



STRESS TESTS SAFETY ENHANCEMENTS – ČEZ NPPs

APPROACH & DEFINITION OF ADDITIONAL
TECHNICAL PROVISIONS

VVER 2013
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martin.bica@cez.cz



National Action Plan

=> Safety Enhancement Programs for NPPs

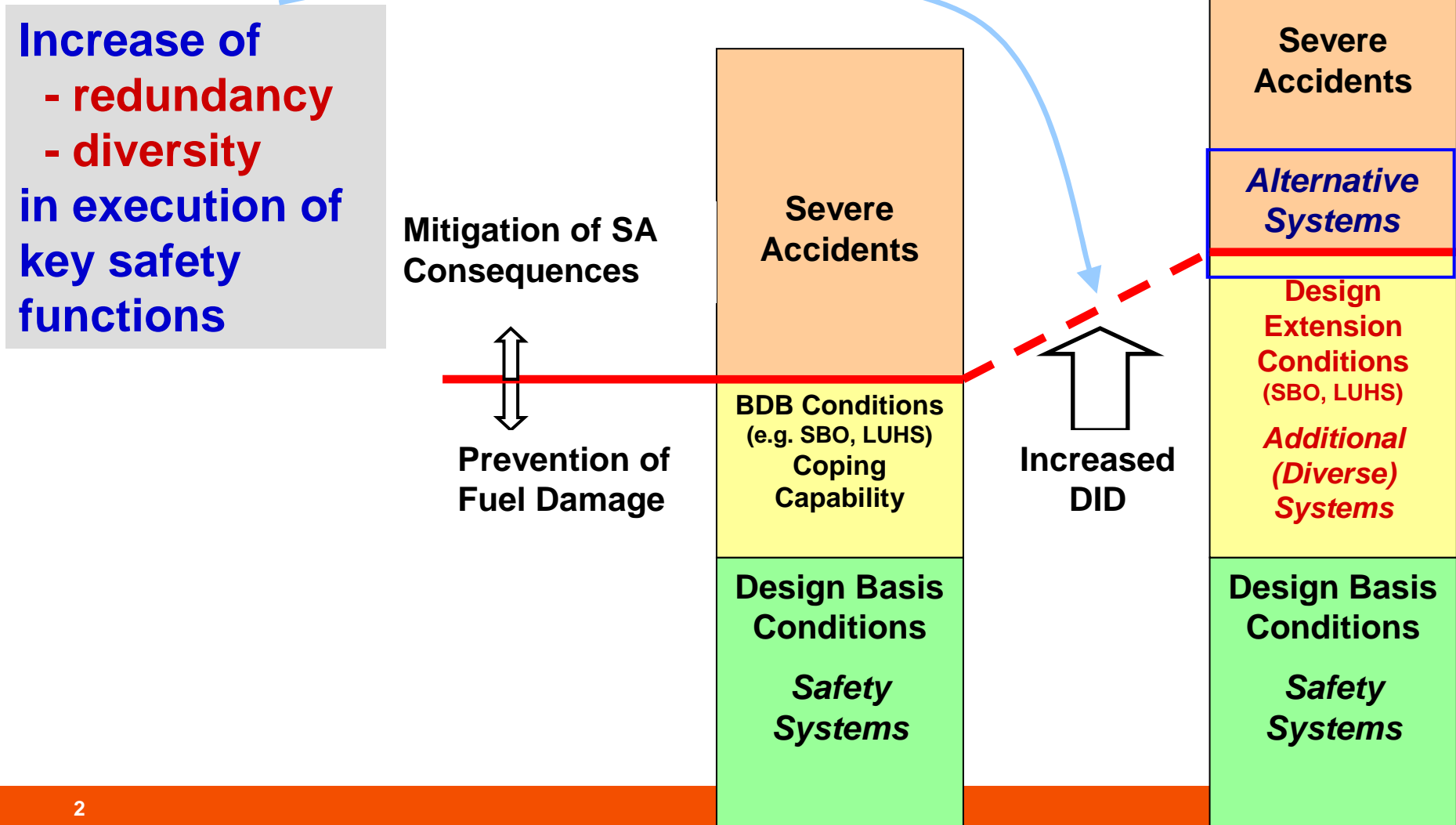
- **Design enhancements – technical provisions**
- **Emergency response** (personnel, training, backup control centers, additional vehicles, ...)
- **Documentation, analysis** (additional procedures (incl. EDMGs), SA analysis, ...)

