



Management of Spent Fuel at Shutdown Reactors in Germany

Technical Meeting on the Management of Spent Fuel at Shutdown Reactor Sites,
Including Those to be Shut Down Prematurely

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Dr. Oliver Wallenfang - BGZ

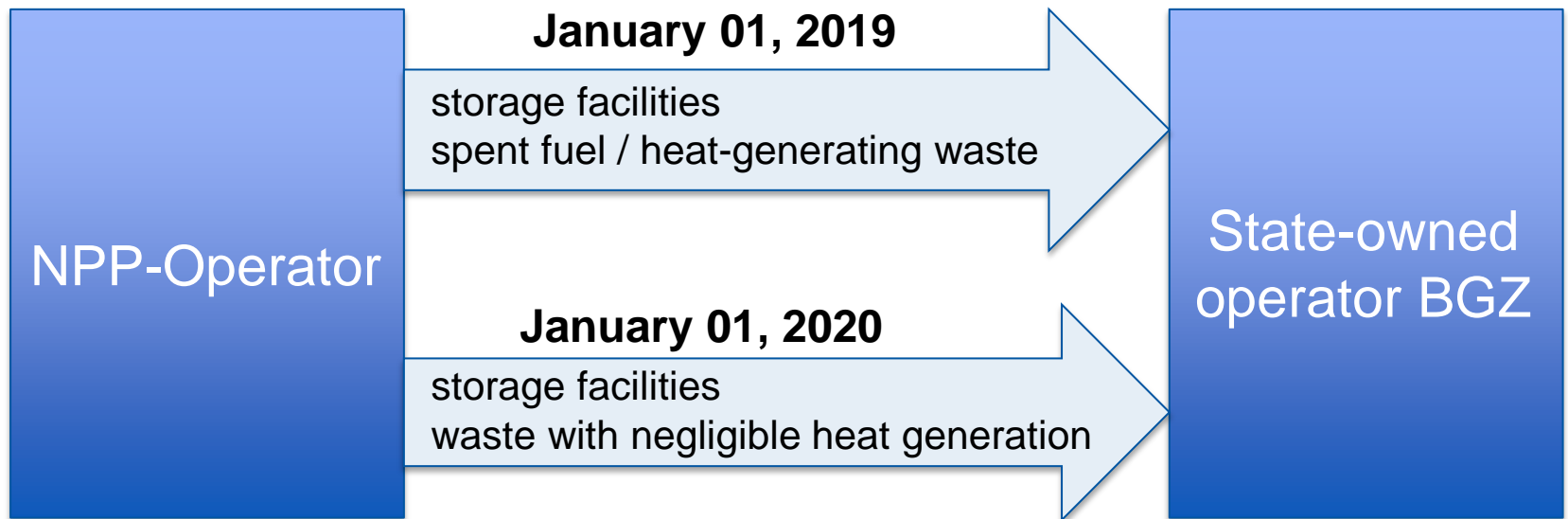
Contents

- Reorganization of nuclear waste management in Germany
- Legal aspects
- NPP and storage facilities for SNF in germany
- How we achieve a self-sufficient storage operation
- Special issues of prematurely shut down NPP
- Management of damaged fuel
- Conclusions

