

Developments in guaranteeing the safety of operating nuclear power plants

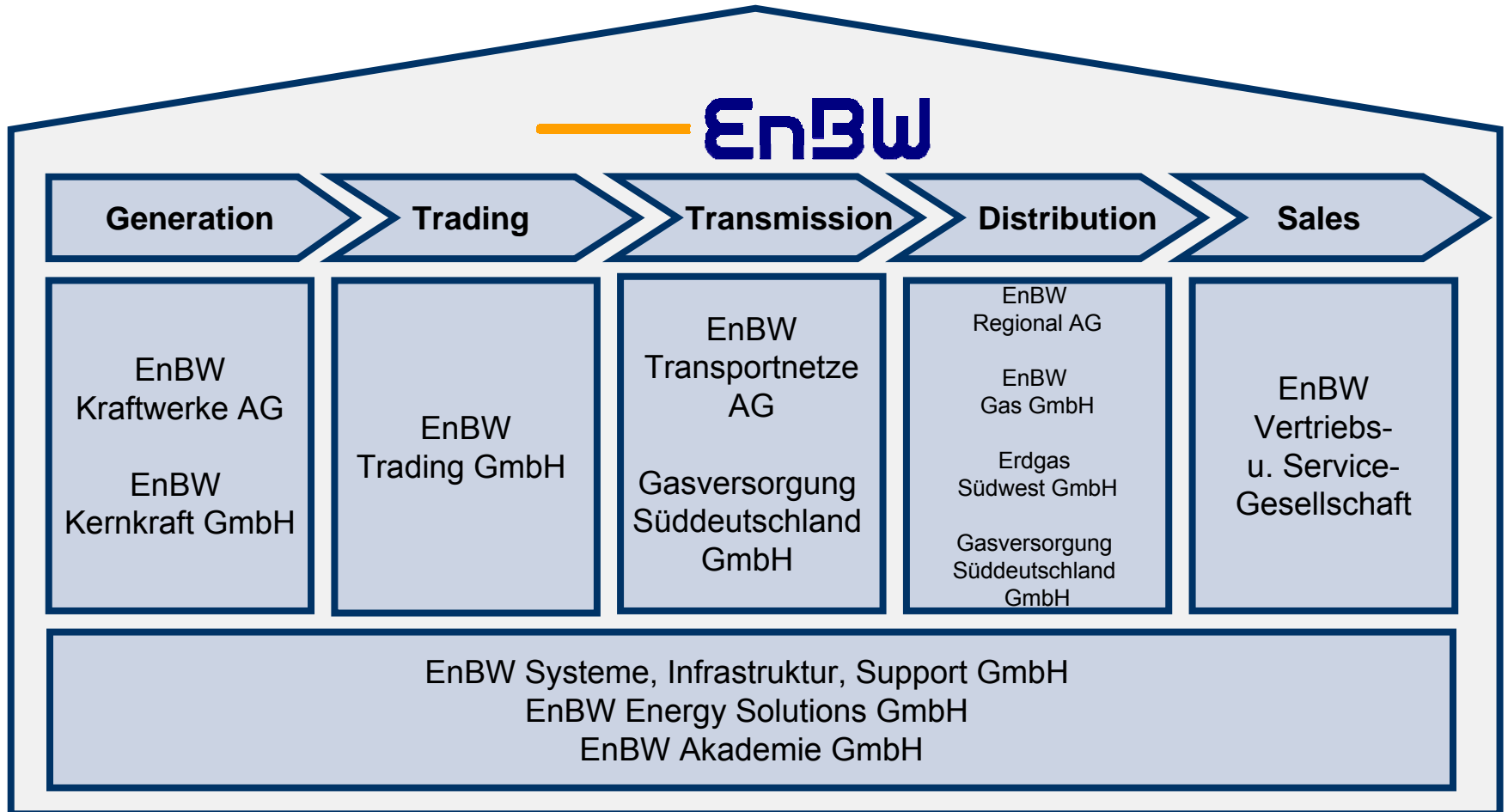
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3. EnBW's strategy for plant operation:
 - Safety and competitiveness
 - Human resources
 - Continuous improvements and modernisation

EnBW – Who we are

At a glance

EnBW group	2006	
No. 3 in Germany (external sales)	13,219.4	m€
Main shareholders:		
EDF	45,01	%
Oberschwäbische Elektrizitätswerke	45,01	%
Unit sales	119,4	TWh
Installed power	14811	MW
Installed nuclear power (incl. contracts)	4843	MW
Employees (annual average)	20,259	

