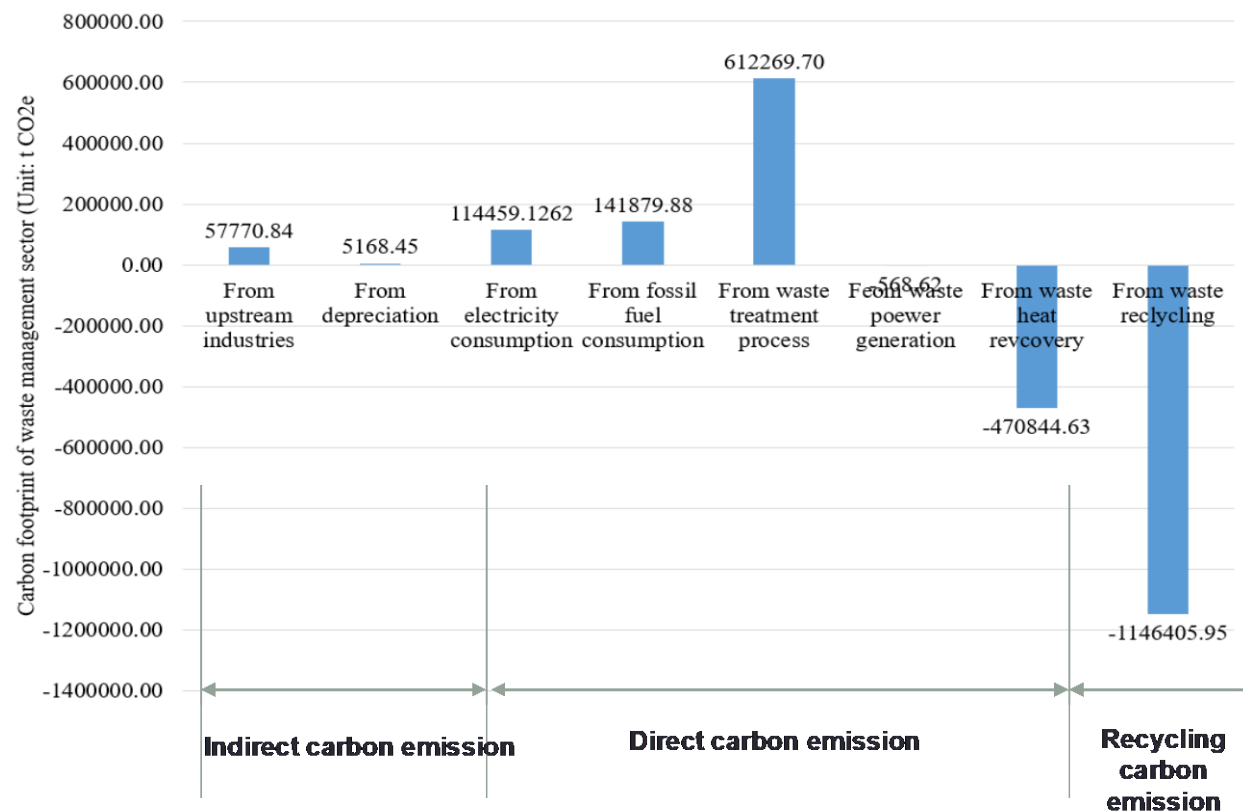


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Importance of Circular Economy in Japan: Perspectives from Tokyo Metropolis

- From life cycle perspective, waste management sector of Tokyo Metropolis will reduce 6.86 million tons CO₂e in 2011, 1.12% (61.1 million tons) of total CO₂ emissions.
- Indirect and direct carbon emissions contributed 1.77 million and 2.83 million tons to the carbon footprint, respectively; the carbon emission reduction from waste recycling is enormous, which is 1.15 million ton CO₂.

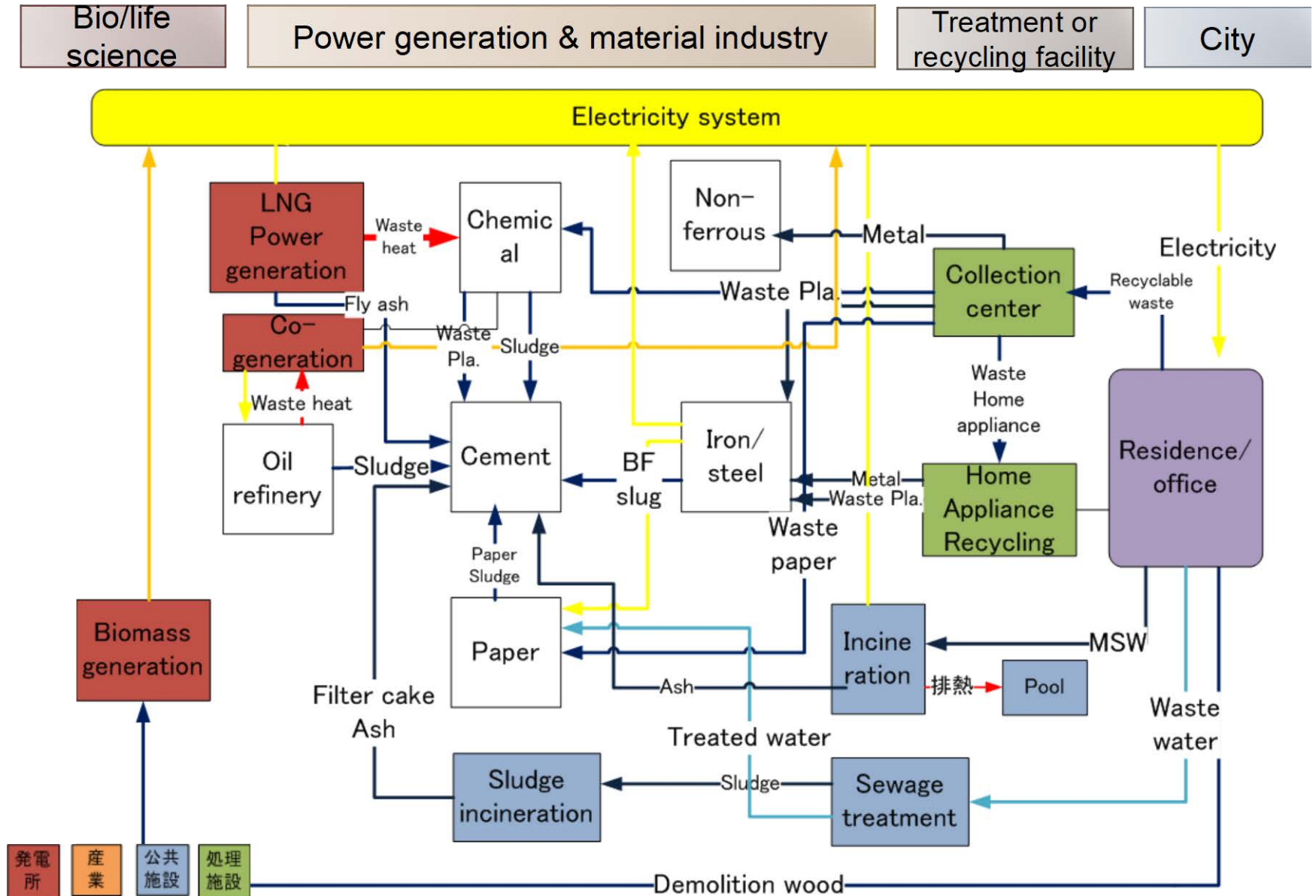


Life cycle carbon footprint of waste management sector, 2011

Industrial Symbiosis and Urban Industries to empower cities by circularization: Case of Kawasaki

