CIRCULAR SYSTEM
ION EXCHANGER

Photo by EnviroFalk

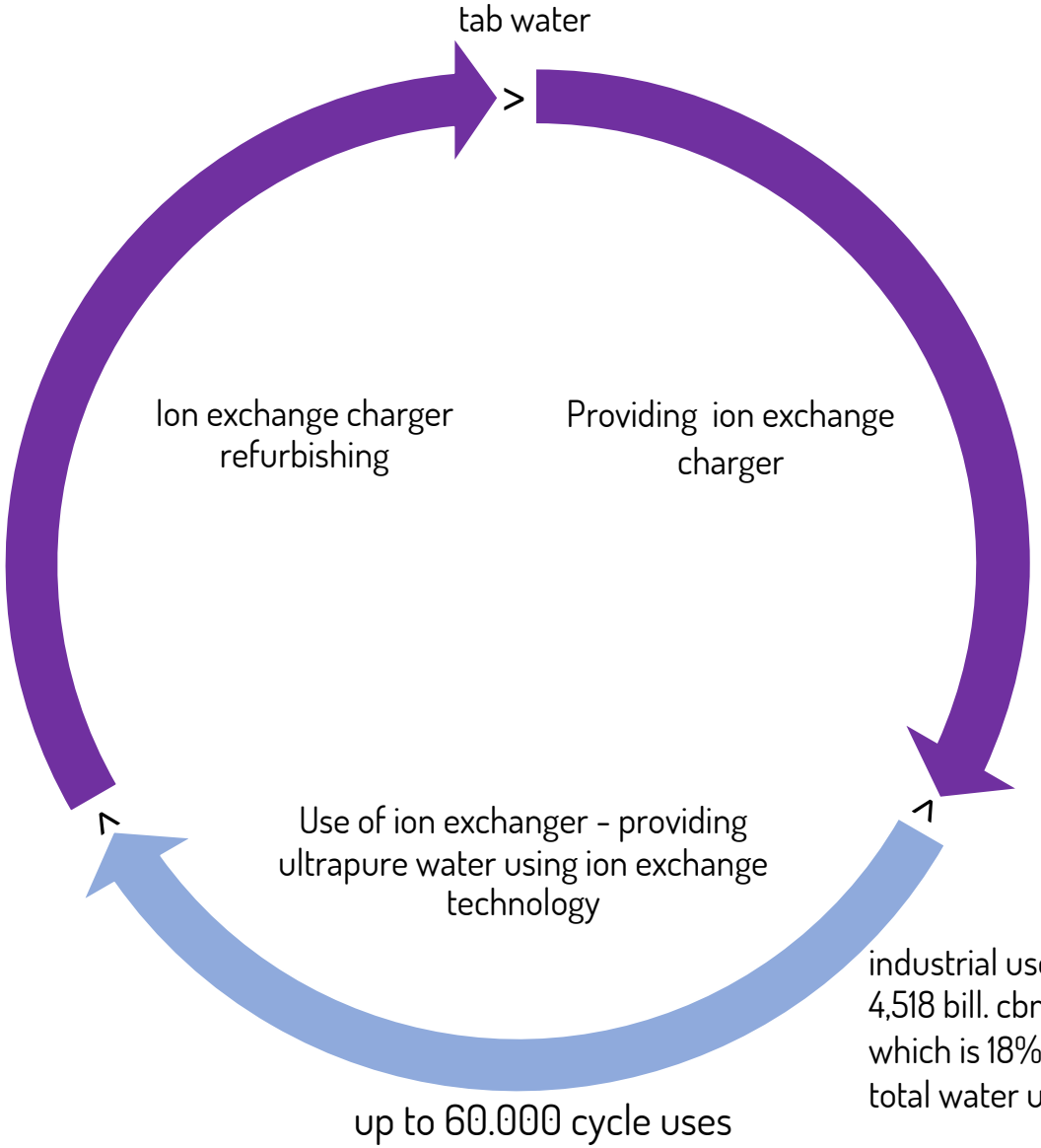
Ion Exchanger - Circular System Characteristics

System characteristics:
Environmental technologies offer cleaning for water. The ion exchange technology is offered by Envirofalk, Veolia and BWT. Envirofalk as a typical German medium-sized company presents 200.000 cbm water to be cleaned by their ion exchange technology. The ion exchange batteries are run in a closed loop system and offered in PaaS business cases.