At a glance



EnBW Kernkraft GmbH (EnKK)



Philippsburg
(KKP)



Neckarwestheim
(GKN)



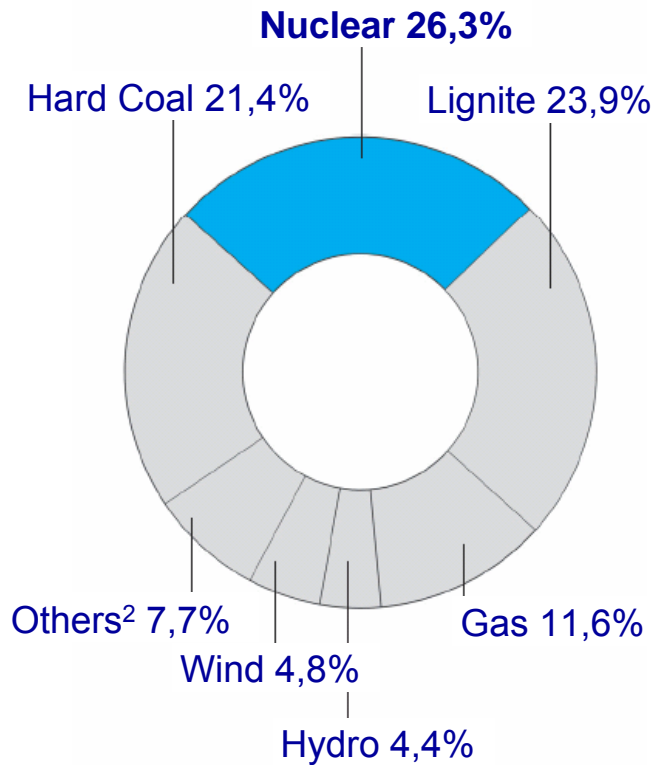
Obrigheim
(KWO)

- About 1.800 employees
- 4.624 MW installed electrical capacity
- KKP 1: BWR 926 MW availability in 2006: 91,1% in operation since 1979
- KKP 2: PWR 1.458 MW availability in 2006: 92,9% in operation since 1984
- GKN I: PWR 840 MW availability in 2006: 94,2% in operation since 1976
- GKN II: PWR 1.400 MW availability in 2006: 95,7% in operation since 1989
- KWO: in decommissioning process since 11th May 2005
- Production: about 37 TWh per year

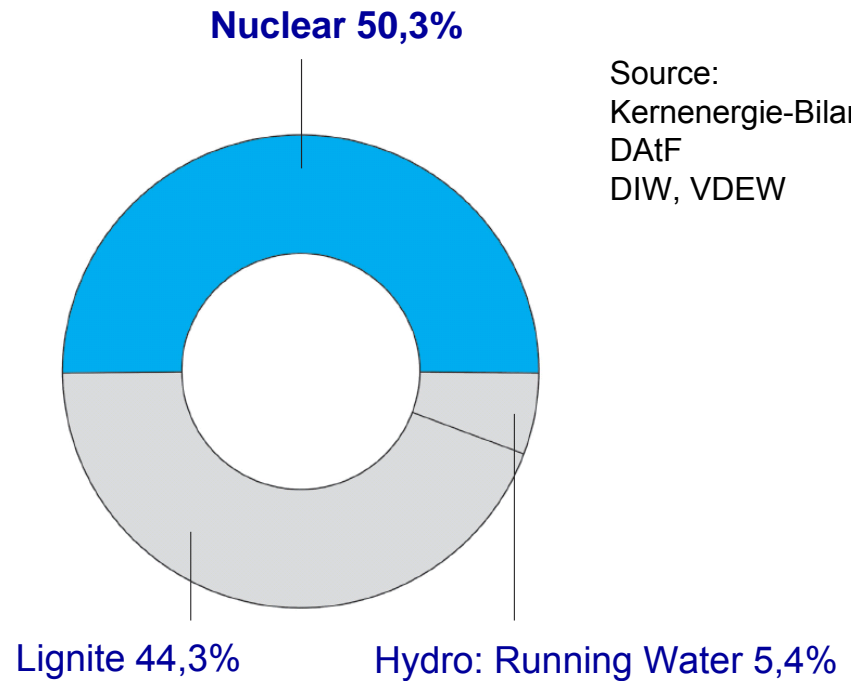
Electricity supply in Germany – Challenges for the future

