EGU General Assembly 2020
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BELMONT FORUM
URBAN EUROPE

CITYFOOD

Session ERE 1.4

A missing link – site resource inventories for the circular city

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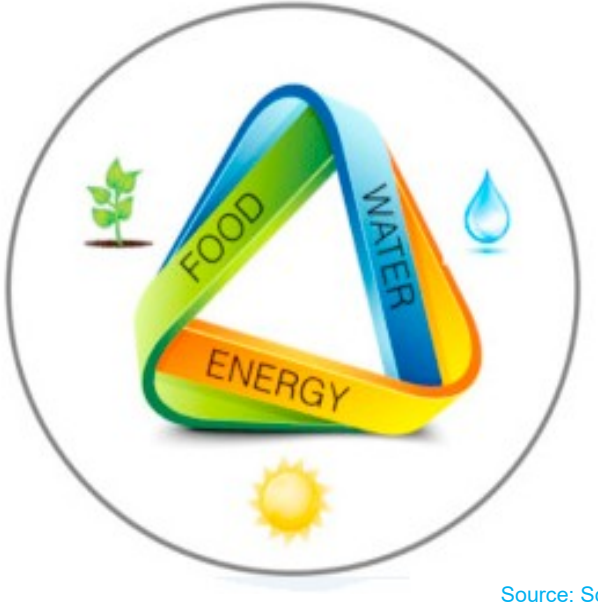
CIRCULAR CITY

- **Circular** city (CC) is based on the ideas of circular **economy**, key concept is **coupling**: unused and/or waste output can be used as productive input
- CC mitigates the impact of the Food-Water-Energy Nexus at the local as well as the global level
- Circular city is all about resources: Reduce, Reuse, Recycle
- Increased resilience due to decreased dependencies from outside the system boundaries
- Concomitant increased vulnerability due to mutual dependencies within the circular city