Availability /Role of technology:
The ion exchange technology is a water cleaning technology that applies synthetic resigns, which can be recycled 100%.

Availability/Role of recycling technology:
- System relevant technology, in highly specialized market.
- Strong competition, market concentration in special fields.
- Monopolistic/oligopolistic structure, world market share 5.1 % .

Maturity of market:
- High maturity, highly specialized, performance economy.
- Elements, widely digitalized, in public interest, business model.
- **PaaS (Product as a Service),** systems character can **be extended to other minerals.**
- Oligopolistic supply market: 10 Suppliers of technology, i.e., Veolia, BWT-Wasser-Technologie, Envirofalk.
- Consumer: 3,800 companies, 35.000 highly trained personnel.
- Market growth of 4,5 – 6% p.a., growth of turnover +81% between 2008-2017.
- **Momentum „Water scarcity" + „Highly specialized use of water".**



Sources: Greentechatlas 2012,2021, Stiefel 2020, X. Huang et al, 2020, VCI 2019, Hammar 1998, Mircari, 2020) TC 2021

Ion Exchanger

Strength

1. Closed loop product
2. Technical cycle, C2C
3. Strong market position
4. Strong water legislative
5. System relevant, high public interest
6. Inherent topic
7. High satisfaction rates of users

Weakness

1. Strong market concentration
2. Loss of prevention in private segments

Opportunity

1. Image-growth of water technologies
2. Strong growth of innovation 34%
3. Wide range of applications
4. Digital service drive development
5. PaaS as best practice example

Threat

1. Water scarcity create war for water

Source: VCI 2019, BMU 2012, Micari et. al 2020, Huang et. al 2020, Stiefel 2020

1. Nature Science

Water as elixir. Ion exchange is a natural process. Humans early recognized ionic water tastes better.

2. Envisioning

Solve contamination and salination to have clean and healthy drinking water.

