Regulating social metabolism
Designing circular economy

Dario Padovan
Università di Torino - Cattedra Unesco - Dip. Culture, Politica e Società

Ontology

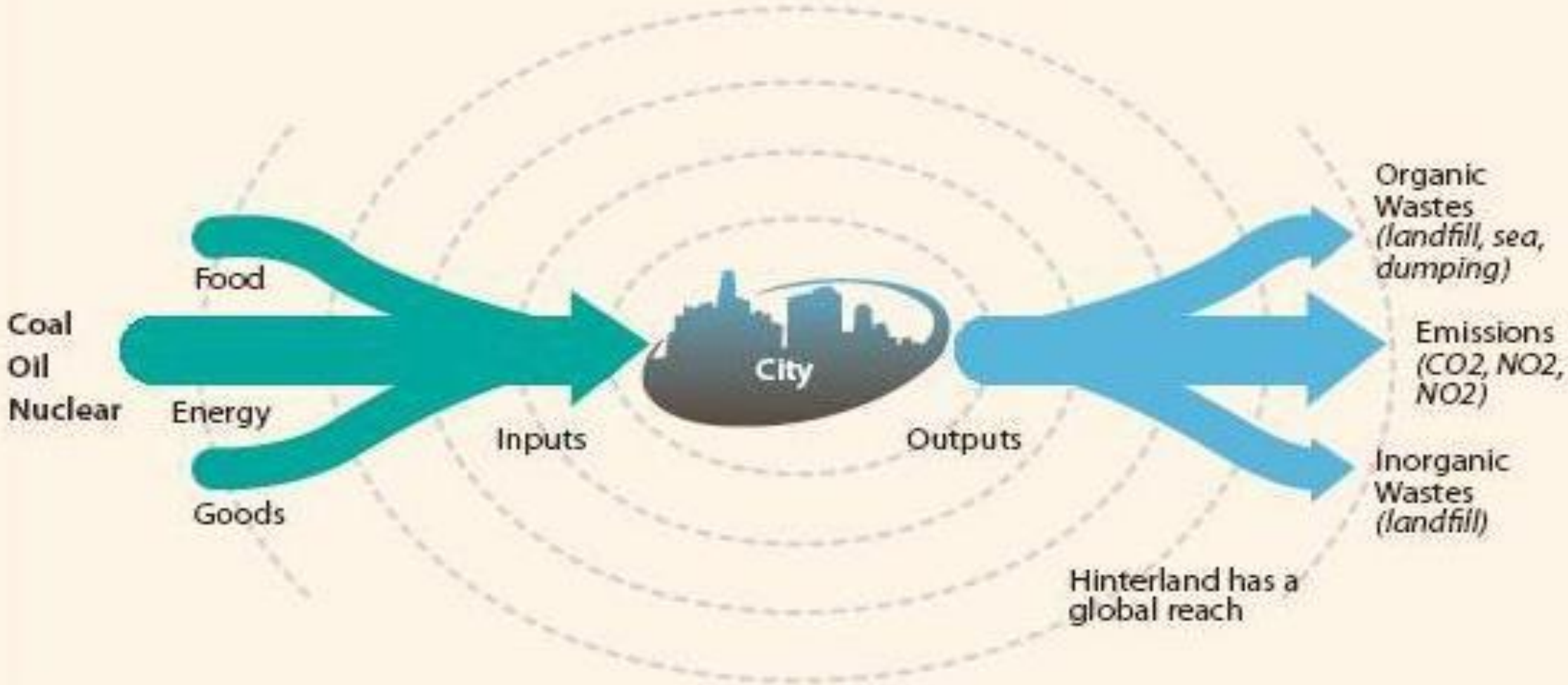
- The circular economy concept has deep-rooted origins and cannot be traced back to one single approach.
- ***Cradle to Cradle***
- ***Biomimicry***
- ***Industrial Ecology***
- ***Regenerative Design***
- ***Natural Capitalism***
- ***Blue Economy***