Circular City
circular-city.eu

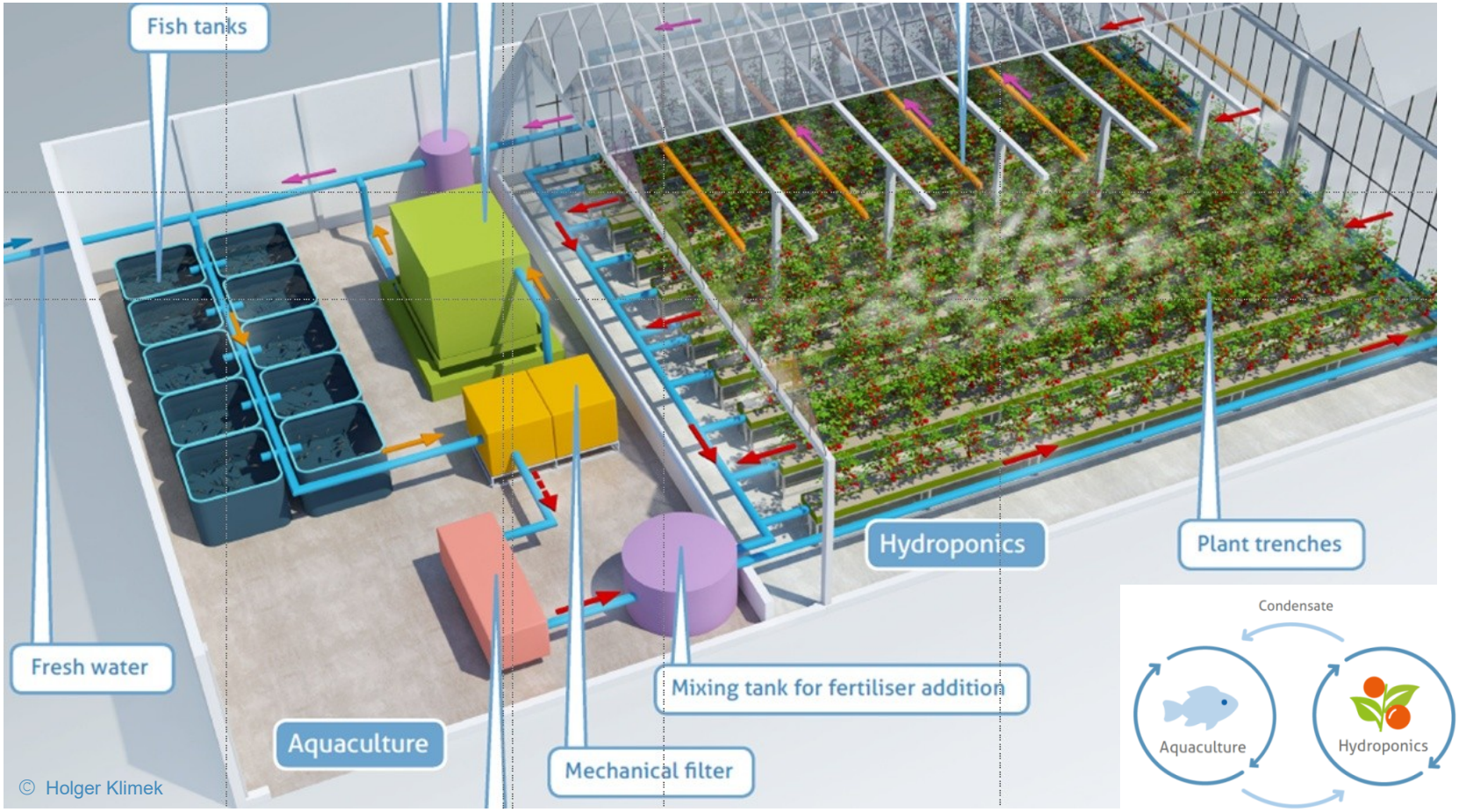


Source: Science direct

AQUAPONICS

- “Global food production is the largest pressure caused by humans on Earth”
  (Willett et al., 2019)
- Solutions for sustainable food production are required to cope with this issue
- Aquaponics is the coupled production of fish and vegetables
- This technology is resource efficient and sustainable and might be part of the solution

AQUAPONIC SYSTEM DESIGN



URBAN AQUAPONICS

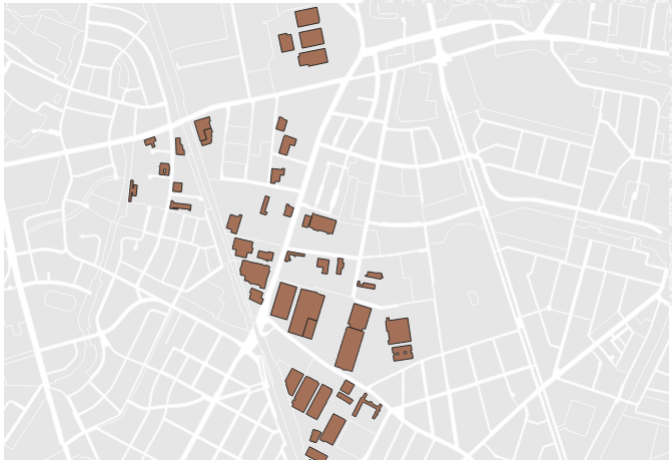
- Aquaponics is predestined to use circular city's resources
- Urban and peri-urban agriculture (UPA)
- Competition of different usages in cities, limited space availability
- Professional urban aquaponics is compelled to be lean
- Investor/operator: crucial to connect with urban resources, need for information

Urban location

Peri-urban location

Where?

- Search: new aquaponic location
- Select: considering CC aspects

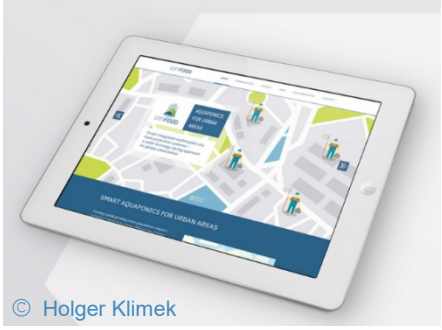


CIRCULAR ECONOMY ENTITIES

- Circular economy (CE) scheme
- Some exemplary circular economy entities

Entity name	Entity type	Location (point)
Biogas Coop	Biogas plant	lat/lon
Fine Fish & Veggies	**Aquaponics**	lat/lon
Skyscraper 7	Residential buildings	lat/lon
South Porcelain	Manufactory	lat/lon

- From the viewpoint of a CE-entity information is needed:
  - on the infrastructure available,
  - where other usable CE-entities are situated, and
  - which qualities and respective quantities they offer