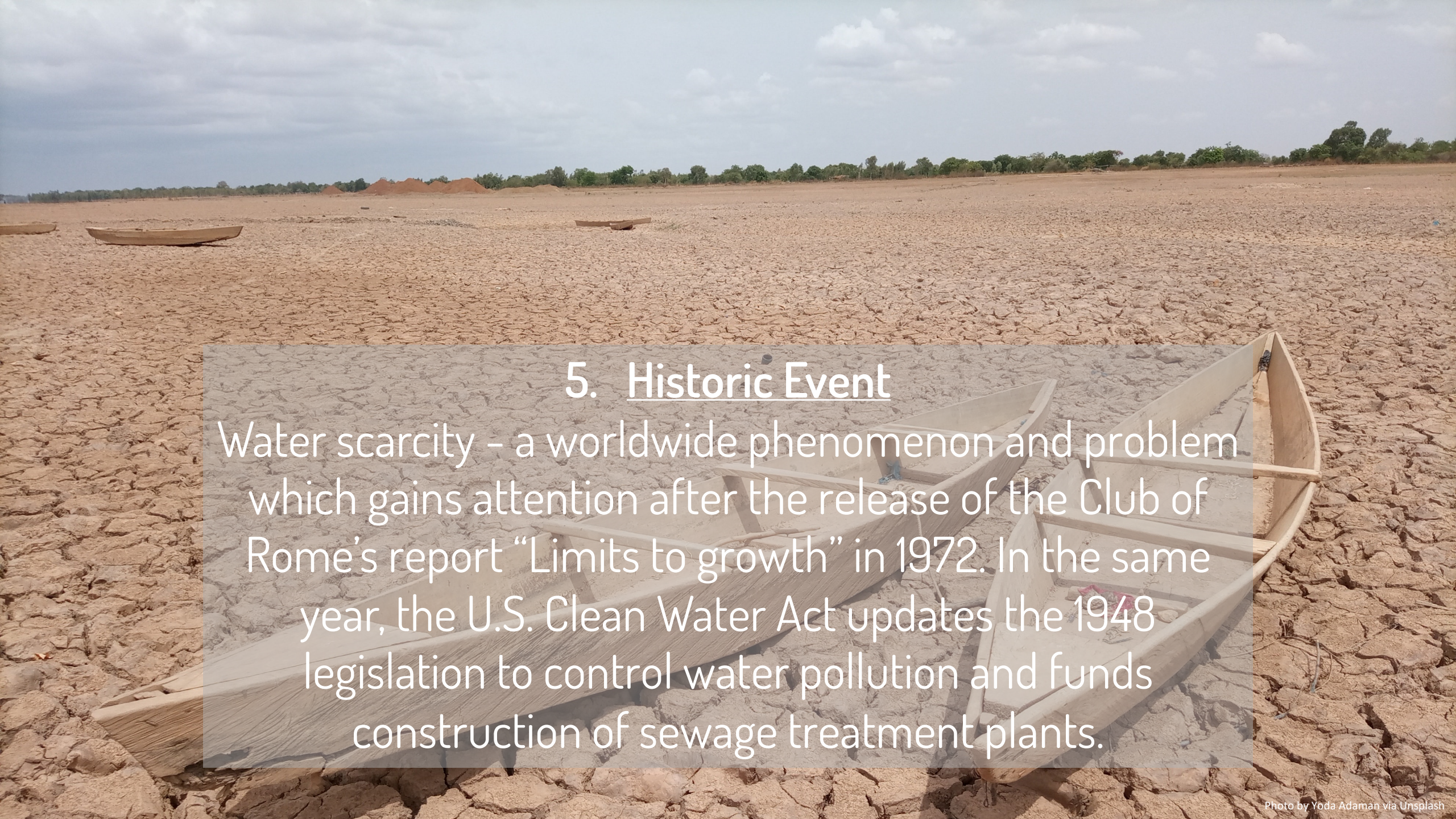
3. Investment

Early investment in water technologies to save clean water.

Photo by Pok Rie via Pexels

4. Rocket Science

Development of ion exchanger as disruptive technology to desalinate and clean water.