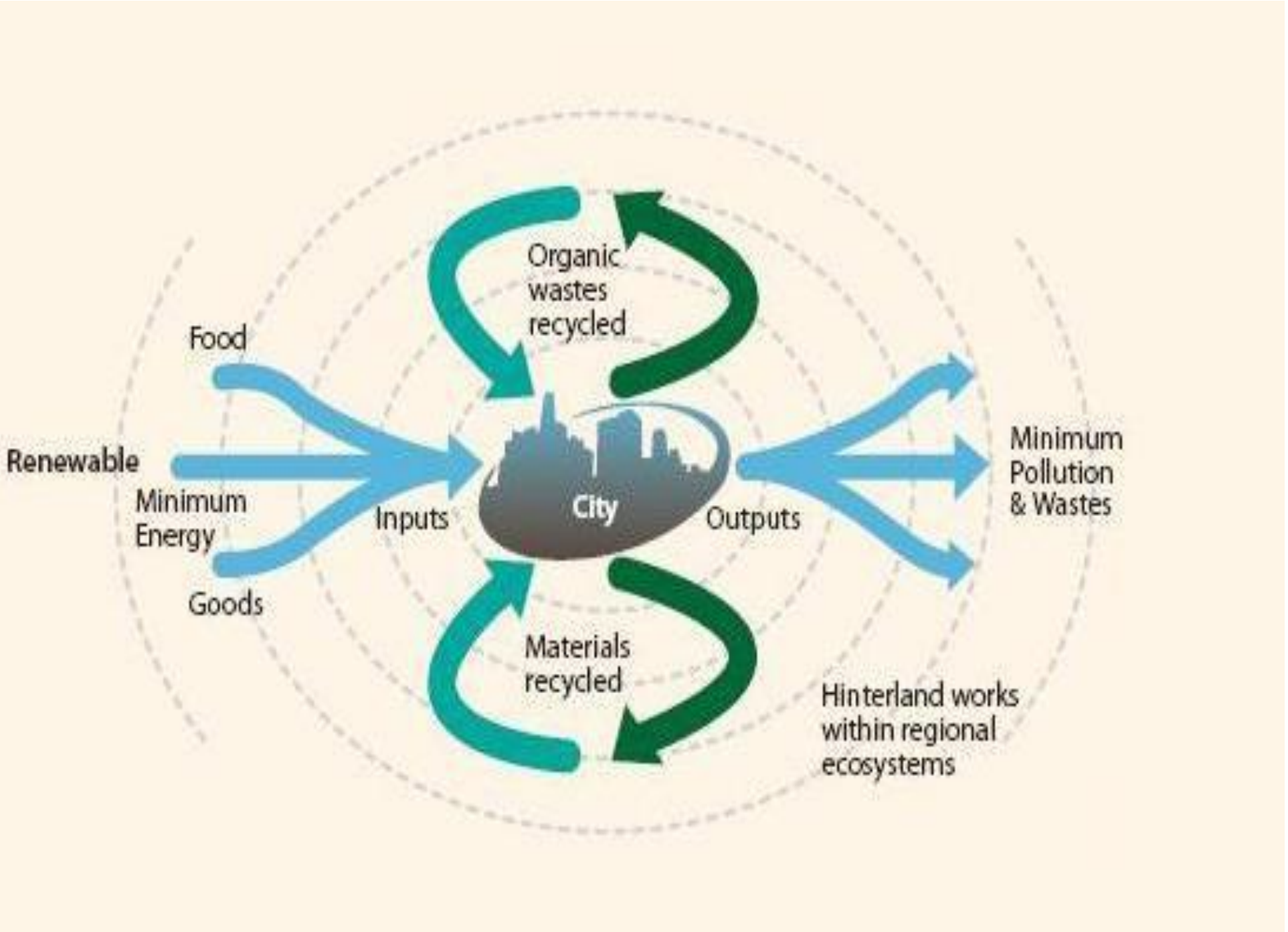
Preliminary definition

- The circular economy aims to address resource scarcity and environmental impacts.
- The current linear “take-make -use-dispose” model is to be replaced by a circular one containing a so-called *bio-cycle* for organic materials (biomass) and a *techno-cycle* for inorganic materials, both involving cascades of reused, recycled or repaired materials and products.
- A deep transformation of production/consumption patterns is envisaged to keep materials circulating in the system for longer, re-designing social systems and encouraging the re-use of materials and waste.

