Supply Chain & Back-End

From liability to asset - giving the nuclear sector a sustainable future

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Content of the presentation

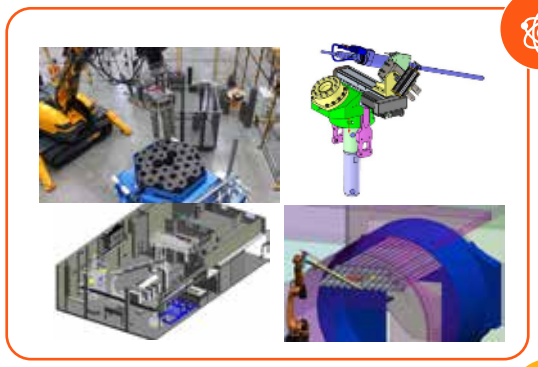
1. Short presentation on Cyclife

2. New waste treatment facility ”Extension”

3. What’s next?

Cyclife Group, a *unique industrial platform* for the treatment of radioactive waste, supplemented by expertise in decommissioning

3 treatment facilities
(segmentation, decontamination, incineration)
15 000 t/year to date

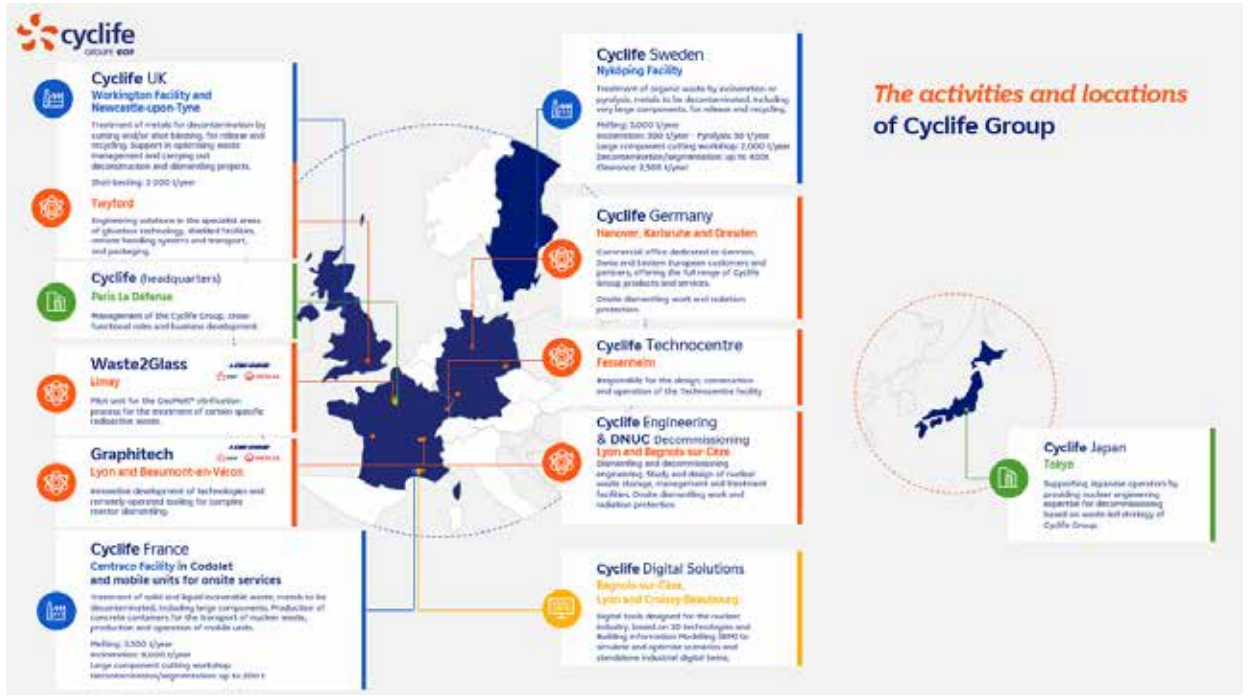


Design and implementation capabilities for decommissioning and waste treatment
(scenarios, processes, tools, including robots)

3D digital solutions
to simulate and optimise dismantling operations

Entities close to customers to market and deploy Cyclife solutions

Locations in 5 target countries



Cyclife Sweden, *a solution for nuclear low-level wastes*

Integrated solutions to reduce the volume of radiological material and contribute to a global circular economy

1 CHARACTERISE

Know what can be handled.
Make the right decisions.

- ü Characterisation services
- ü Waste & material characterisation
- ü Analytical laboratory
- ü Radiation measurement & clearance

2 TRANSPORT

Global reach.
Safe and secure logistics.