Germany – Electricity generation in 2006

Gross electricity generation in Germany 2006¹



Electricity base load
Germany 2006

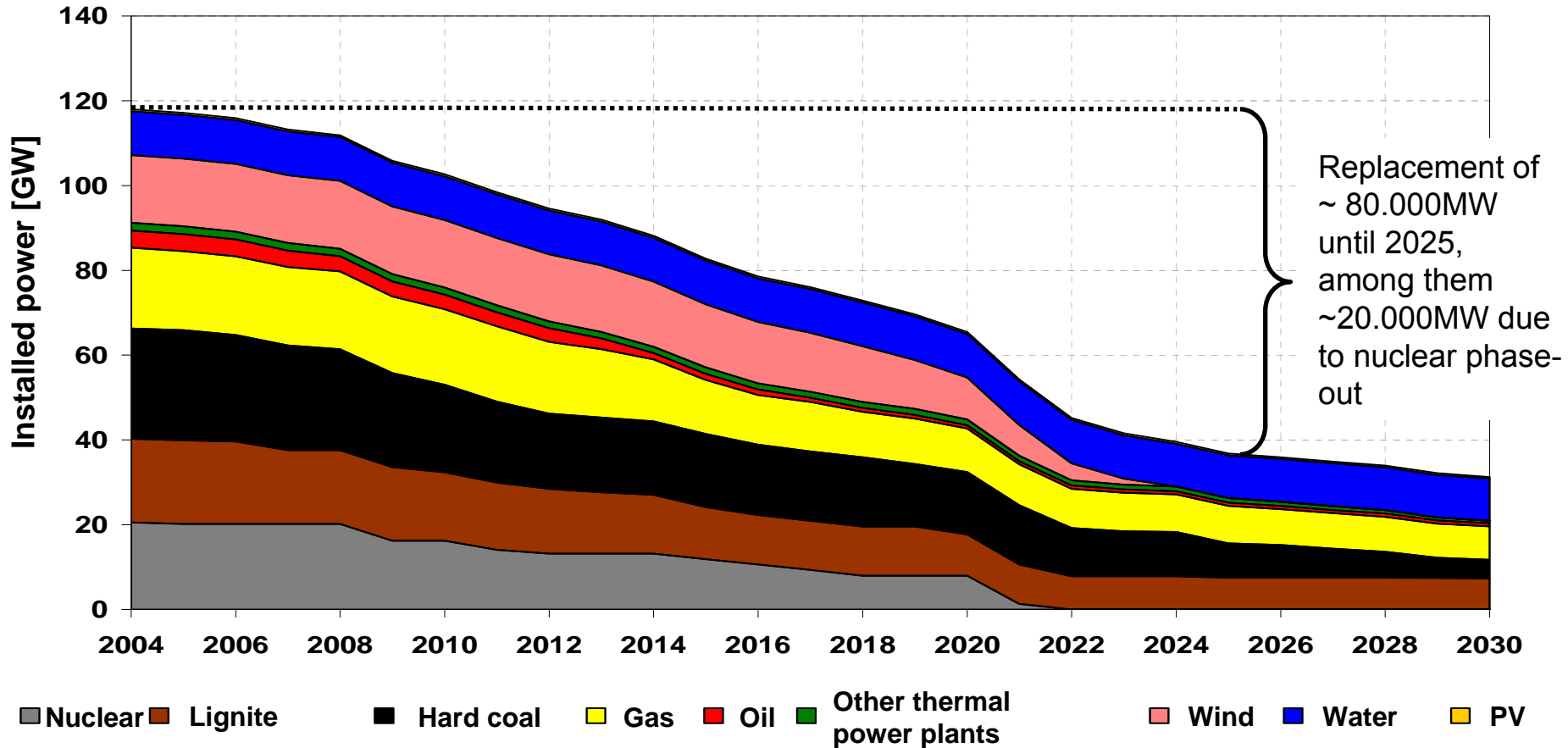


Source:
Kernenergie-Bilanz 2006,
DATF
DIW, VDEW

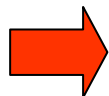
¹ Preliminary data; partly estimated

² Bio mass, produced gases, waste, solar, mineral oil products

Development of installed power in Germany

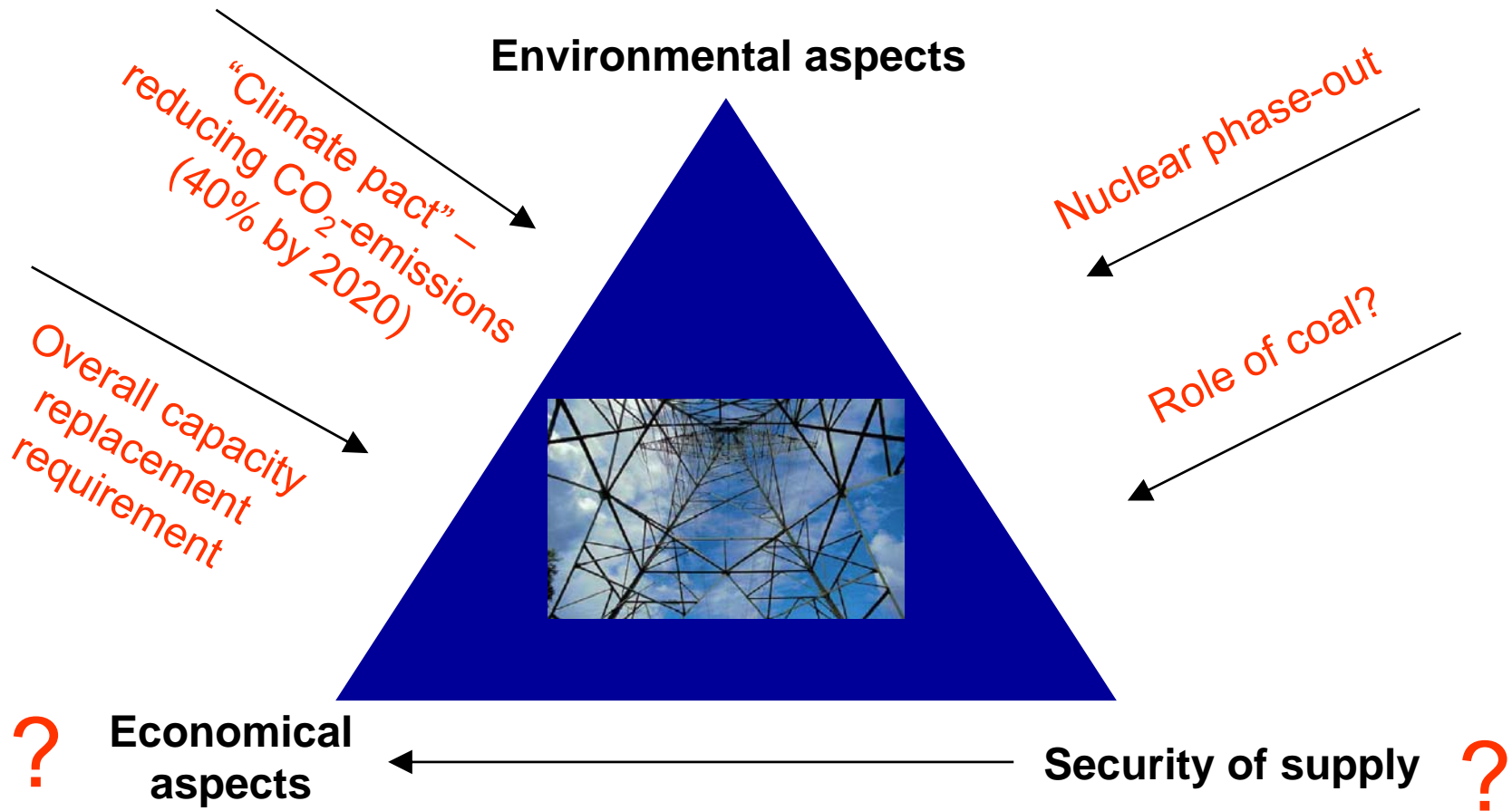


In 2020 there will be a lack of more than 40 % of the actual power generation



How do we solve the capacity requirements?

Electricity supply - competing aspects



EnBW's strategy for plant operation:

- **Safety and competitiveness**
- **Human resources**
- **Continuous improvements and modernisation**

Safety and competitiveness (1)

Definition of goals for nuclear generation activities - Brochure outlining goals and objectives