Socio-material metabolism and circular economy

- Socio-material metabolism should be the ontological frame in which circular economy is fostered, the socio-material architecture that underpins circular economy and its monetary aspects.
- It is an approach that takes into account stocks and flows dynamics and thus it is suitable to understand, account and design circular economy.
- It describes the throughput of matter and energy connected to their conversion in use-values and exchange-values.
- It is a frame useful to investigate, support and improve the regulatory process that might govern this complex interchange between system and environment.


Food
Coal
Oil
Nuclear
Energy
Goods
Inputs
City
Outputs
Organic Wastes (landfill, sea, dumping)
Emissions (CO2, NO2, NO2)
Inorganic Wastes (landfill)
Hinterland has a global reach


Organic
wastes
recycled
Food
Renewable
Minimum
Energy
Goods
Inputs
City
Outputs
Minimum
Pollution
& Wastes
Materials
recycled
Hinterland works
within regional
ecosystems

Metabolic speed

- Socio-material metabolism is made by a huge amount of material input/output, whereas input is an indicator of metabolic size and output is an indicator of metabolic efficiency.
- Goods are often used in a little suitable way and pace of goods' substitution is too fast, producing an increasing consumption of resources and production of waste to be disposed.
- The waste reduction and prevention means decelerating urban metabolism and fostering its circularity.
- Circular economy slows down rates of goods' substitution.
- Metabolic profile points out the potential of CE

