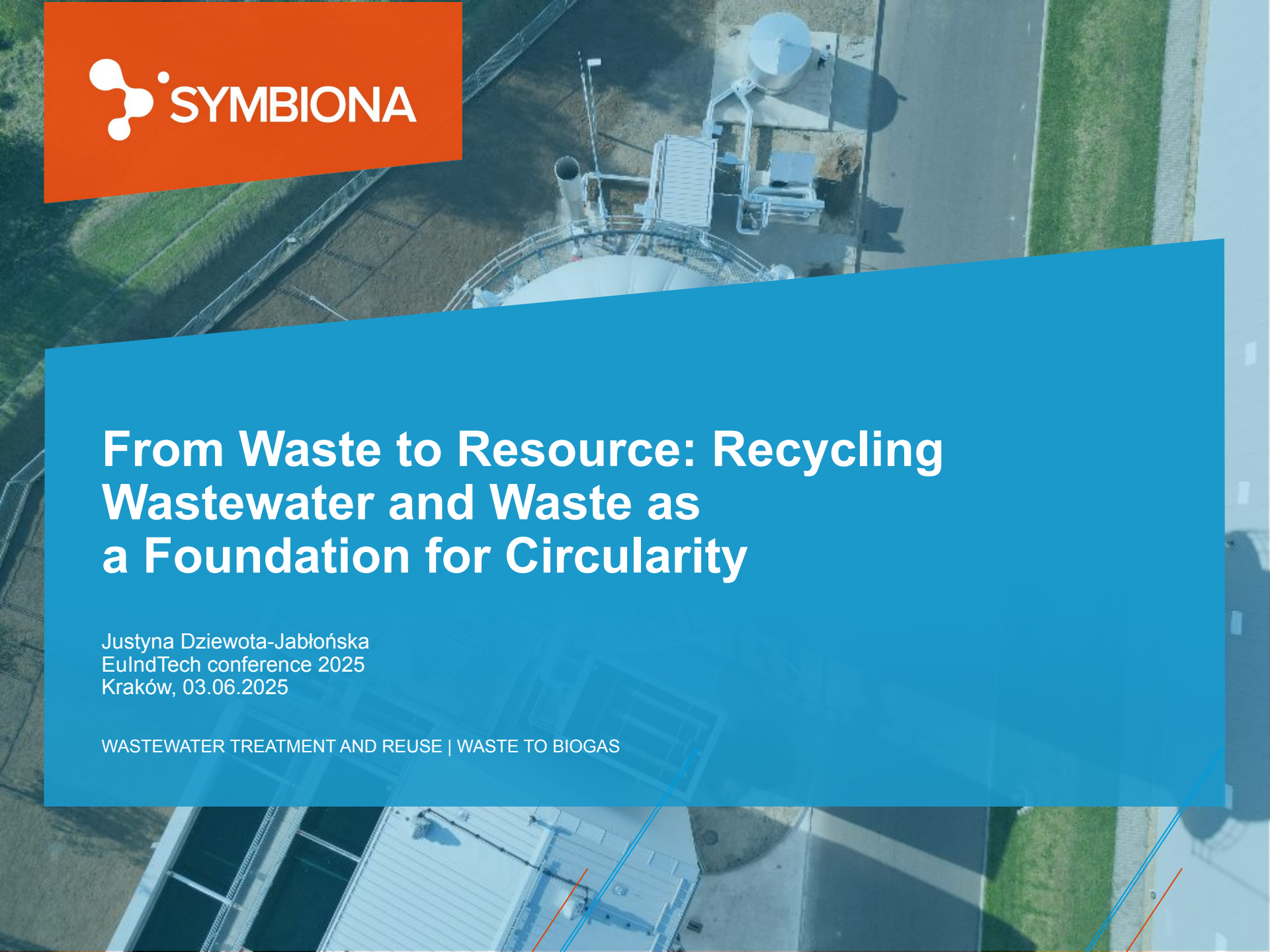


SYMBIONA

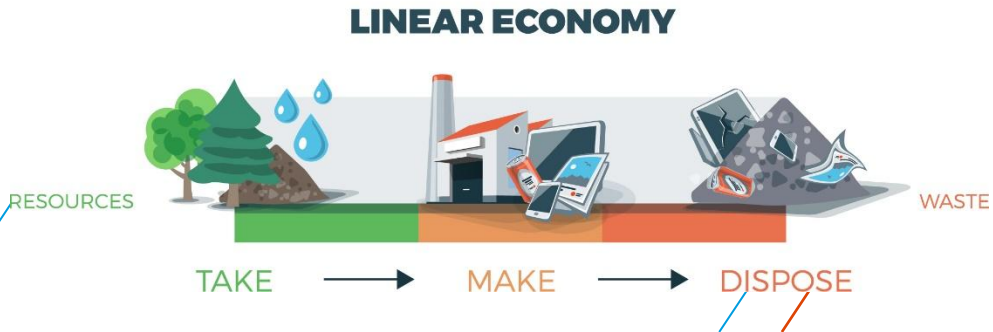
From Waste to Resource: Recycling Wastewater and Waste