Leitlinie	Ziel	Indikator	Zielwert
Sicherer Betrieb	Weiterentwicklung des Sicherheitsmanagementsystems	Einführung des gesamten Prozessumfanges für GKN und KKP Einführung des ELIAS (GKN und KKP)	100 % ELIAS in Betrieb
	Erstellung eines Organisationshandbuchs für die EnKK	Vorlage des Organisationshandbuchs	liegt vor
	Konzepterstellung für eine Wissensdatenbank	Verarbeitetes Konzept im GKN und KKP	liegt vor
	Einhaltung der Revisionsterminplanung	Planungsabschluss Arbeitsaufträge vor Revisionsbeginn	GKN I = 23.02.2007 80 % GKN II = 27.04.2007 80 % KKP 1 = 23.02.2007 80 % KKP 2 = 05.05.2007 80 %
		Fertigstellung der Revisionslisten zur Weiterleitung an das UM bis Datum Zielwert	GKN I = 08.03.2007 GKN II = 13.04.2007 KKP 1 = 19.02.2007 KKP 2 = 21.04.2007
Wirtschaftlicher Betrieb	Einhaltung des Jahresbudgets	Abweichung vom geplanten Budget	Abweichung < 5 %
	Betrieb der Anlagen mit bester Verfügbarkeit	Zeitverfügbarkeit	GKN I = 93 % GKN II = 92,5 % KKP 1 = 93 % KKP 2 = 91,5 %
Hohe Sicherheitskultur	Vermeidung meldepflichtiger Ereignisse mit Verstößen gegen Betriebsvorschriften	Anzahl ME, die aufgrund eines Verstoßes gegen Betriebsvorschriften in INES 1 eingestuft wurden [U7.1-15]	Keine ME
	Minimierung der Strahlenbelastung des Personals innerhalb der gesetzlichen Vorgaben	Unterschreitung der Kollektivdosis [U1.5-04]	GKN I = 750 mSv GKN II = 150 mSv KKP 1 = 890 mSv KKP 2 = 260 mSv KWQ = 650 mSv
	Kontinuierliche Verbesserung von Ordnung und Sauberkeit in den Anlagen auf internationalem Spitzenniveau	Ergebnis des standortspezifischen Anlagenrundganges durch Kontrollpersonal	Verbesserung gegenüber dem Vorjahr auf der Grundlage der SBS-Einstufung

Safety and competitiveness (2)

Safety management system of EnBW nuclear power plants



- EnBW was a pioneer in Germany in the introduction of a safety management system
- Safety management system meets the current international standard defined by the IAEA and the OECD/NEA
- Complex multi-year project
- Process-oriented approach (highly complex but ensures transparency/traceability)
- Process monitoring via indicators in the form of an early warning system
- Homogeneous procedure at all 3 sites – but taking into account of the special situation of Obrigheim nuclear power plant
- Start of the SMS means: the continuous improvement process has begun

Safety and competitiveness (3)

Ageing Management – Implementation

- Our AM covers the technical issues (mechanical engineering, I&C, structural engineering and operating supplies)
- The implementation is not finished for all issues. Mechanical engineering is the most advanced issue
- The AM is based on the Maintenance Management. Therefore the AM-relevant information and feedback of the operating experience (eg. preventive maintenance programmes; in-service inspection, surveillance, corrective maintenance) is bundled
- Together with the information of transferable external events and research programmes the information are systematically and in detail analysed by experts
- The non-technical issues like AM of workforce or documents, which are required by the RSK-recommendation, are treated separately

Safety and competitiveness (4)