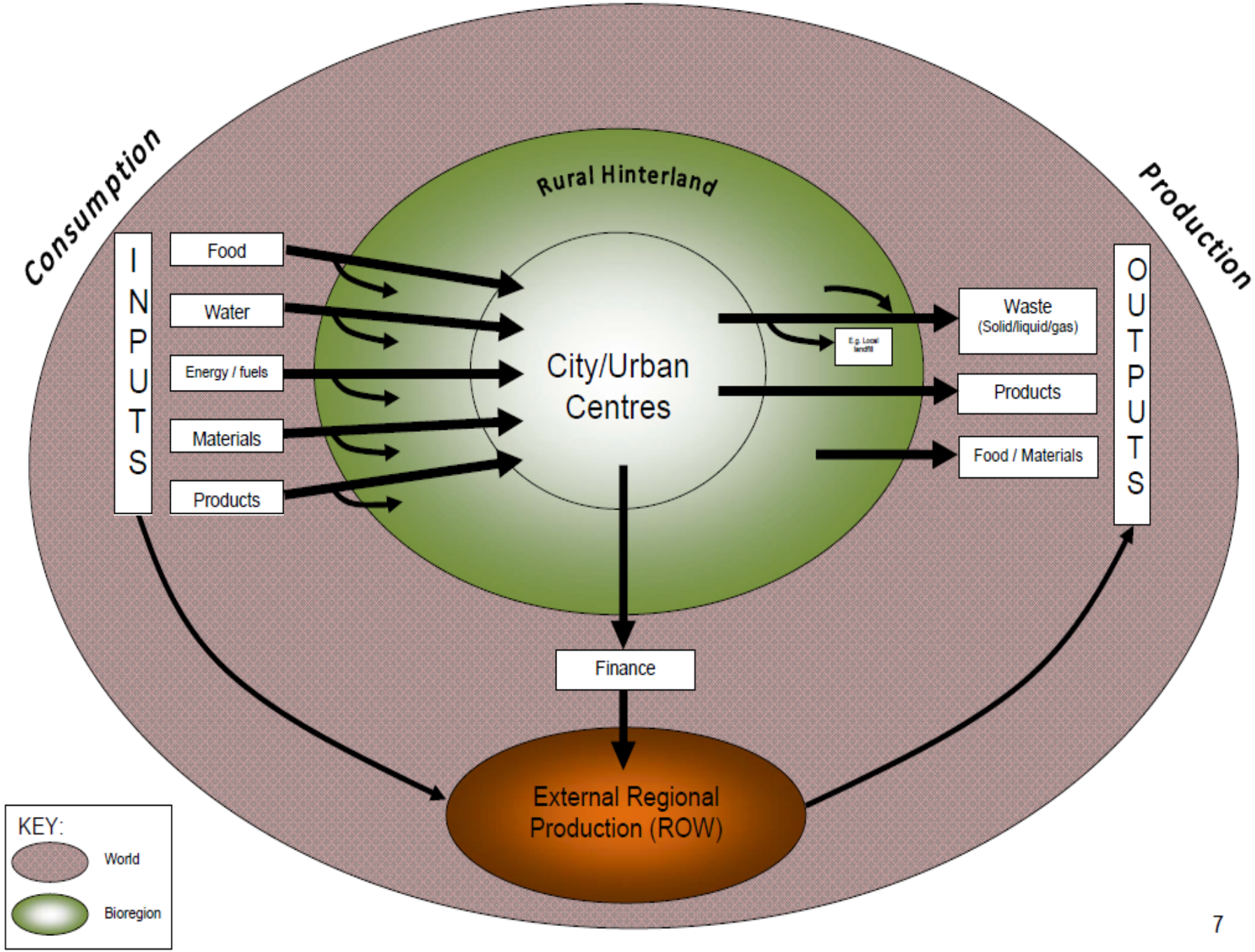


Figure 2: Linear metabolism of a city-region (adapted from Newman & Jennings, 2008, p119)

