IZES
Institut für ZukunftsEnergie- und Stoffstromsysteme

WATER PROOF

Creating Value from Waste

Business, Funding, and practical Insights in Industrial-Urban Symbiosis

WaterProof Webinar Series

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Agenda

Time	Agenda draft	Speaker	Schedule
13:00	**Introduction**	Alena Jahns, **IZES**	5 min.
13:05	**Introduction to Industrial Symbiosis**	Mara Wagner, **IZES**	15 min.
13:20	**Business cases and funding opportunities for I-US**	James Woodcock, **International Synergies**	20 min.
13:40	**Practical insights: I-US collaboration at Höchst Industrial Park**	Prof. Hannes Utikal, **Provadis School at Industrial Park Höchst, Frankfurt**	20 min.
14:00	**Embedding CCU/the volta technology in the I-US context**	Eric Schuler, **Avantium**	10 min.
14:10	**Discussion**	Alena Jahns & Mara Wagner, **IZES**	20 min.

Who we are…

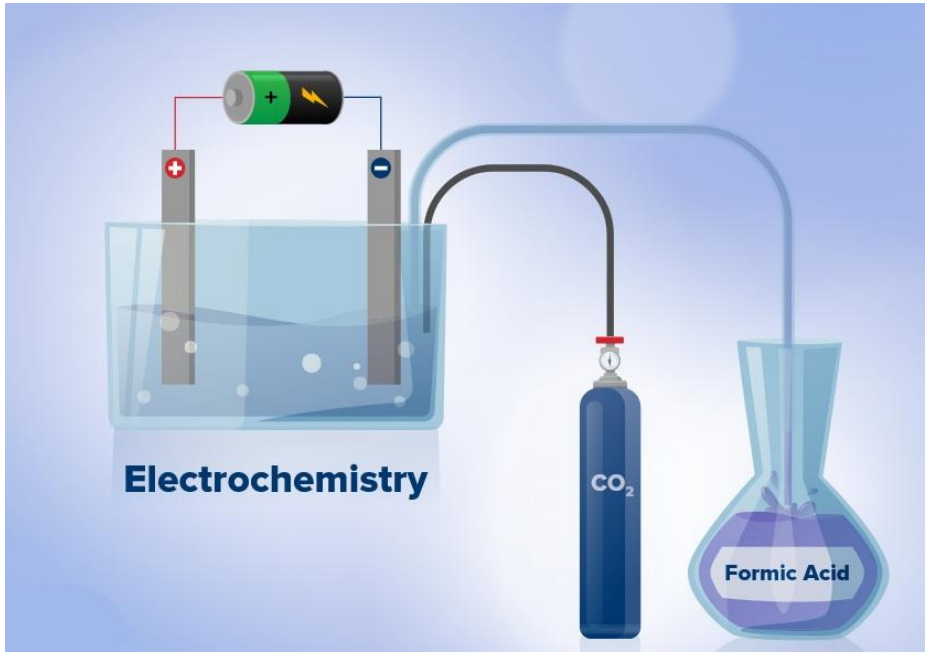

Alena Jahns
Umweltpsychologie
IZES


Mara-Michelle Wagner
Umweltpsychologie
IZES

WaterProof: urban **WA**ste and water **T**reatment **E**mission **R**eduction by utilizing CO_2 for the **PRO**duction **O**f **F**ormate derived chemicals

- EU-funded research project (2022-2026)

- Electrochemical process that converts CO_2 emissions captured from consumer waste incineration and wastewater treatment into formic acid



