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Circular Water 2050

Impact and opportunities for the urban water cycle of the ‘fully circular in 2050’ target of the Netherlands in a changing world

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Bridging Science to Practice

26-4-2022

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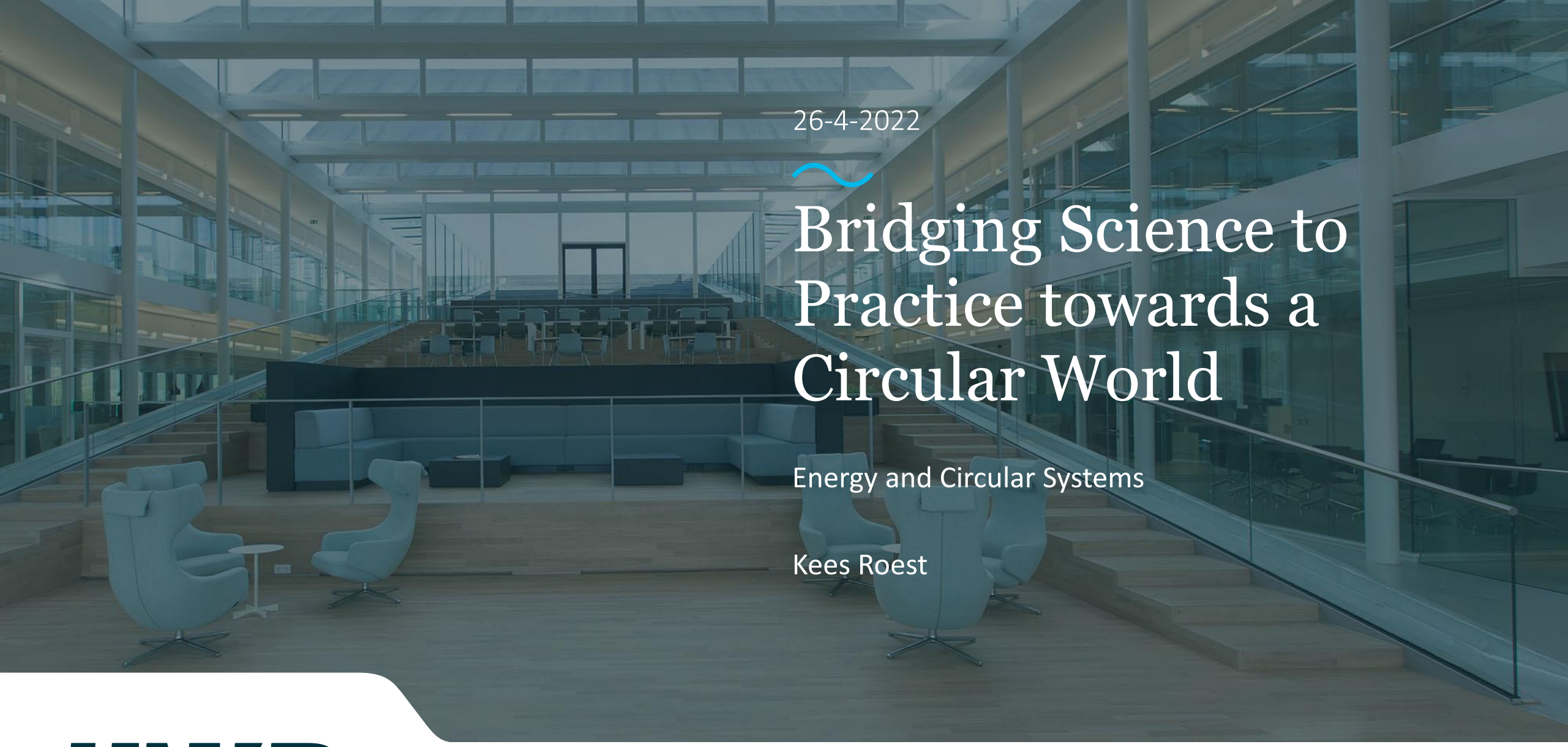
- KWR Water Research Institute
  - Energy and Circular Systems
- Circular Water 2050
  - Material Flow Analysis
  - Circularity (dot on the horizon)
  - Tools & back casting
- Q&A
- *Water, the basis of life*

Availability of sufficient clean water is a societal issue all over the world



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Bridging Science to Practice towards a Circular World