*The presentation provides basic introduction of the area
Design enhancements – technical provisions*

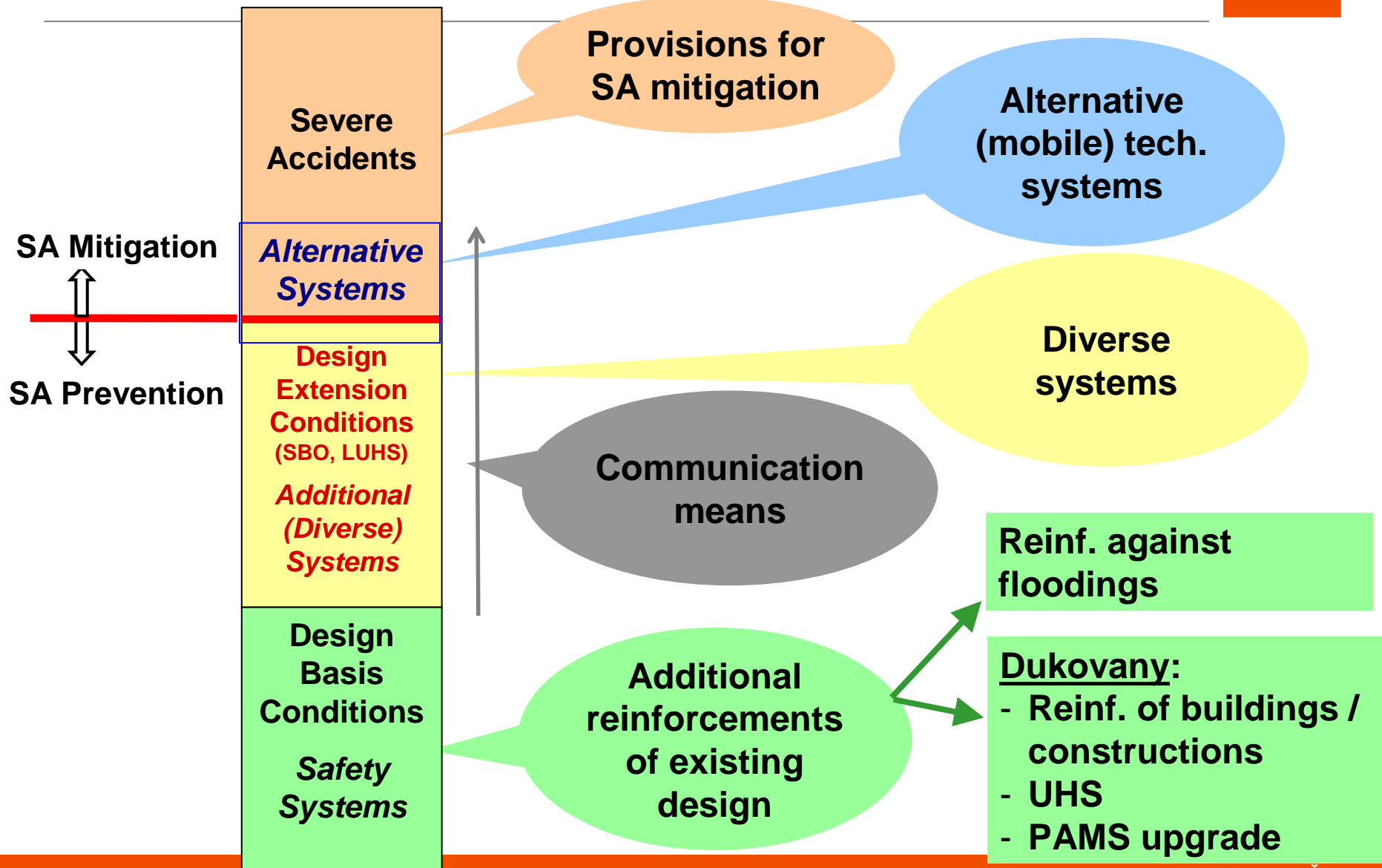
TECHNICAL PROVISIONS – APPROACH



Ref.: NEI - Diverse and Flexible Coping Strategies (FLEX) Implementation Guide



TECHNICAL PROVISIONS – APPROACH (2)