- ü Secure international transport
- ü Unique port access
- ü Transport containers for radioactive materials
- ü Logistics solutions for complex projects

3 TREAT

Advanced treatment. Volume reduction.
Safety first.

- ü Metals treatment aiming for clearance and recycling
- ü Incineration
- ü Pyrolysis for uranium recovery from ashes
- ü Proven high volume reduction for all treatment services
- ü Packaging and conditioning for repatriation of secondary waste

4 RECOVER & RECYCLE

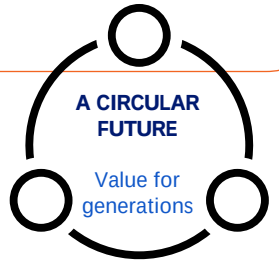
Recover resources.
Close the loop.

- ü Recycle metals into new products
- ü Recycling of sealed sources
- ü Clearance of materials for reuse and recycling

5 RETURN VALUE

Delivering value for our customers and society

- ü Reduced need for virgin materials
- ü Regulatory compliance and risk reduction
- ü Lower environmental impact
- ü Delivering value for our customers and society



INTEGRATED SOLUTION THROUGHOUT THE NUCLEAR LIFECYCLE

A concrete and successful collaboration between Uniper & Cyclife

Avoided CO_2 emissions corresponding to 6 000 round-trip flights Paris and New York

TOTAL MATERIAL HANDLED

15 792

TONNES TO BE TREATED FOR FREE-RELEASE

(either directly, either after melting)

95% expected weight reduction

- Framework contract: **2019-2028**
- Integrated chain from from preparation of the wastes to transport back of the containers
- Enabling UNIPER to master his decommissioning schedule

SCRAP

85%

LARGE COMPONENTS

15%

INCINERATION

Extra 100-120 tons/year

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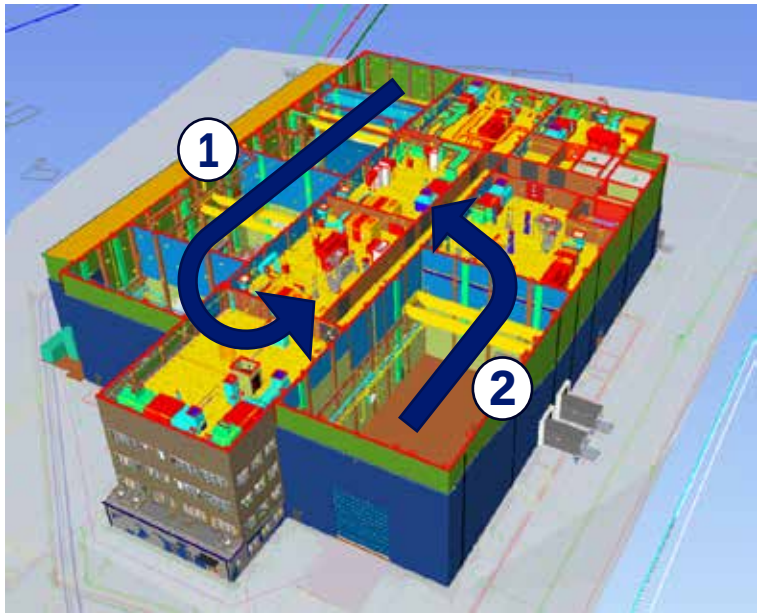
Cyclife Sweden's new facility

40-years' operating experience as a ground

Cyclife Sweden's **total capacity up to 10 000t per year** – equivalent to one Eiffel Tower



① **Steam generator flow**

② **Large components and scrap metal flow**

Footprint of 7500 m²

100+ Contractors involved

20 Nationalities on site

0 severe accidents

5 minor incidents

January 2024 Construction start

2.5 years Construction & testing

78 New equipment

2 200+ pages of documentation to authorities

Cyclife Sweden's new facility

an enhanced process treatment aiming for better services to our customers

Optimizing the recycling rate

A **milling machine** for removal of contaminated surface layer from the water chamber (Steam Generator) or for RPV Head while *minimising secondary wastes.*

Milling machine

Tube pulling

A fully-automated tube-pulling system to extract, flatten and cut tubes from a steam generator, operated remotely, *ALARA and volume reduction in focus.*

Better & safer flow for faster treatment

Blaster (1 out of 3)

Manipulator

3 **blasters associated with manipulators** for removal of contaminated debris, paint, rust and surface contamination capturing dust and preparing containment.

New **mould handling line** associating preparation of the moulds, controlled cooling section and removal of the ingots.