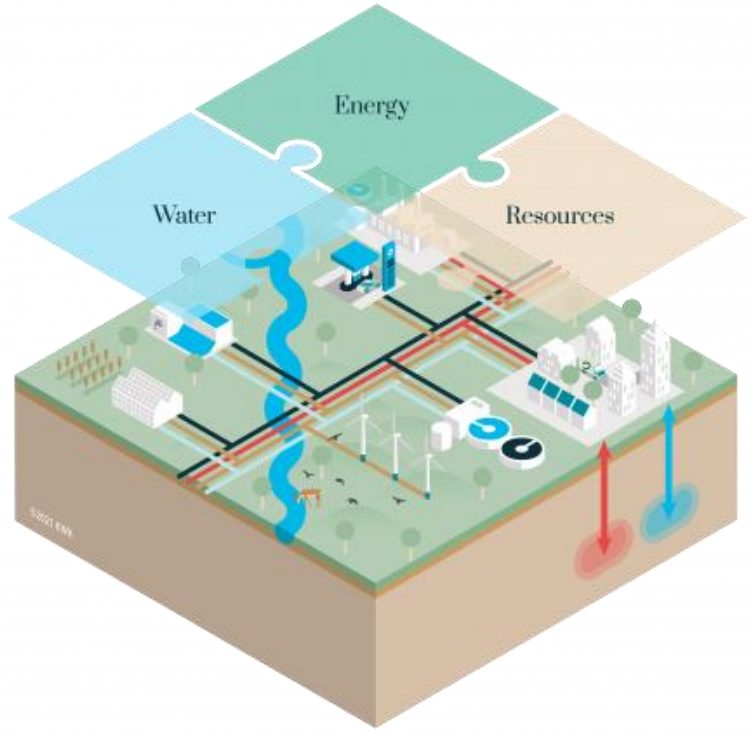
Energy and Circular Systems

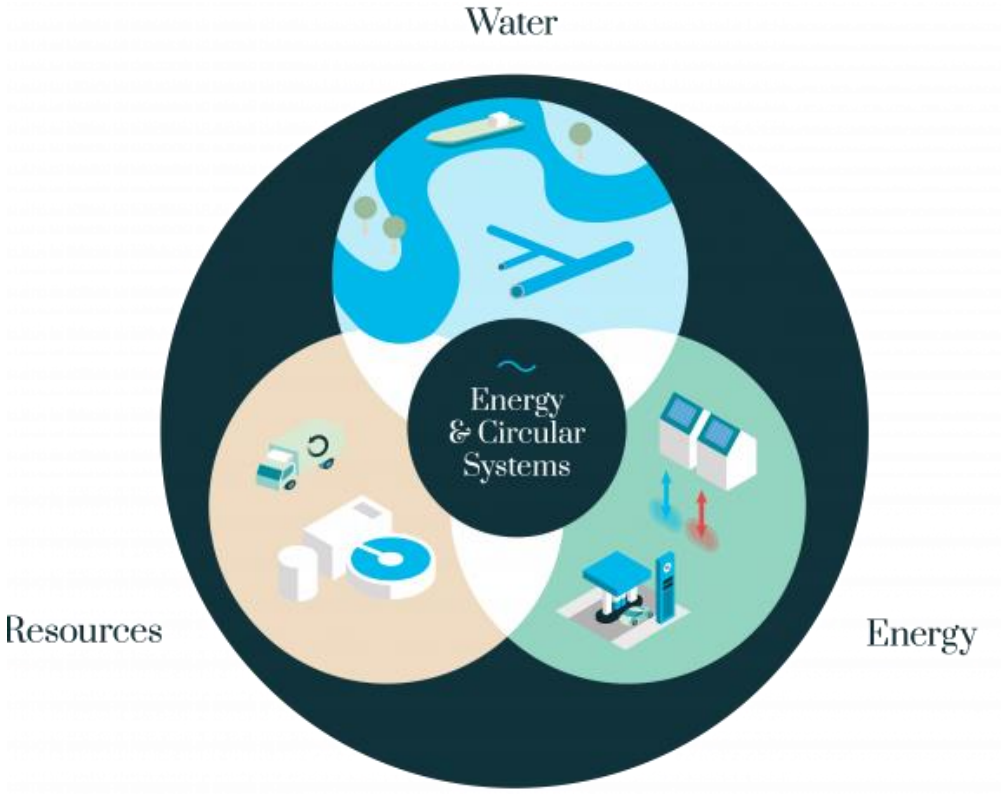
Kees Roest

KWR

Bridging Science to Practice

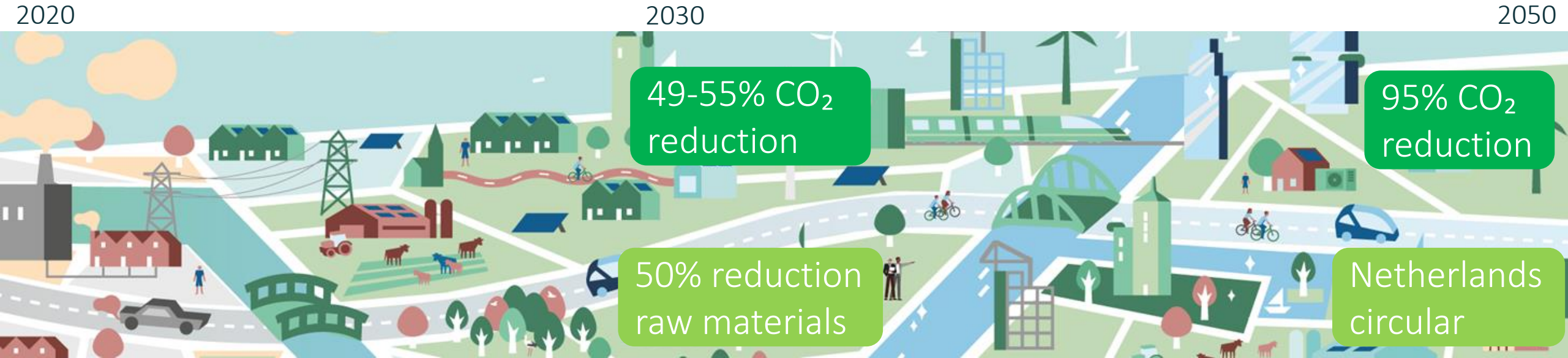
Energy and Circular Systems
Transition to sustainable water, energy and food supply





Energy and Circular Systems
Transition to sustainable water, energy and food supplies

- Closing the cycle
- Water for Energy
- System solutions for a circular economy
- Tools



WATER in the Circular Economy (WiCE)

Building the knowledge base needed to contribute to a circular economy, climate adaptation and transition to a sustainable energy supply.