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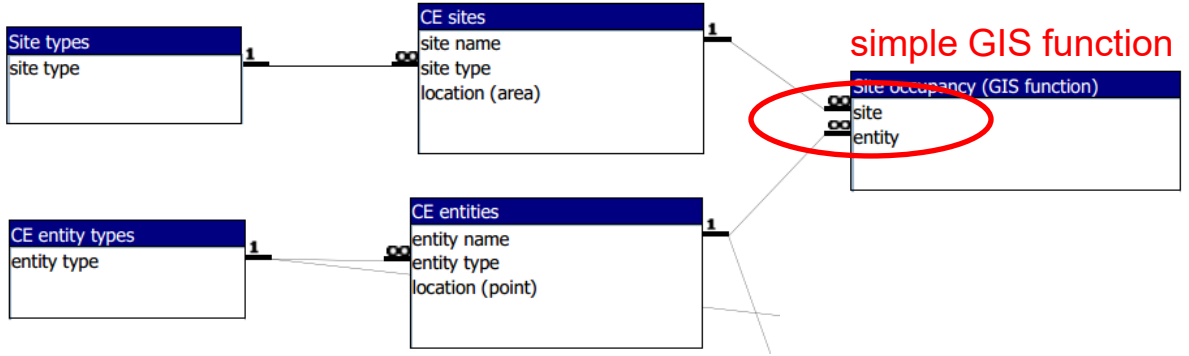
RESOURCE CATALOGUE

- CE-resource catalogue
  - Input: required
  - Output: provided

	Some catalogue entries (aquaponics)			
Direction	IN	IN	OUT	OUT
Resource name	Grey water	Storm water	Plant leftovers	Waste water
Grid				Sewerage network
Not constant		True	True	True
Comment	Double pipe system required	Rainwater retention useful		Specific local regulations
Quality	Treatment required	Treatment required		

SITE RESOURCE INVENTORY

- All CE-entities at a given site
- Technical infrastructur and its CE sources is added via grid resources



Site	Municipal grid	The New Block	The New Block	The New Block
Entity	South Porcelain	Fine Fish & Veggies	Skyscraper 7	Fine Fish & Veggies
Entity type	Manufactory	Aquaponics	Resident. building	Aquaponics
Resource	Excess heat	Excess heat	Grey water	Grey water
Direction	OUT	IN	OUT	IN
Proximy required			True	True
Grid	District heating	District heating		
Quantity per year	250 MWh	112 MWh	5000 m^3	1400 m^3

TERMS AND DEFINITIONS

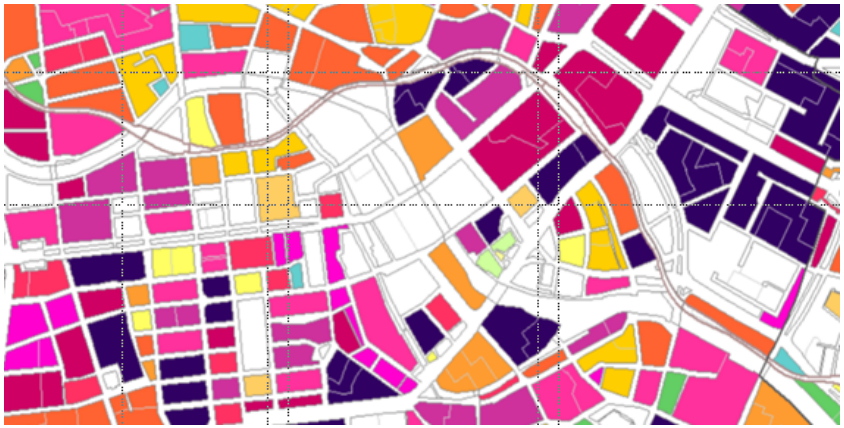
- Definitions:
  - **CE-resource catalogue**: all CE resources of a CC, distributed via the municipal grids or in the vicinity
  - **CE-entity**: a black box with CE-resources as input and/or output
  - **Site resource inventory**: in- and output of all CE-entities at a given location
    (building-specific parameters are resources too - not considered here)

- **Excursus**: technical terms
  - "Site resource inventory" is already introduced but seldom used
  - Terms (identifiers) and definitions are to be discussed
  - Beware of ill-conceived concepts