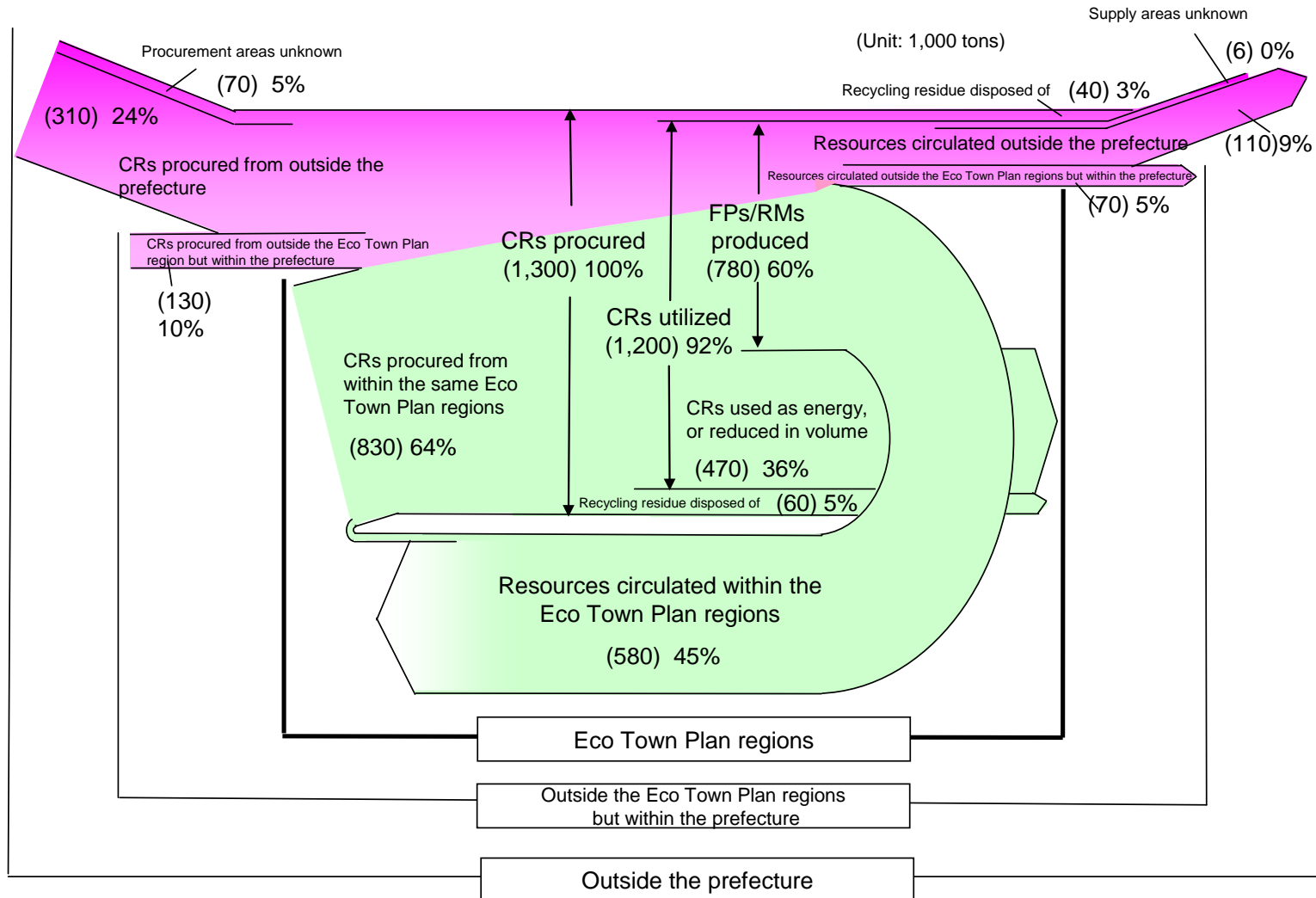


Kawasaki Synergy Network (current situation)



Evaluation of 90 Circular Facilities in 26 Eco-towns

Reduction of Virgin Materials; 900,000.ton /yr
 CO2 Emission Reduction 480,000 t-CO2/yr
 Circular use ration of by-product 92% Intra-eco-town circulation ratio 61%

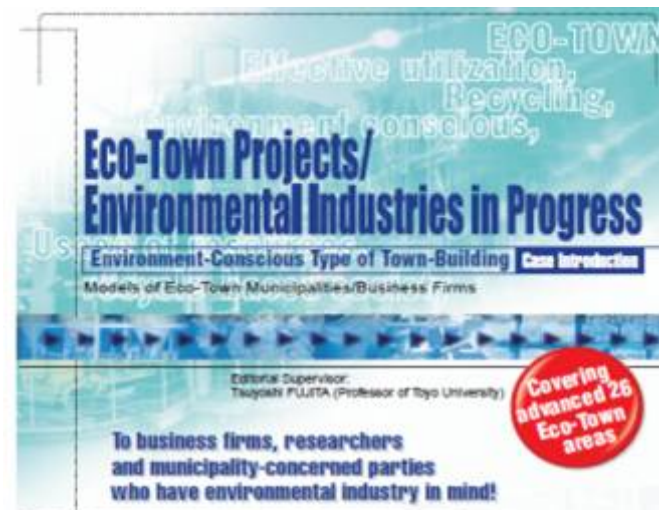
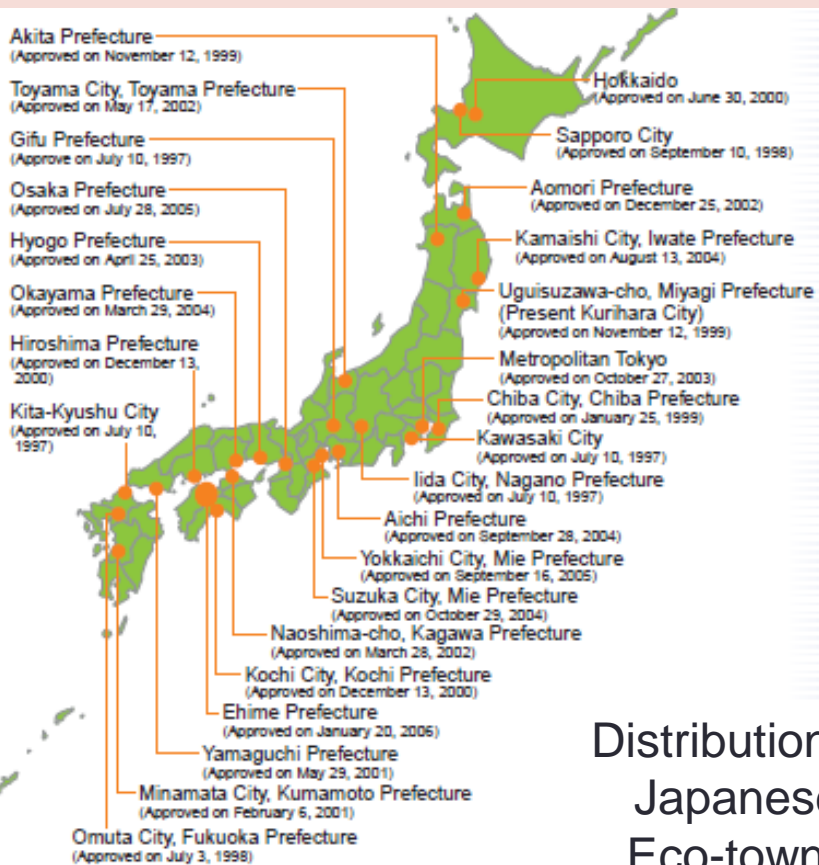