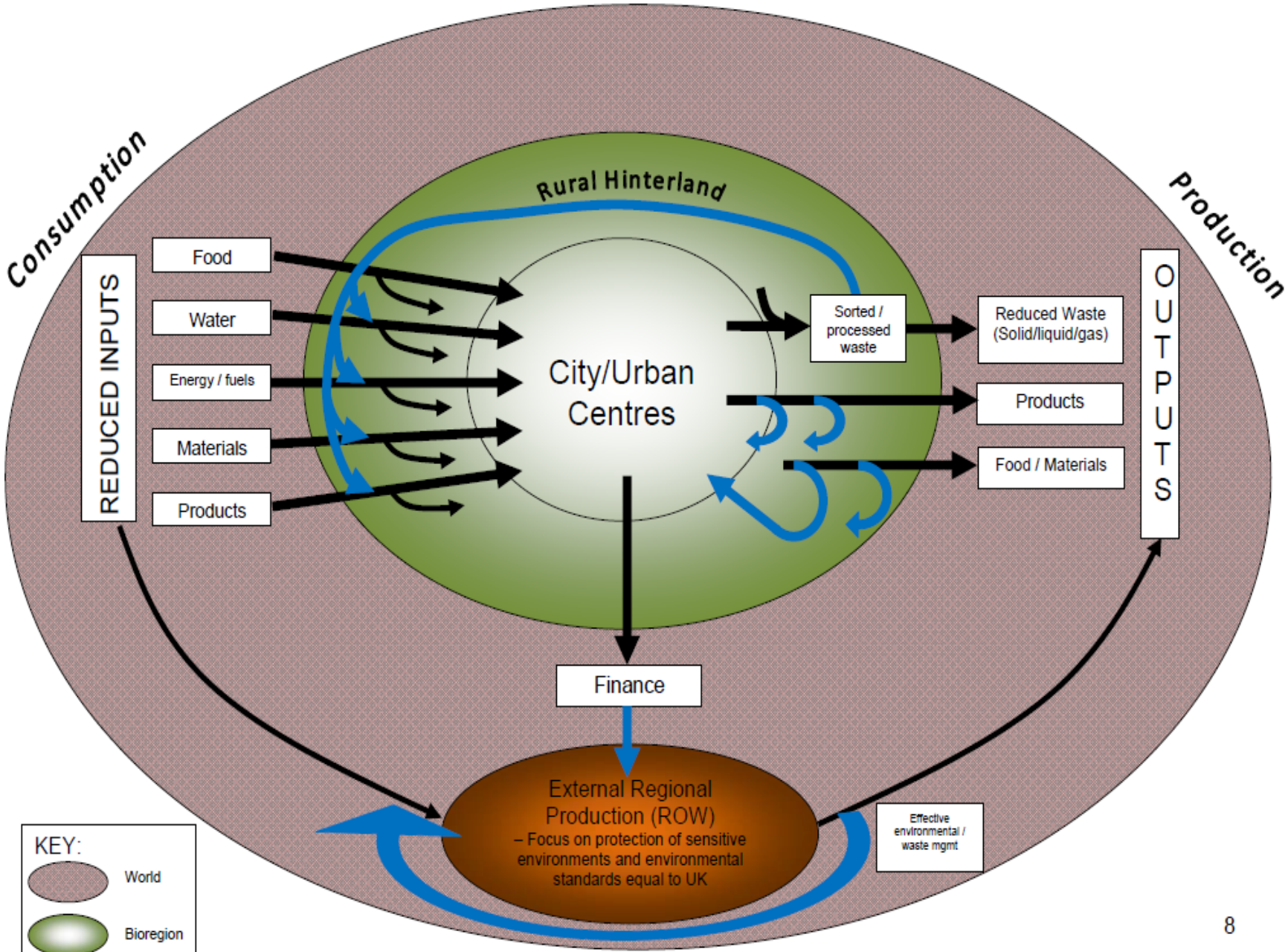