- Dutch water companies, branche association Vewin and De Watergroep (BE)
- KWR: Coordinator, principal implementor

WiCE Circular Water 2050

Impact and opportunities that lead to the realization of a fully circular water chain in 2050

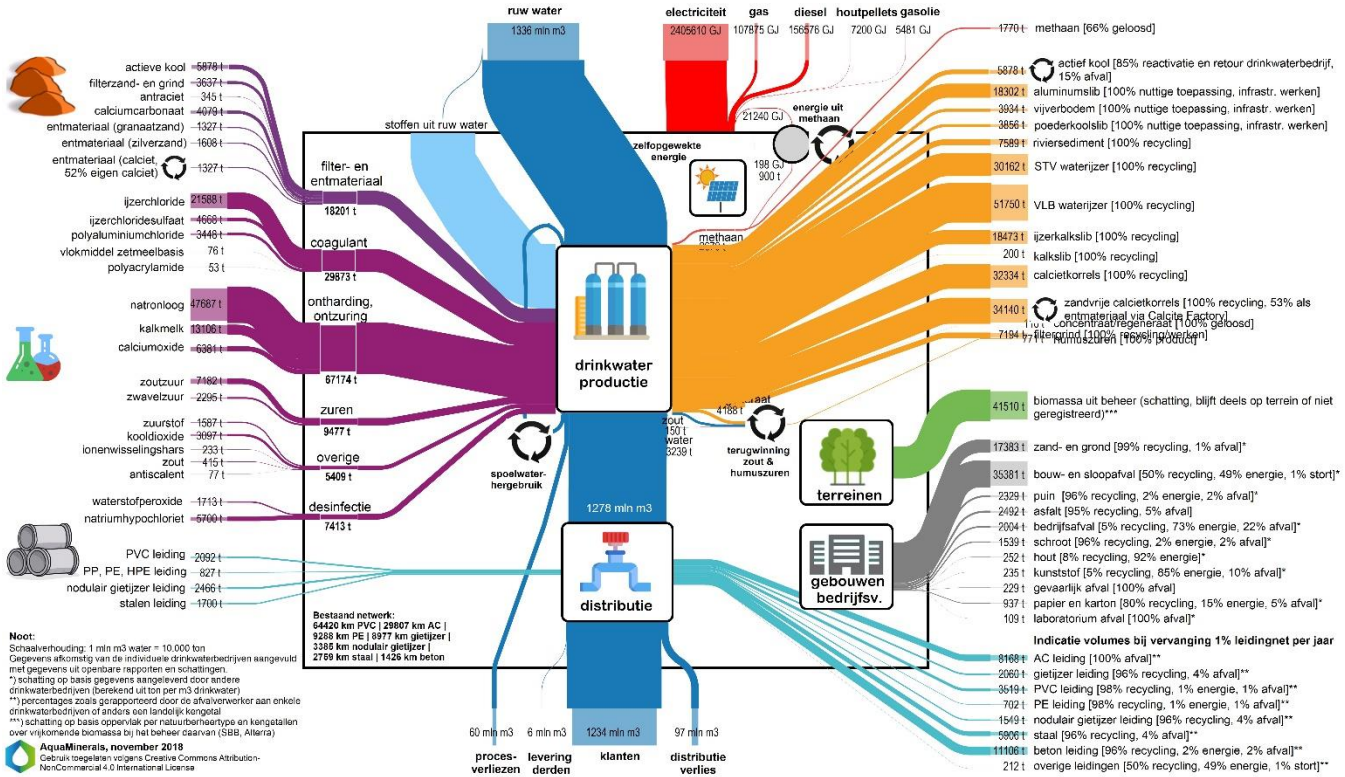
1) Provide insight into all incoming and outgoing material flows in the water chain (drinking water companies, water boards and possibly also municipalities) in the current situation.

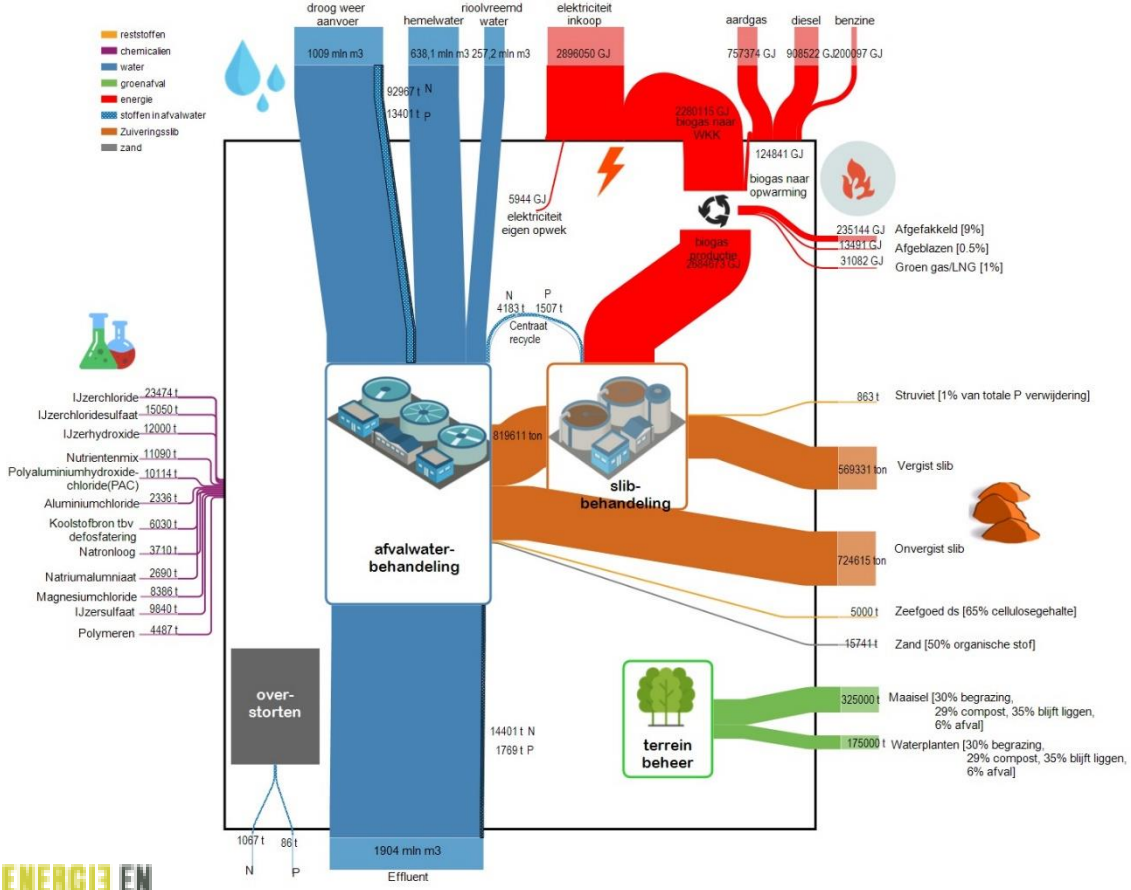
2) Investigate, describe, discuss, define and record what is understood in the water chain by fully circular in 2050 (dot on the horizon).