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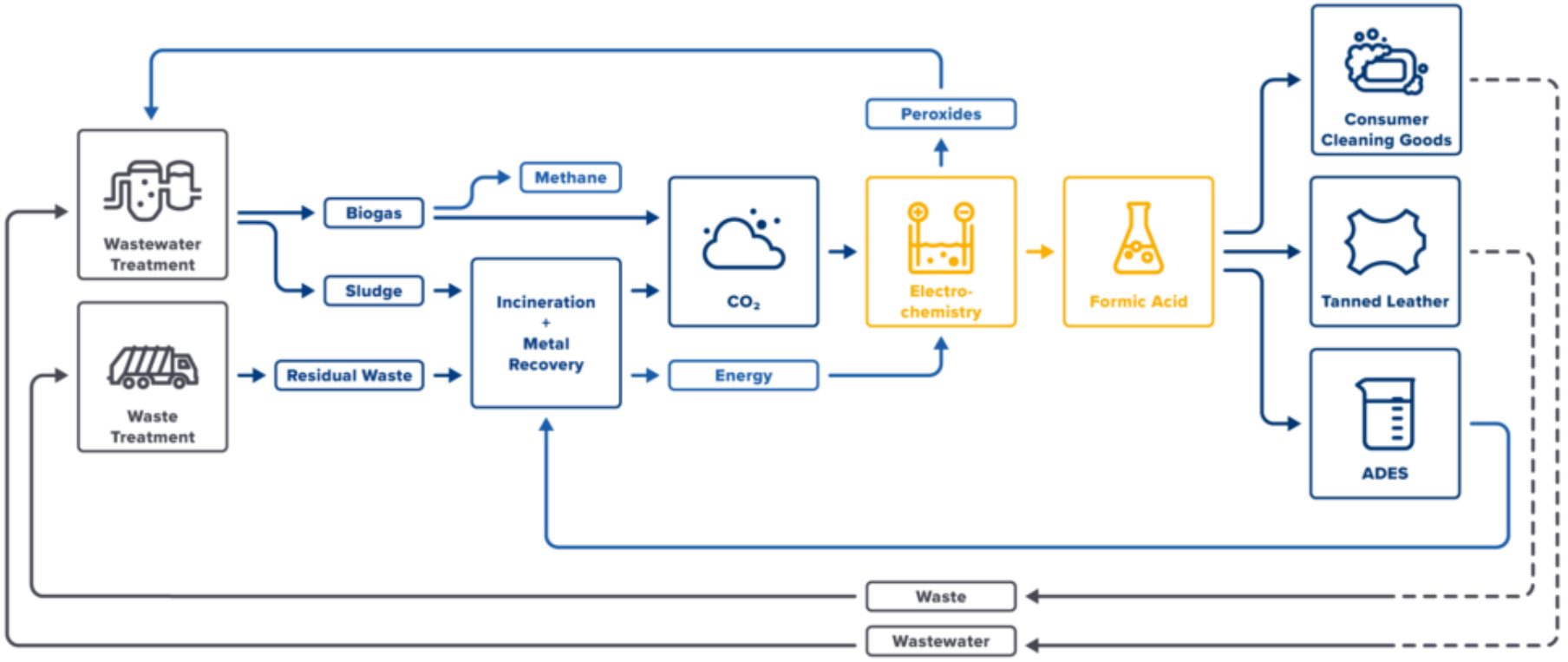
WaterProof project



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WaterProof project

Test-applications:

- cleaning detergents
- the tanning of fish leather apparel
- and acidic deep eutectic solvents (ADES) for the recovery of previous metal from waste incineration ash and wastewater sludge (Factsheet)

WATER PROOF

The WaterProof project receives funding from the Horizon Europe Framework Programme under grant agreement number 101058578.

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IZES Institut für ZukunftsEnergie- und Stoffstromsysteme

