

WELCOME!

Experience different perspectives on the urban water - energy nexus!



Your team today

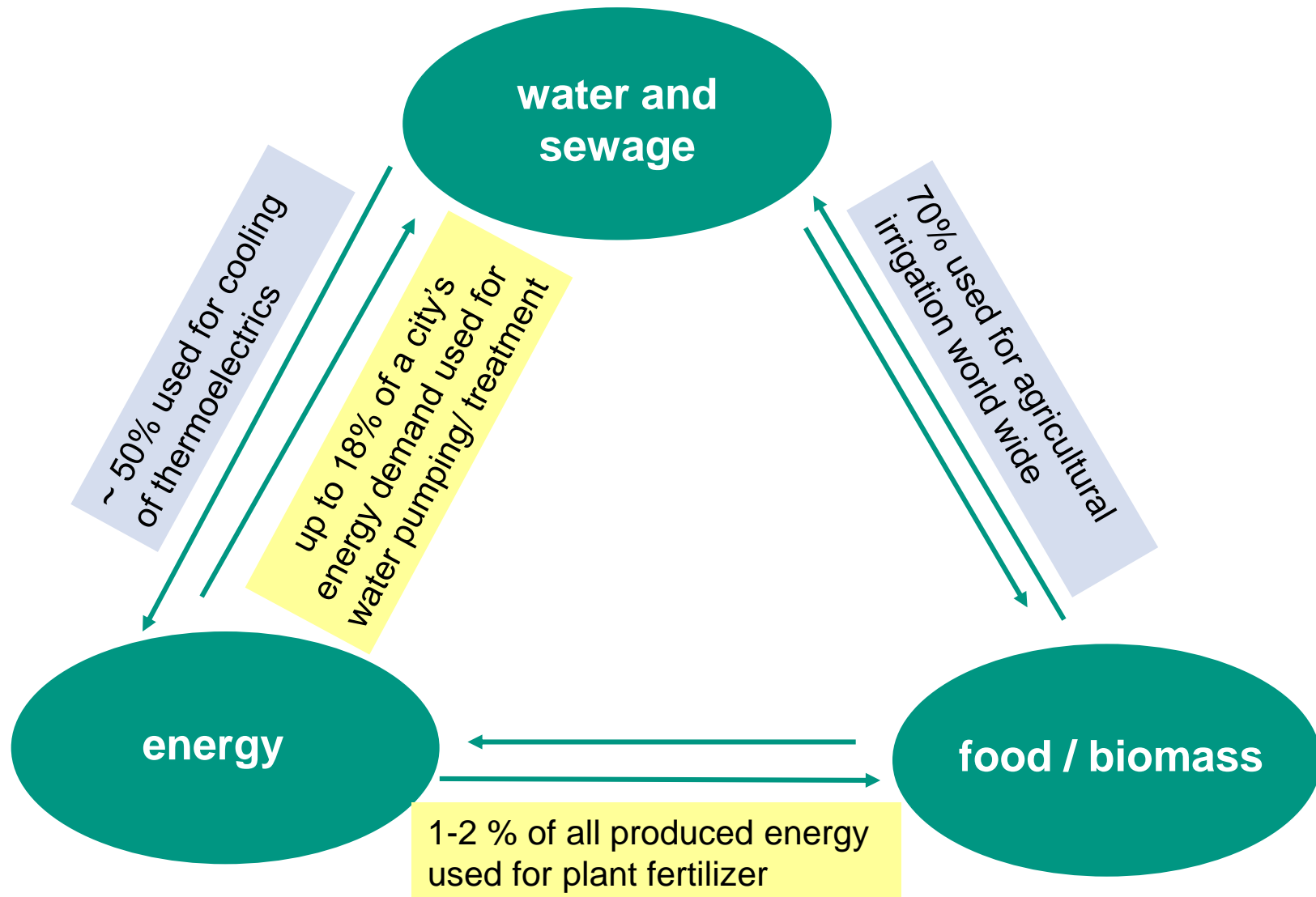
ITAS Institute for
Technology Assessment
and Systems Analysis



