

“Advantages for the new maintenance and modernization contract in Kozloduy NPP”

Varna, June 8th 2017

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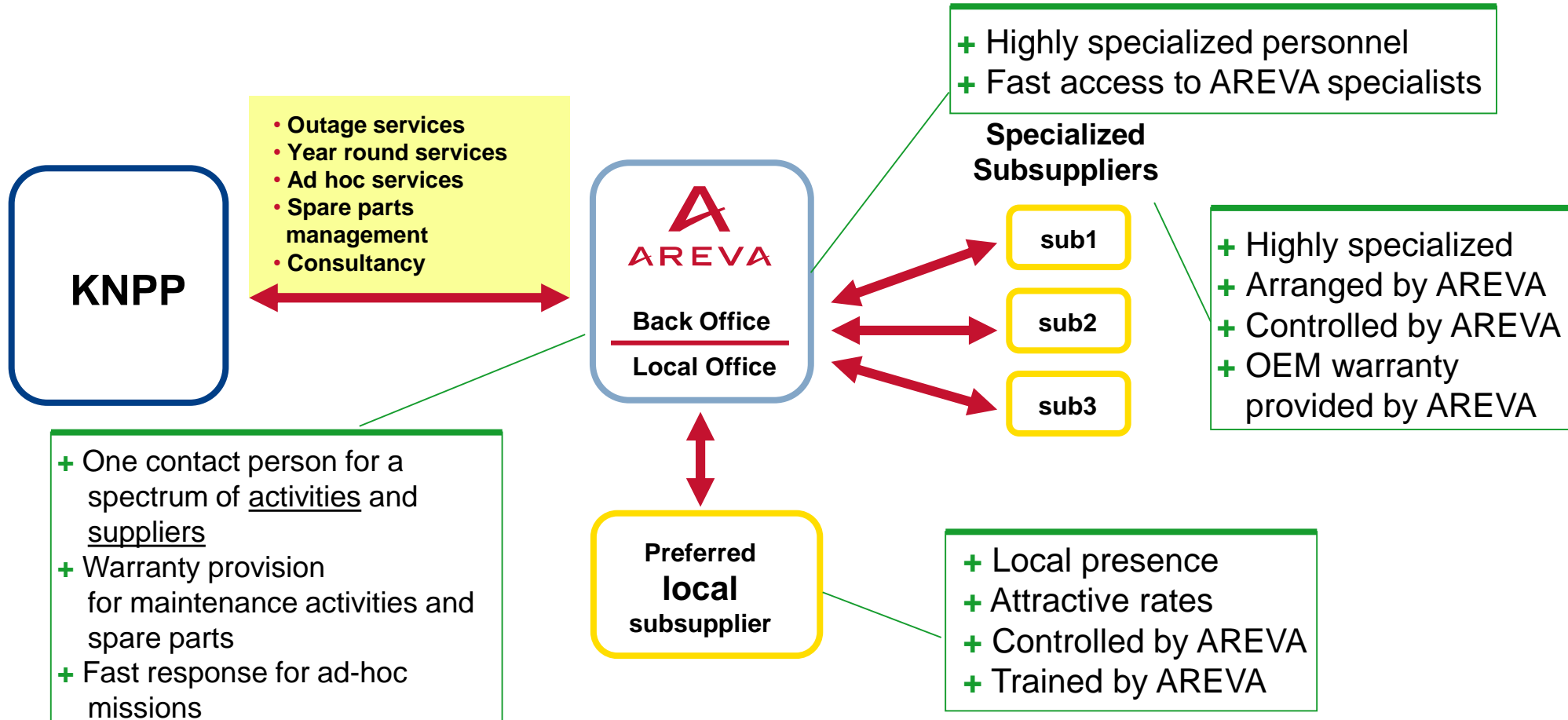


- ▶ **Structure of maintenance services**
- ▶ **Review of 9 years of maintenance services**
- ▶ **Operational Benefits**
- ▶ **Future Expectations**
- ▶ **Contribution to comprehensive assessment**
- ▶ **Conclusion**



Structure of maintenance services Cooperation Concept

► flexible and adaptable



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Review of 9 years of maintenance services Maintained Systems

I&C

- KÜS
- FLÜS
- FAMOS
- H2-measurement
- Reactor coolant level
- Seismic control and monitoring system
- Automated system TXP
- Automated system for COP TXS

Electrical

- Uninterrupted power supply Cat. I
- Uninterrupted power supply Cat. II
- Unit diesel generator
- Recording system SIMEAS R
- Excitation system Thyripol-D
- RF monitoring system
- ASO system of the 6kV switchgear
- Digital electrical protections
- 6kV switchgear NXAIR-P
- Generator breaker HEC-7
- Fire detection and automatic fire extinguishing system
- Open switchyard and bank pump station