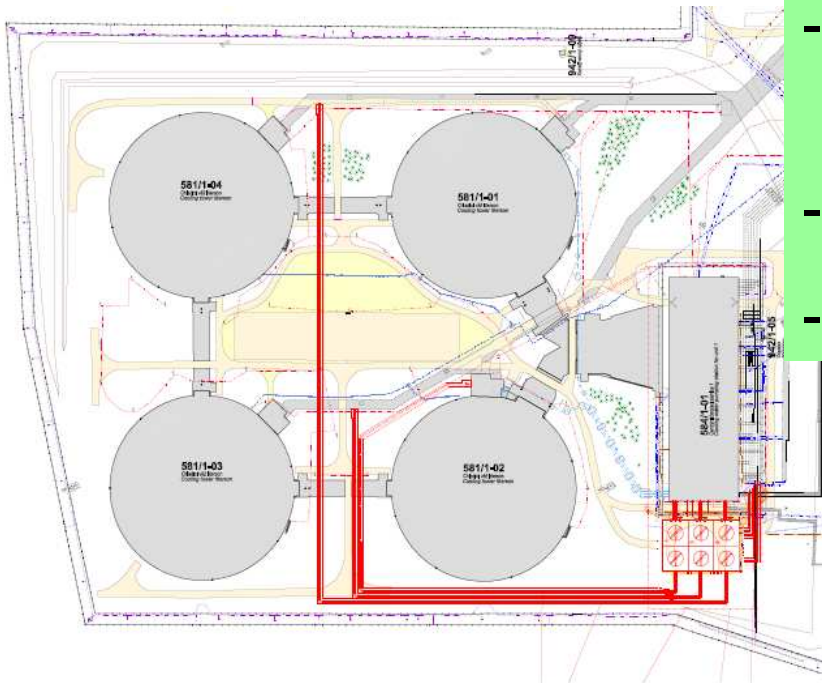


ELIMINATION OF PERSISTING DEFICIENCIES OF EXISTING DESIGN

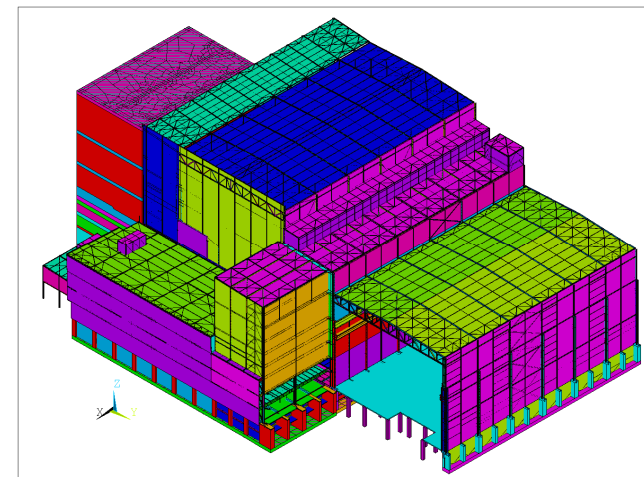


Dukovany:

- Reinf. of buildings / constructions >>> *seismic + climate extremes*
- UHS – new ventilating towers >>> *independence*
- 3rd super-EFW division
- PAMS upgrade >>> *RG 1.97 req's*



Completion till 2016



REINFORCEMENTS AGAINST FLOODINGS

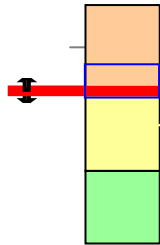


- EDG stations / fuel tanks
- Entrances into ECW ducts



COMPLETED

DIVERSE SYSTEMS



Diverse systems

for **DECs**

Functions covered:

- Secondary heat sink
- RCS / SFP / contm. makeup
- Diverse emergency power source

Basic principles:

- Increase of **redundancy and diversity** in exec. of SFs
- Fixed installation
- EQ – extreme conditions
- Rating – RHR
- Operation w/o site external support (72 hrs.)

