



Water, energy, and greenhouse gas footprint of the city food system in Australia

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Australia's National Science Agency



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emergency: metrics and
tools for rational action*

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Presentation outline



01 Background

Concept, Research question & Aim

02 Methods

Goal and scope, Inventory data, and Impact assessment

03 Key findings

Energy, Water, GHG emissions and Contribution analysis

04 Future direction

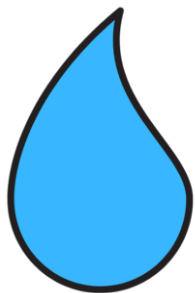


01 Background

Concept, Research question & Aim



Background



70% global water consumption



FOSSIL FUEL
DEPENDENCE

30% global energy consumption



~33% global GHG consumption

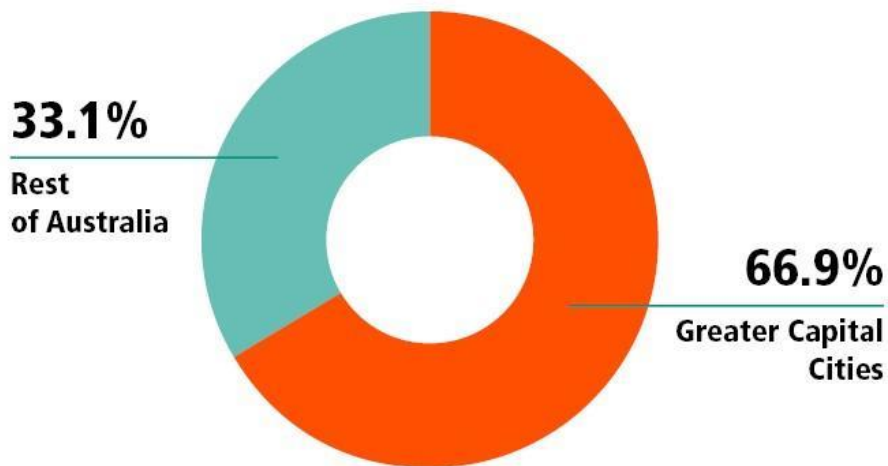


➤ **City food
consumption-
alarming future.**



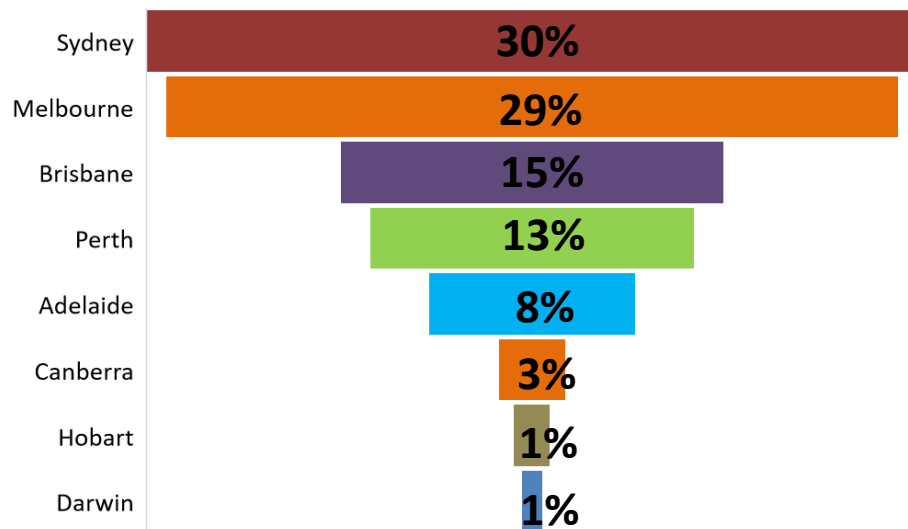
Background

Capital cities versus regional population in Australia



Data source: ABS Population Statistics,
<https://www.abs.gov.au/statistics/people/people-and-communities/location-census/latest-release#data-downloads>

Population distribution in Capital cities of Australia



Data source: ABS Population Statistics,
<https://www.abs.gov.au/statistics/people/population/regional-population/latest-release>