5. Historic Event

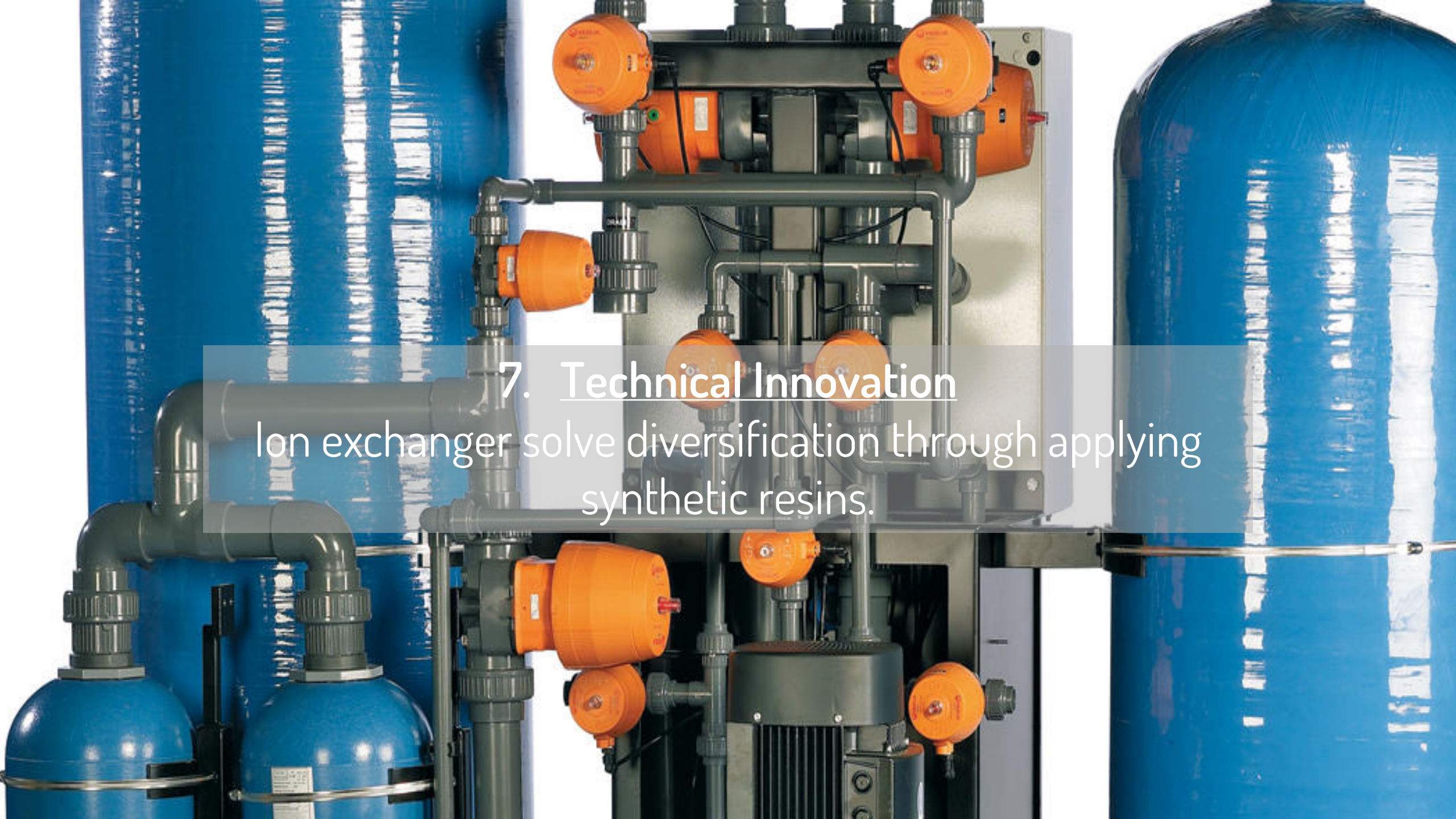
Water scarcity - a worldwide phenomenon and problem which gains attention after the release of the Club of Rome's report "Limits to growth" in 1972. In the same year, the U.S. Clean Water Act updates the 1948 legislation to control water pollution and funds construction of sewage treatment plants.

Photo by Yoda Adaman via Unsplash

6. Cognition for System Relevance

Water is needed for living, for hygiene and for science.

Photo by Samad Deldar via Pexels



7. Technical Innovation

Ion exchanger solve diversification through applying synthetic resins.

VEOLIA

BWT
BEST WATER TECHNOLOGY

8. Business Innovation

The system has become manageable through a small network of players offering the product as a service.