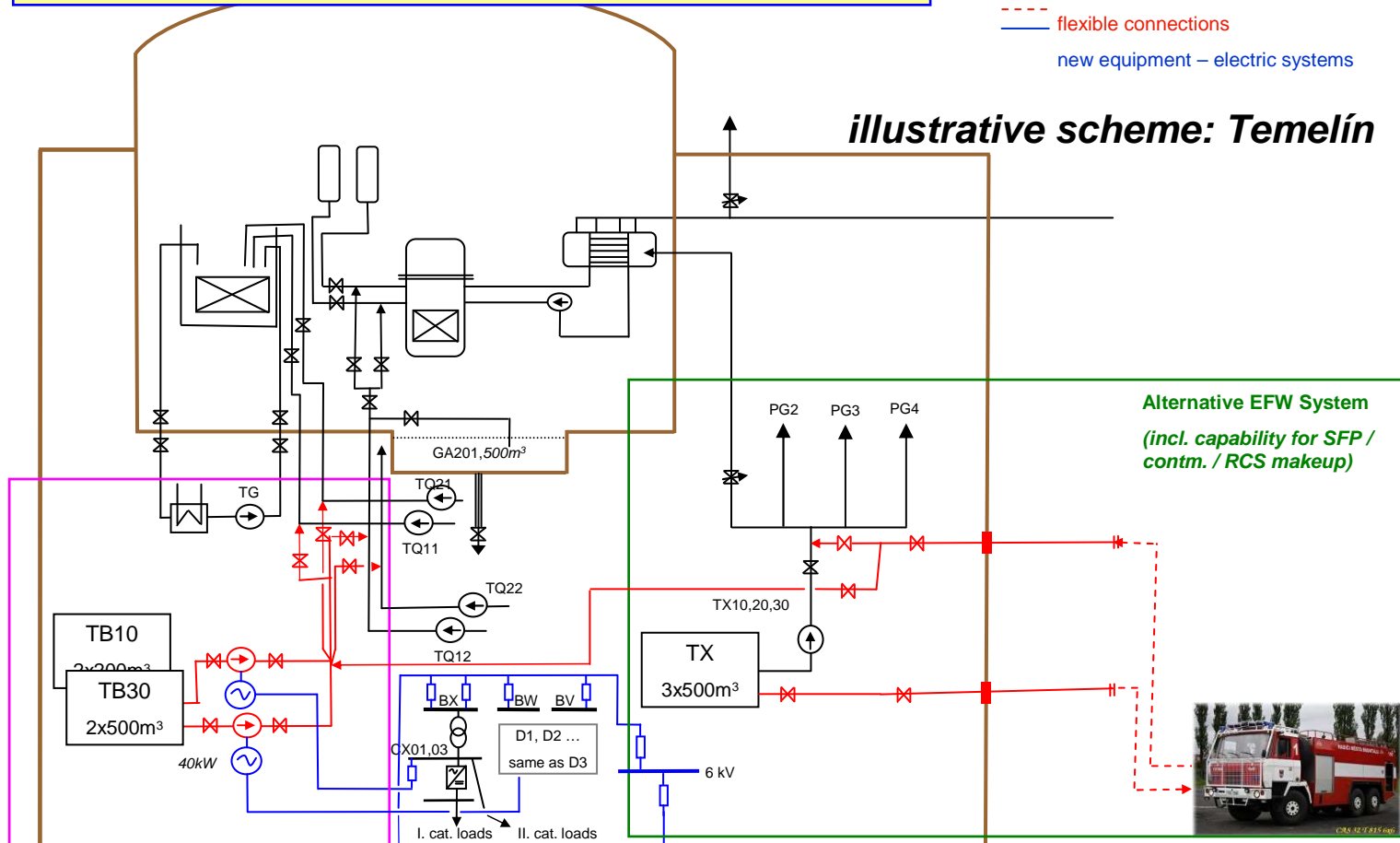
DIVERSE SYSTEMS (2)