as a Foundation for Circularity

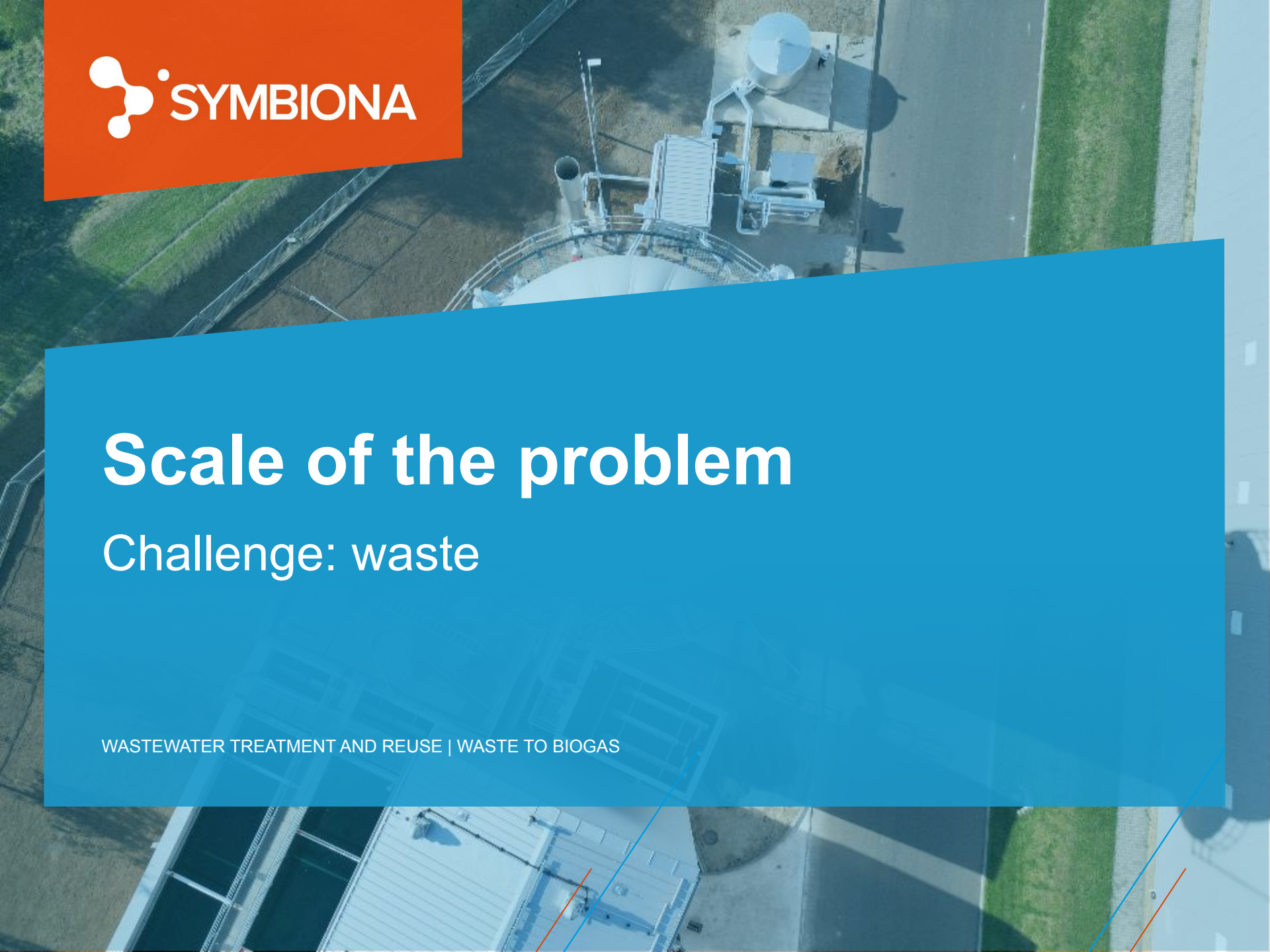
Justyna Dziewota-Jabłońska
EuIndTech conference 2025
Kraków, 03.06.2025

