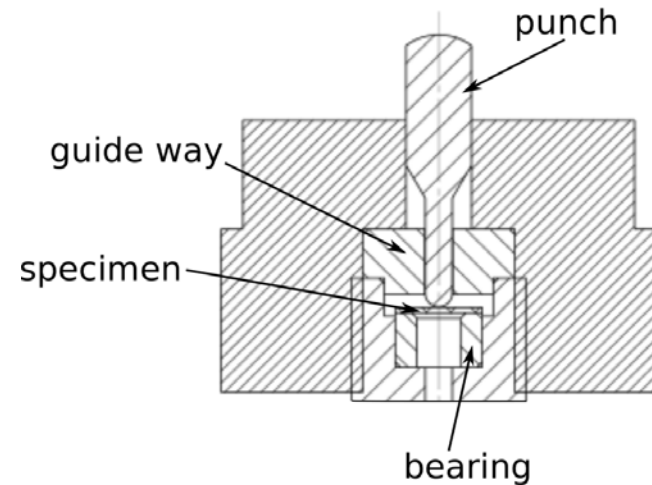


Small Punch and other minimum invasive or non-invasive techniques

Small Punch:  
CEN Workshop agreement (CWA) is being followed up for standardization



New issue of PED includes the necessity of risk assessments

CEN Workshop agreement (CWA) is going into a standard

		Number of components				
PoF	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	9	0	
	0	0	0	77	0	
	0	0	0	24	0	
		CoF				

A joint European research project for a systematic procedure to manage risk by identifying and prioritising inspection and maintenance activities



- *Establish a European framework for risk based inspection and maintenance planning (cf. API project)*
- *Provide basis for continuous improvement in the industry*
- *Forming the basis for future standardisation in this area*

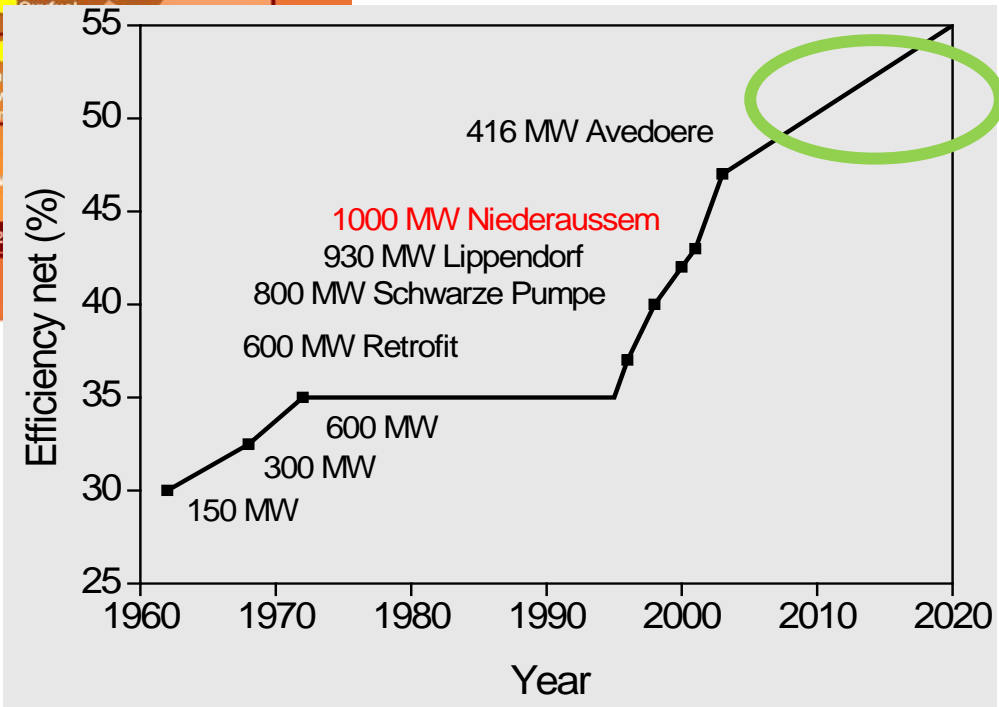
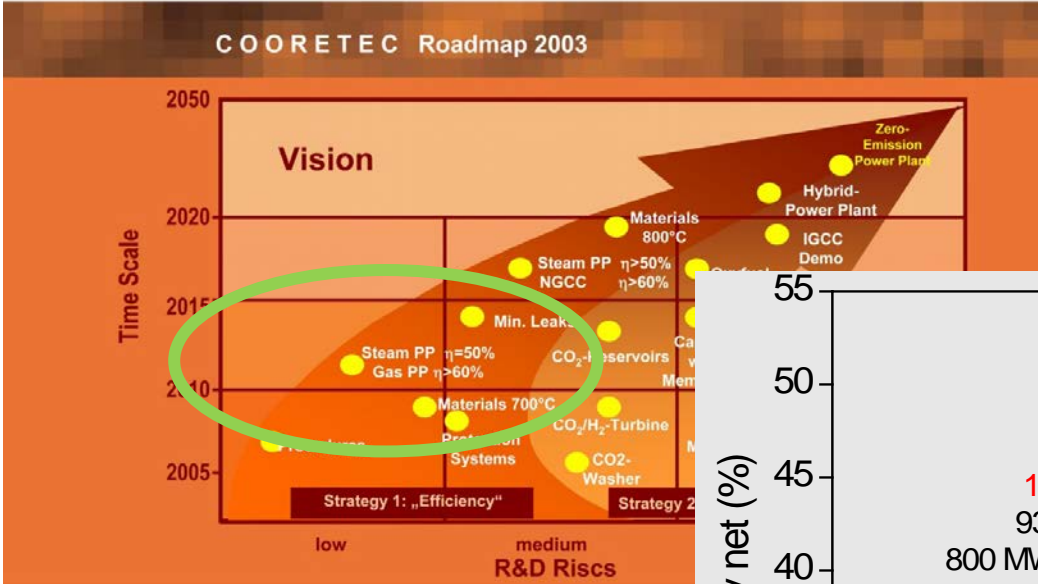
## ECCC Activities -- new recommendations (2014)