HydroGroup

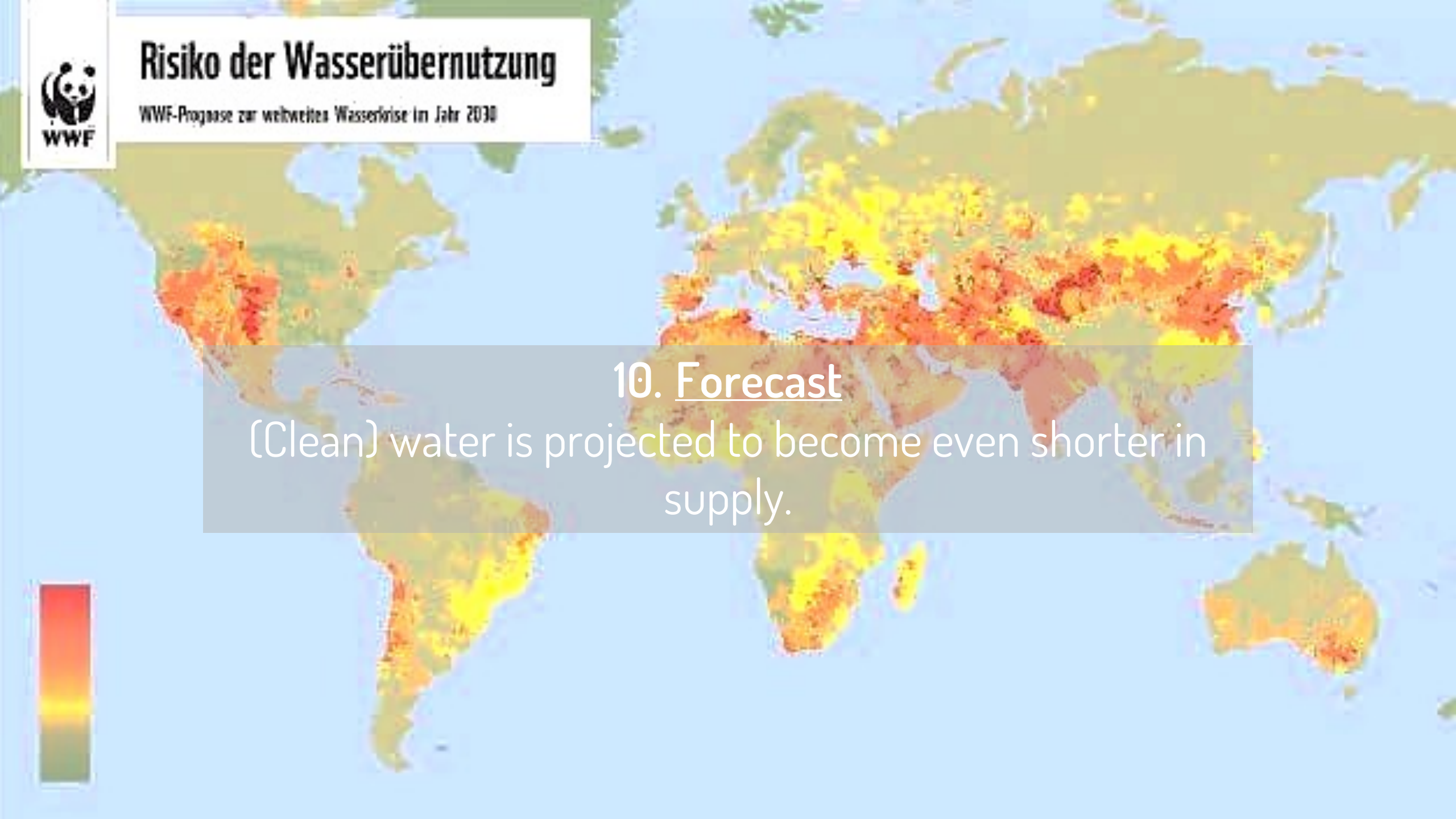
Prozesswasser-Technik
ENVIROFALK
Wasser intelligent nutzen

9. Life Cycle

In Global North, water is already cycling though ion exchangers are still rocket science technology not implemented for standard use.

In Global South, water treatment is still a huge problem.

Photo by Pixabay via Pexels



10. Forecast

(Clean) water is projected to become even shorter in supply.

Ion exchangers cycle - product system evolvement

Thank you for your attention

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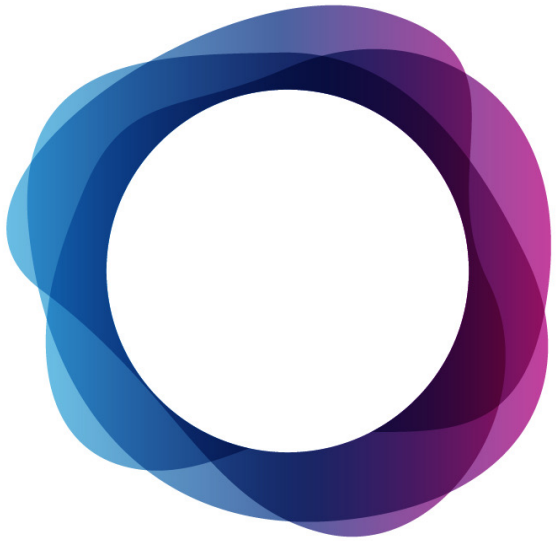

Thinking Circular