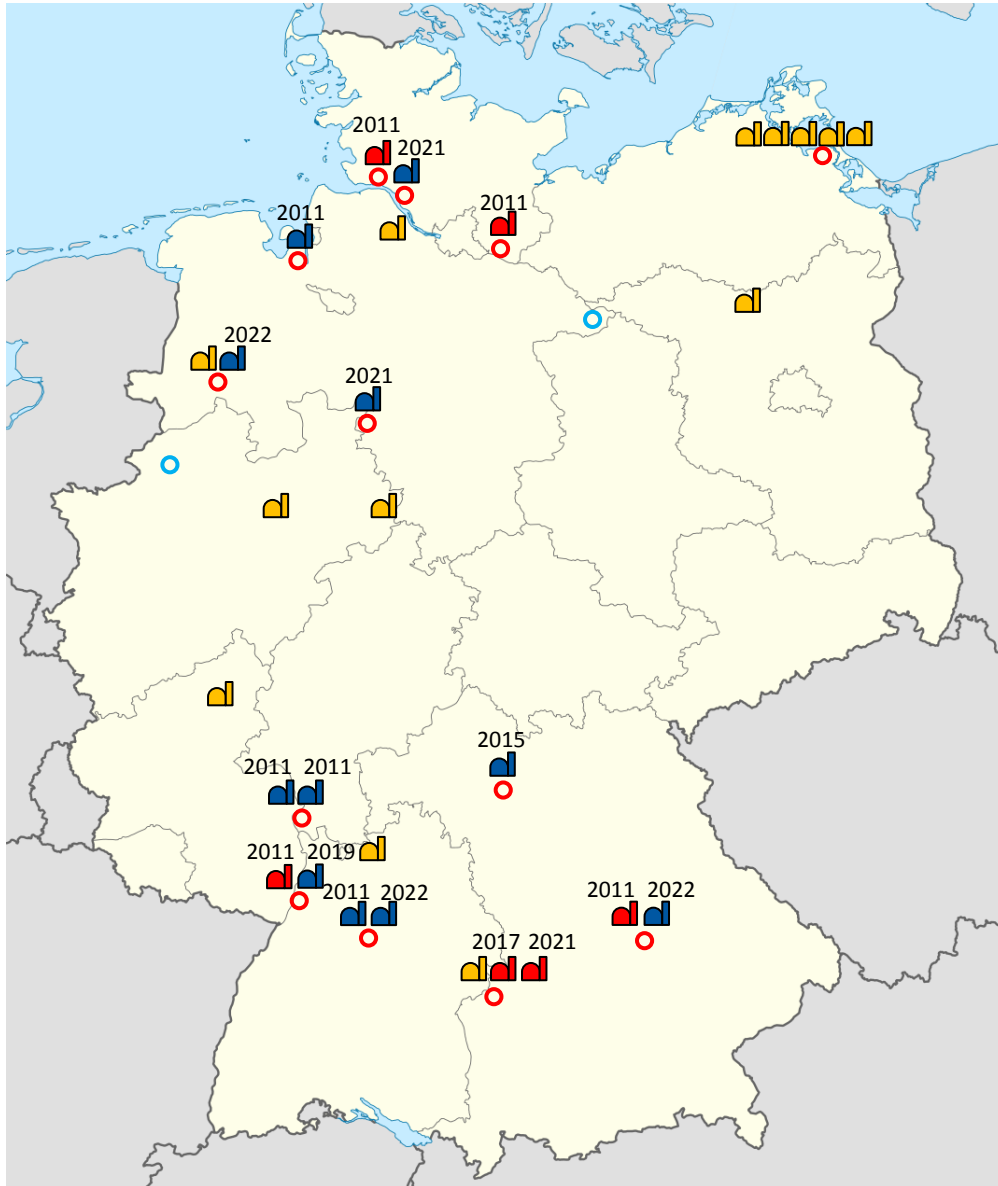
Legislator decided to reorganize nuclear waste management