- VOLUME 1 - Overview
- VOLUME 2 - Terms and terminology
- VOLUME 3 - Recommendations for data acceptability criteria and the generation of creep data
- VOLUME 4 - Guidance for the exchange and collation of creep data
- VOLUME 5 - Guidance for the assessment of uniaxial creep data
- VOLUME 6 - Residual life assessment and microstructure
- VOLUME 7 - Guidance for the assessment of creep crack initiation in testpieces and components
- VOLUME 8 - Guidance for the assessment of multi-axial creep test data
- **VOLUME 9 - High temperature component analysis**
  - → provides comprehensive summary and studies on various component geometries using different standards and codes

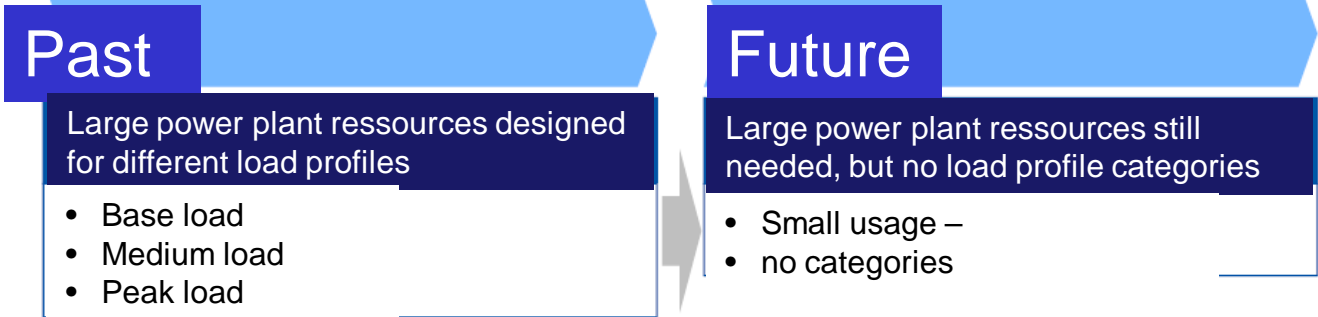
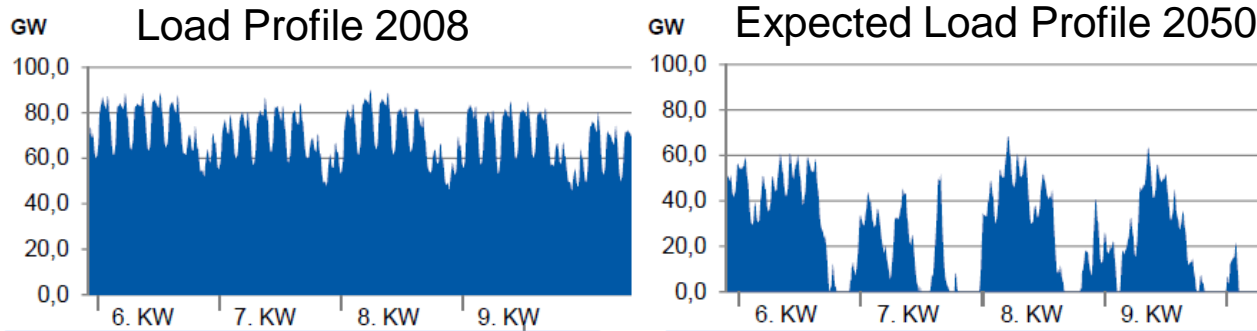
- Introduction
- **EPERC scope and activities - current activities - examples**
  - Risk based maintenance and –inspection
  - Repair Welds
  - Life assessment techniques
- **Actual research activities:**
  - High efficiency plants
  - Flexibility of power plants
- **Summary**