Eco-town area as demonstration project for Sound material cycle society

METI & MOE approved Eco-Town Plans for 26 areas as of the end of January 2006, and they provided financial support to 62 facilities located within the appropriate areas.



Forming the basis of capacity that totally 2.18 mil t of wastes were treated



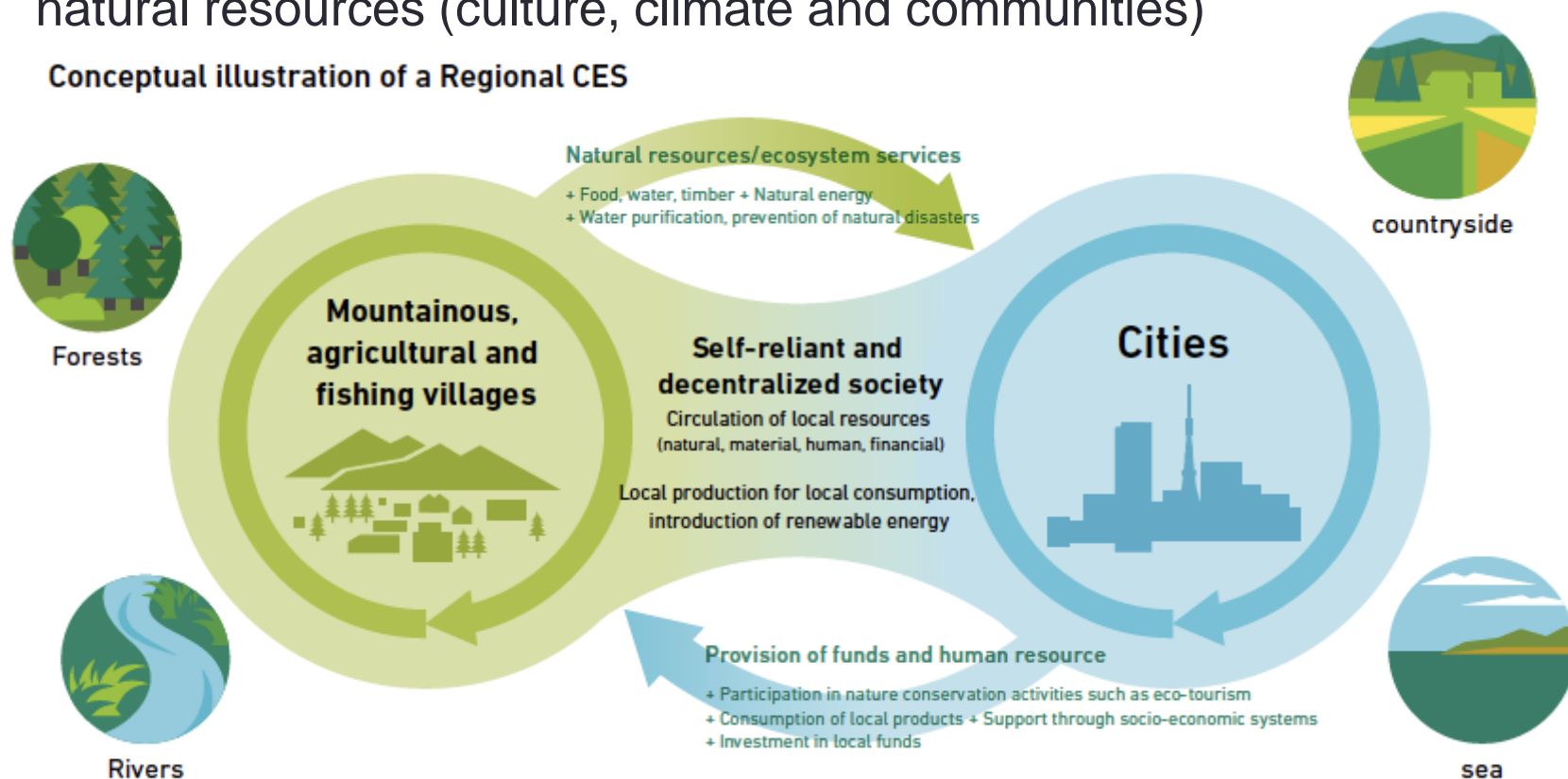
Edited by Prof. Fujita, T., Published by METI, 2006

<p>Distribution of Total Investment Subsidy projects in 24 Eco-Towns 600mil. US\$</p>	<p>Distribution of Total Investment 60 projects in 24 Eco-Towns 1.6 bil. US\$</p>
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Combining Circular economy and GHG mitigation: Regional Circular and Ecological Sphere (CES)

- Aims to enhance utilization of regional resources for building a sustainable society not only within a region but also with neighboring regions.
- Regional resources including energy (solar and wind), social and natural resources (culture, climate and communities)