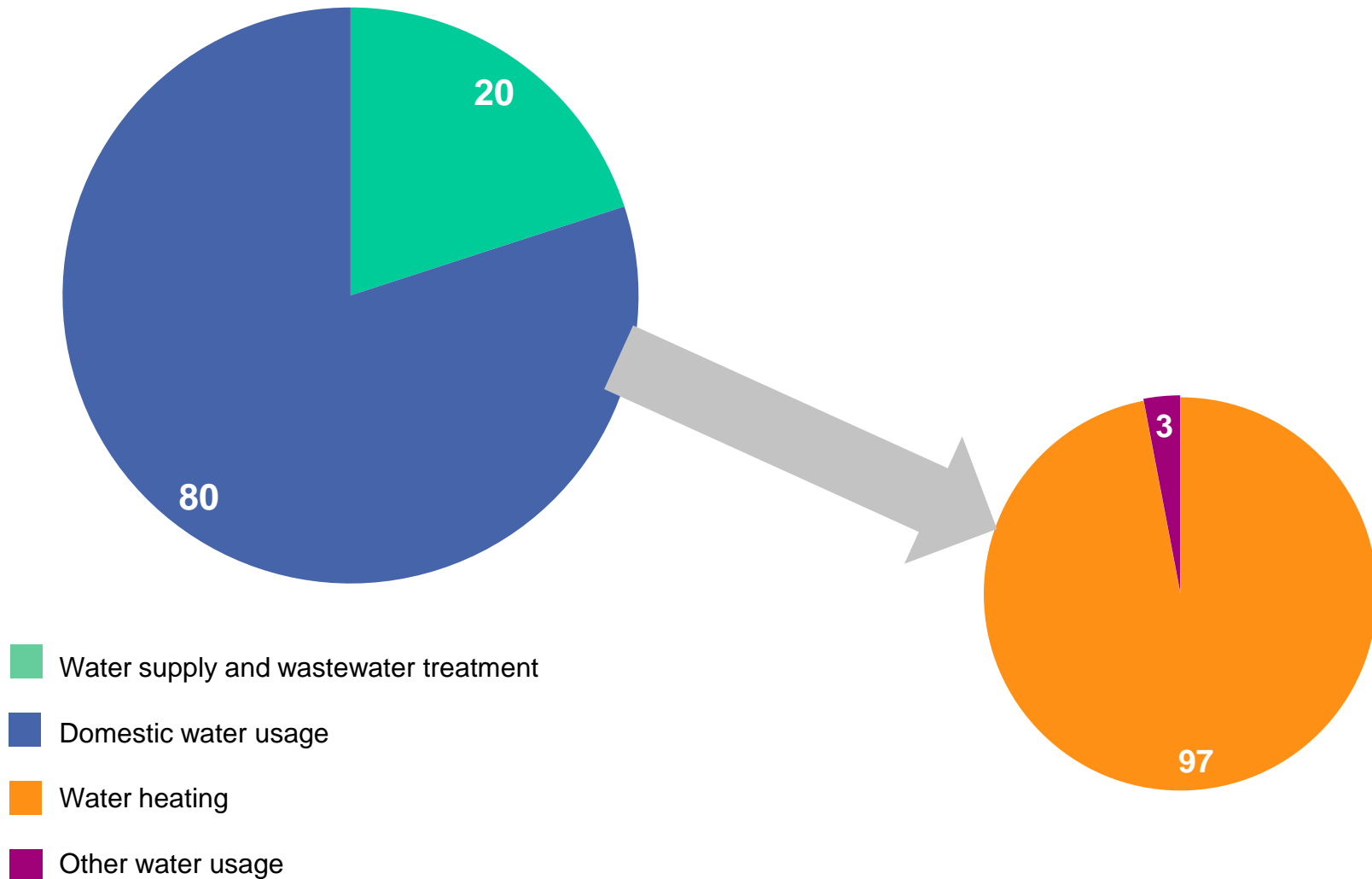
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OPTIONS FOR WASTEWATER SEPARATION

The water - energy - food nexus



Energy demand within the urban sector in %



Mass flows in domestic sewage



Parameter	Mass Flow (kg/cap* year)	Grey water	Black water
		Specific volume (l/capita*year) ~ 30.000	Specific volume (l/capita*year) ~ 550
		percentage	percentage
Nitrogen (N)	~ 4 - 5	~ 3 %	~ 97 %
Phosphorous (P)	~ 0,75	~ 10 %	~ 90 %
Potassium (K)	~ 1,8	~ 34 %	~ 66 %
COD	~ 30	~ 41 %	~ 59 %

Wastewater = energy and material resource!