Background



## Effect of increase of renewable energies in the German Energy-mix

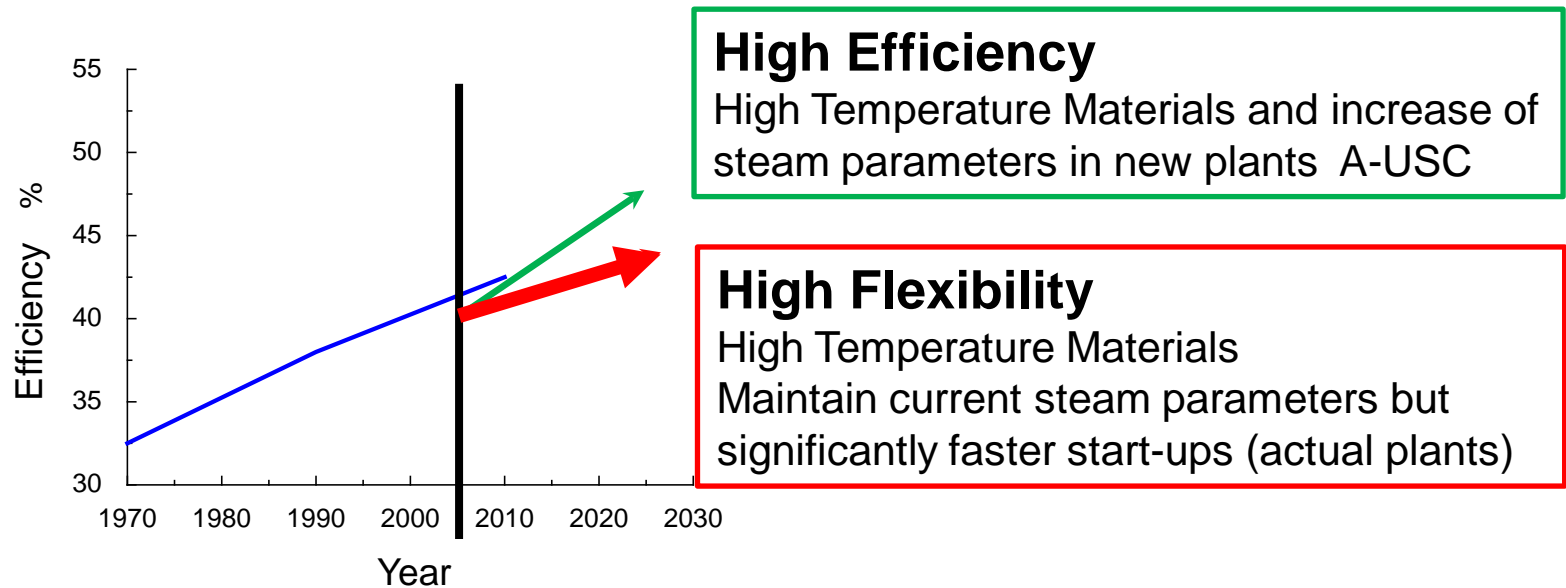


Source: COORETEC-Advisory Committee | Dr. D. Keller | Bonn, 12.02.2014



- high flexibility – fast start-ups
- still high Efficiency
- cost effectiveness due to lower usage

- **Increase of efficiency AND flexibility**
  - **Application of materials with higher creep strength**
  - **Creep Fatigue and Thermal Fatigue Loading to be considered in detail**



Component test (Workpackage 6) under thermal fatigue loading

Electrical resistance heating on the inside of the component  
1000 load cycles planned, 1 per day

Pressurised with air, 120bar, 600°C

Instrumented with strain gauges, ceramic inlays, pressure and temperature, potential drop crack monitoring at the transition radii.

- In service monitoring
- Assessments using codes (EN, R5, RCC-MR etc)
- Assessment using advanced numerical simulation methods