RCS / SFP / contm. makeup

- new equipment/pipelines – technology
- - - flexible connections
- new equipment – electric systems

illustrative scheme: Temelín



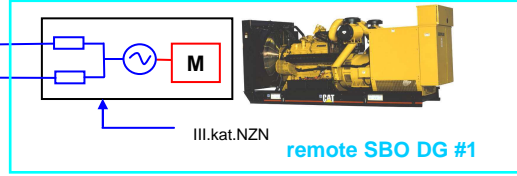
Secondary heat sink

Alternative EFW System
(incl. capability for SFP / contm. / RCS makeup)

Diverse Makeup System (Reactor / SFP / Sump)

remote SBO DG #2

UNIT 2



remote SBO DG #1

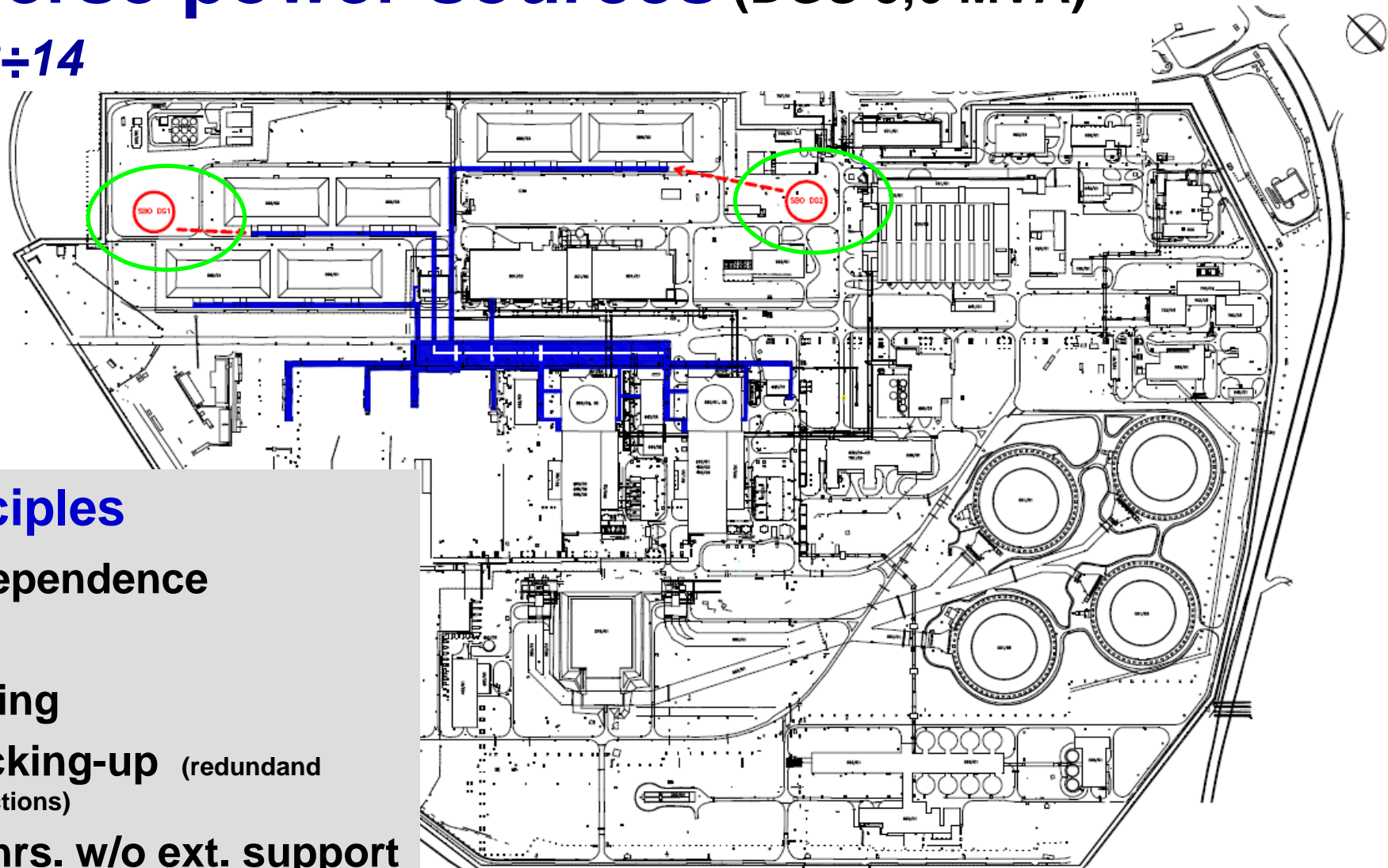
Diverse power sources

DIVERSE SYSTEMS (3)



Diverse power sources (DGS 3,6 MVA)

2013÷14



Principles

- Independence
- EQ
- Rating
- Backing-up (redundant connections)