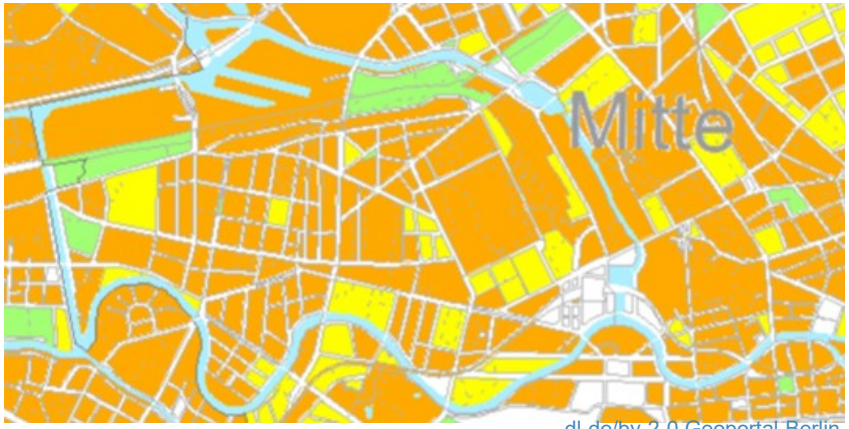
GEODATA BERLIN

- Example Berlin
  - Open data geoportal
  - Data often aggregated at block level

Supply areas building heating:
District heating 2005



Feasibility study climate-neutral Berlin 2050:
Specific final energy consumption

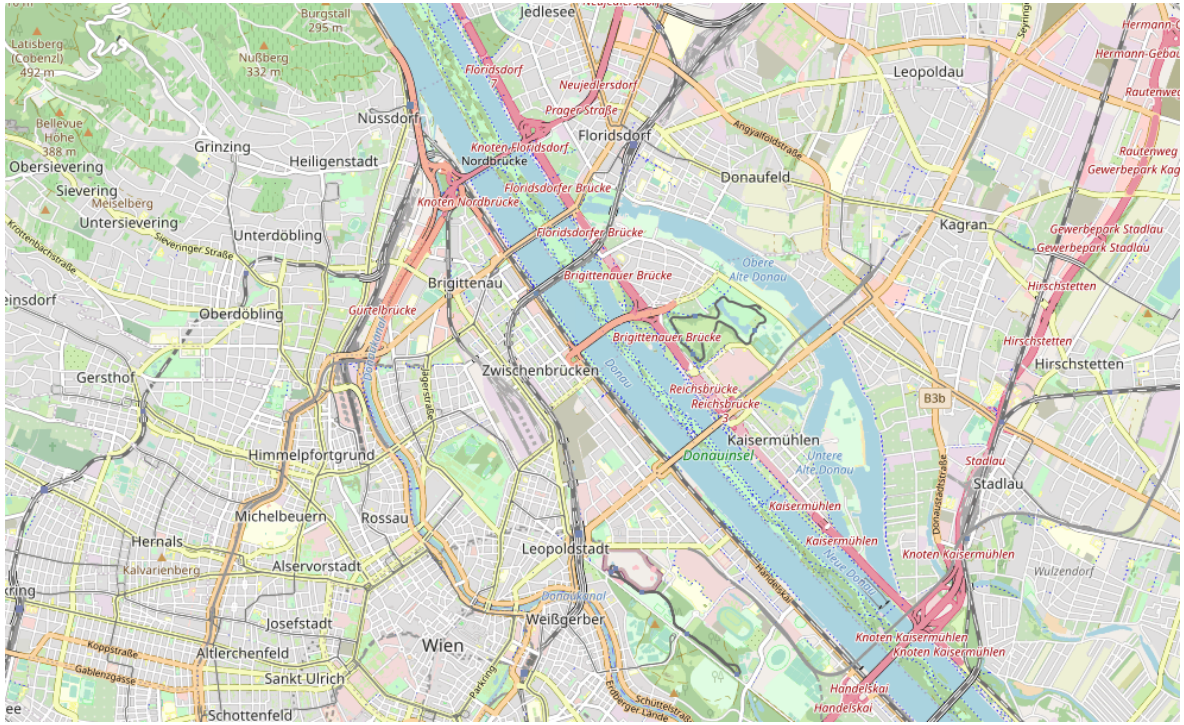


dl-de/by-2-0 Geoportal Berlin

OPEN STREET MAP

- Community driven
  - creates and distributes free geographic data
  - open source
  - open data
- Tags
  - describe specific features of map
  - key-value pairs
- Namespaces
  - for grouping closely related keys