3) Determine which possible measures and actions are required (designed as route(s) map) to transform the current water chain into a fully circular water chain in 2050.

https://www.kwrwater.nl/en/projecten/circular-water-2050/

Incoming and outgoing material flows in the Dutch water chain





Some resources in the water cycle

fresh water

biosolids

energy

phosphorus

cellulose

biopolymers

proteins

organic matter

bioplastics

Definition Circular Economy

- Fysical dimensions (like substance flows)
- Socio-economic values (like efficient, social responsible, quality of life)

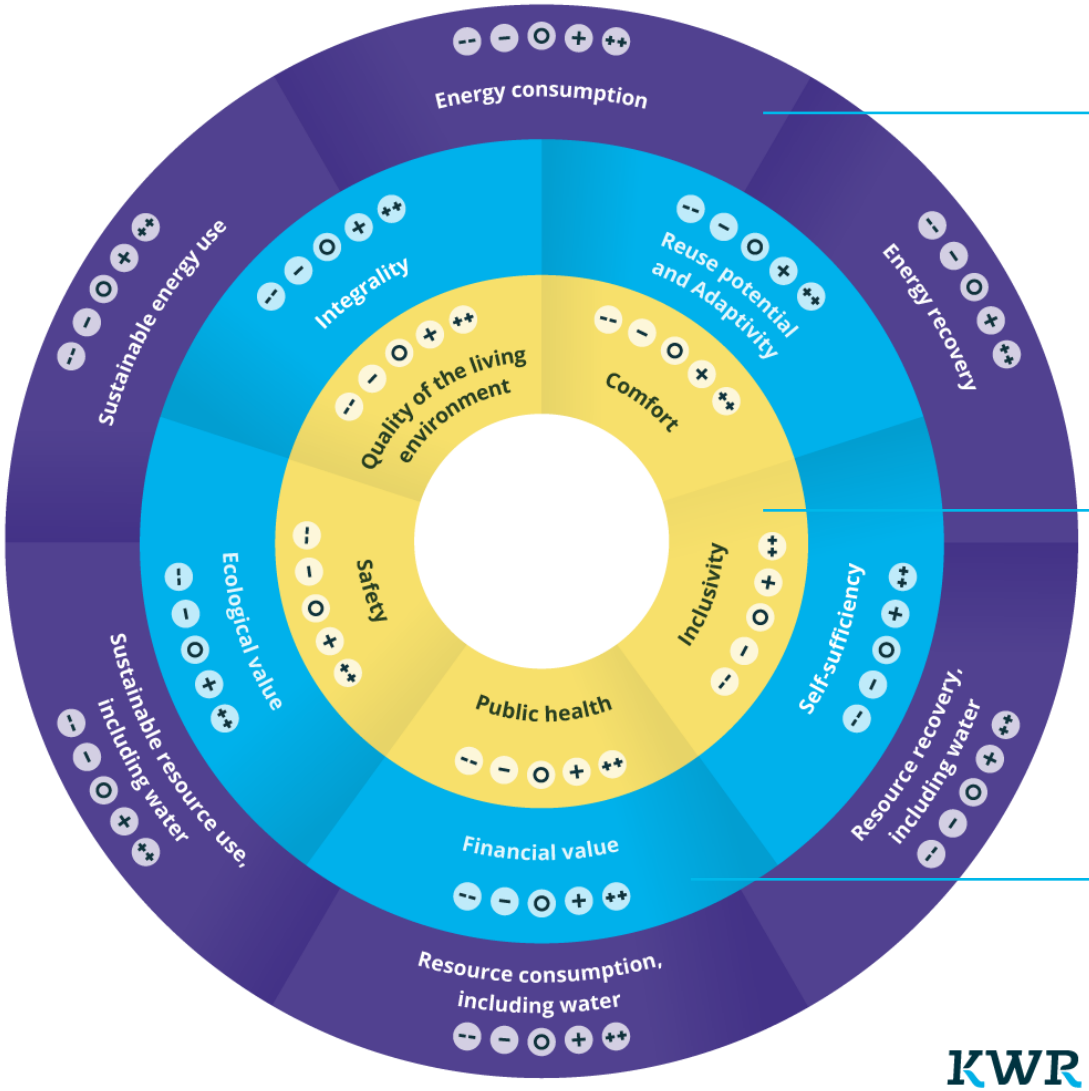
Definition Circular Economy according to the SER*:

An economy that handles products, materials and resources efficiently and in a *socially responsible* manner *within ecological preconditions*, so that future generations also retain access to material prosperity.

