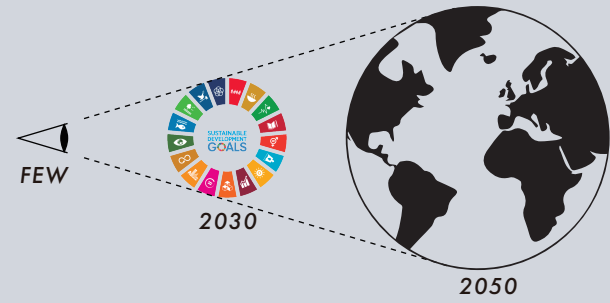


1

The Lens of Food (F)-Energy (E)-Water (W)

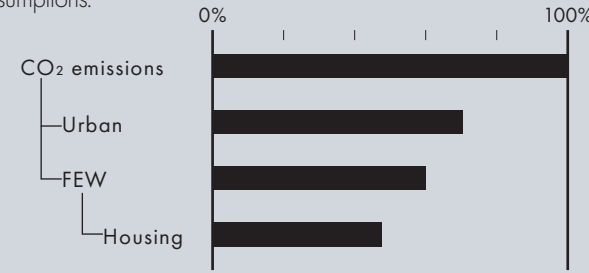
M-NEX is a designing support platform through the lens of food-energy-water (FEW) nexus toward SDGs and carbon neutral society.



2

Food-Energy-Water and the reduction of CO₂ emissions

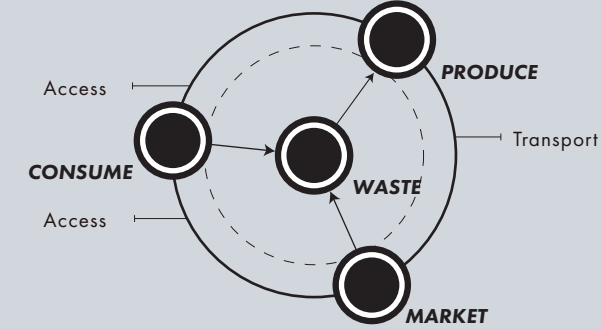
Urban area occupies 70% of CO₂ emission globally while FEW takes 60% in all of sectors, in which 80% comes from domestic sumptions.



3

Transformation to A Circular Economy Through Nexus Thinking

Redesign the efficiency of FEW resources and quality of services by solving the complexity of FEW nexus for circular citie



Land area to meet the demand for FEW

We have developed an index, FEWprint, which is used to analyze the current status of the target area and evaluate design proposals. It is expressed as the sum of two areas: (1) land area for food, electricity, and water recharge required to meet the demand for FEW, and (2) equivalent forest area to absorb the emitted CO₂ in the process of acquiring FEW.



1. Site analysis

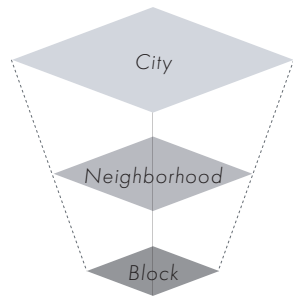


2. Understanding politic goals



3. define design concept

We investigate various conditions such as land, buildings, and society at the city, neighborhood, and block levels to identify SWOT (strengths, weaknesses, opportunities, and threats) of the study area. Based on this information, we launch projects to achieve national and local policy goals and discuss design concepts.



Case	Concept Design
Japan Team	Edible City
UK Team	Aquaponic City
USA Team	Urban Food Security
Netherlands Team	Redevelopment thorough FEW
Qatar Team	Food Infra in Arid Cities
Australia Team	Food Industrial Zone in New Urban Development

TOOL

Intensity Data (statistics, papers)



Dietary table by age classes



Electricity, gas, water by building form



Permeability by land use

Typologizing urban forms in GIS



Households size, age



Buildings structure, built years



Lands land use and zoning

FEWprint NOW as baseline



Needed land area to meet the FEW demand



Land area to absorb CO₂ emissions



unit area

Available land to secure FEW resources and services

Identify the amount of land that can be used for existing or new FEW supply. Then, the area of land for FEW supply that will be created by spatial design that introduces new technologies, etc., and the increase or decrease in the area of forest for CO₂ absorption will be incorporated into the FEWprint.



4. What-if and scenarios



5. Design and evaluation



6. Iteration of the design process

Known trends and unknown risks are identified and adaptation scenarios are devised. Various design proposals are created, and compared by integrating available knowledge and future technologies that can respond to those scenarios at various scales. Their performances are evaluated by using the key performance indicator, FEWprint.

	BAU	Incremental	Transformative
Building			
Neighborhood			

TOOL

Technological Innovations with functions and specs



New energy



Green infra



Urban agriculture

Prediction by scenarios corresponding to urban renewal dynamism



FEW PRINT



TIME



unit area

FEWprint NEW as Key Performance Indicator



Existing FEW supplying land area



Creating FEW supplying land area



Land area to absorb emitted CO₂



unit area

Shrinking the area needed to cover FEW demand

Shrinkage of demand sphere for FEW is expected by increasing local production and supply so that FEWprint is reduced correspondently. To make this a reality, players from government, business, and citizens will meet in the Living Lab to engage in creative solutions and business plans.



7. Engaging players

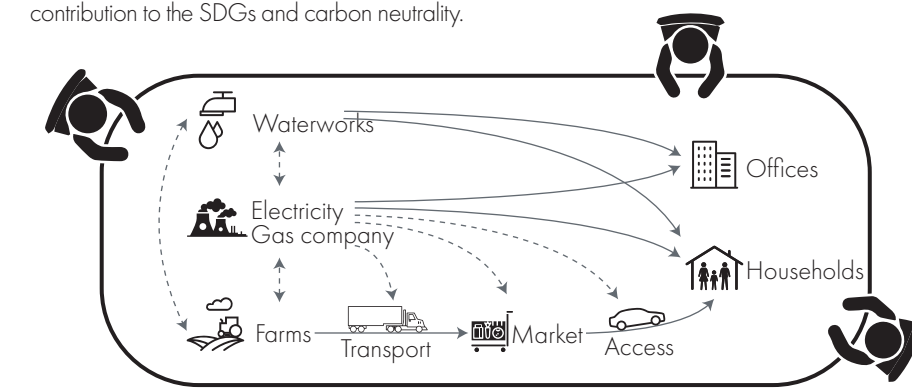


8. Setting up Living Lab



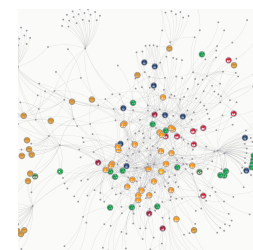
9. Promotion of co-design

We will use the Living Lab as a base to discuss the design proposal in order to embody the propositions, to organize the relationships of each player involved in the supply and demand of FEW in an actor network, to quantify their roles and responsibilities in the FEWprint, and to visualize their contribution to the SDGs and carbon neutrality.

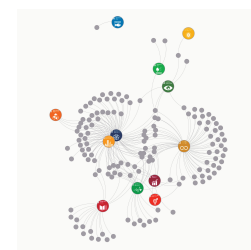


TOOL

Analysing the connections of actors



Visualizing the commitment of actors to SDGs



Supporting participation with Tangible GIS