- Good complement to official information



OSM - PROJECT CIRCULAR ECONOMY

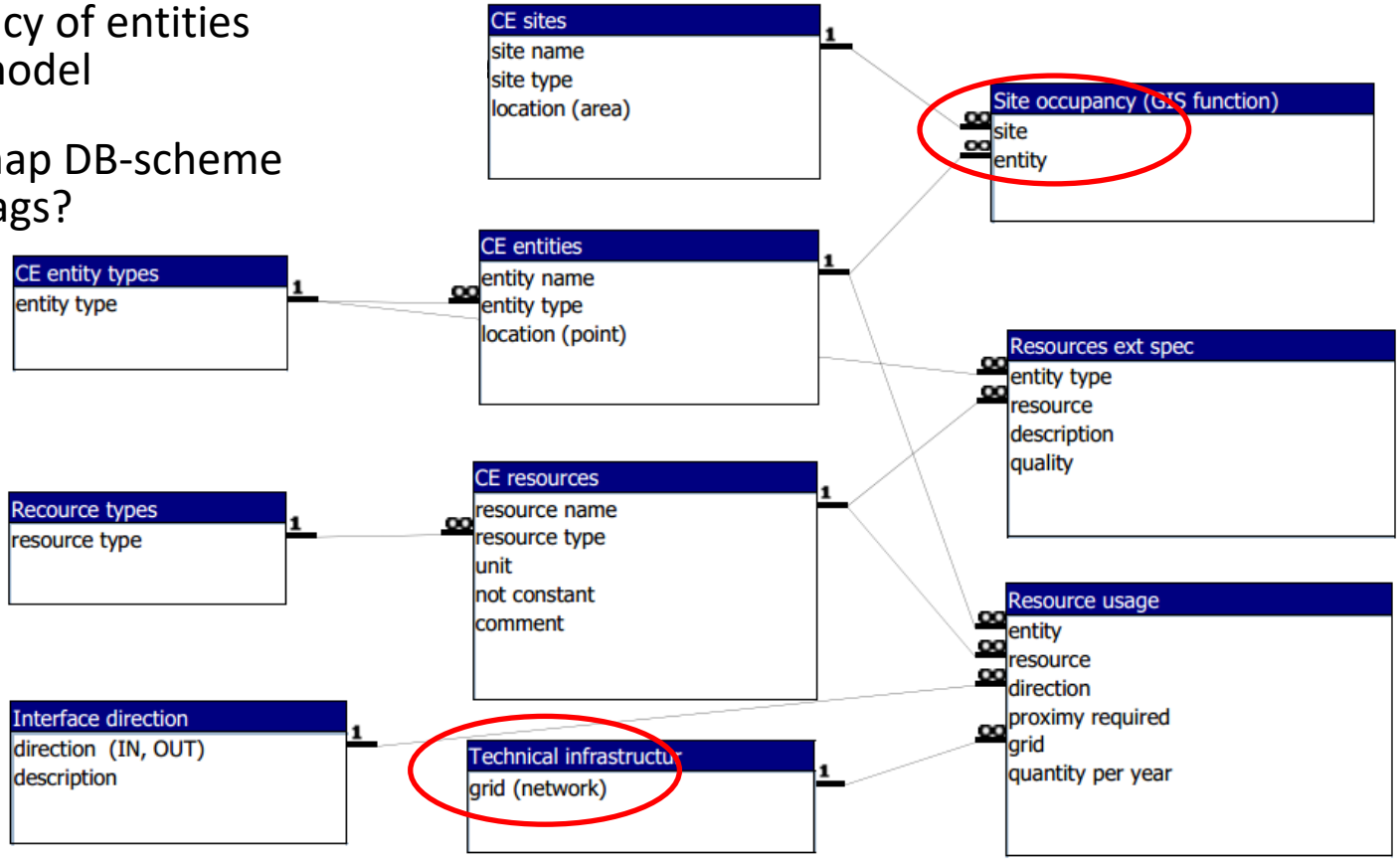
- OpenStreetMap project CircularEconomy
  - POIs of community circular economy
  - good documentation

tag	description	example
repair=assisted_self_service	**mandatory** It's a workshop	
key value amenity=workshop	**mandatory** workshop most of the case. Repair Café if the organizers	
service_times=*	**mandatory** Hours of the workshop	Sa[3] 09:00-12:00; Aug Off Mo[1,3] Jan,Mar 09:00-12:00 Th[-1] 09:00-12:30
name=*	**mandatory** name of the workshop	Repair café informatique
operator=*	**optional** the charity / organization running the workshop	Association Repair Café du Pays d'Ancenis
description=*	**mandatory** Description	Si vous avez un appareil électrique usagé,