Don't Mix!

- Avoid dilution
- Increase reuse potential
- Make available new resources optimally


Separate collection and treatment of different partial flows of wastewater!

Separate pipe systems necessary!

Resource I: separated greywater

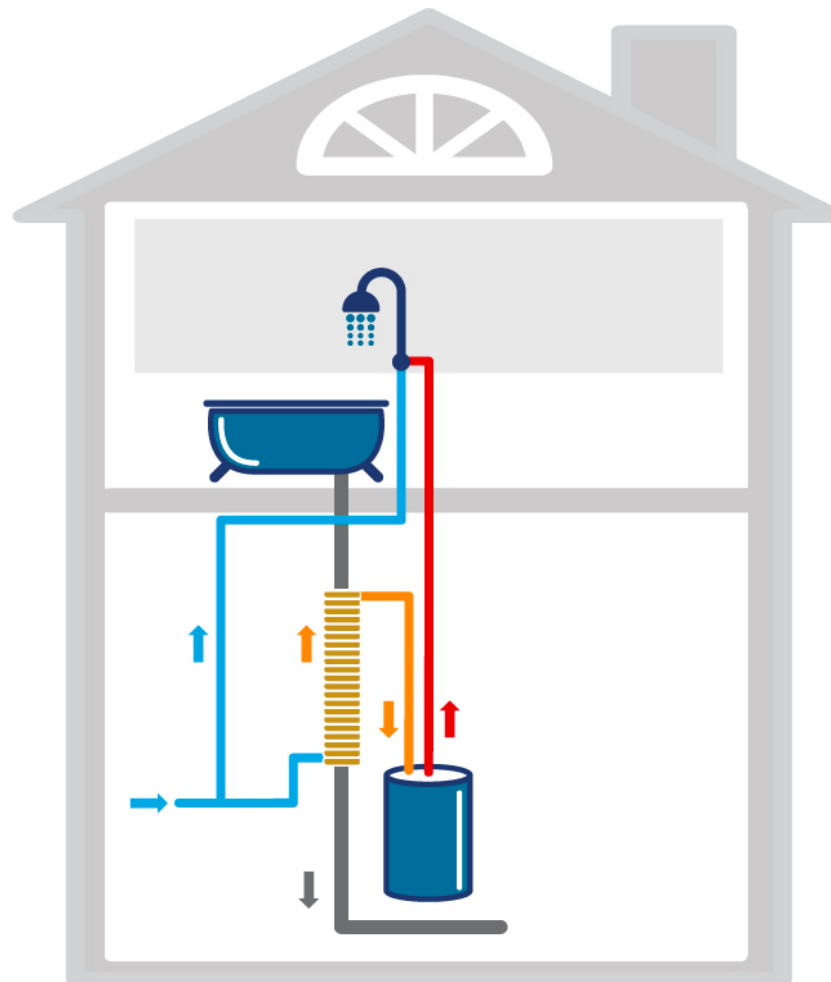


- From bathtub, shower, washing machine

- Options for reuse:
 - Irrigation
 - Process water in households (e.g. toilet flushing)
 - Source of thermal energy 

- Further advantages:
 - Less dilution of blackwater

Heat recovery from greywater



- Cold water
- Hot water
- Preheated water
- Waste water

Heat recovery from greywater



Passive house of 41 flats in Berlin, Arnimplatz

Heat recovery from greywater




**Greywater
heat exchanger**

**Greywater
treatment**

Resource II: separated blackwater



- From toilet
- Options for reuse:
 - Source of chemical energy: biogas 
 - Source of plant nutrients; digestate: fertilizer
- Further advantages:
 - Energy producer instead of energy consumer
 - Less pollution of other wastewater streams

Blackwater separation, vacuum station



Resource III: Separated rainwater



■ Options for reuse (storage/use):

- Irrigation
- Process water in the household (e.g. toilet flushing)
- Design urban living spaces
- Infiltration to raise groundwater level or leading to surface waters to increase stream flow