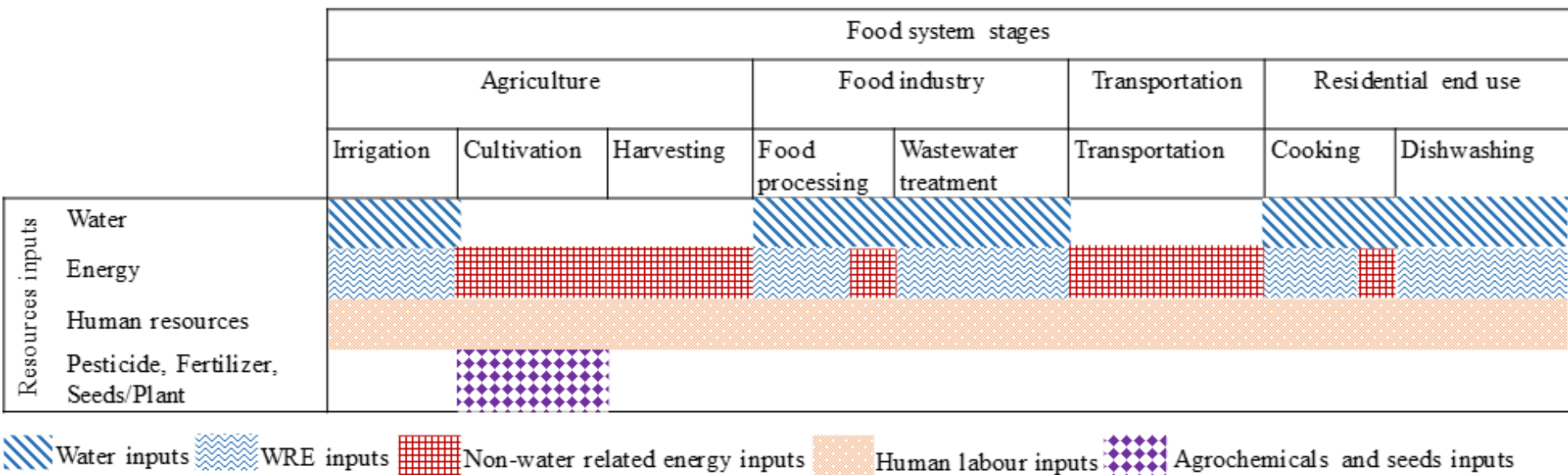
Background

- The aim of this study was to analyse the water, energy, and GHG footprint of an Australian city's food system.

The underlying research questions were:

- (i) where to direct eco-efficiency efforts to ensure a sustainable city food system due to current interest in achieving net zero, and SDGs, such as SDG11, SDG12, and SDG 13?
- (ii) how water consumption influencing other impacts (e.g., energy and GHG emission)?

Background





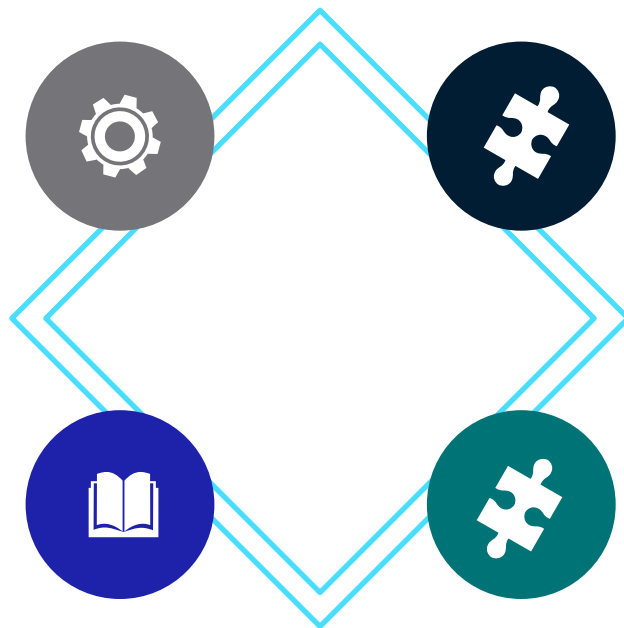
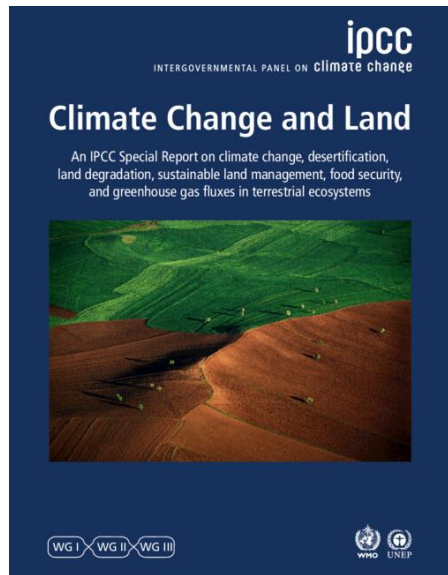
02 Methods