WASTEWATER TREATMENT AND REUSE | WASTE TO BIOGAS

From waste and wastewater to circularity

- „Waste is a waste only, if we discard it”
- Redefining waste as valuable source: global opportunity of 1,5 bln EUR till 2030
- Linear model should be fully discarded
- We should stop seeing waste and wastewater as the end-of-the pipe problem





SYMBIONA

Scale of the problem

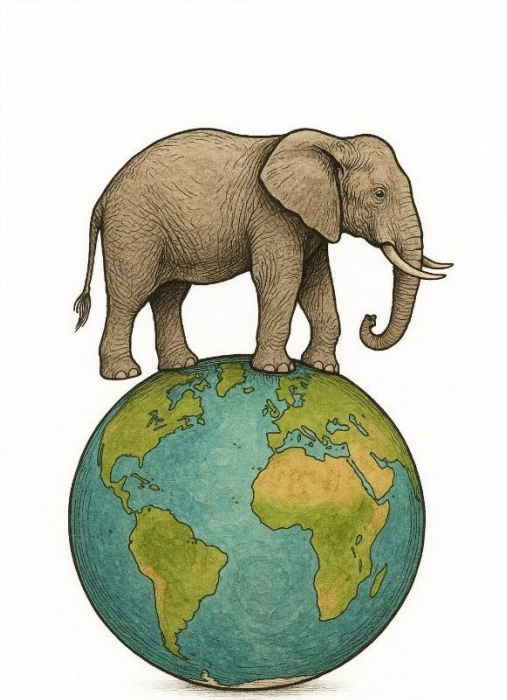
Challenge: waste

WASTEWATER TREATMENT AND REUSE | WASTE TO BIOGAS

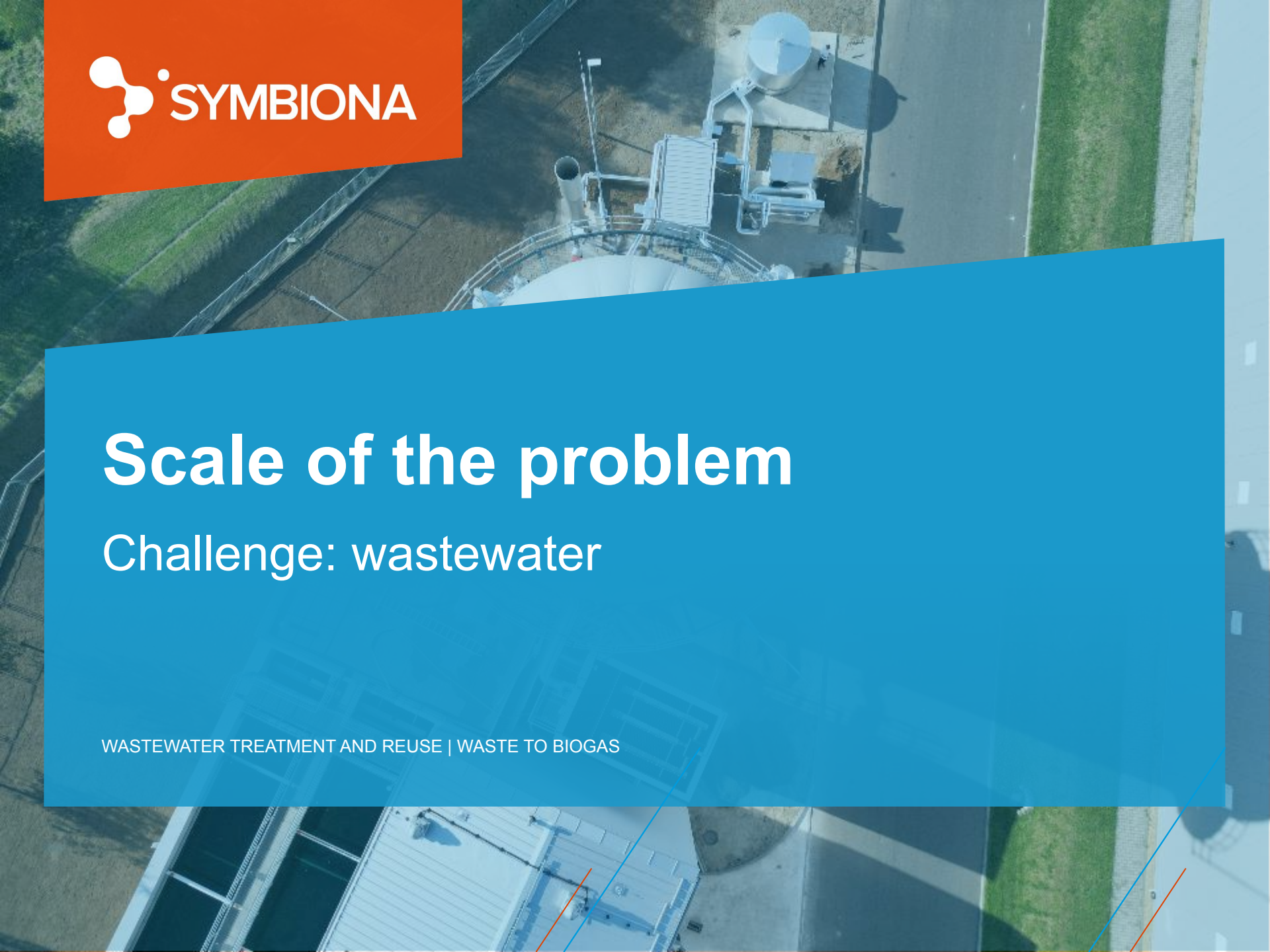
Waste generation

The scale of the problem

- Globally, we generate an astounding 2.01 billion tons annually. This figure is projected to surge by 70% to 3.40 billion tons by 2050
- This is the weight of 300 million elephants
- 80% ends up in landfields, only 20% is recycled
- Economic cost of disposal and loses is staggering



SYMBIONA



SYMBIONA

Scale of the problem

Challenge: wastewater

WASTEWATER TREATMENT AND REUSE | WASTE TO BIOGAS

The challenge and the source

Wastewater as a foundation for circular economy

- Global wastewater production stands at an estimated 359.4 billion cubic meters per year
- Not only 48% of this wastewater leaves environment untreated but also precious nutrients are being lost
- Only 40,7 bln m3 are reused and recycled
- Membrane Bioreactors and Reverse Osmosis are key technologies to achieve circularity when talking about water reuse
  - Either potable water or water for technological use
  - Superpure water for electroplating
  - Water for endproduct