*The Social and Economic Council of the Netherlands:

- an advisory body in which employers, employees and independent experts (Crown-appointed members) work together to reach agreement on key social and economic issues. (https://www.ser.nl/en/SER/About-the-SER/What-is-the-SER, Sociaal-Economische Raad (2016) Advies Werken naar een circulaire economie: geen tijd te verliezen, p. 11)

New dashboard model for the water sector



Energy and substance flow: physical characteristics

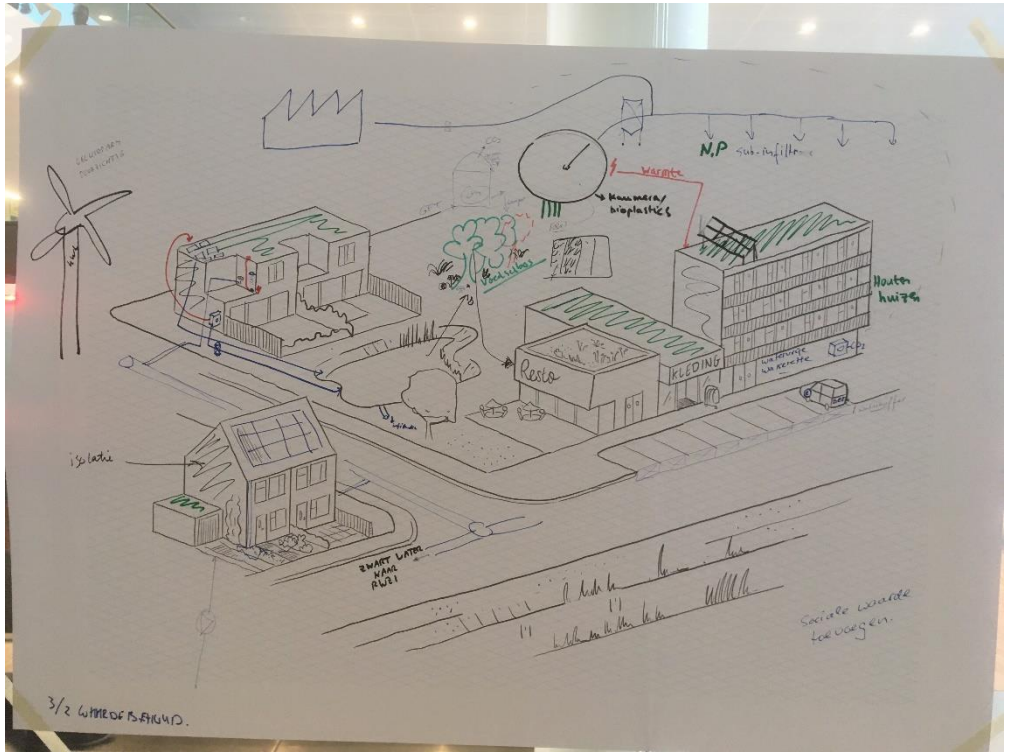
Values for people: socio-political characteristics

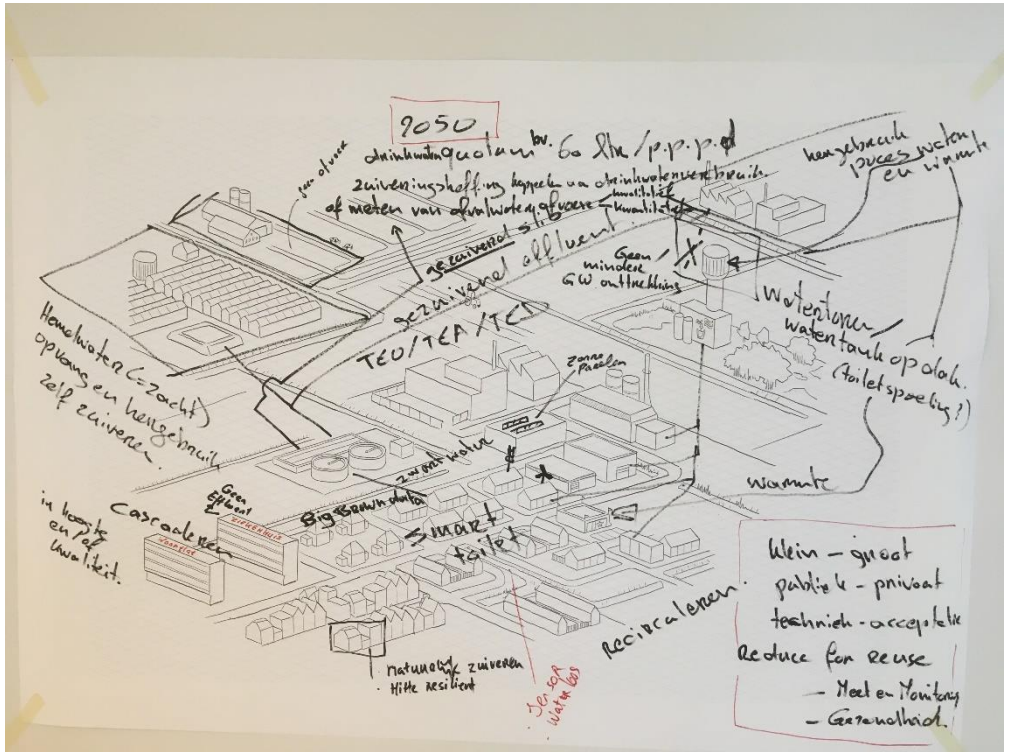
System properties: characteristics at system level

Workshops with diverse groups from within & outside the water sector (academics, professionals, generalists..)