Goal and Scope, Inventory data & Impact assessment

Methods

City Food System

Fresh vegetable production in Queensland (QLD), and home consumption in Southeast Queensland (SEQ)



Processes

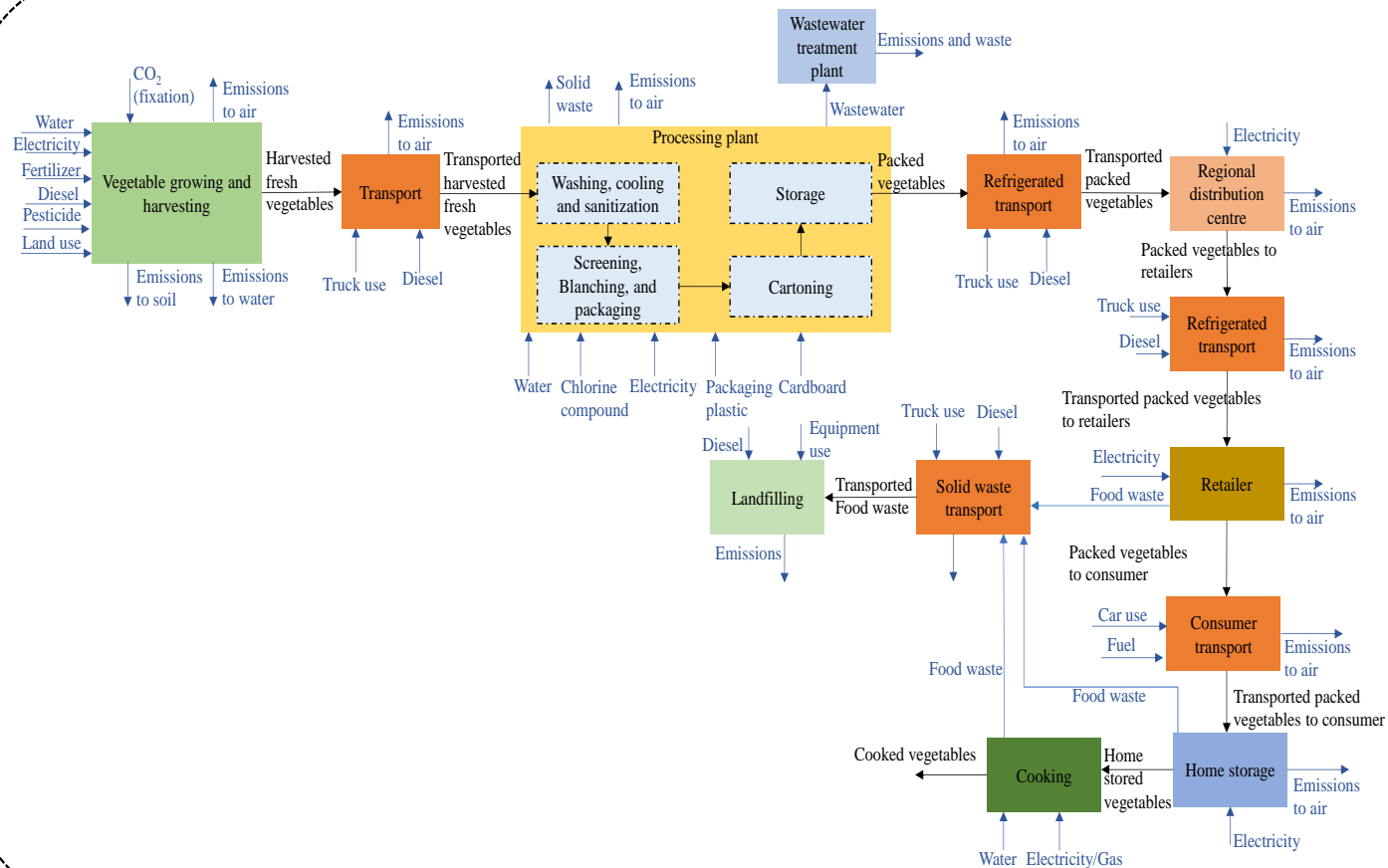
Growing, storage, processing, packaging, retail, home transport, home preparation, home consumption, and waste transport and management