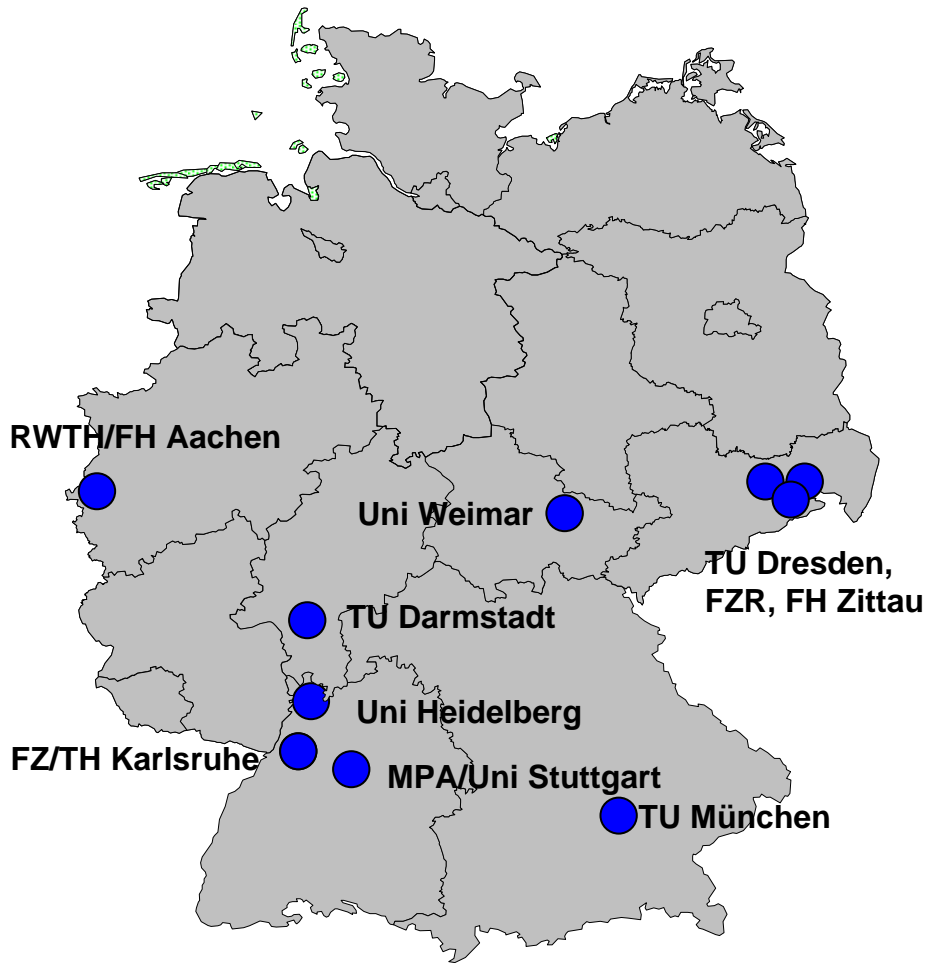
Outage optimisation

- As short as possible – as long as necessary
- Safety always prior to economy
 - IT-based outage planning tool
 - Improvement of safety and optimization of the scheduling of tasks with time-critical dependencies
 - Long-term outage planning: time-consuming or extensive periodic inspections, maintenance or changes are adapted to the outage strategy
 - Optimization of isolation of redundancies
 - Improvement of the duration for fuel assembly loading and unloading







Safety and competitiveness (5)

Retention of research expertise

Coordinated support and cooperation activities on the part of German utilities, the nuclear industry and associations within the framework of an expert network for nuclear techniques



Supported by:

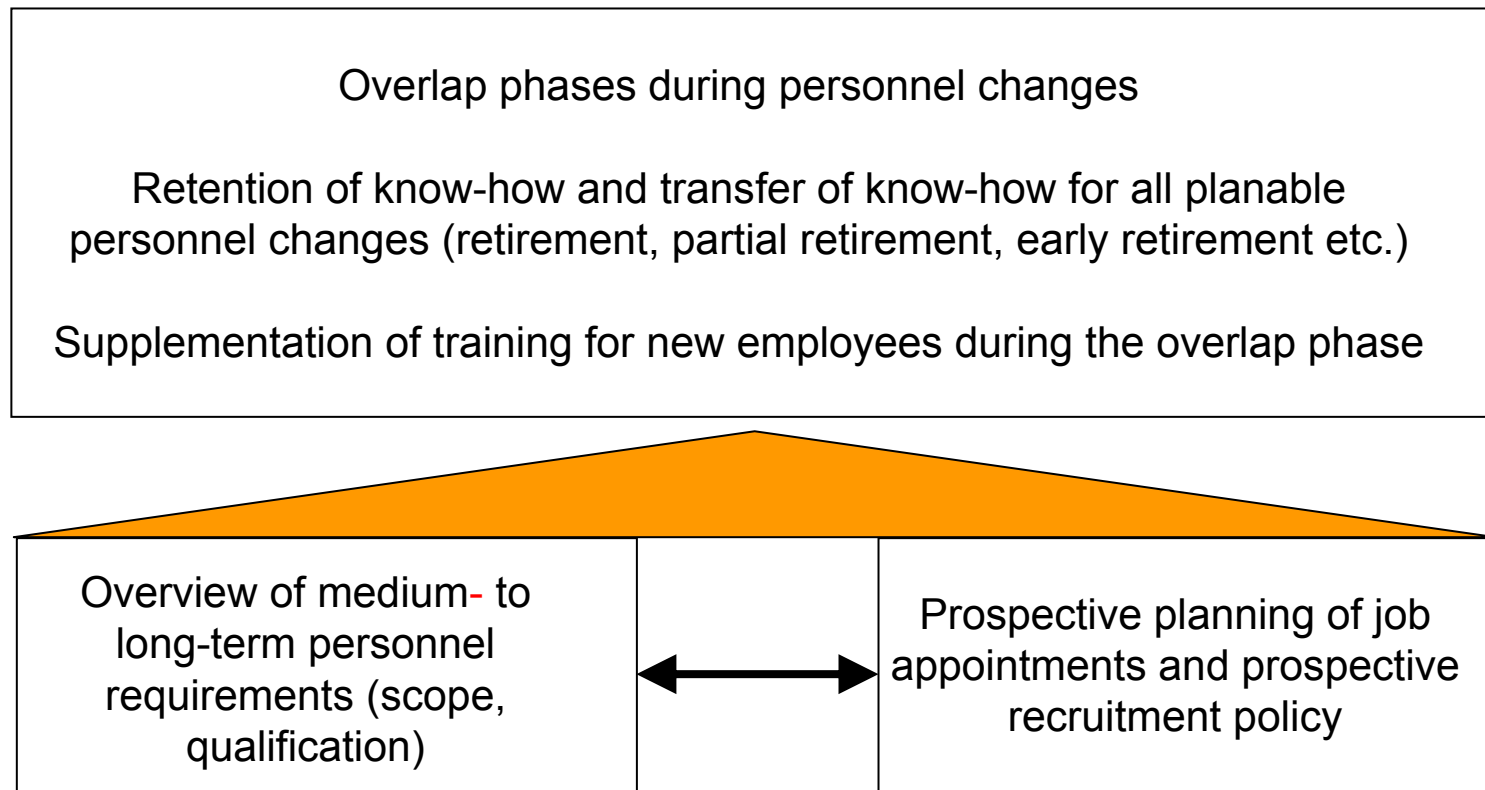
-  - E.ON
-  - RWE
-  - EnBW
-  - VENE
-  - GNS
-  - VGB

