How to ensure competence for a safe and efficient operation

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Operating Plant Services

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Ensure Competence for Safe and Efficient Operation

- Westinghouse Finnish market commitment
- The new energy landscape
  - Competence impact due to new market conditions
- Long Term Operation, competence transition
  - How to close the competence gap
  - Example of competence cooperation's
- Digital solutions to address competence challenges
  - Smart Competence
  - Smart Worker

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About Westinghouse

GLOBAL HEADQUARTERS

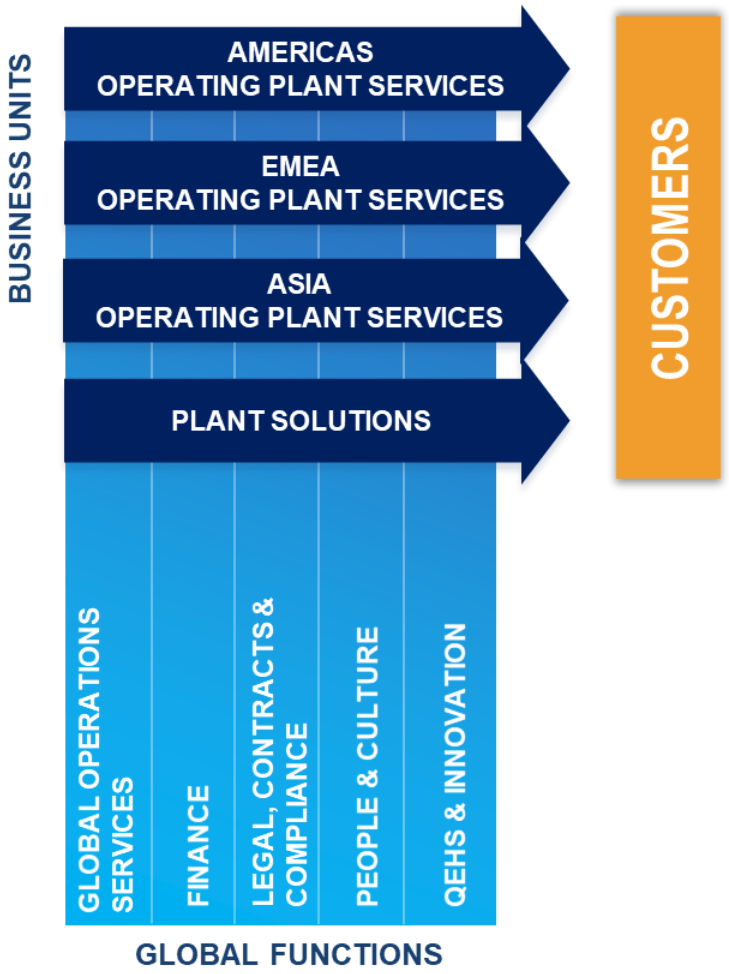
Cranberry Township, Pennsylvania, U.S.

Approximately **9,000** Employees

Comprised of **4** Business Units

- AMERICAS OPERATING PLANT SERVICES
- EMEA OPERATING PLANT SERVICES
- ASIA OPERATING PLANT SERVICES
- PLANT SOLUTIONS

Locations in **19** Countries



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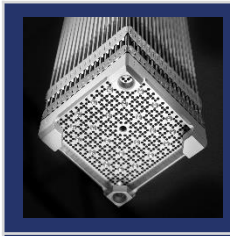
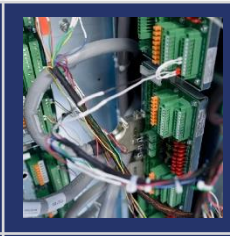
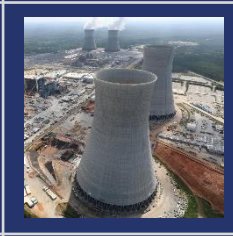
Global Portfolio Of Products & Services

 Nuclear Fuel	 Instrumentation and Control	
 Components and Manufacturing	 Field Services and Plant Modifications	 New Plants
 Engineering Services	 Decontaminating & Decommissioning Solutions	

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Westinghouse Nuclear Power Plants

A Part of Finnish Nuclear History

40 years operation
OL1 2018
OL2 2020

Olkiluoto 1 and 2

OEM Partner for Plant Modifications

OEM Partner for Fuel and Services

1970 **1978** **1980** 1990 2000 2010 2020 **Long-Term Operation**

Designer and supplier of 25 nuclear power plants in Europe

Nearly 50% of the nuclear power plants worldwide, are based on Westinghouse technology