Inputs

Fertilizers, pesticides, fuels, plastics, disinfectants, electricity, water, etc



Methods

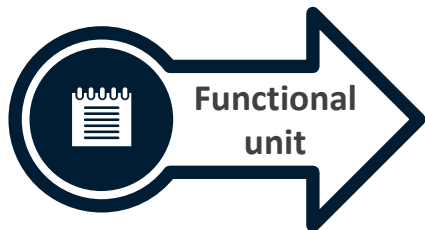


System boundaries



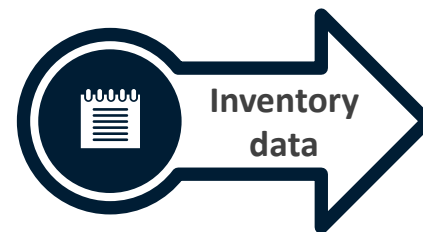
Methods

1 kg of fresh vegetable produced in QLD and consumed by an average SEQ household.



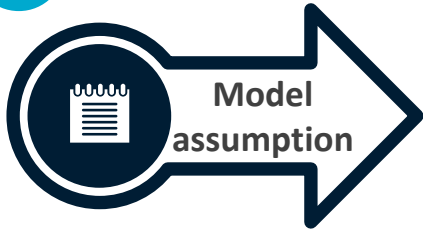
- SimaPro software 9.1.1.
- Impact category: GHG emissions, Water, Energy.
- Best Practice Guide for Life Cycle Impact Assessment (LCIA) in Australia V 2.04

- AusLCI database (V1.34).
- Ecoinvent (V3.6) .
- AGRIBALYSE (V3.0.1)
- Literature
- Government and Industry report





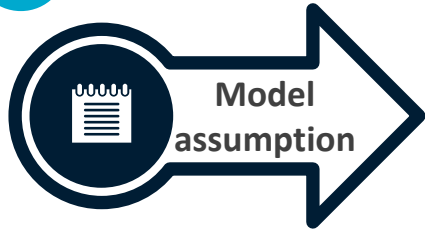
Methods



- **QLD growing areas: Lockyer Valley, Bundaberg, Stanthorpe, Buderim).**
- **On-farm facilities for washing, packing, and storing fresh produce before transporting it to Regional Distribution Centre (RDC).**
- **The recommended storage time: 5 to 10 days before consumption. Two days of storage on-farm facility before transporting to RDC.**



Methods



- **Fresh vegetables: Cooling and washing with chilled water, containing disinfectants.**
- **Assumed an equal proportion of loose packed with polyethylene, PET trays, and punnets.**
- **Shopping: Groceries by private car and 2.1 trips/household/week.**
- **2-day storage and 2-day display time was assumed at retail.**
- **Also modelled household storage, cooking, dishwashing, waste generation and management .**