Conceptual illustration of a Regional CES



Schema of The Regional CES: Mandara

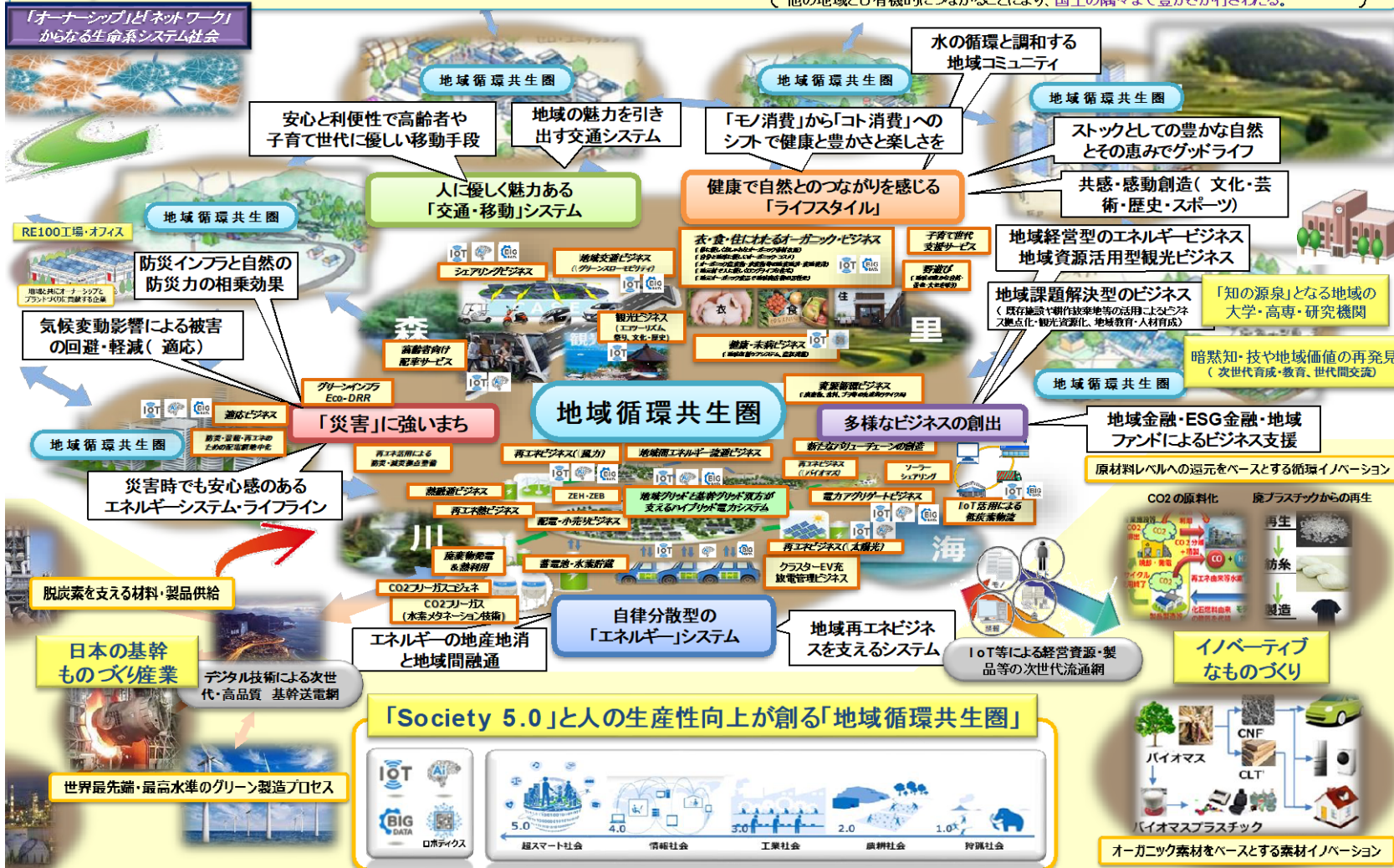
地域循環共生圏 (日本発の脱炭素化・SDGs構想)

— サイバー空間とフィジカル空間の融合により、地域から人と自然のポテンシャルを引き出す生命系システム —

「自立分散」×「相互連携」×「循環・共生」= 活力あふれる「地域循環共生圏」⇒「脱炭素化・SDGsの実現、そして世界へ」
「オーナーシップ」「ネットワーク」「サステナブル」「人間の安全保障、次世代・女性のエンパワーメントを基盤に」

→ 新たな価値とビジネスで成長を牽引する地域の存立基盤

「人々が健康で生き活きと暮らし幸せを実感することで、地域が自立し誇りを持ちながらも、他の地域とも有機的につながることにより、国土の隅々まで豊かさが行きわたる。」



Newest Smart Community underway in Fukushima



**Shinchi Town,
Soma-Futaba Region, Fukushima Prefecture**
Population: 8,247 / Households: 2,754 /
Area: 46.35 km² (As of Jan. 1st, 2017)

SDGs from Local Energy Business

Sustainable rebuilding projects through collaborative planning among town planning, industrial development and local energy system

施設農業

Multi sectoral energy management /housing/commercial/agriculture

Strategic land use transition targets

都市

Energy Center

- Smart thermal and electricity management

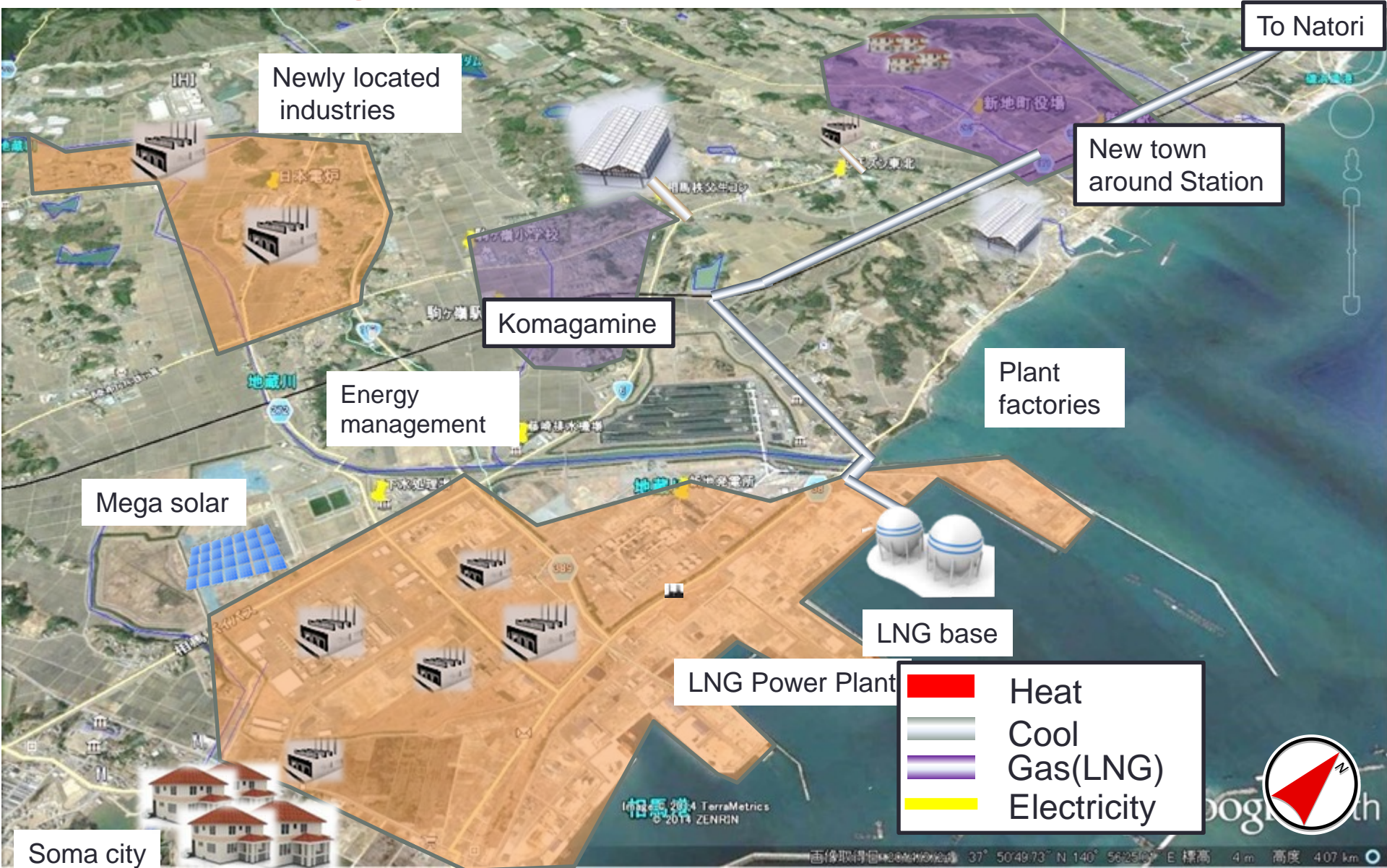
→ 熱 (Heat)
→ 電気 (Electricity)