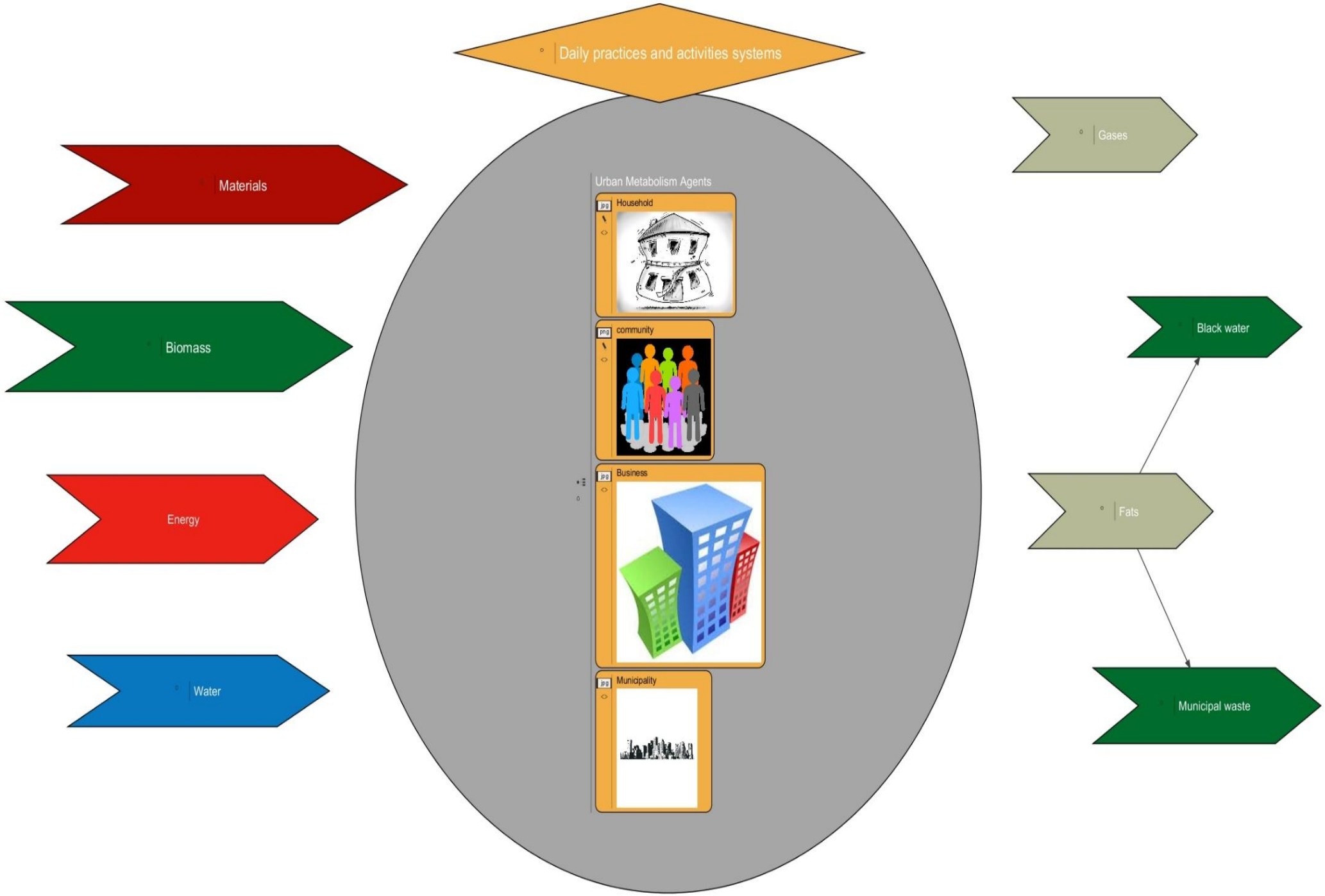