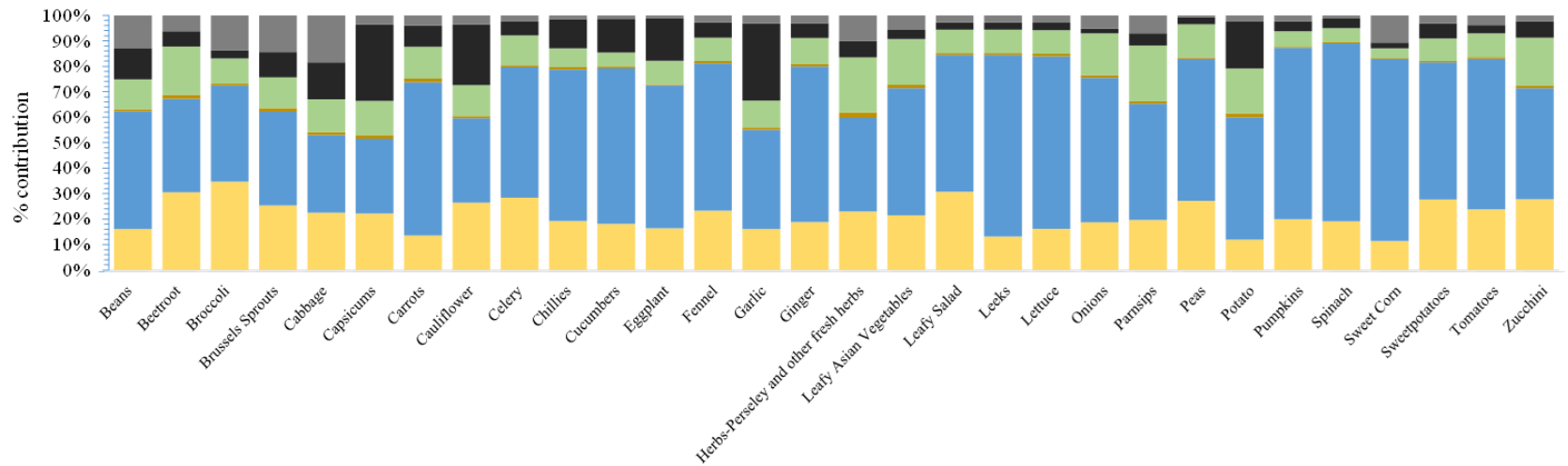
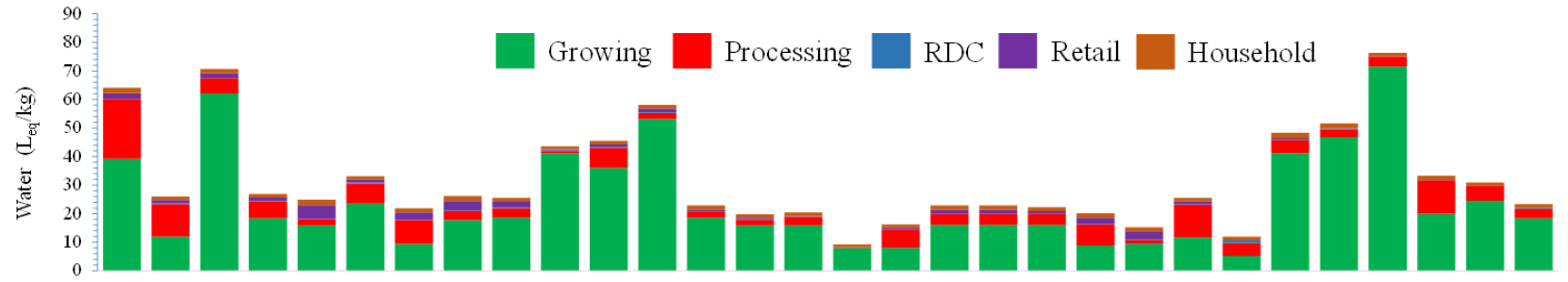