Legal aspects



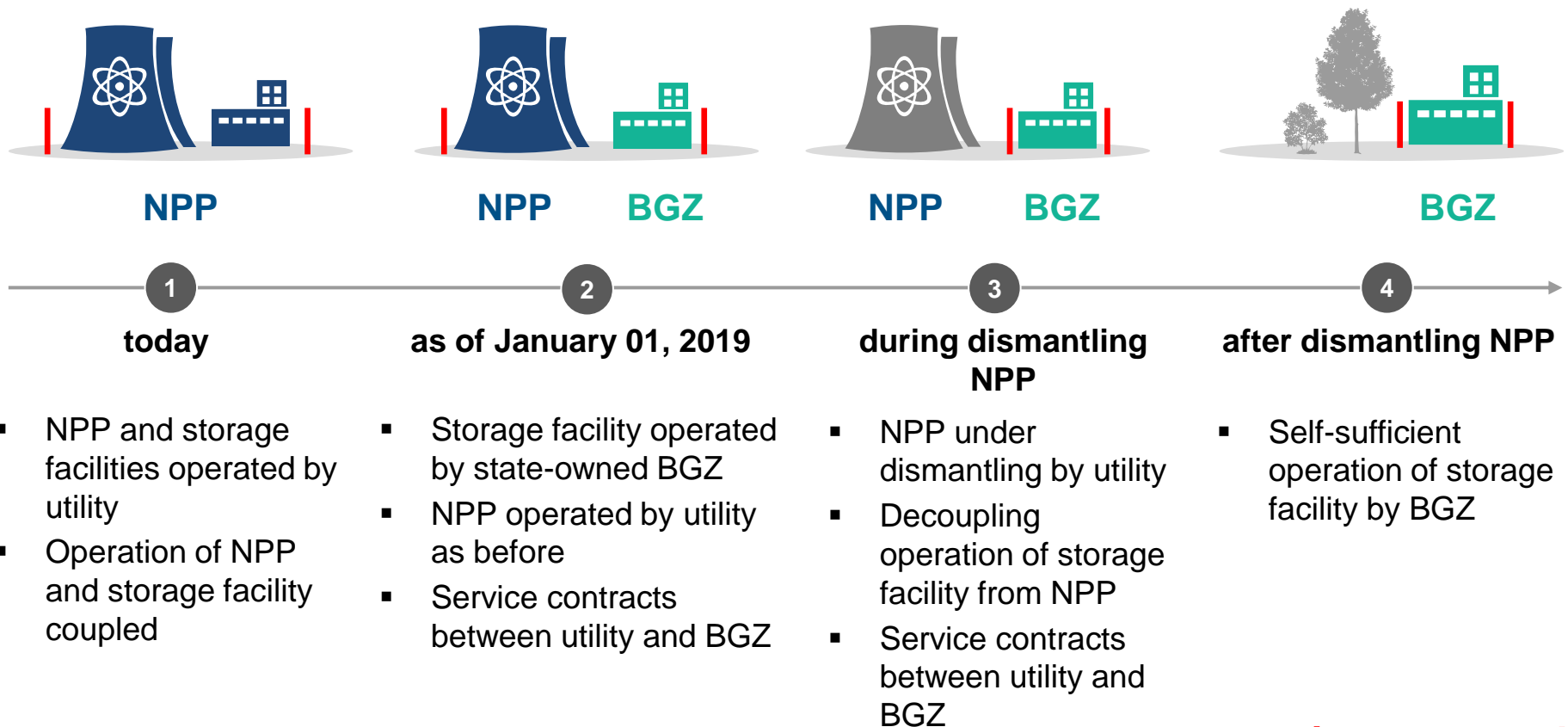
- The existing storage licenses granted for the German utilities will pass to BGZ and remain in force unchanged.
- ➔ **No need for BGZ to apply for new storage licenses for radioactive waste**



NPP and storage facilities for SNF in germany

-  PWR
-  BWR
-  power reactor (shut down before 2005)
-  on site storage
-  off site storage
- 2011 year of shutdown

Step by step: How we achieve a self-sufficient storage operation

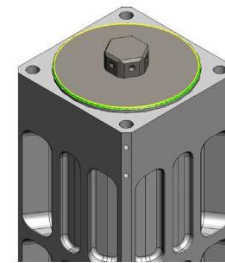


Special issues of prematurely shut down NPP

- In 2011 eight NPP were shut down immediately after the Fukushima incident.
- The existing reports of subcriticality take a burn up credit for some fuel assemblies.
- New reports were made for those fuel assemblies with partial loadings of the casks (7 or 13 of 19 PWR / 48 to 51 of 52 BWR assemblies) prove subcriticality.
- The first storage license with this issue was granted in 2016.
- All on-site storage facilities have the needed capacity for the additional casks.

Management of damaged fuel

- GNS invented an integrated quiver system for the transport and storage of damaged fuel with the shape and the weight of german fuel assemblies.
- The quiver and the fuel can be dried down to 1 g H₂O/quiver.
- The system is gas-tight with a bolted and welded lid.
- The quivers are licensed as a part of the casks CASTOR[®] V/19 and CASTOR[®] V/52.
- The first casks with quivers will be stored in 2018.

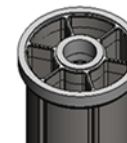


bolted and
welded lid

GNS IQ
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32 loading
positions



6 loading
positions

Pictures provided by GNS



BWR- and
PWR-Quiver

Conclusions

- Spent fuel will be stored in on-site and off-site dry interim storage facilities until final disposal.
- The facilities are operated by state-owned companies.
- There are technical solutions for the dry interim storage and for transport of all spent fuel including the damaged fuel from German NPP.