NORDIC FISH LEATHER iceland

tecnalia MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE

waternet waterschap amstel gooi en vecht gemeente amsterdam

Coraltech

Who we are…

IZES
Institut für ZukunftsEnergie- und Stoffstromsysteme

Institute for Future Energy and Material Flow Systems - IZES gGmbH

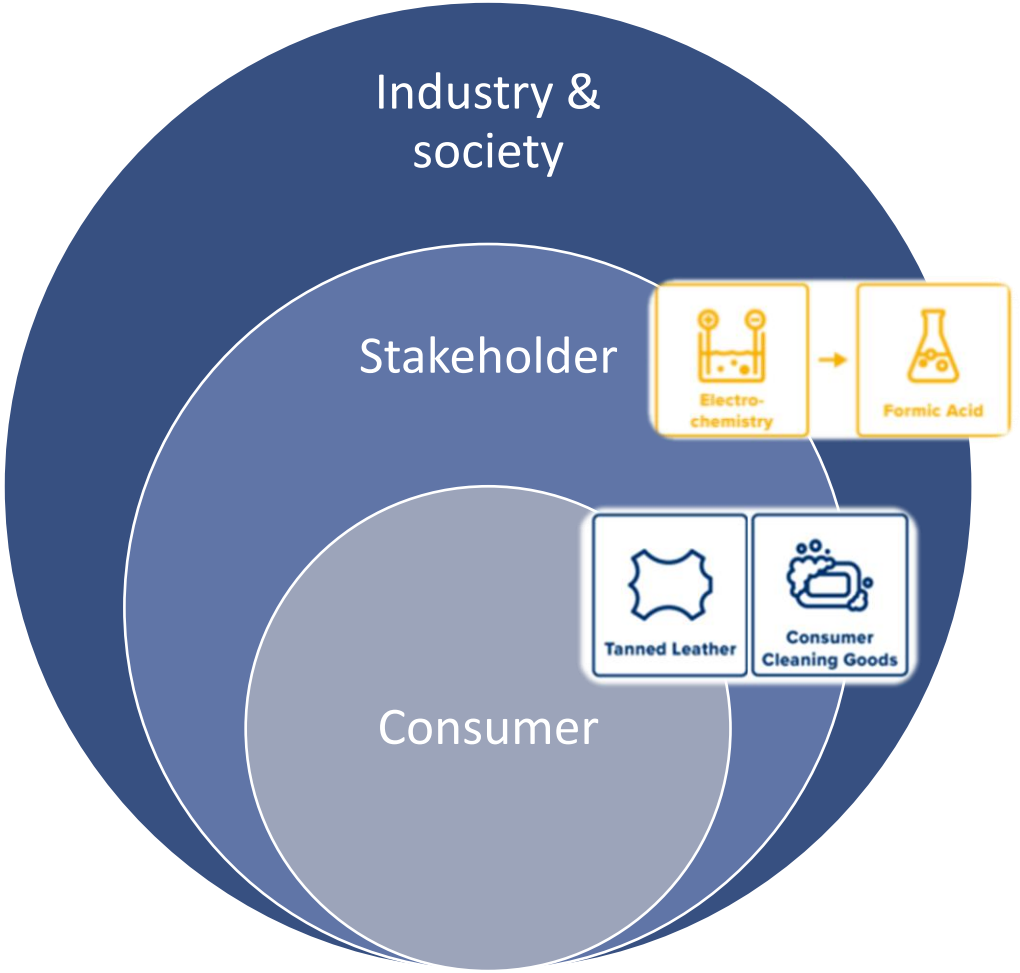
- research institute affiliated with the **htw saar** and the **Saarland University**
- approx. 80 employees with an interdisciplinary focus working on sustainability topics

Department Environmental psychology

- Research on acceptance of renewable energy technologies and participation processes
- Accompanying (circular) transformation processes with a systemic, multi level perspective

IZES tasks within WaterProof

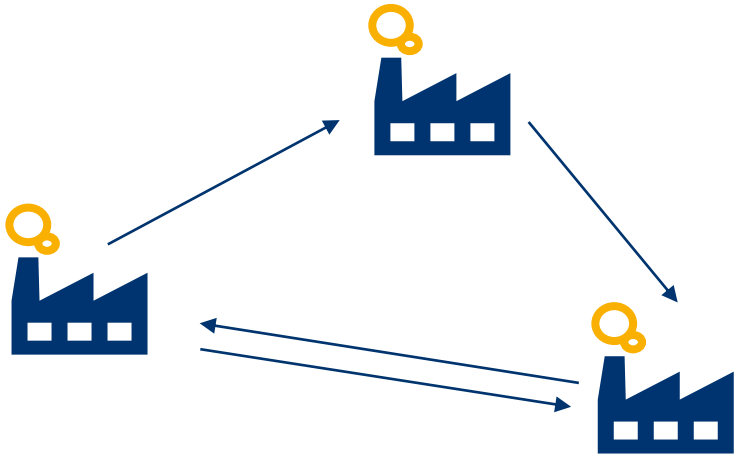
- Broader **industrial & societal level**: Engaging in Industrial-Urban Symbiosis
- **Stakeholder** perspectives along the WaterProof-value chain (→ Deliverable)
- **Consumer** perspectives on CCU products



Industrial Symbiosis: Where does it come from?

Rijal – stock.adobe.com (generated with AI)

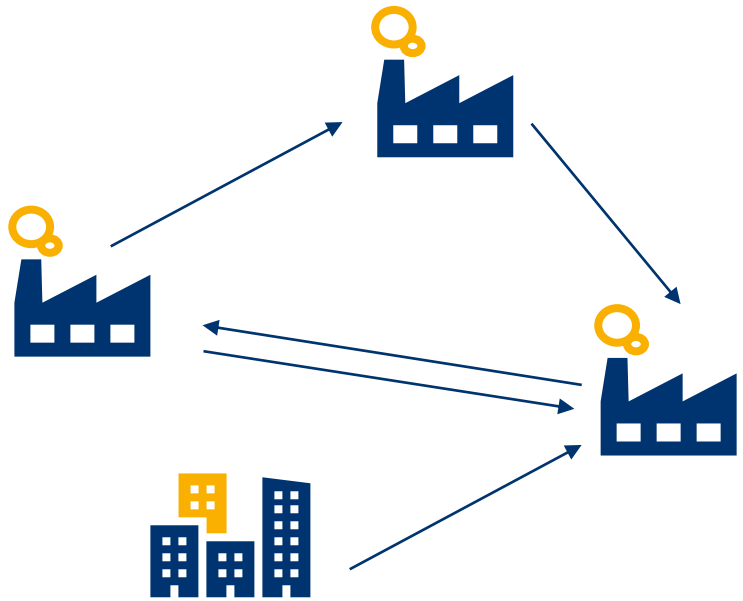
What is Industrial Symbiosis?