03 Key findings

Energy, Water, GHG emissions, and
Contribution analysis



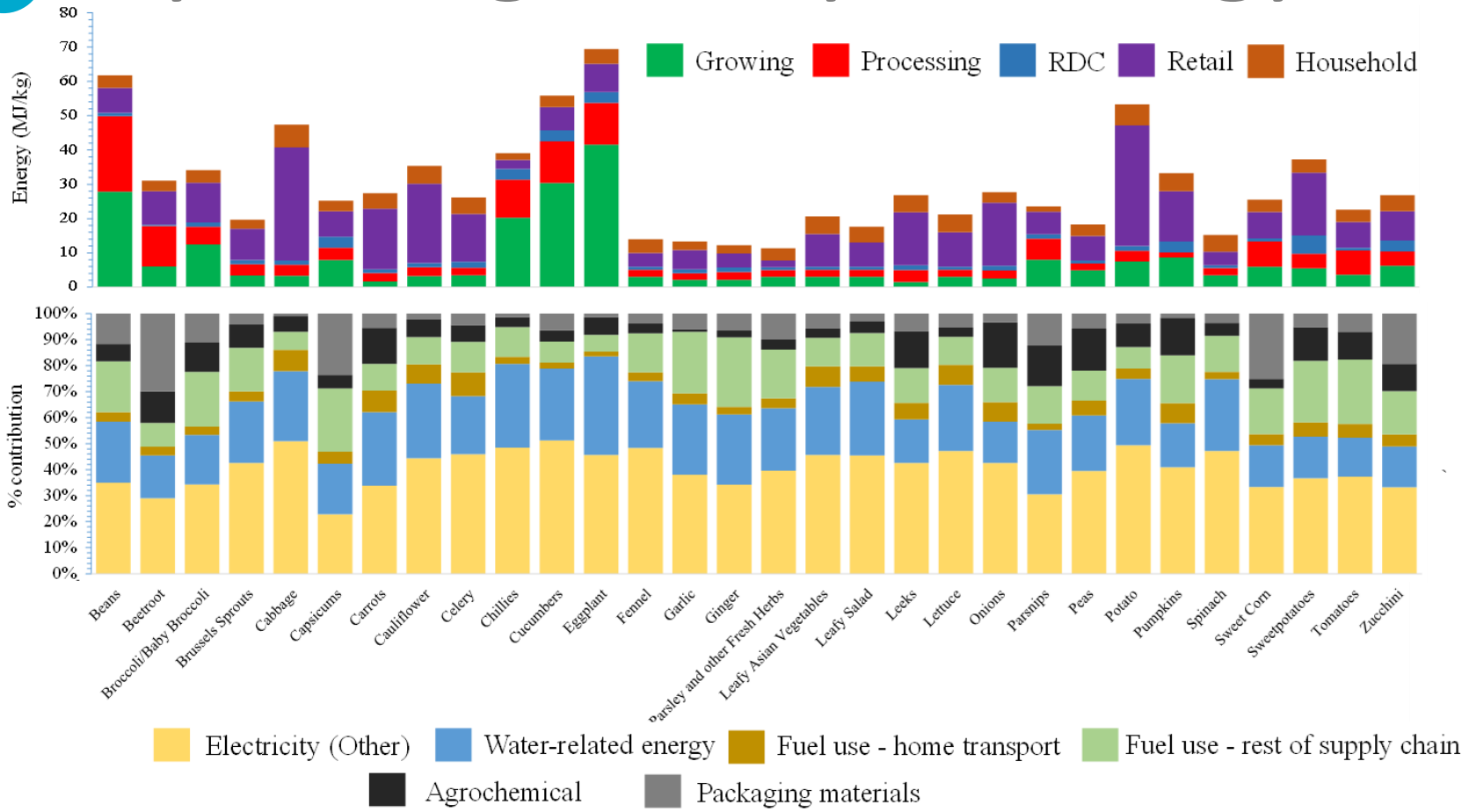
Key findings-life cycle water use



- Electricity (Other)
- Water use
- Fuel use - home transport
- Fuel use - rest of supply chain
- Agrochemical
- Packaging materials