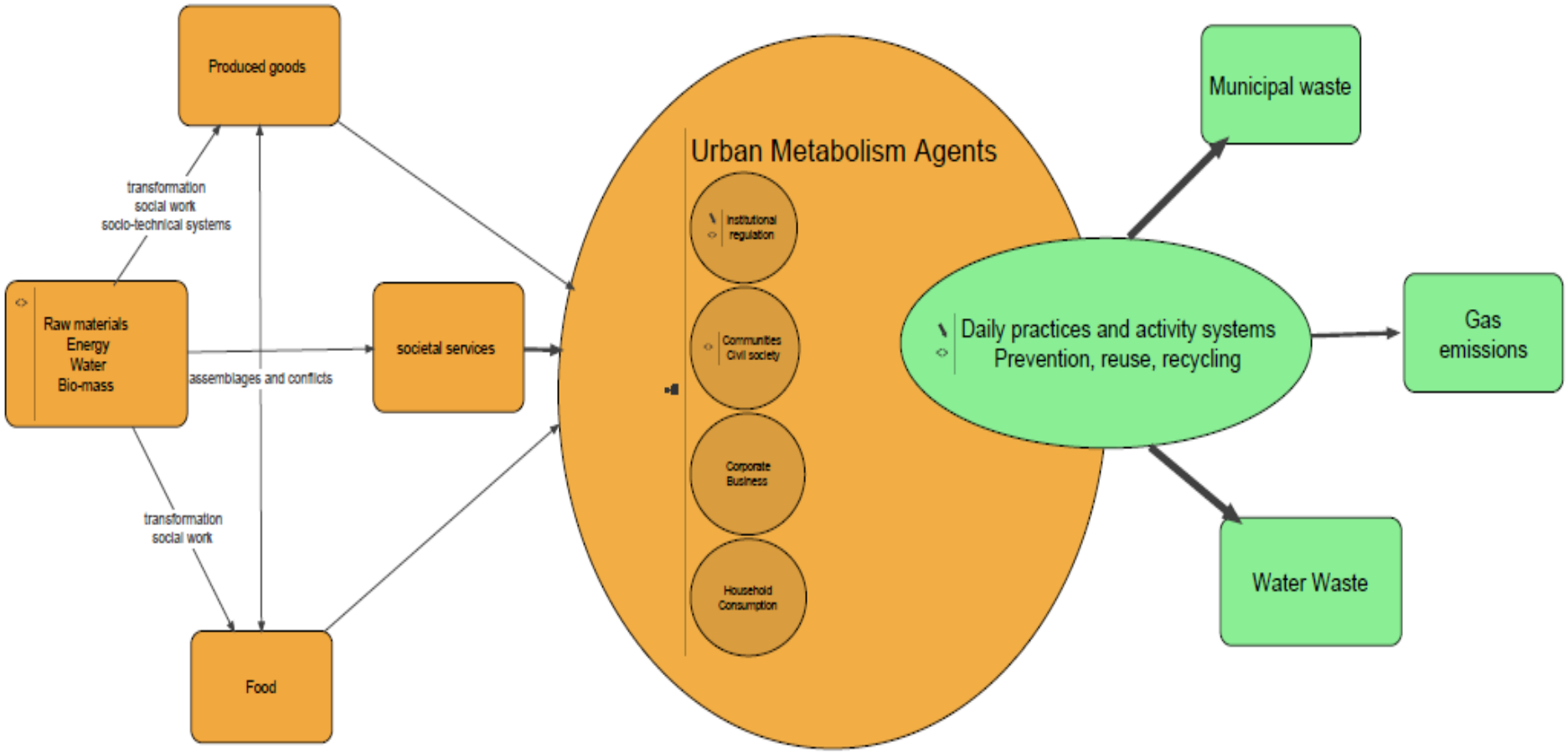