Human resources (1)

Prospective personnel planning and job overlaps

Concept for medium- to long-term personnel planning developed and implemented

→ Retention of expertise as well as long-term securing of desired workforce level



Human resources (2)

Prospective translocational personnel planning and job overlaps

- Examples of overlap times:

- Shift supervisors/Shift engineers 4.5-5 years
- Deputy shift supervisors/Reactor operators 4-4.5 years
- System engineers 2-3 years
- Technicians/Master tradesmen 1-3 years
- Skilled blue-collar (also shift) 1-2 years

Human resources (3)

Cross border training of future key personnel - Common recruitment and training program of EDF/EnBW

- EnBW and EDF have developed a joint recruitment and training program in the field of nuclear techniques
- Name of the program: “We offer a future” (WOAF)
- Goal: to recruit and train future key personnel as nuclear energy experts who:
 - possess intercultural and language skills to permit employment in both Germany and France
 - possess the required technical expertise in the nuclear field for Germany and France
 - are integrated in a good international network

Continuous improvements and modernisation (1) — EnBW

State-of-the-art safety features were included in the plant design.
Continuous developments concerning safety aspects were taken into account by backfitting and modernisation

Examples

(Improvement of barriers, improved reliability of normal operation):

- Exchange of piping/ piping material
- Leak before break behaviour
- Improvement of main steam valves
- Digital I&C (instrumentation and control)
- Ageing management measures
- Optimized fuelling strategy
- Continuous improvements in the field of radiation protection and radiochemistry
- Continuous education of staff

Continuous improvements and modernisation (2) — EnBW

Examples “design basis accidents“

(decreasing the effects of possible fire, improving efficiency and reliability of safety techniques):

- Exchange of components
- Optimisation of sump suction strainers
- Improved fire protection concept