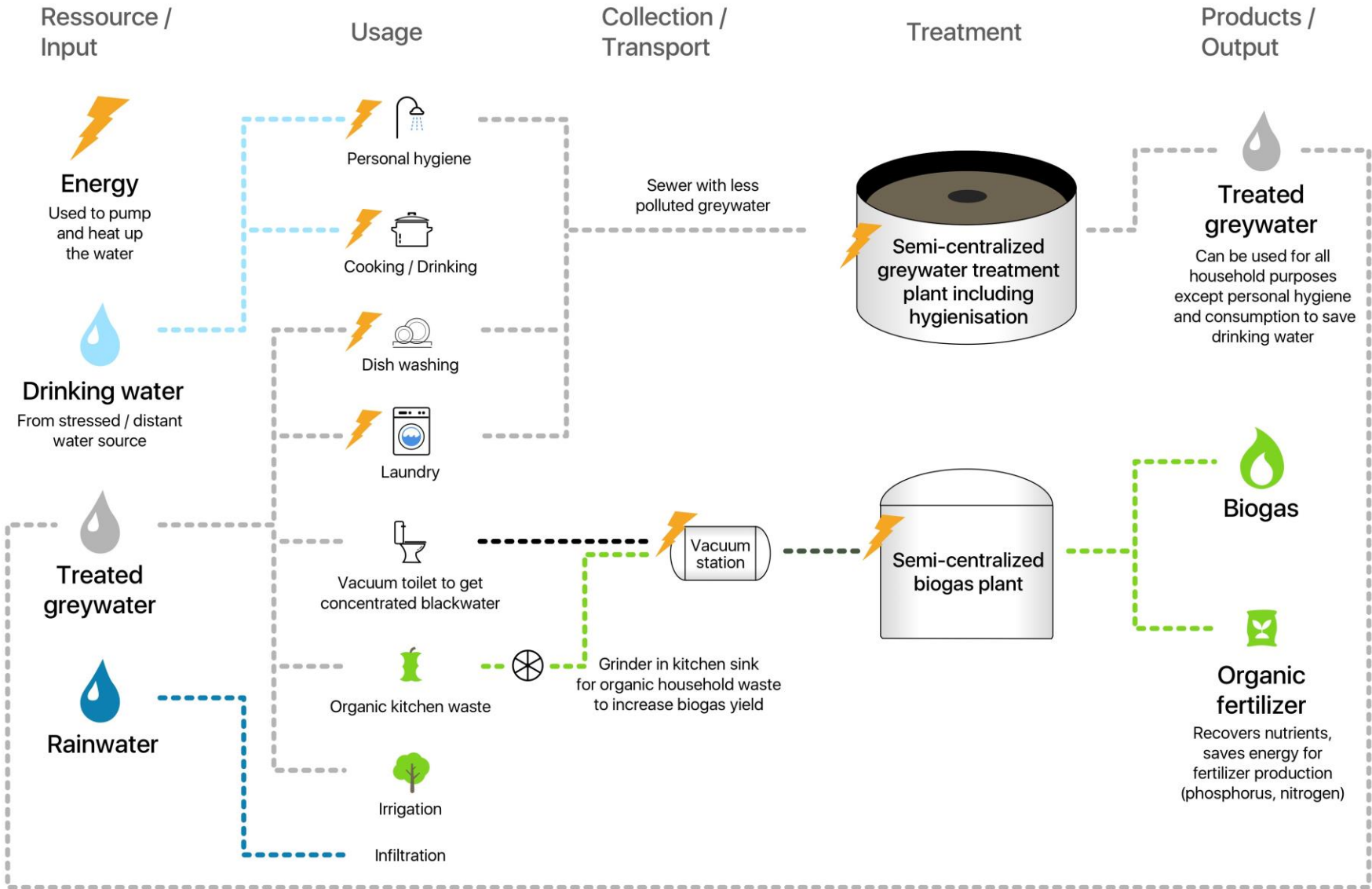
Wastewater separation

- Is a promising option
- Chance to leapfrog the traditional sewerage system
- Transforms houses towards recycling centres of energy and substances (resource efficient buildings)
- Necessity of different pipe systems