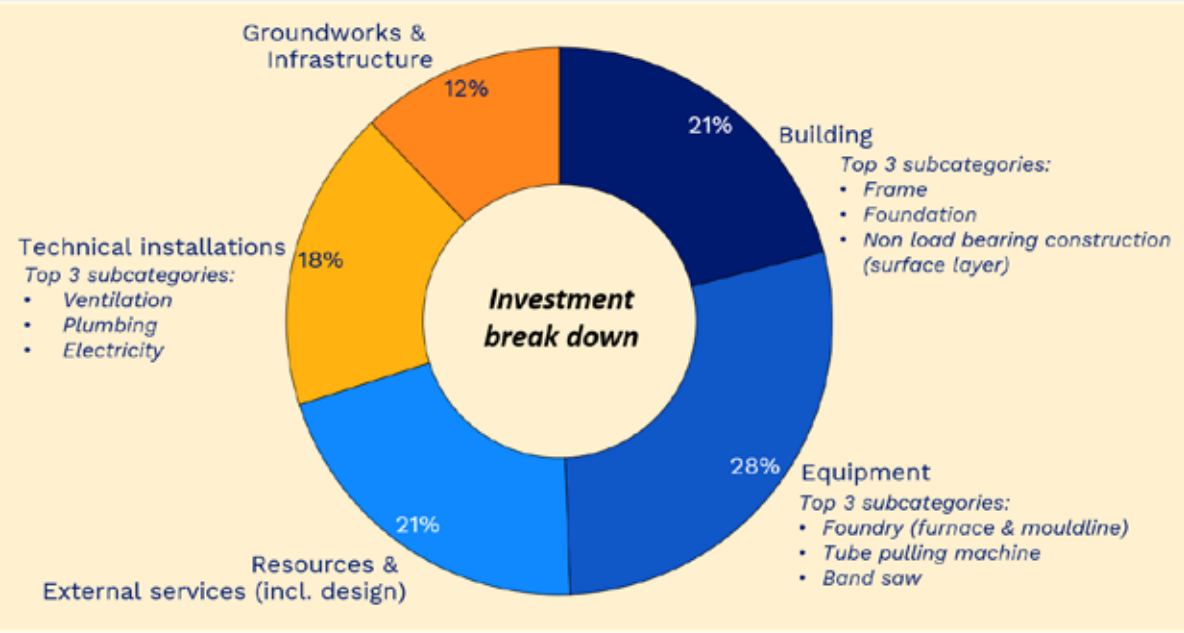
Mould handling line

Smarter technologies to reduce waste, lower impact, enhance performance and increase customer value

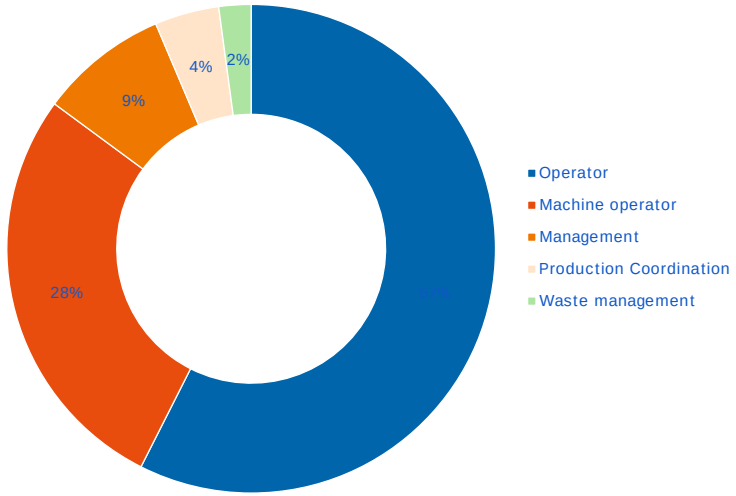
Cyclife Sweden's new facility

Involved supply chain & competencies

Involved supply chain



Set-up in operations



Other competences to build new waste treatment capacities

- Operational know-how
- Radio physicists, health physics, waste management experts
- Licensing

Both in construction & operation, the "nuclear" part of the supply chain & competencies is very limited and mainly based on existing operational knowledge

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What's next ?

Recycling more and more

- Continous innovations for **more volume reduction**
- Increasing society and industry appreciation of **recycled metal** from nuclear industry

Avoiding creating legacy for future generations - *decommissioning and waste management must be integrated early, not treated as an afterthought*

- Focus on wastes with unclear routes today – ***for instance legacy wastes, non-nuclear radioactive waste -*** with enhanced techniques
- Involvement in early stage of ***New Built projects incl. SMR***

Staying on core values based on circular economy & international principles related to ownership of the waste

Nuclear credibility depends on how well we manage the full lifecycle

A sustainable nuclear future requires **responsibility from operation and decommissioning to recycling and resource recovery**.

Circulare solutions reduce waste, preserve valuable resources and minimise the need for final disposal.

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Thank you