Examples “beyond design accidents“

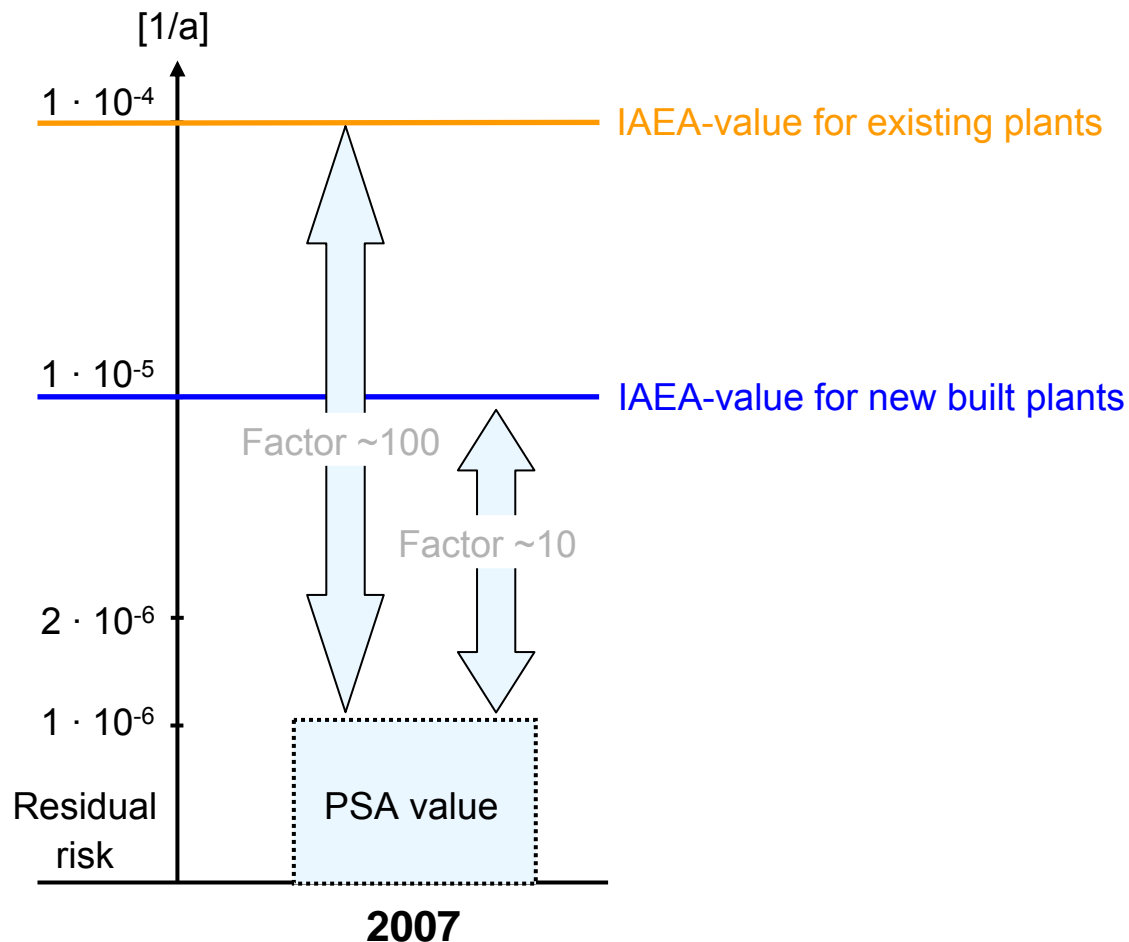
(controlling of design-exceeding emergency cases, internal emergency management):

- Controlled containment venting
- Pressure relief of primary circuit
- Aircraft impact actions
- Autocatalytic hydrogen recombiners

Continuous improvements and modernisation (3)

Safety status and reliability of German NPPs

Example: probability of „Overall core damage frequency“ for GKN I
(in operation since 1976)



Continuous improvements and modernisation (4)

Safety assessments – regular national and international reviews

Goals:

- National and international feedback, based on neutral benchmarking
- National and international exchange of knowledge and experience
- Transparency
- Improvements according to national and international standards or best practices
- Assuring best quality in operating nuclear power plants on worldwide accepted and international guidelines

Continuous improvements and modernisation (5)

EnBW's strategy on national and international reviews

Regular reviews:

- National peer review (by German NPP operators) once a year on each site
- International OSART/WANO peer reviews every 6-8 years on each site
 - GKN, WANO: 10/2001, follow-up 2005
 - KKP, OSART: 10/2004, follow-up 2006
 - GKN, OSART: 10/2007
- National „VGB-Sicherheitskultur-Bewertesystem“ (SBS, „safety culture self assessment“) every 2-3 years:
 - KWO: 02/2005
 - GKN: 06/2007
 - KKP: 12/2007

Summary

- Nuclear energy in Germany today is important, safe, reliable, sustainable and competitive
- German NPPs have a high safety level
- Modernisation is part of the daily business
- Ageing Management is implemented
- No matter how challenging the situation in Germany is, we keep our plants in an excellent condition to assure safe and competitive operation today - and for the future
- National and international reviews guarantee continuous improvements and high safety levels, based on actual guidelines
- EnBW is actively promoting and lobbying for a modernisation of today's German phase out law with the goal to extend the lifetime of the existing plants