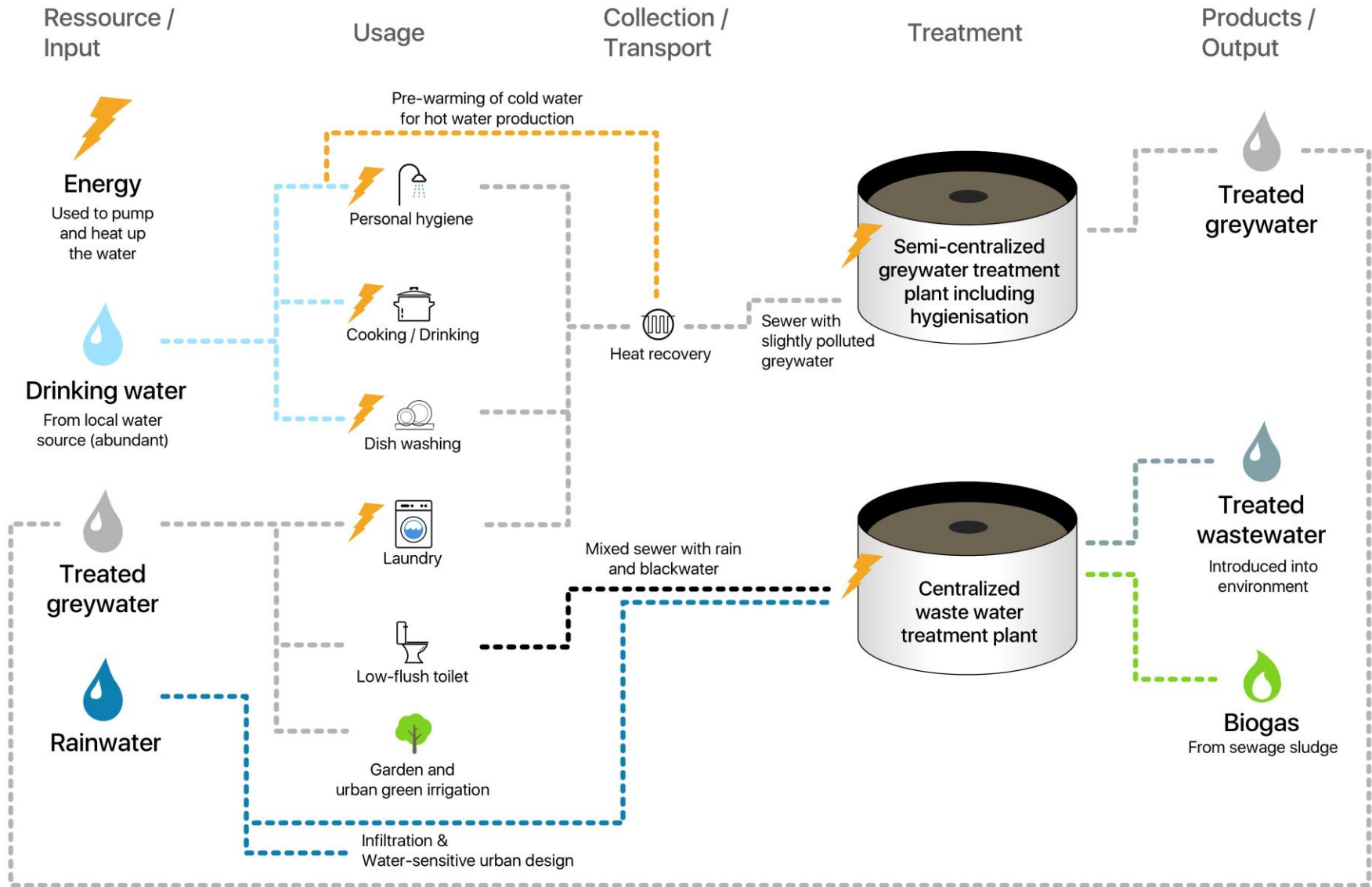
No solution „one fits all“!

Alternative concepts should be more flexible and upwards compatible!

New built-up area: **Water-poor neighbourhood** (Goal: Save water)



Existing building stock: **Water-rich neighbourhood** (Goal: Save energy)



YOUR TURN!