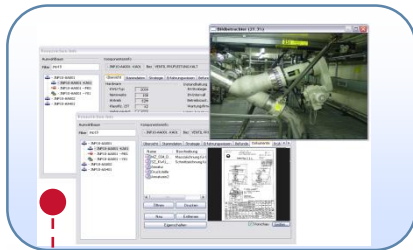
Mechanical

- Taprogge
- SUSI visual reactor floor inspection
- Pilote valves

Review of 9 years of maintenance services

Timeline of Service Innovations (1/3)

- ▶ Close and engaged team of engineers
- ▶ 100% fulfillment of prescribed reaction time



WIS

Database for maintenance history



EMPATH

Diagnosis for electrical motors with motor current signature analysis



Diagnostic tools at local office

For highly sophisticated performance of measurements and diagnostics

2008

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2009

2010

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Review of 9 years of maintenance services

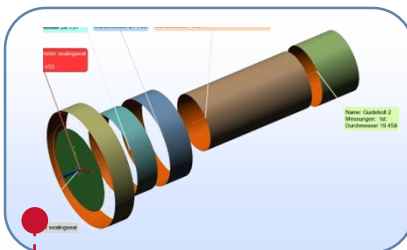
Timeline of Service Innovations (2/3)

► Inclusion of innovative concepts and tools



Obsolescence consultancy

For all equipments included in the maintenance scope



3D-measurement

3D visualization of installed valves



DAW/ADAM

Mobile test bench for valve and actuator diagnostics



SUSI Submarine Services

Tool for visual inspection of the reactor floor



SIPLUG 4

Pilote project for valves and actuator monitoring

2011

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2012

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2013

Review of 9 years of maintenance services

Timeline of Service Innovations (3/3)

- ▶ Inclusion of innovative concepts, tools and additional support



Obsolescence Management

For all equipments included in the maintenance scope

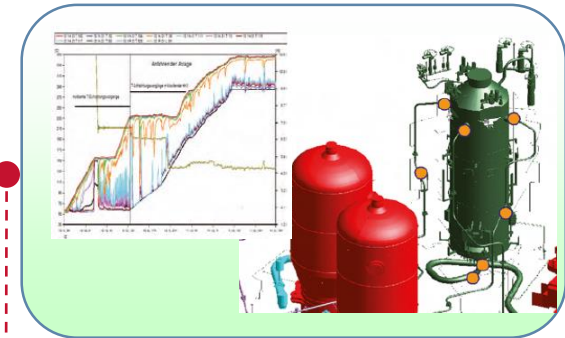
2014

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Unit 6 Generator Power Upgrade

2015



Fatigue Monitoring Evaluation with FAMOSi

Assessment of thermal loads on primary circuit components for fatigue evaluation

2016

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Benefits involving AREVA in your outage activities