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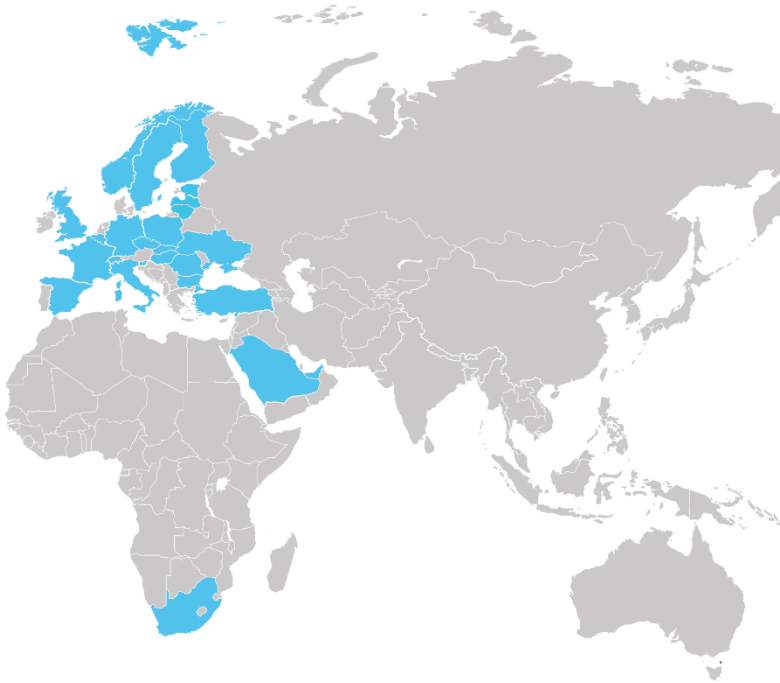
Westinghouse Overview

EMEA OPERATING PLANT SERVICES BUSINESS UNIT

Single point of accountability for sales and delivery of products and services in Europe, Middle East and Africa (EMEA).



Westinghouse locations in EMEA:

Belgium, Bulgaria, Czech Republic, Finland, France, Germany, Italy, South Africa, Spain, Sweden, Ukraine, United Arab Emirates, United Kingdom

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Blue highlights represent countries where Westinghouse does business

The New Energy Landscape

Changed Economic, Regulatory and Political Landscape

- New consumers and demands
- Increasing role for renewables

Consequences for nuclear

- Need of flexible operation
- Profitability – reduced production cost
- Reduced investments – maintain availability
- Long term operation (60+, 80+ years?)

What is the consequence for the human capital?

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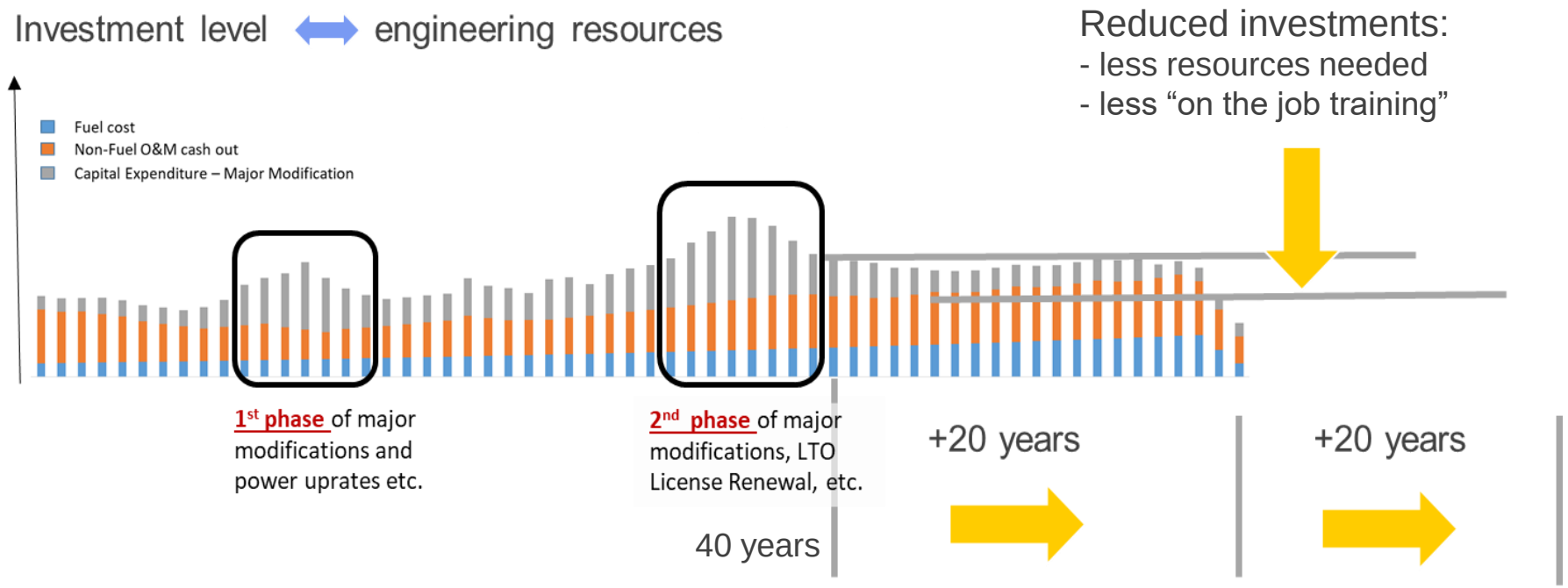
Competence Impact due to New Market Conditions