Efficient local energy management for a local scale system

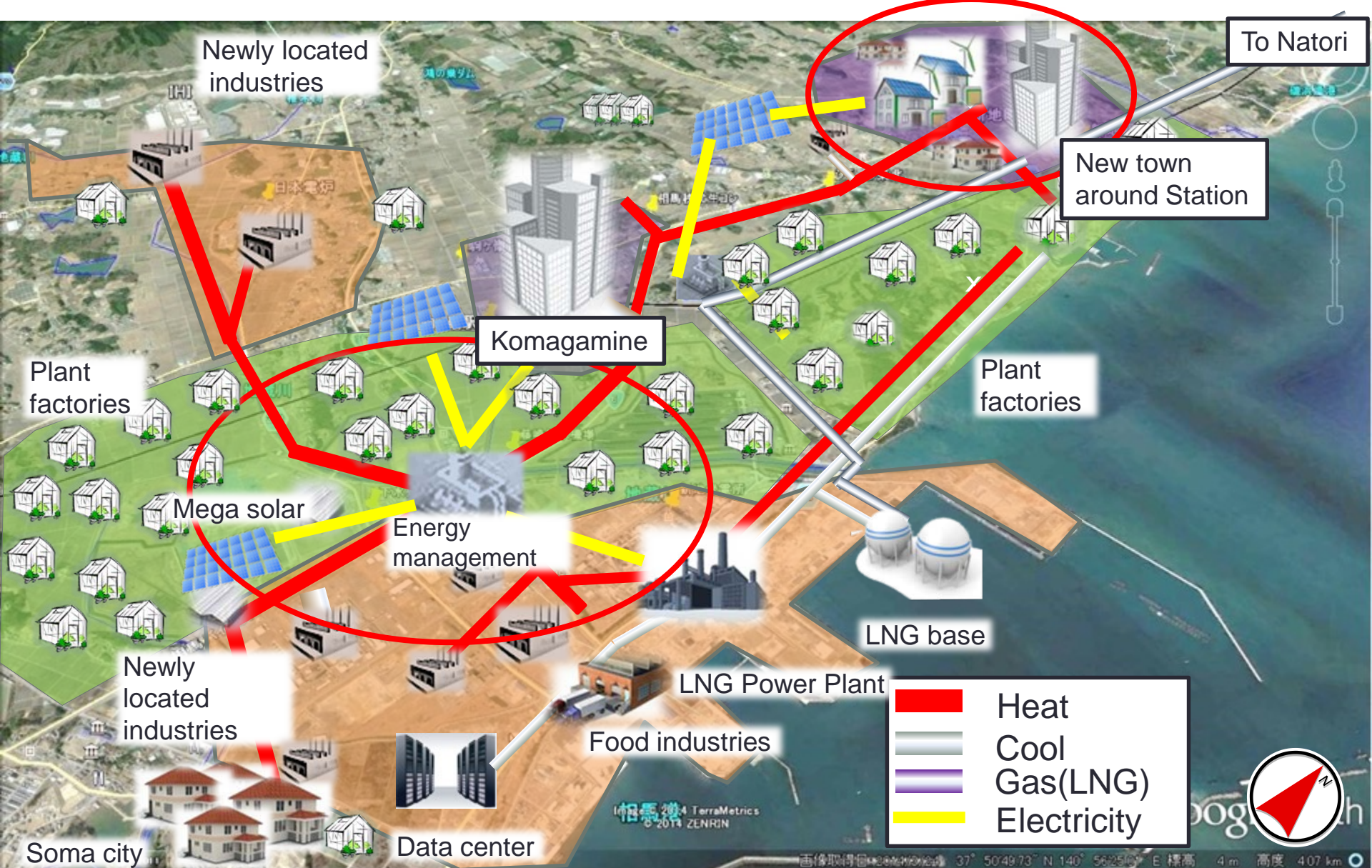
↑ LNG

LNG Plant

Spatial Design under the BaU scenario in 2030

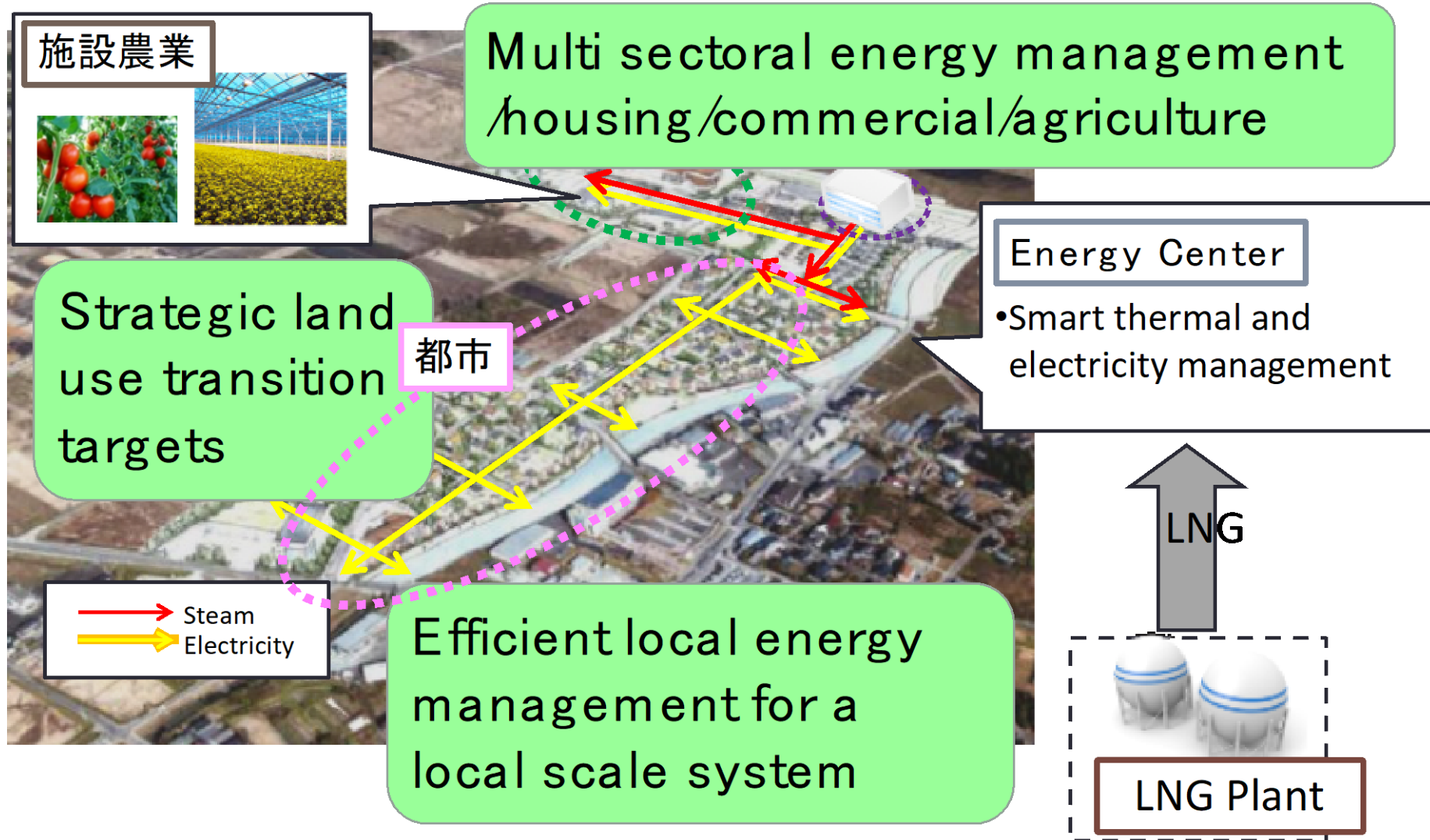


Spatial Design for the Smart City in 2030



Local Energy Based Urban Rebuilding Project in Fukushima

Sustainable rebuilding projects through collaborative planning among town planning, industrial development and local energy system

