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Nuclear renaissance Opportunities & Challenges

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Power for the **Next Generation**

Arabelle Solutions provides world-class turbine island technologies and services dedicated to the nuclear industry - delivering reliable and accessible low-carbon electricity for energy security and long-term economic growth.

Arabelle turbine Flamanville 3. Source EDF

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Arabelle Solutions in numbers

1/3
global nuclear installed base

50 - 1900 MW
turbine output range

~100
units serviced annually

75 inches
largest ever last stage blade

Arabelle for HPC at Belfort factory

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Meeting turbine island needs

Partnering with customers across the entire Turbine Island Lifecycle for all reactor types

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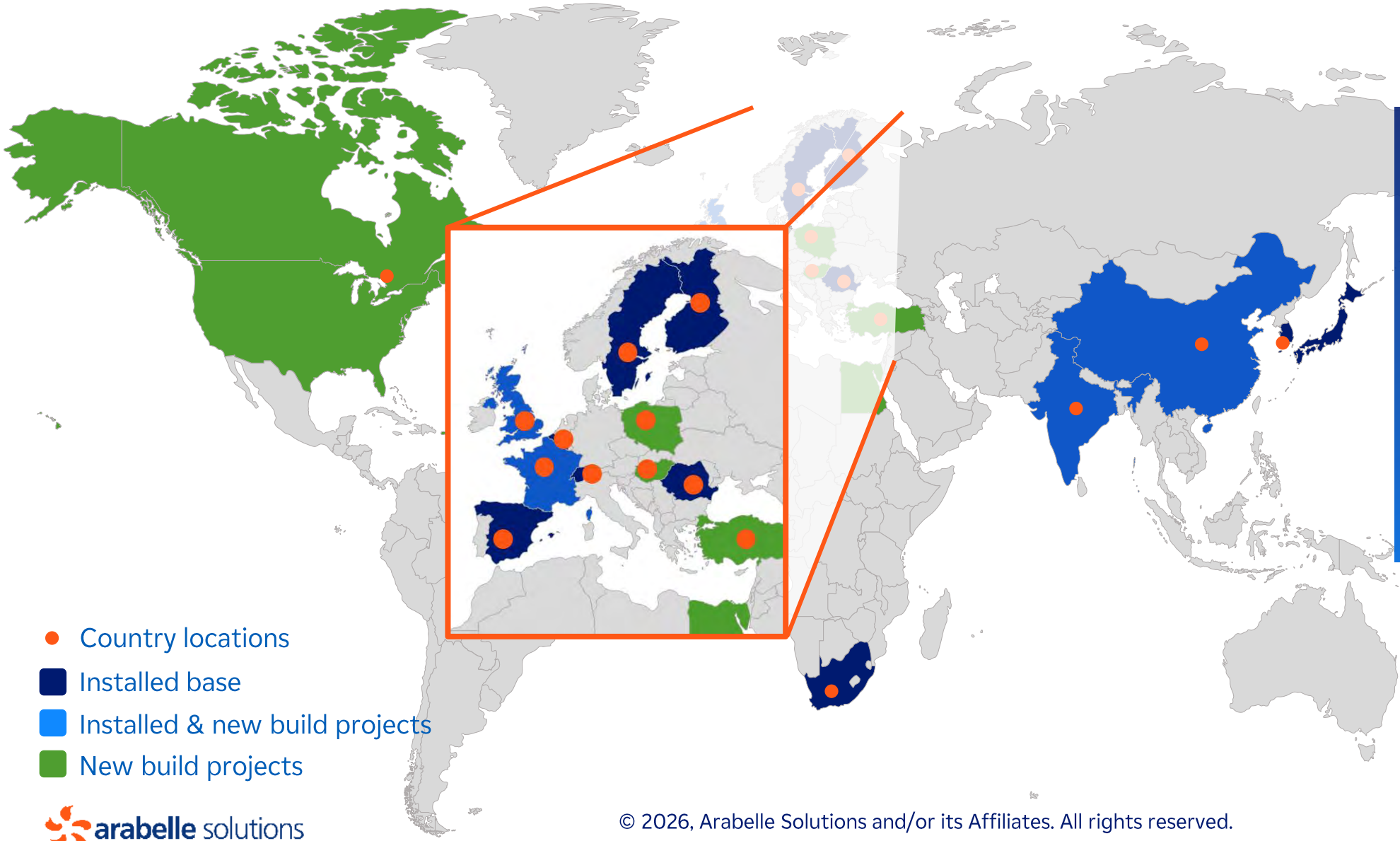
A strong international footprint



+ 3,800
employees

16
country locations

6
factories
& workshops

- Country locations
- Installed base
- Installed & new build projects
- New build projects

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Supporting Nordic Nuclear Power

Nordic turbine and generator engineering heritage from ASEA, ABB, Alstom and GE to Arabelle Solutions.

- ~100 employees with offices at **Norrköping** (workshop) and **Västerås** incl. **Field Service**, **Engineering**, **Quality** and **Sourcing** plus Support functions
- **Local service organization** with decades of experience, performing outage/ service for **Oskarshamn**, **Forsmark** and **Ringhals** and **Olkiluoto.**
- OEM for **all operating Swedish nuclear steam turbine & generator units**
- Manufacturer of compact and efficient GTD **air- and water-cooled generators**

Sweden:
FORSMARK 1-2 (4x550 MW)
FORSMARK 3 (1170 MW)
OSKARSHAMN 3 (1400 MW)
RINGHALS 3-4 (4x550 MW)

Finland:
OLKILUOTO 1-2 (2x890 MW)

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Nuclear Renaissance in Europe

More than 30 GW of new nuclear capacity in Europe till 2050.