Group work

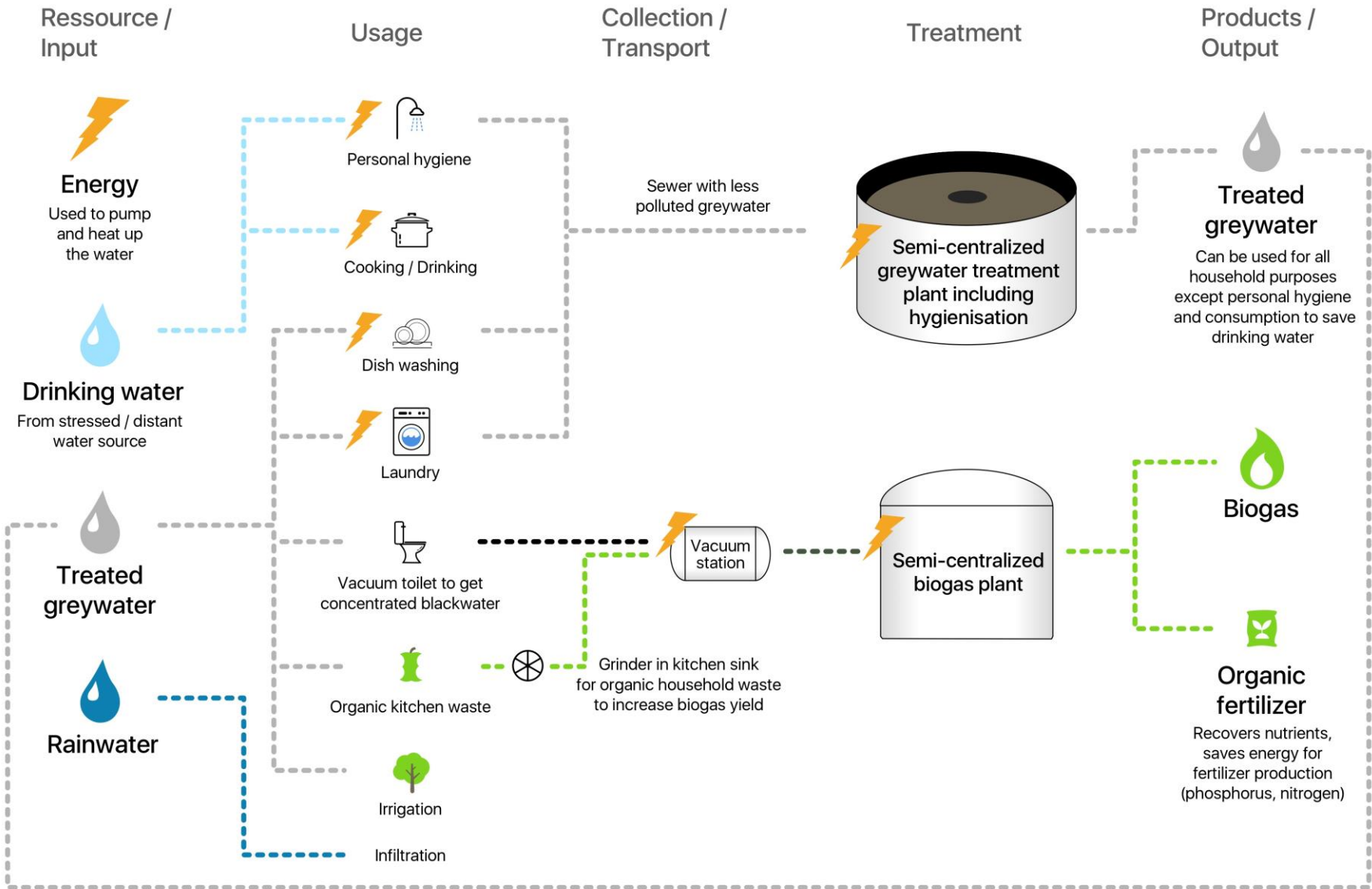
- Time: **30 Minutes**

- Do **not** optimize the system technologically but focus on **drivers and barriers** in respect to governance
 - **Red cards** = Barriers
 - **Green cards** = Drivers
 - **White cards** = Ways to use driver / overcome barrier