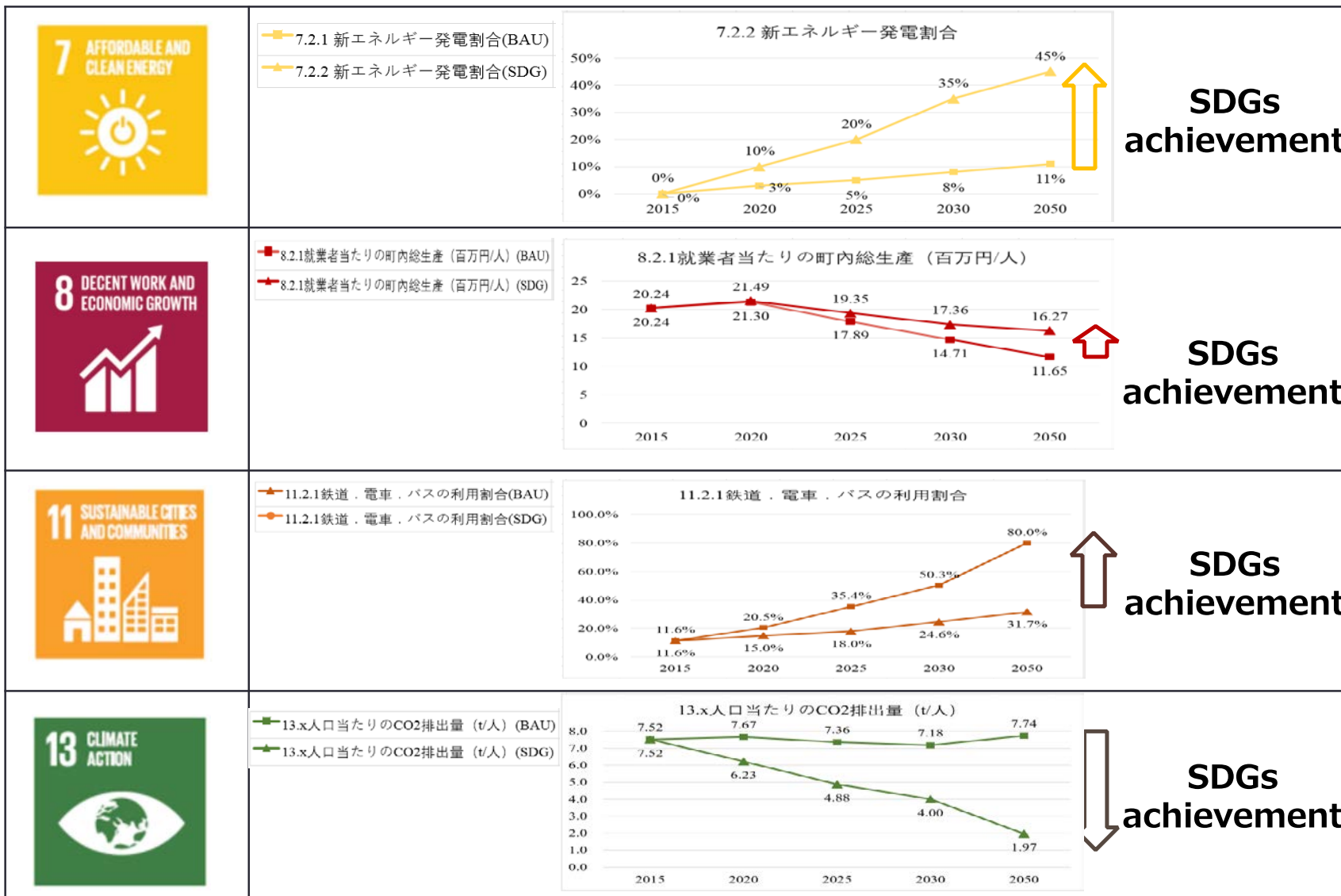


Local Energy Based Urban Rebuilding Project in Fukushima