Generic Nuclear Lifecycle Investment Profile



Long Term Operation:
- maintain / develop competence
- competence transfer (x times)

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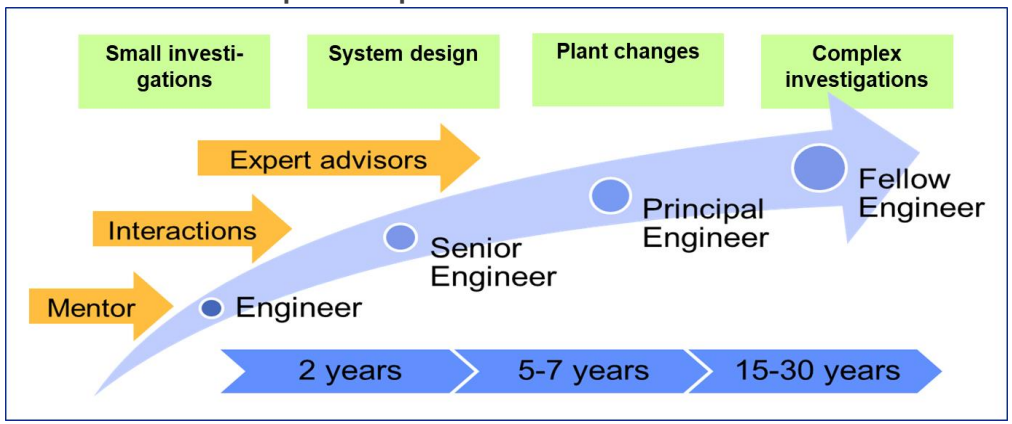
Long Term Operation - Competence Transition

Next generation is already digitalized!!

Present Competence → Transition Gap → X Years → Y Years → Z Years

Time to develop competence



How to fill the gap (in addition to traditional training):

- Competence Partnerships
- Long Term Agreements / Contracts
- Digitalization
  - Augmented & Virtual Reality
  - Immersive VR Training
  - Artificial Intelligence

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Long Term Contracts / Cooperations

VVER 1000 Fuel Deliveries
> 15 years competence plan

Supplier
- Fuel design, fabrication and delivery
- Licensing support
- Technology transfer and training

Customer
- Licensing, safety analysis
- Local component manufacturing
- Core design
- Core Monitoring
- Fuel Inspection and repairs

BWR Fuel Delivery
Long Term Contract

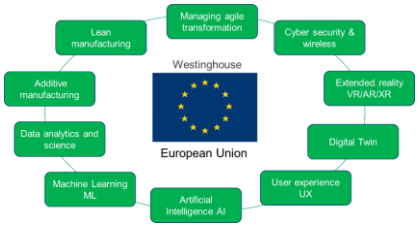
Supplier
- Fuel design, fabrication and delivery
- Development of new fuel design and features – with customer involvement
- Licensing new fuel products

Customer
- In Core Fuel Management
- Core Monitoring

Foundations for competence development

Enables cooperation for product improvements

Digital Solutions to Address Competence Challenges



"Smart Competence"

- EU funded project to increase/strengthen competence within Digitalization
- 130 Westinghouse employees selected for 2019-2020

"Smart Worker"

- Real-time communications between field technicians and engineers – safety improvement
- One subject matter expert advising multiple technicians at once
- Record video of real scenarios for future training purposes

Artificial Intelligence

- Index historical plant design basis and design modification data
- Enhances knowledge transfer and retention
- Empower workers with prescriptive guidance

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Summary

- Competence investment is as crucial as technology investments
- Long term competence strategy/cooperations essential for LTO operation
- Digitalization transition key for a safe and efficient operation
  - Competence transfer and development
  - Support closing the “competence gap”
  - Attract young Engineers
  - Technology for improved availability and reduced costs

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Thank you!

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