- 72 hrs. w/o ext. support

DIVERSE SYSTEMS (4)

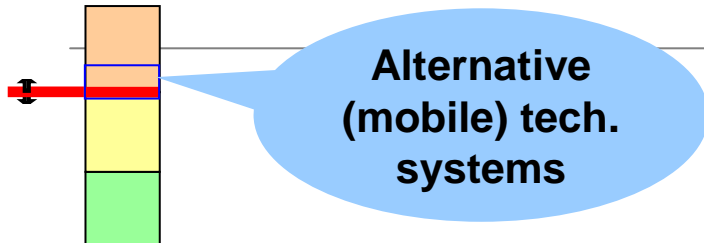


Fixed fire-pump connection points (*connections to EFW system*) for secondary heat sink

COMPLETED (TE, DU)



ALTERNATIVE SYSTEMS (MOBILE)



Functions:

- RCS / SFP / contm. makeup, contm. spray.
- Alternative power supply
- Alternative parameter acquisition – *technological, radiation, dosimetry ... (portable tools)*

Basic principles:

- **Mobile** (portable)
- No specific EQ
- Redundant, distributed, flexible ...

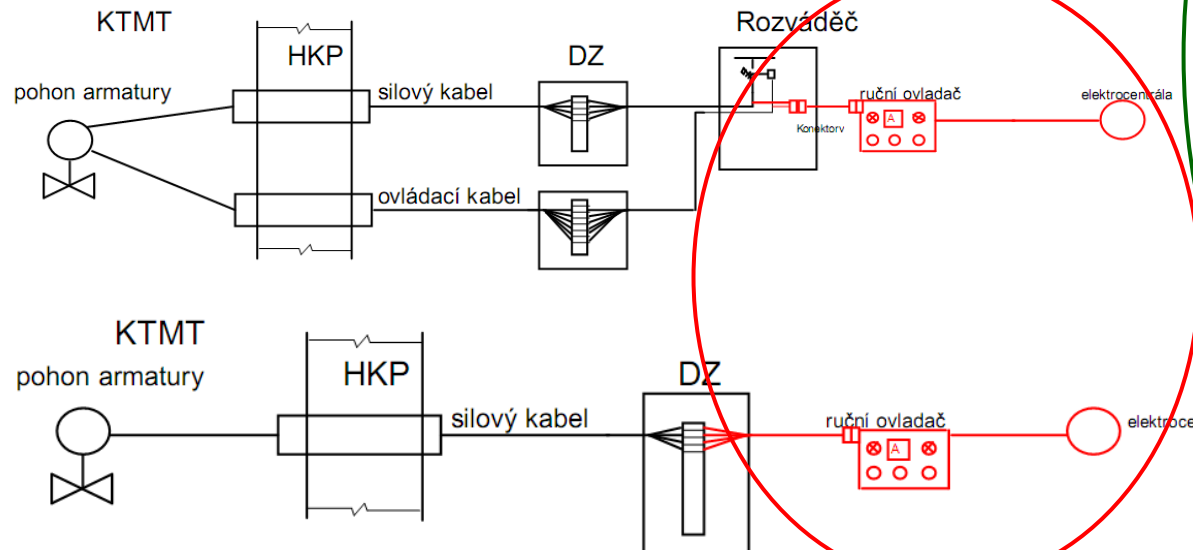
ALTERNATIVE SYSTEMS (MOBILE) (2)