The use of one company's **underutilized resources (waste, by-products, and residues, but also energy, water, or even infrastructure, capacities and expertise**) by another. The goal is to keep resources in a productive loop, integrating sustainability in the industry sector and supporting the transformation towards a **circular economy**.

CEN Workshop Agreement – CWA 17354:2018

What is Industrial-Urban Symbiosis?



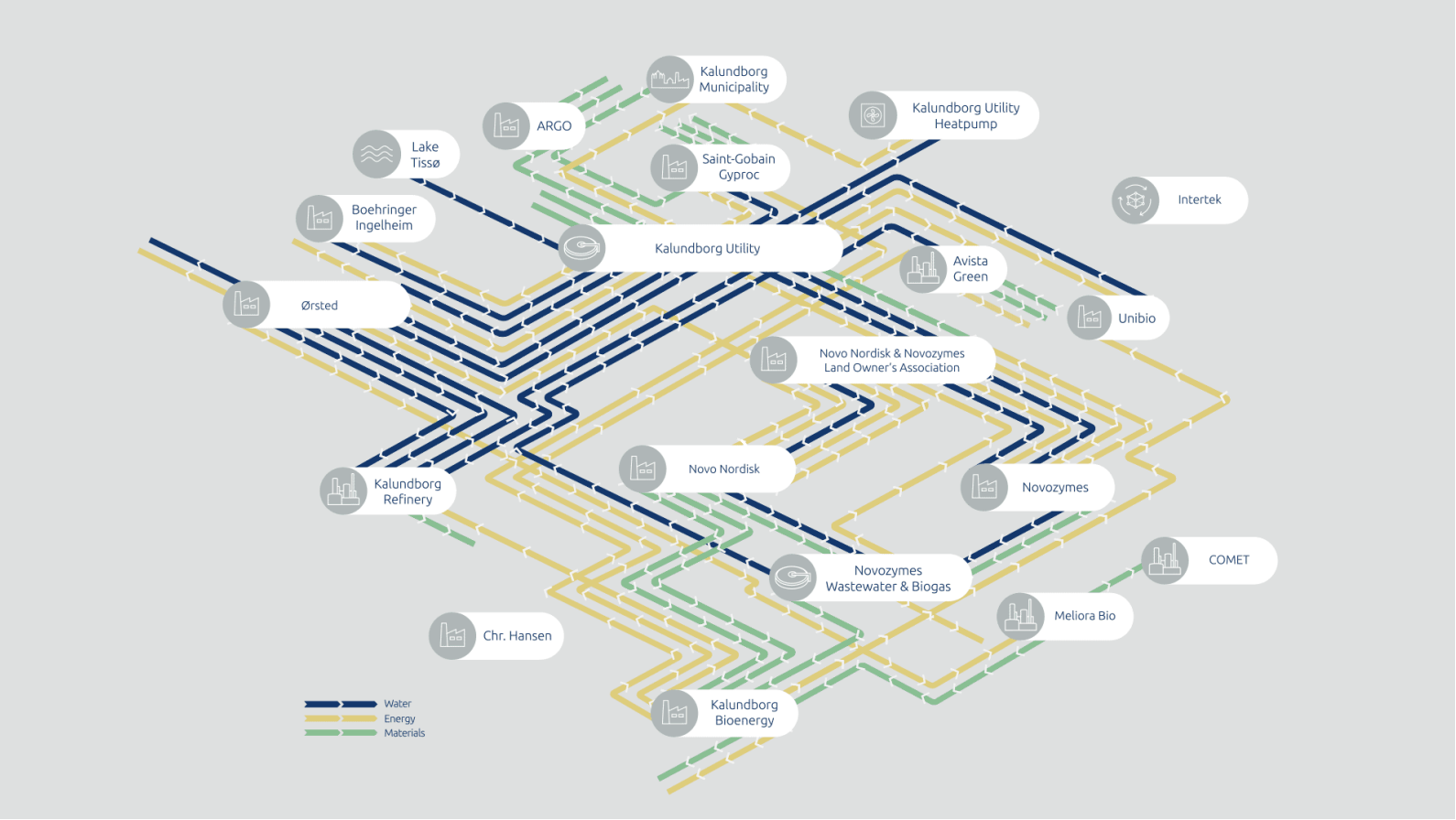
A symbiotic system integrating **urban material streams** (such as municipal solid waste or wastewater from households) as feedstock, creating a collaboration between businesses and urban waste management companies.