- Identify innovative circular concepts for the fulfillment of the functions of the water chain in 2050.
- Inventory of possible technological innovations (in the long term) for the circular water chain and the use of raw materials in the water chain.
- Weigh measures in an orderly manner on the basis of the new dashboard model

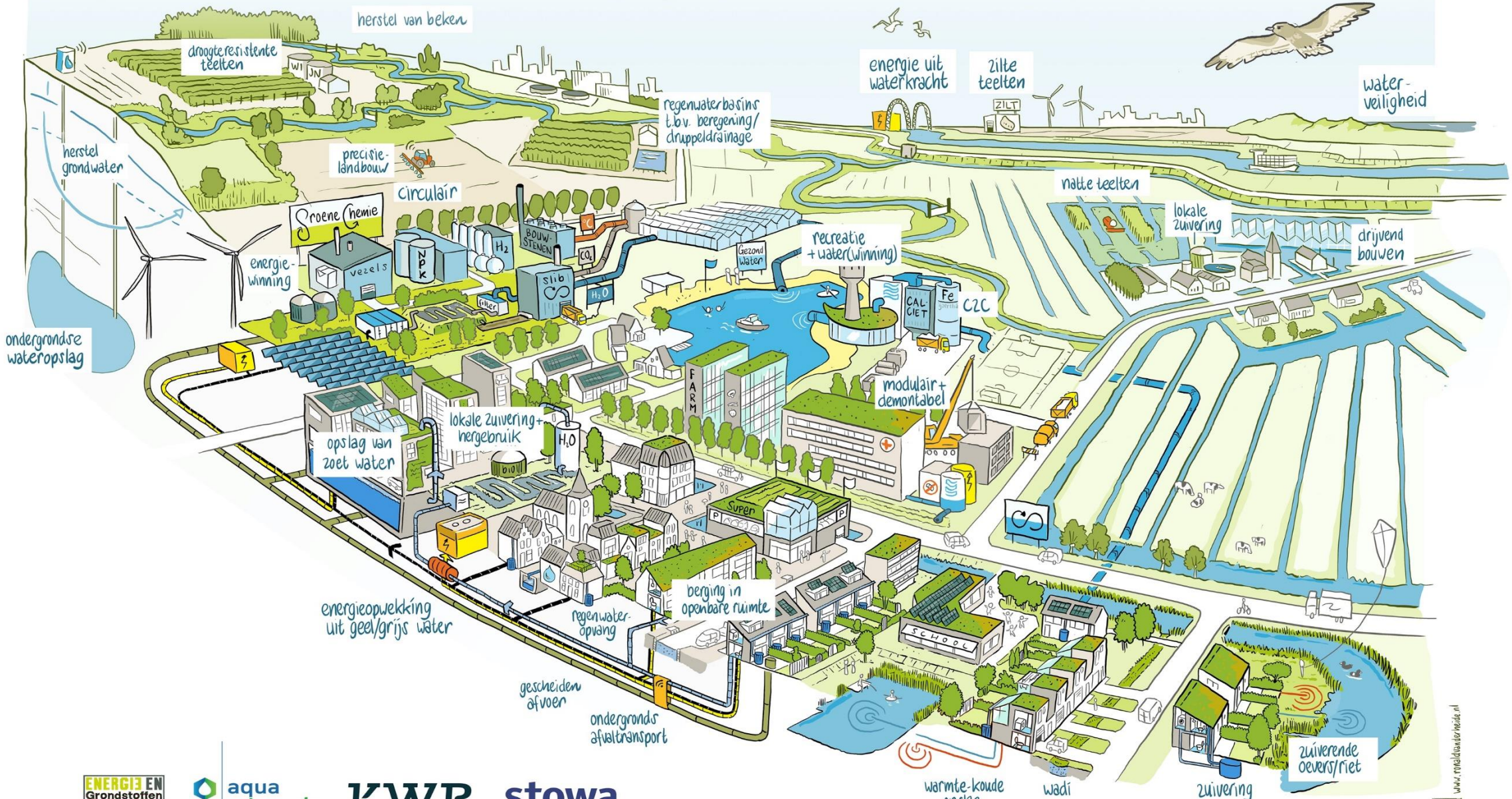
Workshops with diverse groups from within & outside the water sector (academics, professionals, generalists..)