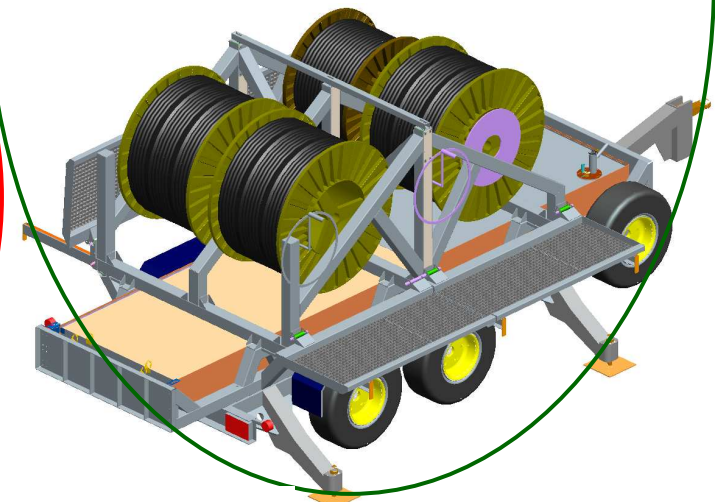
Alternative power sources

- **Mobile DGs (250 kW) + cable sets**
- **Portable sources** (manipulation with inaccessible valves, parameter aq. ...)

Connection capability w/o permanent modification of existing equipment



Example photo: SE-ENEL

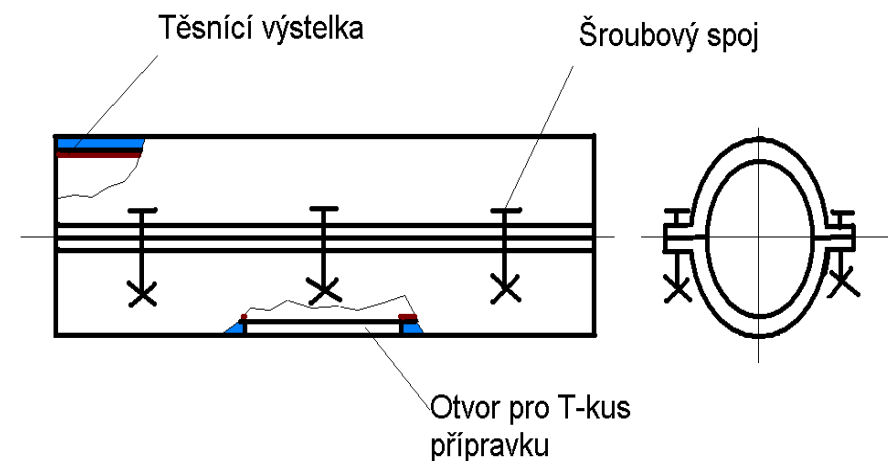
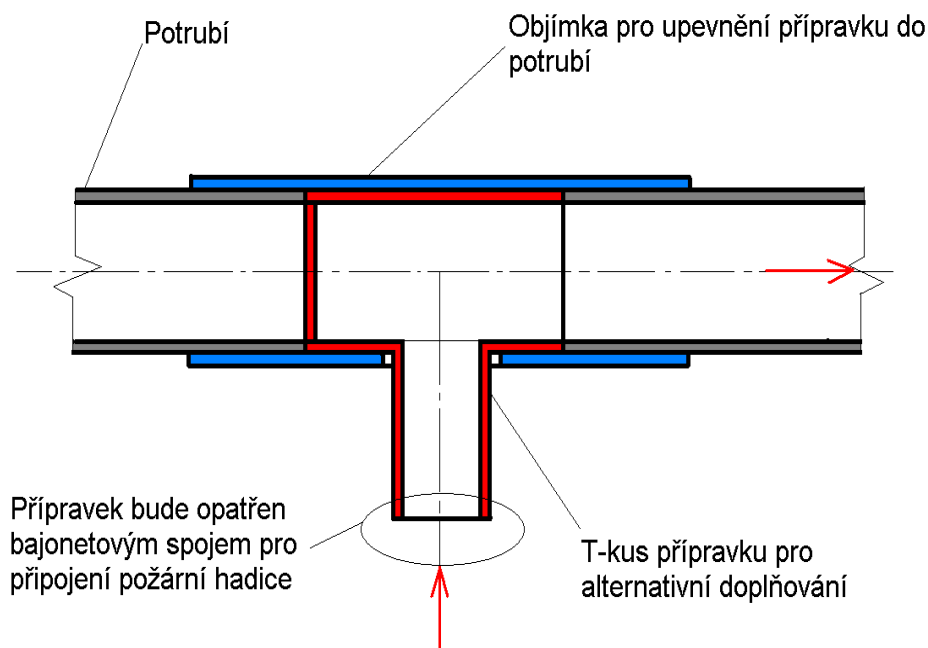