Butturi, M. A., Lolli, F., Sellitto, M. A., Balugani, E., Gamberini, R., & Rimini, B. (2019). Renewable energy in eco-industrial parks and urban-industrial symbiosis: A literature review and a conceptual synthesis. Applied Energy, 255, 113825. https://doi.org/10.1016/j.apenergy.2019.113825

Reasons to pursue symbiotic industrial collaborations:

- Resilience
- Resource independence
- Sustainability
- Industrial transformation towards a circular economy
- Economic value

Kalundborg Symbiosis in Denmark



Kalundborg SYMBIOSIS

- A global blueprint of Industrial Symbiosis – existing since the 1970s
- Symbiotic network of 17 partners (public & private)
- Connected via 20 different resource streams

Unlocking IS potentials (Factsheet)

DRIVER
Understanding of benefits
Forerunner and blueprints
Facilitation entities
Diverse industries

BARRIER
Financial
Management
Information flows
Technological
Policy & Regulation

Our approach

- Information & exchange
- Information on (kick-off) funding opportunities
- Insights into blueprints & technological innovations

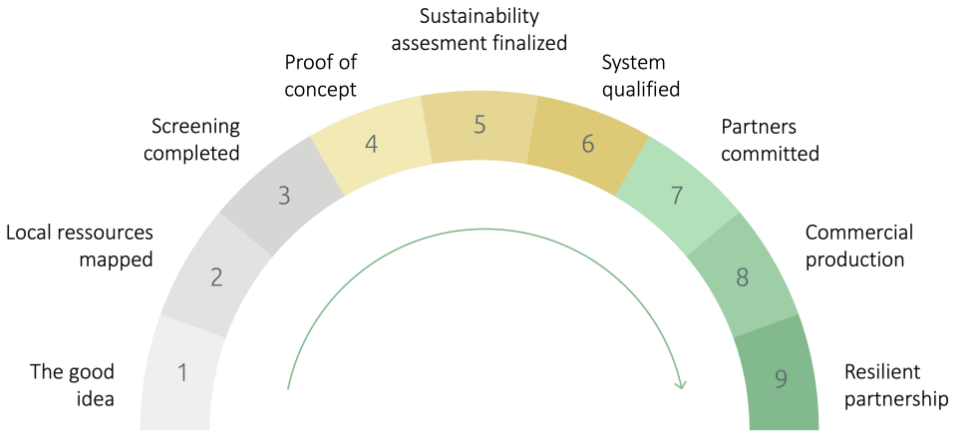
Industrial Symbiosis – Current developments

- EU-funded research projects

  → Study and portfolio review of the projects on Industrial symbiosis in DG Research and Innovation (EU, 2020)

- IS screening tool

- IS readiness level



https://www.symbiosis.dk/en/inspiration/

Harfeldt-Berg et al. (2025)

Thank you for joining!

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WaterProof Factsheet:
Industrial-Urban Symbiosis

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https://waterproof-project.eu/

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Sources

Butturi, M. A., Lolli, F., Sellitto, M. A., Balugani, E., Gamberini, R., & Rimini, B. (2019). Renewable energy in eco-industrial parks and urban-industrial symbiosis: A literature review and a conceptual synthesis. *Applied Energy*, *255*, 113825. https://doi.org/10.1016/j.apenergy.2019.113825

European Commission: Directorate-General for Research and Innovation. (2020). *Study and portfolio review of the projects on industrial symbiosis in DG Research and Innovation – Findings and recommendations*. Publications Office. https://doi.org/10.2777/381211

European Committee for Standardization. (2018). *Industrial Symbiosis: Core Elements and Implementation Approaches* [CEN Workshop Agreement]. https://www.cencenelec.eu/media/CEN-CENELEC/CWAs/RI/cwa17354_2018.pdf

Harfeldt-Berg, Lovisa., Wallin, Elin., Löwgren, Annika., & Sommarin, Per. (2025). Industrial symbiosis readiness level assessment—A stakeholder co-designed matrix tool for guidance and evaluation. *Resources, Conservation & Recycling Advances*, *27*, 200270. https://doi.org/10.1016/j.rcradv.2025.200270

Kalundborg Symbiosis—Inspiration & Tools. (2025, April 4). *Kalundborg Symbiosis*. https://www.symbiosis.dk/en/inspiration/