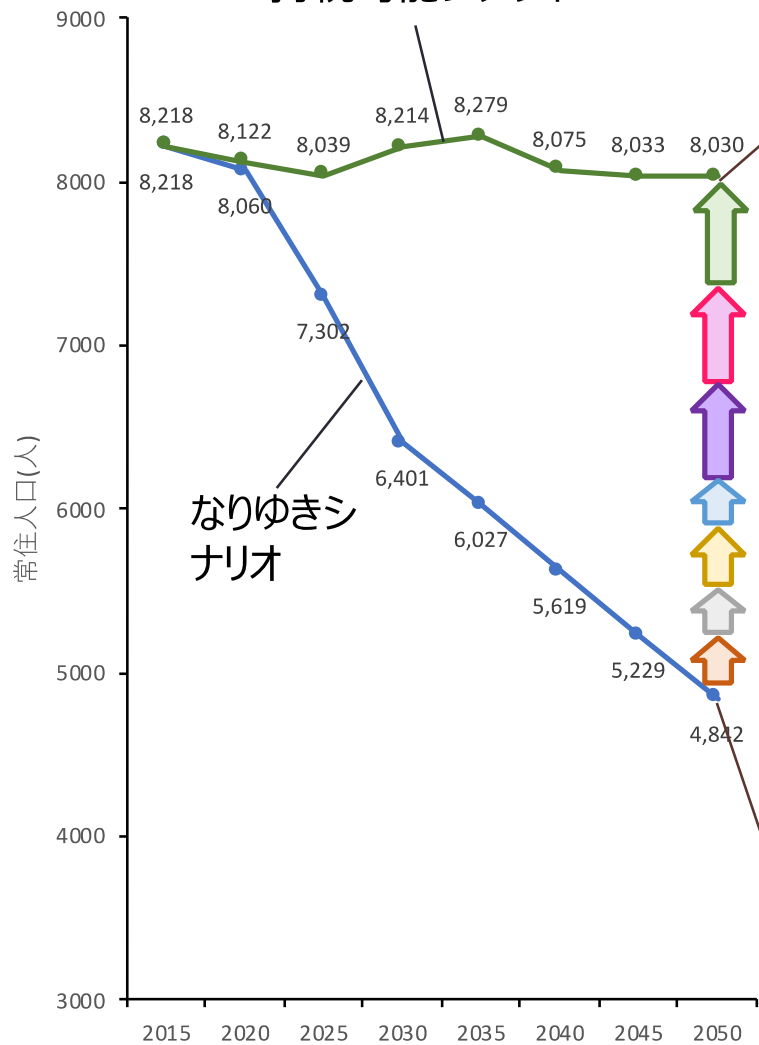
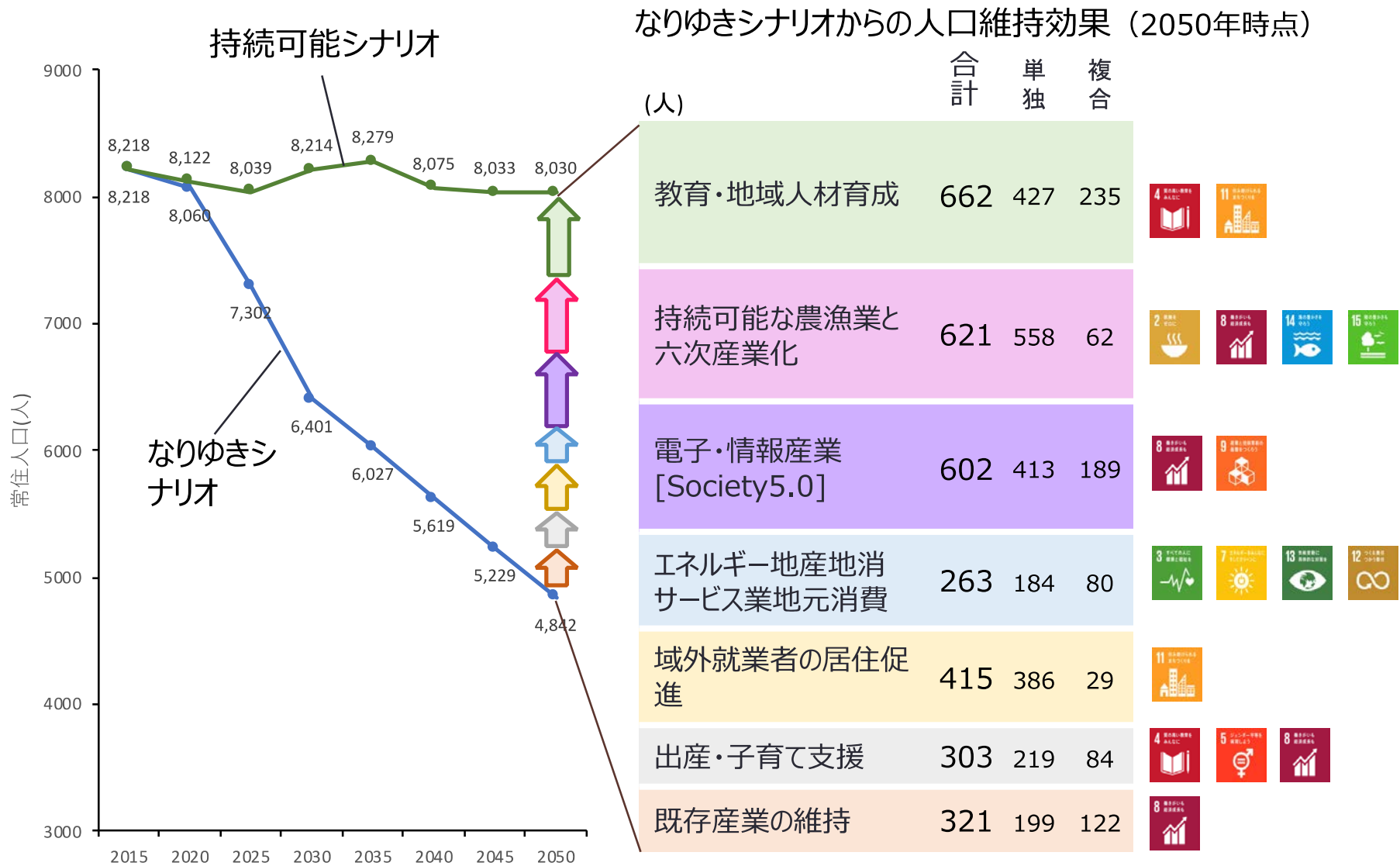