OSM CircularEconomy project

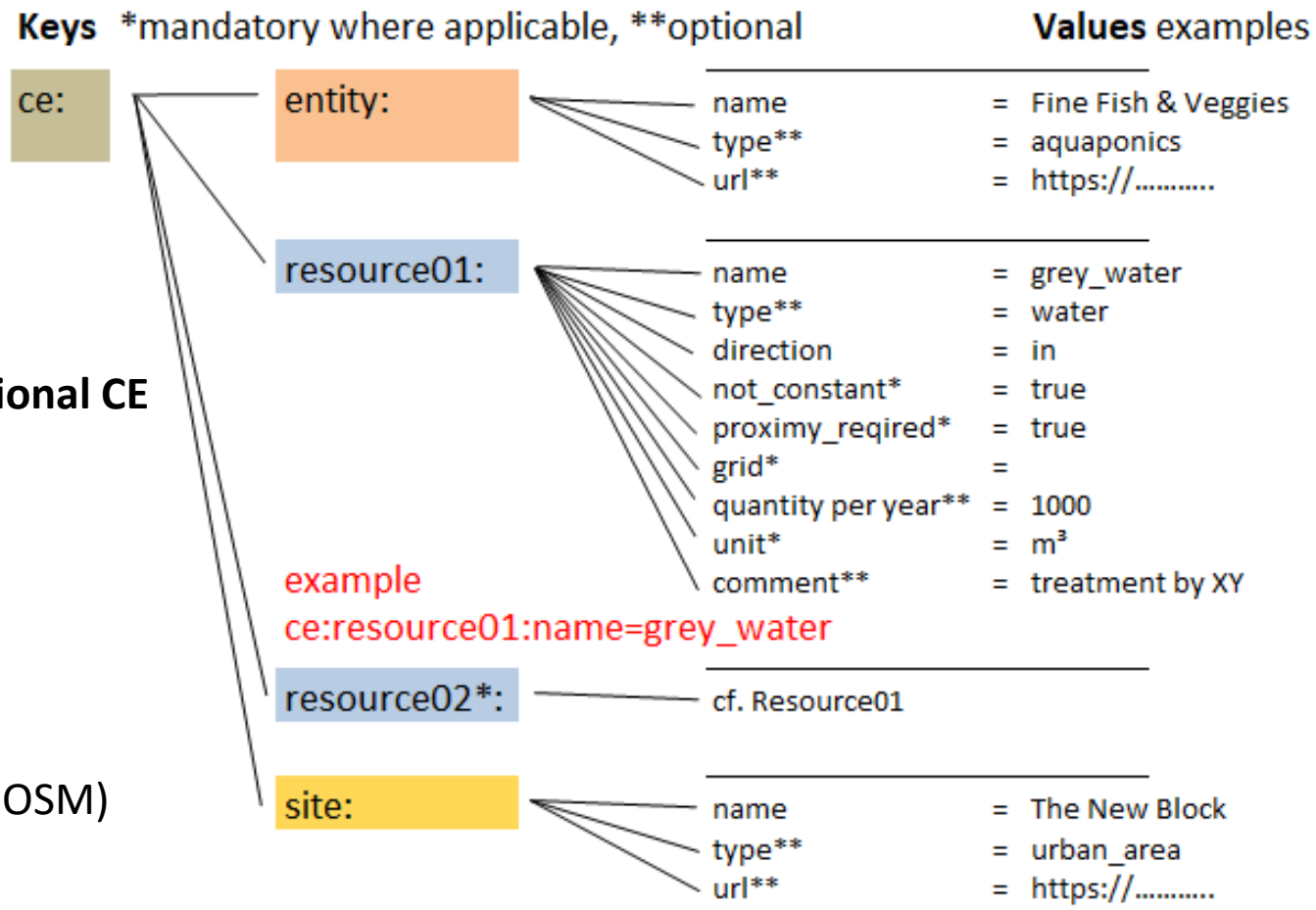
SIMPLE CE SCHEME

- Consistency of entities by data model
- How to map DB-scheme to OSM tags?



TAGS FOR PROFESSIONAL CE

- Proposal: introducing **OSM tags for professional CE**
- Unitary principle (local portals differ)
- Consistency by database design
- Root namespace "ce:" (not yet used in OSM)



CONCLUSIONS

- Urban aquaponics as a CE-entity is used exemplarily to propose some new OSM tags

- These can evolve to a CE tagging system: a new circular city geodata management approach, for authorities too

- Site resource inventories close the missing link between difficult to obtain on-site information and people needing it

- CC vulnerability: information available for replacement in case of CE-entity failure

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- **My questions:**
  - Is it OK to use “ce:” as root namespace, concerning the existing CircularEconomy project on OSM?
  - Term: CE-entity or CE-element?
  - Can we learn something from INSPIRE?

THANK YOU FOR YOUR ATTENTION!

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Relaxed? Your questions?

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Let us forge the link!

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