Naar een circulaire waterketen

Een toekomstvisie voor 2050



ENERGIE EN Grondstoffen FABRIEK

aqua minerals

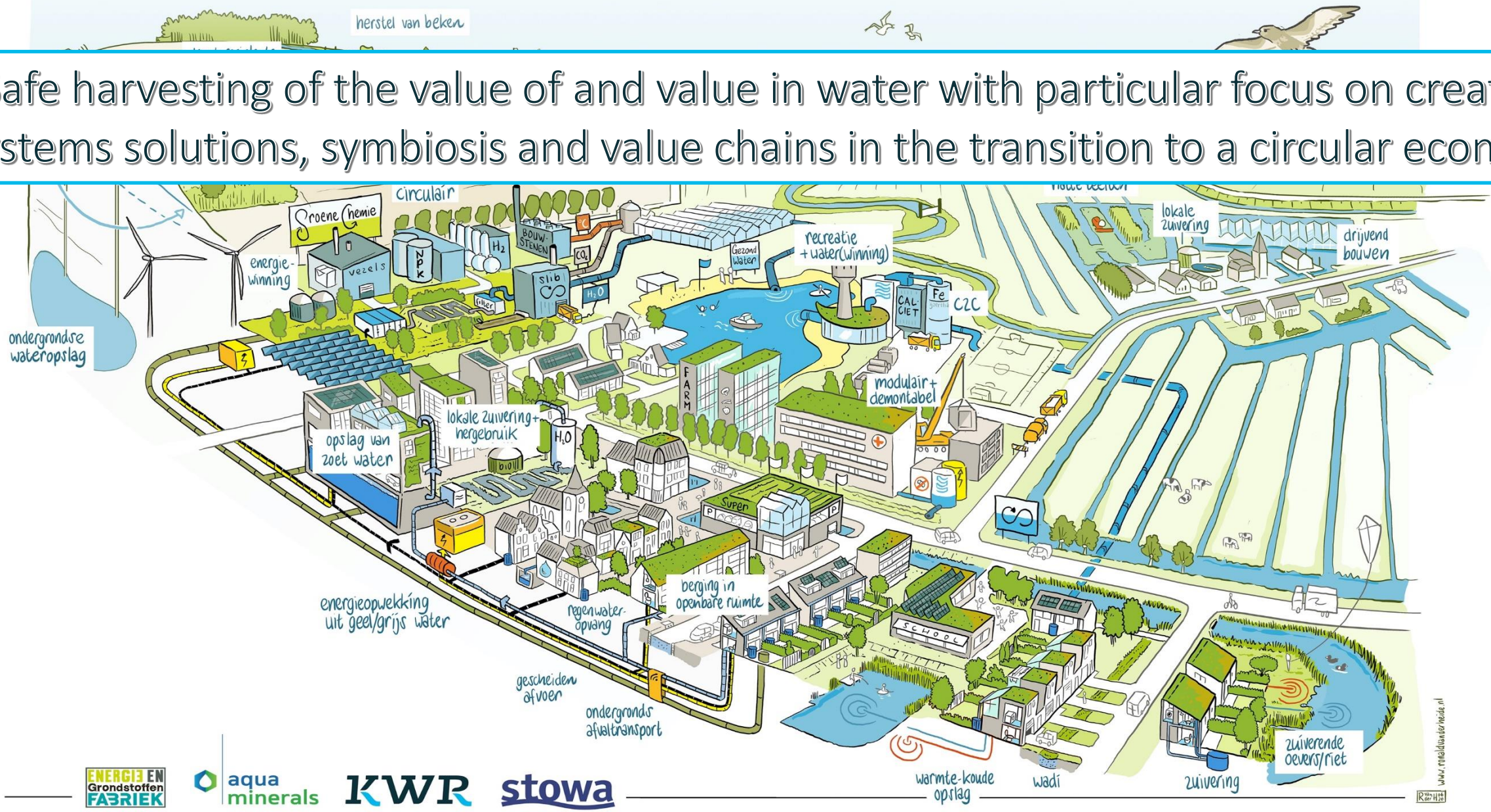
KWR

stowa

Naar een circulaire waterketen

Een toekomstvisie voor 2050

Safe harvesting of the value of and value in water with particular focus on creating systems solutions, symbiosis and value chains in the transition to a circular economy



ENERGIE EN Grondstoffen FABRIEK aqua minerals KWR stowa

Backcasting development paths

In addition to a roadmap, backcasting provides insight into:

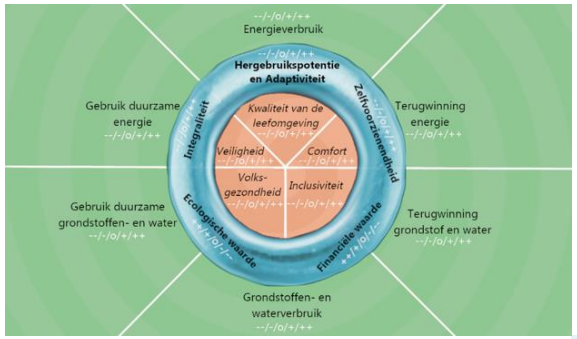
- ***Knowledge questions*** that water organizations must have answers to in order to determine and follow the chosen roadmap (conscious ignorance)
- ***Innovation needs*** of water organizations in terms of tools and techniques to follow the chosen roadmap (conscious incompetence)
- ***Moments of choice*** when water organizations should or should not invest in the next step of the roadmap to achieve the goals for 2050 (conscious deadlines)