1

Health Safety and Environment Protection

Work and plant safety have highest priority

2

Highest quality standards

Maintenance procedures performed by qualified personnel

3

Planning flexibility

Optimized use of outage time windows and personnel flexibility

4

Technology & Innovation

Access to AREVA pool of engineering and tools

5

Human Factor

Mix of KNPP and AREVA teams and continuity of personnel

Future Expectations

► Upgrades of systems according to obsolescence management

Diagnosis Systems

KUS, FLUS

Partial Upgrade of
obsolete parts of the
systems

EDG's 1- 6 Excitation

system type

THYRIPART

Partial Upgrade of
obsolete components

2017

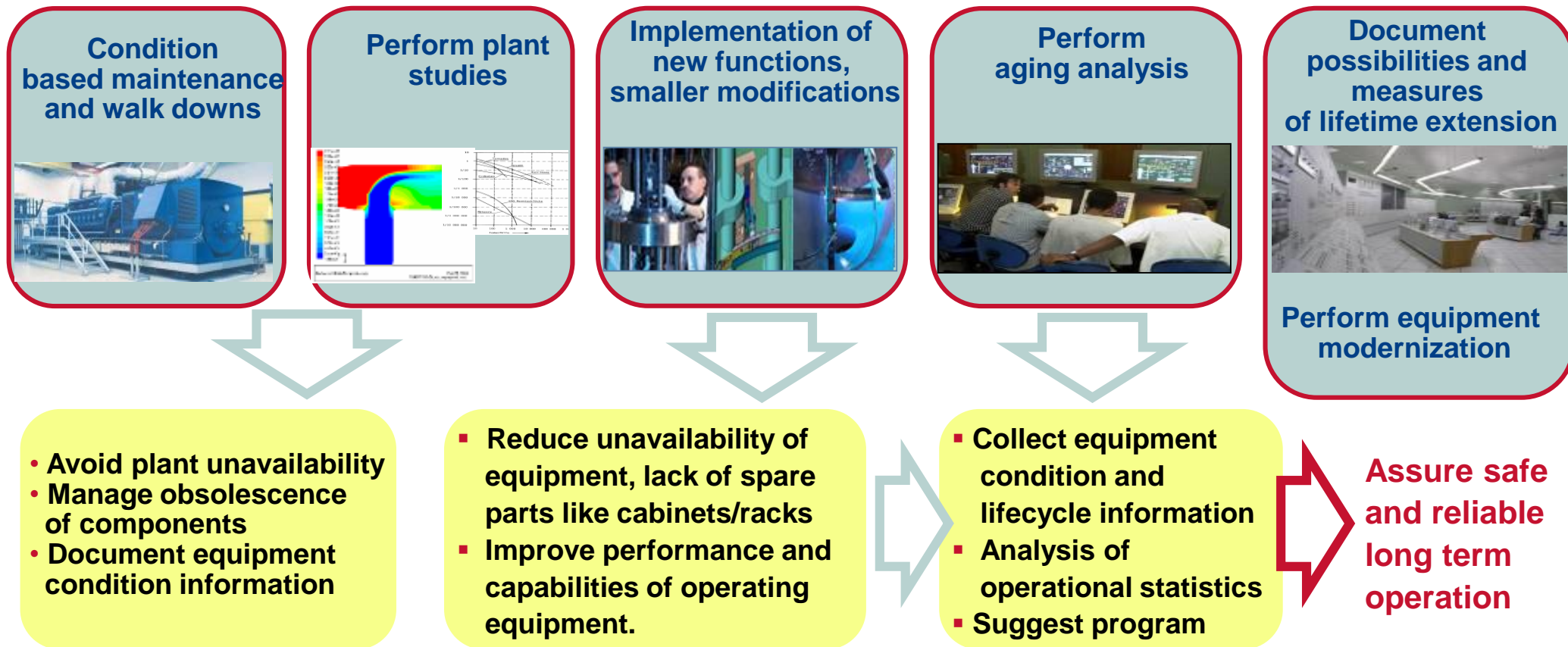
2018-2020

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Contribution to KNPP Comprehensive Assessment of Unit 5+6

► Project is based on equipment condition documentation



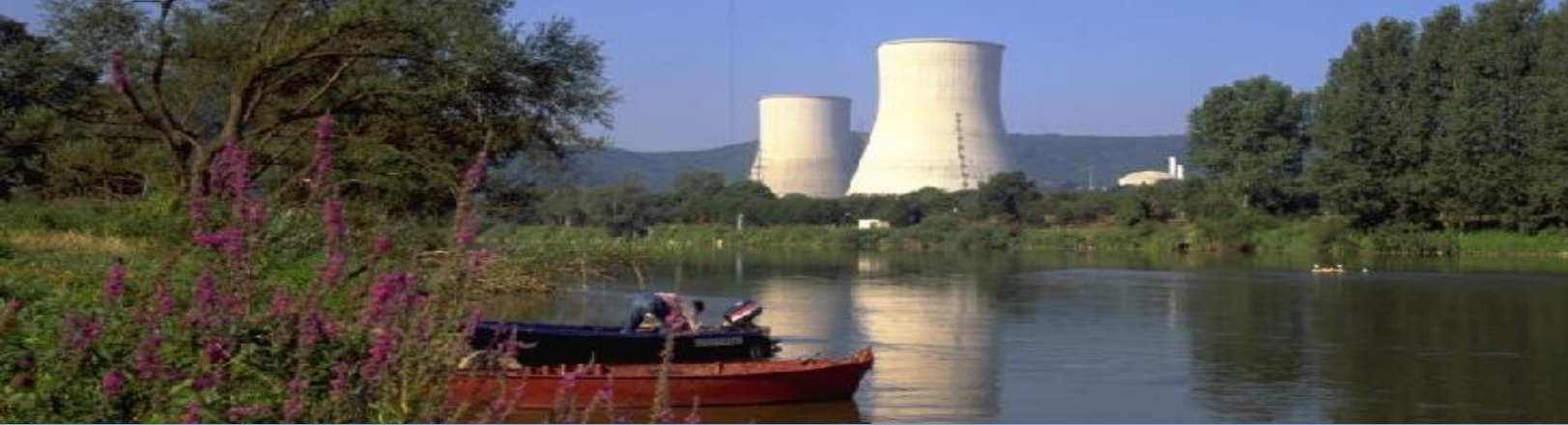
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- ▶ After 9 years of maintenance services, KNPP and AREVA have continuously intensified their partnership
- ▶ Close cooperation between KNPP, AREVA Local Office Engineers and OEM experts
- ▶ Involvement of sophisticated tools for diagnostics and condition monitoring
- ▶ Performance of engineering services and obsolescence evaluation
- ▶ Possibilities to perform equipment modernization of Electrical and I&C equipment in future



Service project can be enhanced to maintain the installed equipment throughout its complete lifecycle



Thank you for your attention!

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