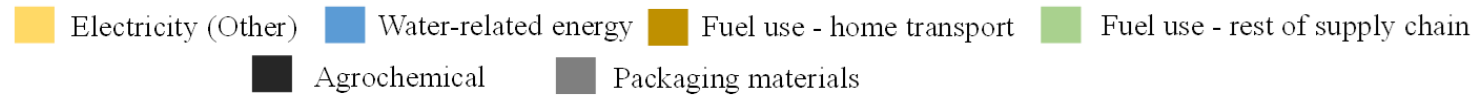
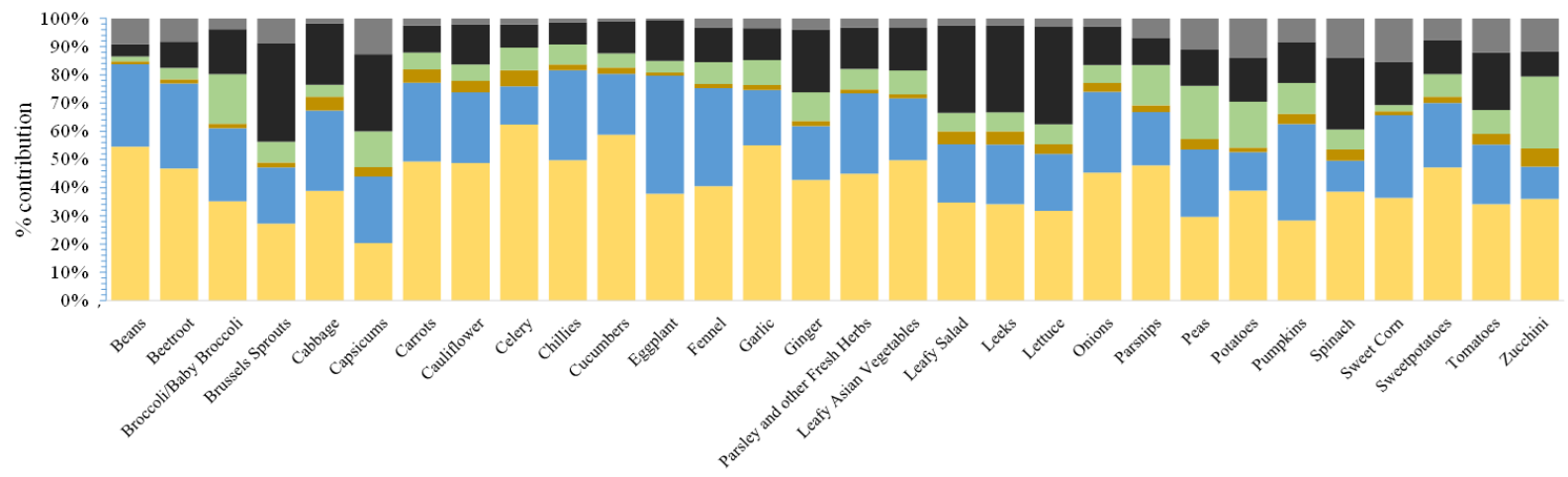
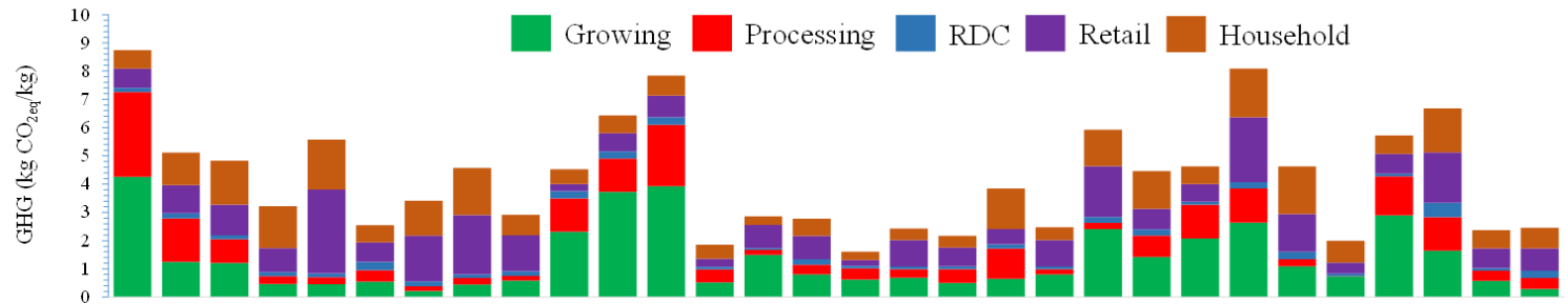


Key findings-life cycle energy use





Key findings-life cycle GHG emissions



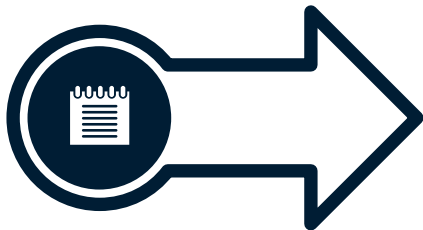


04 Future direction



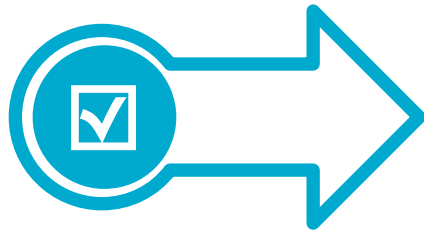
Future direction

- Fresh vegetable industry.
- Retail.
- City Authority.



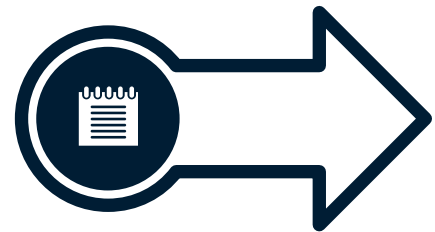
Collaboration

Every city has a different story to tell



- Testing and applying the model for different country contexts.