Backcasting development paths

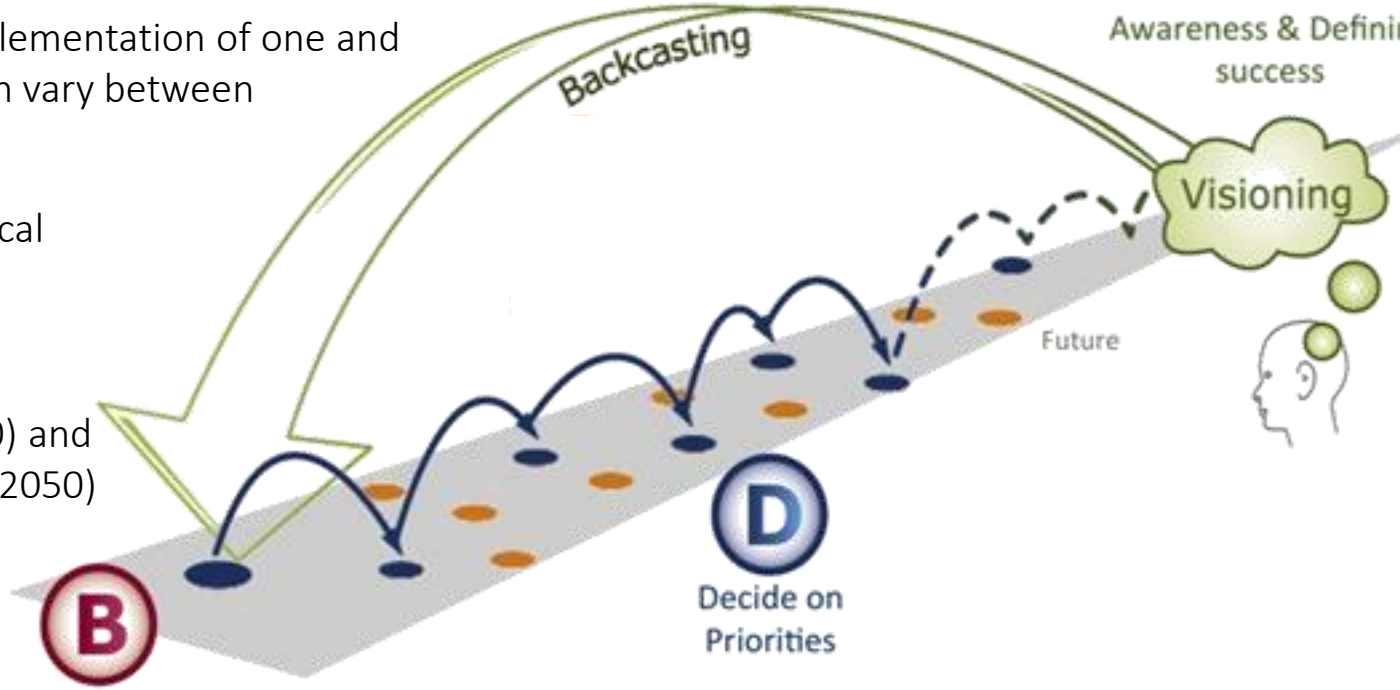
For a realistic backcasting, the choices depend on the specific situation of the city, the water company, geographical location, financial situation, etc.

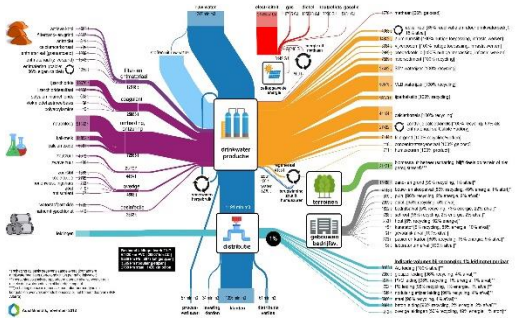
For example, the implementation of one and the same solution can vary between locations/cases.

Backcasting for a typical Dutch town or neighborhood with a hypothetical baseline measurement (T2020) and dot on the horizon (T2050)



Compelling Vision 2050





Impact and opportunities for the fully circular urban water cycle – Circular Water 2050

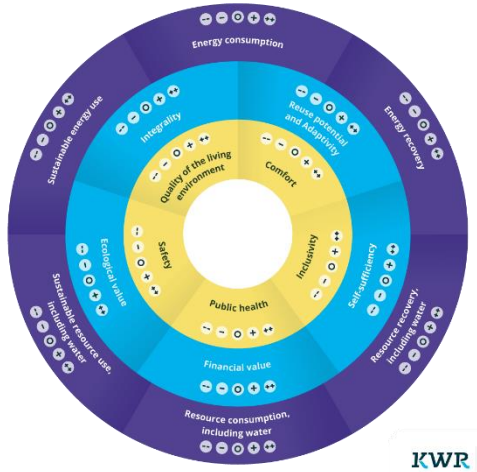
How does the current water chain score on circular characteristics?

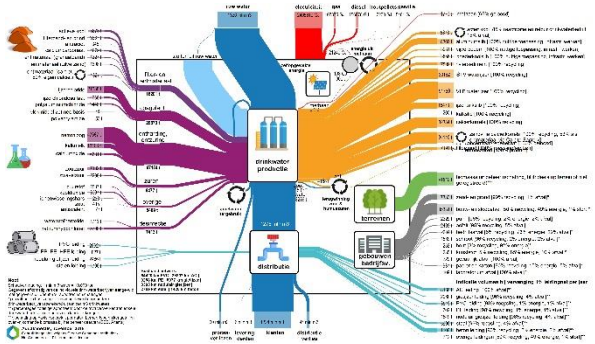
A scorecard with a clear number of recognizable and clearly defined characteristics of a circular water cycle

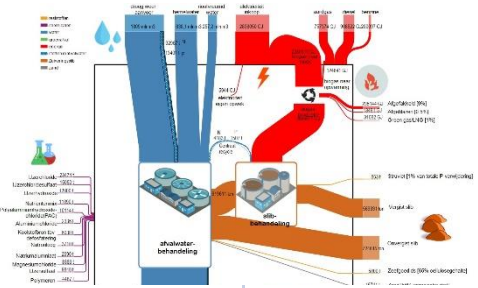
How far does the water sector want to be in 2050 in terms of circularity? ***= dot on the horizon***

But HOW can and do we want to realize this? ***= Backcasting***

Make it tangible for administrators, policymakers and planners







An integrated systemic approach is needed for circularity

E.g. Water reuse, an integrated approach

Sustainability

Governance

Treatment technologies

Health and safety

Reuse applications

Demand and availability

cross-sectoral collaboration
for a
sustainable circular economy

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The collective research programme Water in the Circular Economy (WiCE) involves the joint research of the water companies and of stakeholders in and associated with the water cycle, with the objective of contributing to the societal challenges regarding the circular economy, climate adaptation and the sustainable energy transition.

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Bridging Science to Practice

- We work at the interface of science, business and society.
- We translate scientific knowledge into applicable, practical solutions for end-users in the Dutch and international water sector.
- We are top-level innovation accelerators and international network builders.
- We increasingly play a coordinating role in national and international collaborations.

KWR

KWR: The knowledge enterprise