Nuclear projects that meet sustainable electricity demands, ensure grid stability and strengthen regional interconnections require:

- **Nuclear engineering know-how**, with a skilled workforce
- **Integration experts**, optimized components for plant output
- **Innovative technology,** designed for efficiency and reliability
- **Safety and installation experience,** based on nuclear industry knowledge

➢ **Supported by a global network of suppliers**

Generator stator arriving at HPC

Flagship Arabelle turbines around the world

UK: 4x
Hinkley Point C 1&2
2x 1750 MW (EPR)
Sizewell C 1&2
2x 1750 MW (EPR)

France: 11x
Chooz B 1&2
2x 1550 MW (N4)
Civaux 1&2
2x 1550 MW (N4)
Flamanville 3
1x 1650 MW (EPR)
Penly 3&4
2x 1800 MW (EPR2)
Gravelines 7&8
2x 1800 MW (EPR2)
Bugey 6&7
2x 1760 MW (EPR2)

Poland: 3x
Lubiatowo-Kopalino 1-3
3x 1250 MW (AP1000)

Hungary: 2x
Paks 5&6
2x 1250 MW (VVER1200)

Turkey: 4x
Akkuyu 1-4
4x 1250 MW (VVER1200)

Egypt: 4x
El Dabaa 1-4
4x 1250 MW (VVER1200)

China: 26x
Ling Ao 3&4
2x 1080 MW (CPR1000)
Hong Yan He 1-6
6x 1080 MW (CPR1000)
Ningde 1-4
4x 1080 MW (CPR1000)
Taishan 1&2
2x 1750 MW (EPR)
Fangjiashan 1&2
2x 1080 MW (CPR1000)
Fuqing 1-4
4x 1080 MW (CPR1000)
Tianwan 5&6
2x 1080 MW (CPR1000)
Xudapu 1&2
2x 1250 MW (CAP1000)
Lianjiang 1&2
2x 1250 MW (CAP1000

2%
more output vs. traditional configuration

99.96%
Reliability rate*

50+
units around the world

75 inch
Largest last-stage blade

*Arabelle turbine 10 year forced outage rate: 0.04%

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Arabelle Solutions: A nuclear turbine hall supply chain

Exchanger - Out-house assembling factories

MSR

Low Pressure Heaters

High Pressure Heaters

Deaerator Storage tank

BtP -The “equipment” is fully defined by Arabelle Solutions

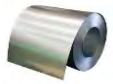
Turbine & Generator In-house assembling factories

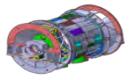
Forging

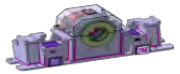
Casting

HP/IP/LP Diaphragms

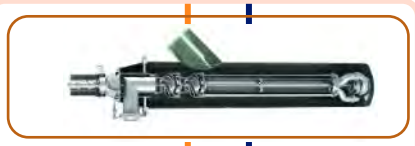
Blades


Electrical Sheet


Steel Structure


Bearing Pedestal

Pumps In-house assembling factories



Casting

Forging

BtP - The “product” is fully defined by Arabelle Solutions

BOP/MSD Out-house assembling factories

Vorecon

Piping Prefabrication

Miscellaneous Skids

Tube & Piping

Instrumentation

HP/LP Valves

Miscellaneous Tanks

Motors

Electrical Equipment

Miscellaneous Pumps

Valves

Compressed Air Plant

Cable trays

HV/LV/I&C Cable

BtS - The “equipment” detail design is owned by the supplier

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Supply chain challenges from different angles

Global Capacity Constraints & Supply Chain Risks

- **Limited pool** of qualified nuclear-grade suppliers
- **Shortages in commodities: e**.g. large forgings, heat exchangers, valves & pumps…
- **Shortage of skilled labor**, incl. welders, inspectors and QA specialists
- **Long cycles for** qualification and certification
- **Increasing geopolitical pressures** and localization

Asia Pacific: High growth management

- China is roughly half of global capacity under construction
- Strong manufacturing base, but increasing competition for qualified suppliers
- Local demand absorbs available strategic suppliers capacity

Europe: Largest qualification challenge

- France, UK, Poland, Sweden, Czech Republic and others pursuing nuclear expansion and extensions
- Strong engineering expertise but limited nuclear qualified manufacturing capacity after years of reduced investments

Americas: SMR growth and fleet extension

- Existing supply base is mature but constrained by workforce demographics and certification requirements

- **Securing qualified supply chain capacity** ahead of the next wave of nuclear projects
- **Sourcing organizations** to secure capacity, talent and **form strategic partnerships with global suppliers.**
- **Qualifications & regional suppliers developments** complementary to global partnership agreement.

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Nuclear Safety and Quality framework

Robust processes, comprehensive controls and risk-based surveillance are underpinned by our culture of safety as the top priority.

- **Transparent nuclear safety culture** embedded across all levels of the organization and supply chain
- **Established quality control plans** managing nuclear safety items and activities
- Rigorous **supplier qualification** and **risk-based surveillance**
- Stringent management of **non-conformities and customer documentation**
- **Continuously enhancing skills** and improving processes through problem solving and Lean methods

Unwavering commitment to nuclear safety and quality

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How do we succeed together?

Our offering to Suppliers:

- **Long term visibility** of demand and revenue (Nuclear life cycle)
- **Binding commitments** and partnership agreements
- **Qualification & co-development programs** to become a leading supplier in nuclear requirements and technology

Partners for the Nuclear Renaissance require:

- **Ability & true motivation** to embrace nuclear safety culture, mindset and rigor
- **Dedicated nuclear organizations** and teams
- **Investment in resources & competences** of key functions: Quality, Supply Chain, Project Management, Manufacturing

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