Figure 3: Circular, more sustainable metabolism of a city-region (adapted from Newman & Jennings, 2008, p119)

Social dimensions of circular economy

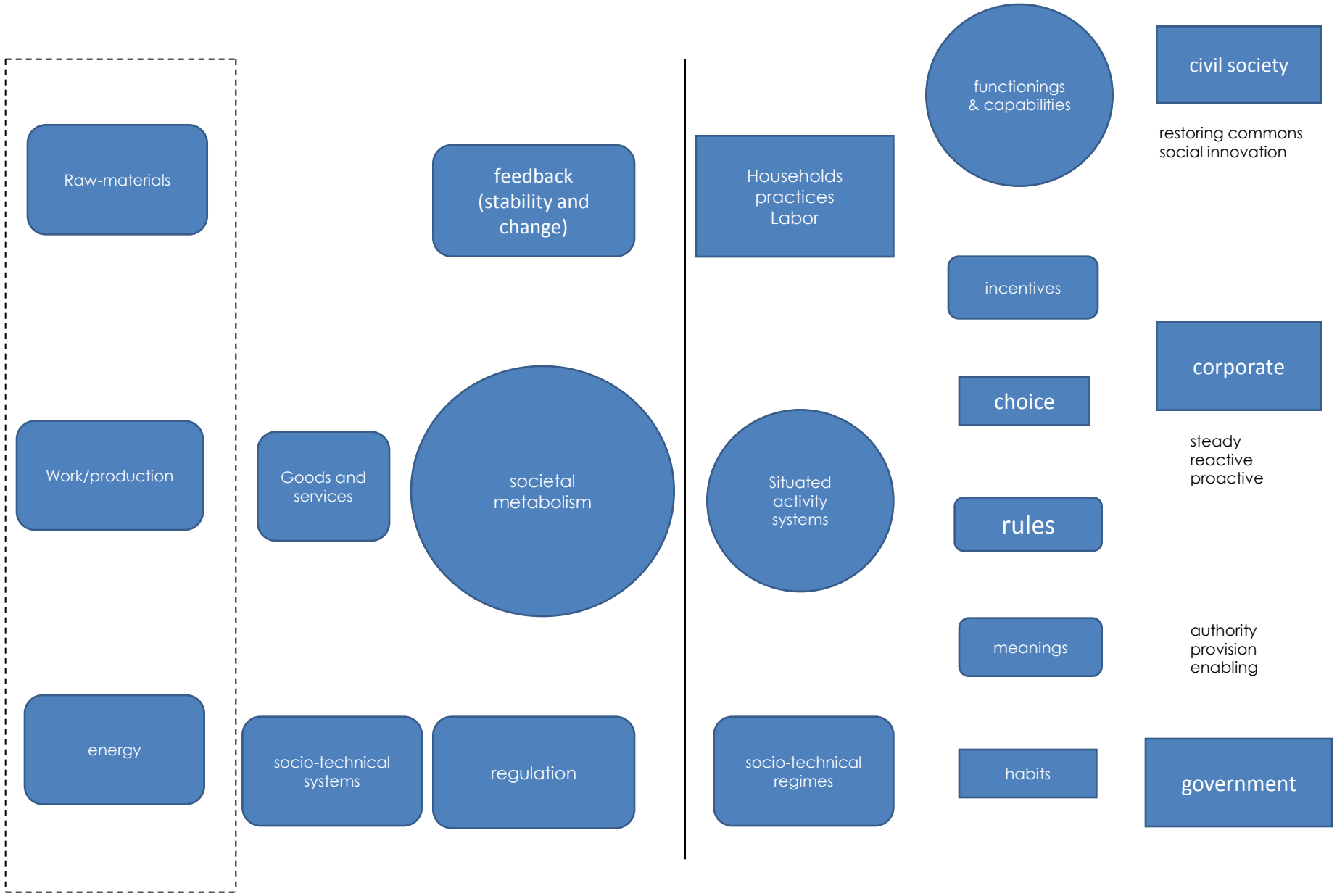
- Circular economy arises from many practices performed by agents. It requires the cooperation, combination, and harmonization of different practices of consumption or production
- It presupposes also the contribution of socio-technical apparatuses of production and consumption and their deployment on a massive scale.
- The improvements that are possible and necessary for circular economy performance arise solely from the social experiences of consumers and producers, and by the regulation of public institutions.


Daily practices and activities systems
Materials
Biomass
Energy
Water
Urban Metabolism Agents
Household
community
Business
Municipality
Gases
Black water
Fats
Municipal waste


Produced goods
transformation
social work
socio-technical systems
Raw materials
Energy
Water
Bio-mass
societal services
assemblages and conflicts
transformation
social work
Food
Urban Metabolism Agents
institutional regulation
Communities Civil society
Corporate Business
Household Consumption
Daily practices and activity systems
Prevention, reuse, recycling
Municipal waste
Gas emissions
Water Waste

Circular practices

- Practices of reuse, recycle, repairing and regeneration of goods are to be supported, reinvented, incentivised, both at the level of small and medium enterprises as well as at the level of consumers.
- Changing social practices toward circularity is a complex effort that asks for a combination of different actors and approaches.
- Waste, discarded goods, exhausted materials flee from different areas of the planet painting global trajectories and dynamics.


Raw-materials
Work/production
energy
feedback (stability and change)
Goods and services
societal metabolism
socio-technical systems
regulation
Households practices Labor
Situated activity systems
socio-technical regimes
functionings & capabilities
incentives
choice
rules
meanings
habits
civil society
restoring commons
social innovation
corporate
steady
reactive
proactive
authority
provision
enabling
government

Global aspects of circular economy - Tires

Conclusions

- CE needs tools to be investigated
- It has a large scale character
- It is global in mechanisms
- It needs a social deployment where all agents are involved
- It needs supporting policies
- It needs clear goals
- It needs a clear systemic framing such as societal metabolism