SYMBIONA

SYMBIONA

RECOVER AND REUSE

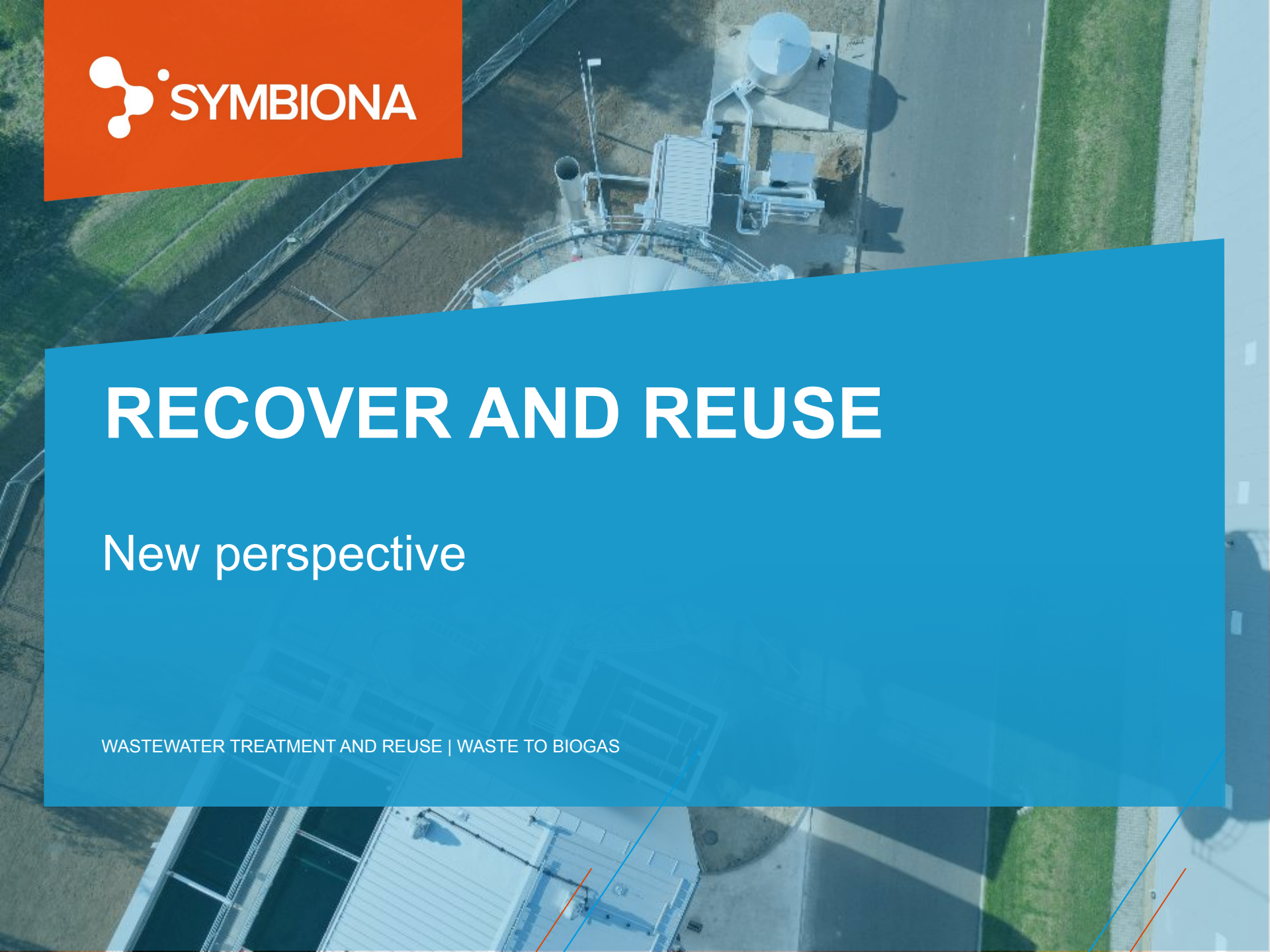
Bionutrients

WASTEWATER TREATMENT AND REUSE | WASTE TO BIOGAS

Wastewater as a source of nutrients and energy

- Essential components of wastewater are bionutrients: N, P, K.
  - Reuse is crucial from political, geopolitical and economical point of view
- Superfluous discharge of bionutrients to environment causes eutrophisation
- By using processes that may complement wastewater treatment, such as struvite precipitation we can recover those valuable materials
- Economic potential is immense, with projects that may reach up to 50 billion EUR globally

SYMBIONA



SYMBIONA

RECOVER AND REUSE

New perspective

WASTEWATER TREATMENT AND REUSE | WASTE TO BIOGAS

Wastewater as a source of energy

Integral process part

- Organic matter in wastewater is a source of biogas and hence biomethane
- Currently wastewater treatment contributes to up to 4% emissions globally
- Nevertheless wastewater may be a source of energy

SYMBIONA

Solid waste and business benefits of circularity

- Shifting of paradigm offers a powerful alternative to linear model
- This involves a hierarchy of strategies: reduce, reuse, repair, refurbish, remanufacture, and finally, recycle
- A circular economy model could generate a net gain of USD 108.5 billion per year globally by decoupling economic growth from resource consumption
- It's estimated that moving towards a more circular economy could create 700,000 jobs in the EU alone by 2030
- EU's Just Transition Mechanism: €55 billion is allocated to support regions transitioning to circular industries, including wastewater valorization

Challenges and a path forward

- Transition happens only when we solve our roblems wisely
- Public perception and education plays a critical role
- CSRD and its role in changing the perception of circularity
- Recycled goods and substances stigma
- New technologies help achieve best results
- Not only in Singapore but also in Poland!

SYMBIONA

Conclusion

- Our journey from waste to resource is not just an environmental aspiration; it's a scientific frontier and an economic imperative
- The science is evolving rapidly, providing us with the tools and knowledge to make this vision a reality
- It's time for scientists and business leaders, to champion this paradigm shift, to invest in the research, develop the technologies, and build the infrastructure necessary to create a truly circular future.
- EU responds to the abovementioned calls but this is **totally on us to make this happen**

SYMBIONA

Thank you!

Justyna K. Dziewota-Jabłońska
jdj@symbiona.com
Justyna.dziewota.jablonska@edu.uni.lodz.pl

+48515922559