- Exploring the mitigation opportunities



How the city vegetable food system become more sustainable?



Take home message

Science based and robust data driven decision making

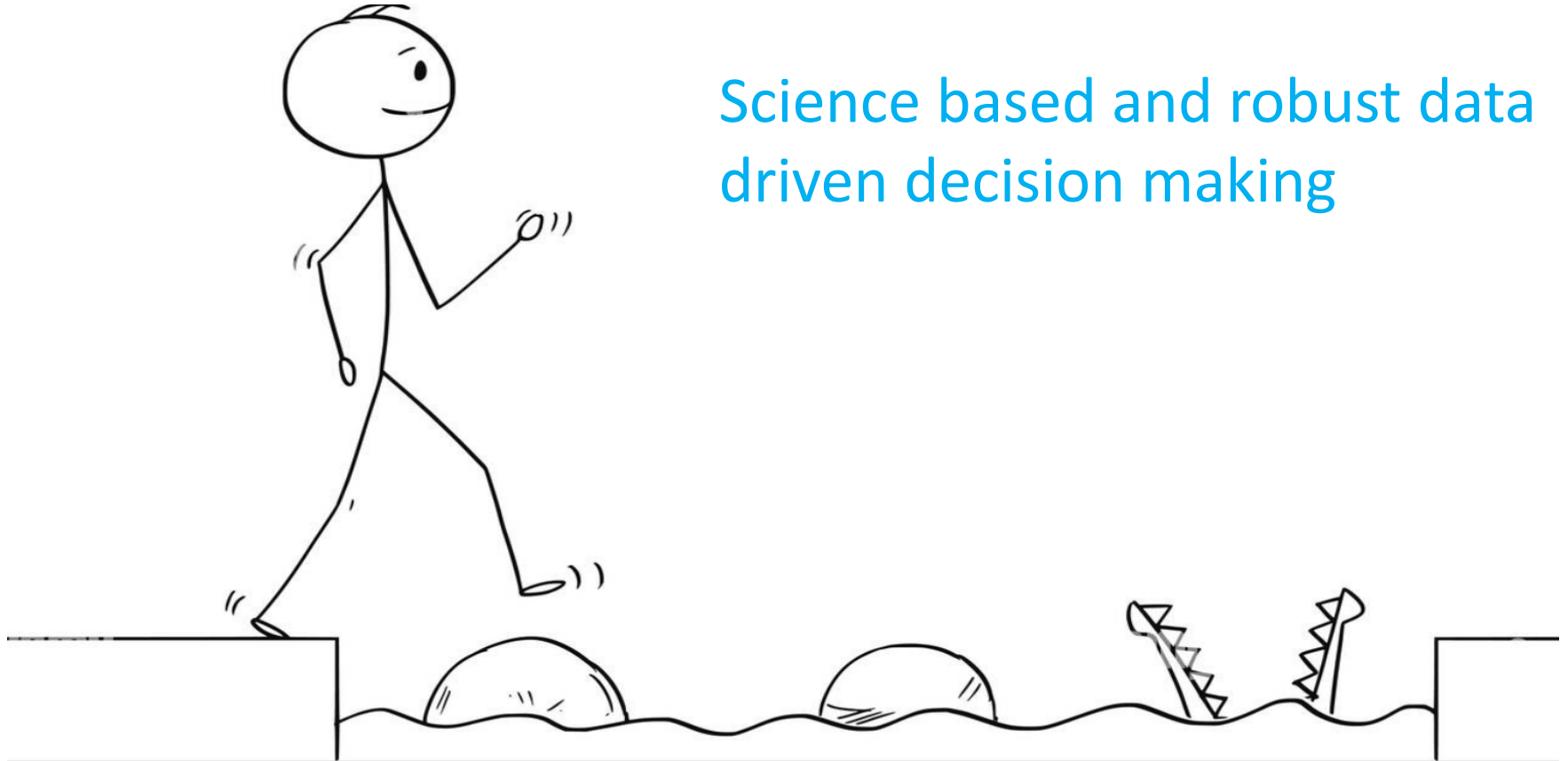


Image source: <https://www.alamy.com/cartoon-of-man-or-businessman-walking-on-stones-to-get-over-water-obstacle-image239548640.html>

Take home message



A paradigm shift is needed!



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Thank you

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