Impacts of Regional CES in Shinchichi – Application of AIM

BAU scenario vs. SDGs scenario

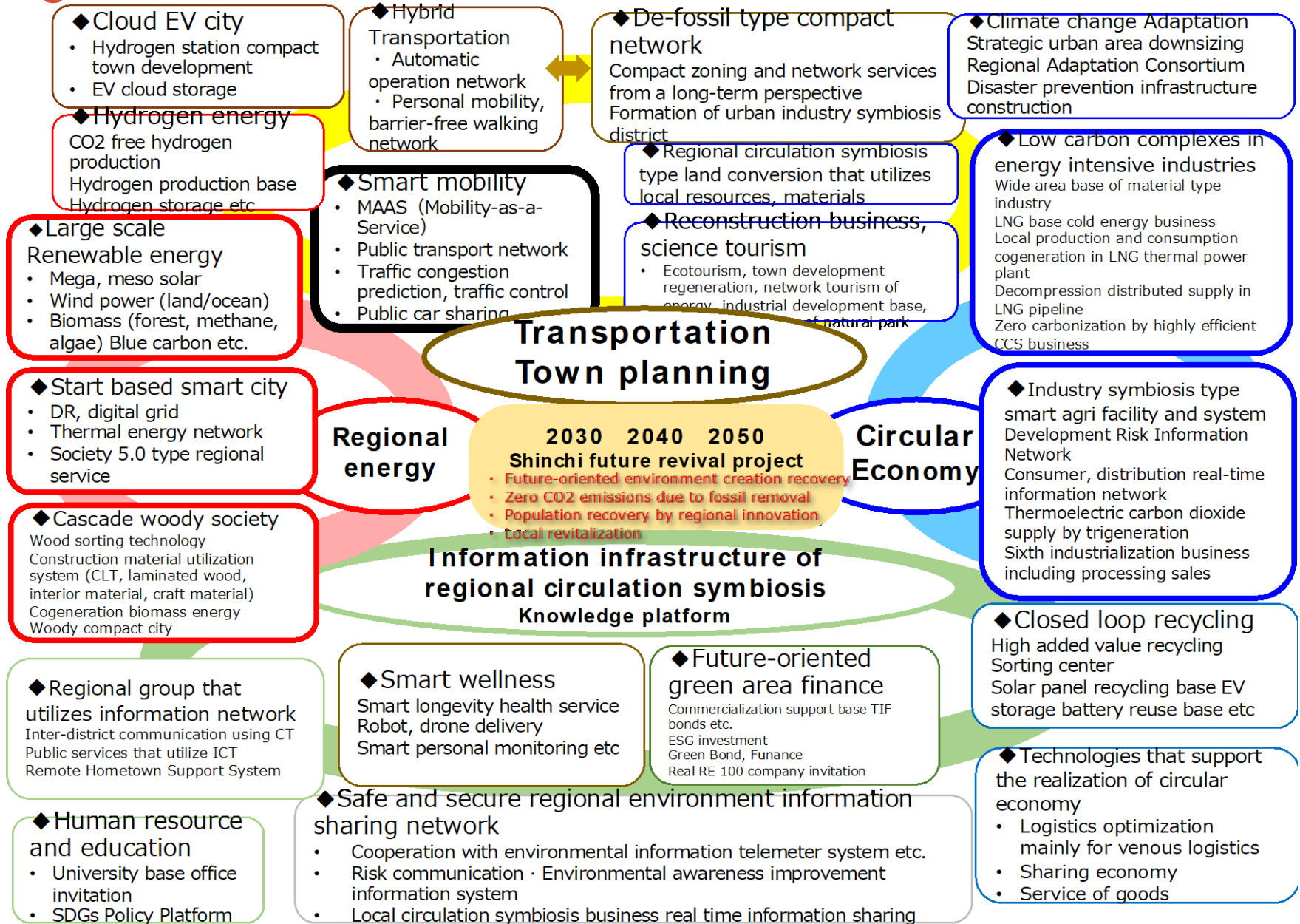


Impacts of Regional CES on Population in Shinchi



(人)	合計	単独	複合
教育・地域人材育成	662	427	235
持続可能な農漁業と六次産業化	621	558	62
電子・情報産業 [Society5.0]	602	413	189
エネルギー地産地消 サービス業地元消費	263	184	80
域外就業者の居住促進	415	386	29
出産・子育て支援	303	219	84
既存産業の維持	321	199	122

Regional CES Mandara in Shinchi



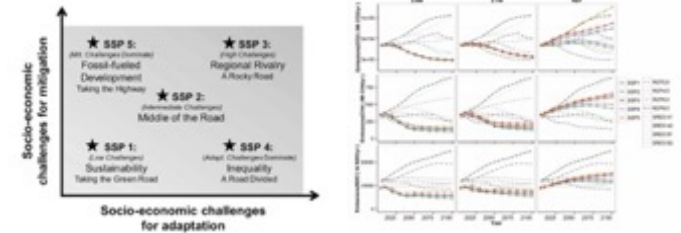
A Multi-Resolution Approach in AIM

- Different scales but interactive approaches are employed in AIM

Global



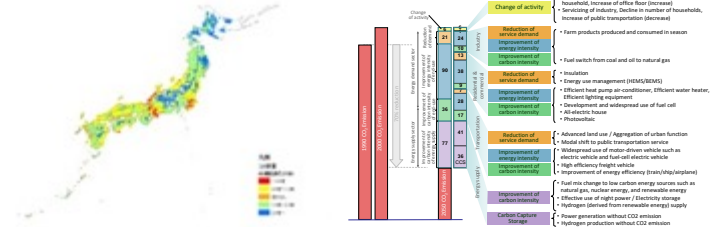
- Representative Concentration Pathways (RCPs)
- Shared Socio-Economic Pathways (SSPs)
- Food hunger risk



National



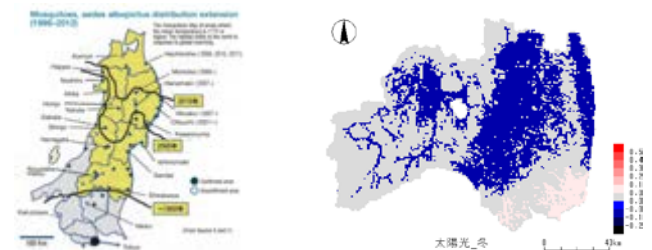
- Low Carbon Scenario
- Adaptation Strategy
- Nationally Determined Targets (NDC)
- Greenhouse Gas Inventory



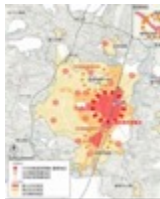
Regional



- Low Carbon Development Plan
- Low Carbon Actions
- Adaptation Strategy
- Regional Energy Potential



City



- Low Carbon Town Planning
- Compact city
- Project Design
- Stakeholders Involvement
- Social Monitoring



Research Questions for Establishing Regional RES



(1) What is National/Regional Targets and Actions towards the Regional CES?

(2) How to Design Roadmaps/Pathways towards the Regional CES at National/Regional Scale?

Regional CES

Now



(3) How to Monitor Progresses and Impacts of Actions (or MRV for Actions) towards the Regional CES?

(4) How to Integrate (1) to (3), and the Role of S&T