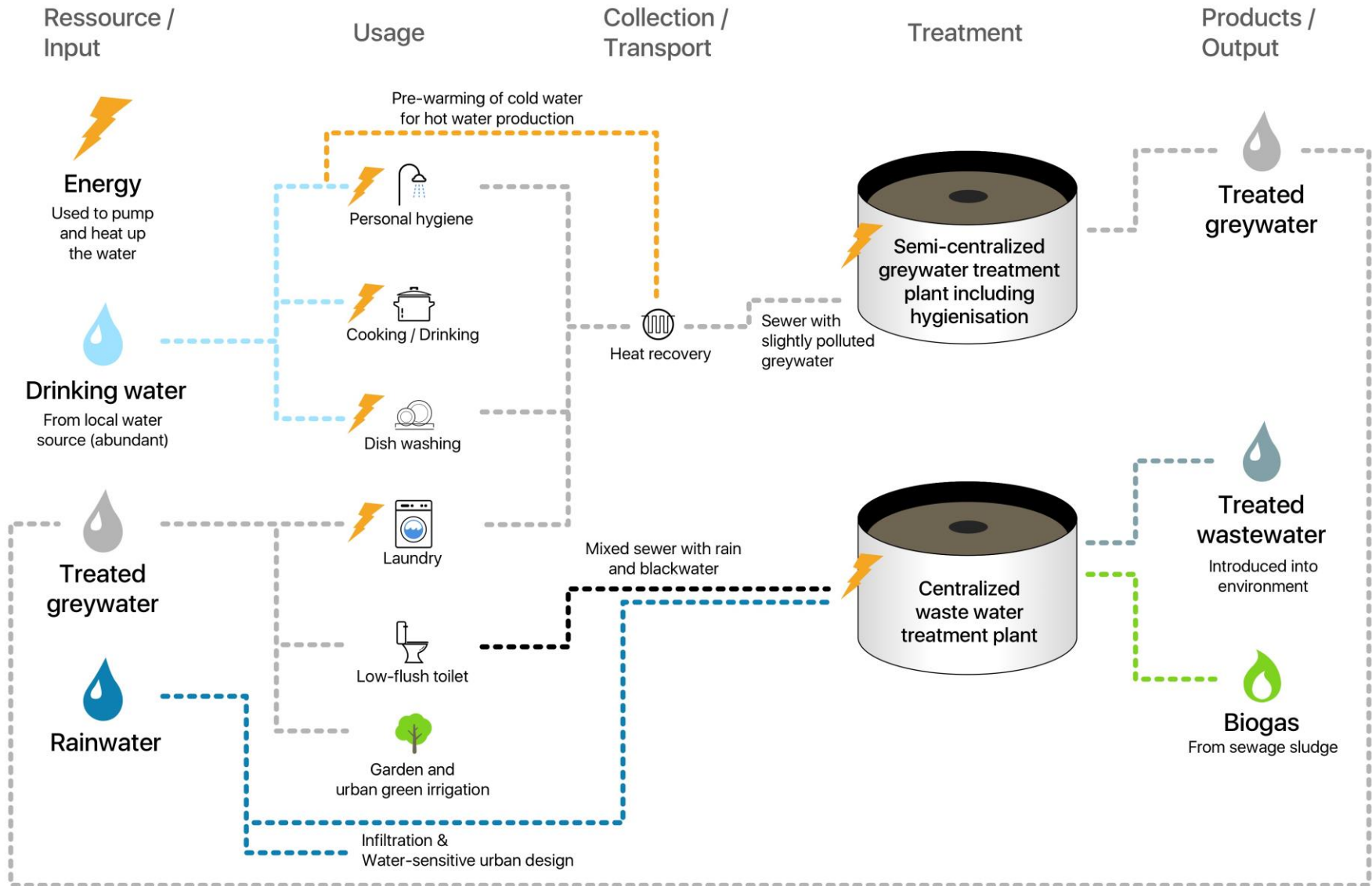
- Prioritize your cards from 1-3 (1 = most important)

- At **17:00** please pin your **priority 1 cards** on the pin board

New built-up area: **Water-poor neighbourhood** (Goal: Save water)



Existing building stock: **Water-rich neighbourhood** (Goal: Save energy)



THANK YOU!

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