ALTERNATIVE SYSTEMS (MOBILE) (3)



Alternative RCS / SFP / contm. makeup, contm. spray

- *Fire pump + flexible hose connections*
- *Special tools for coupling to various pipelines*



Completion: 2014



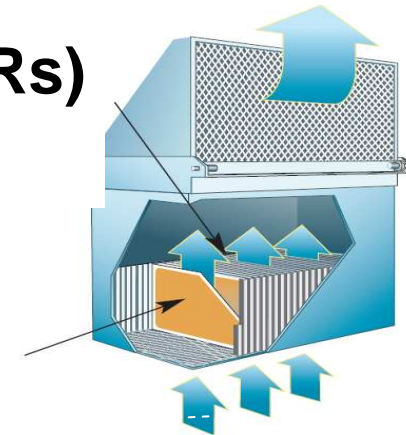
- **Long-term backup power supply for telephone and radio network (optionally from diverse power sources)**
- **Field phones infrastructure**
- **Satellite phones**

2013

SA MITIGATION PROVISIONS

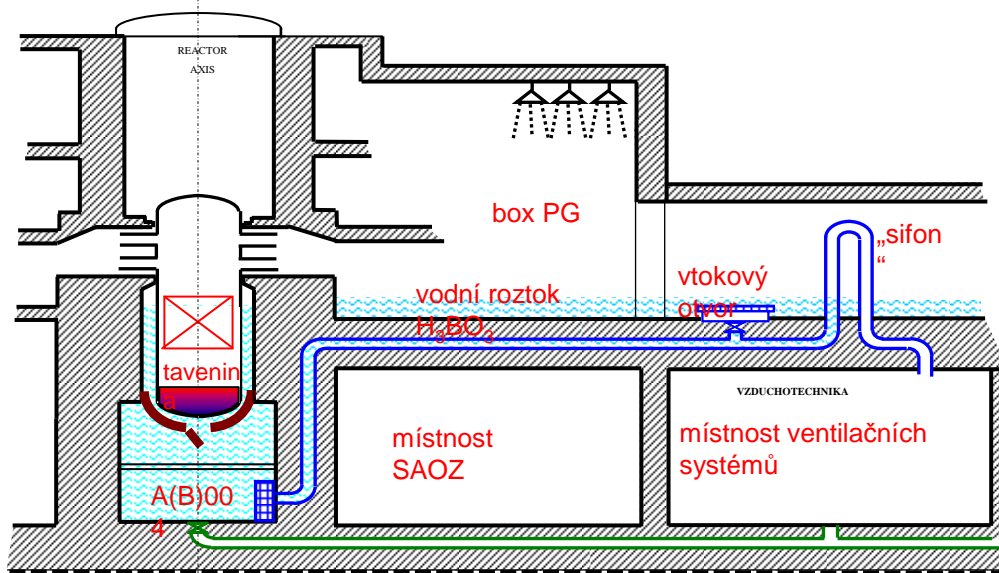


➤ **Hydrogen recombiners (PARs)**
rated for SA scenarios (TE, DU)



➤ **Dukovany – IVR**

Completion till 2015



➤ **Definition of other provisions for SAs**
(Analysis in progress – till 2014)

QUESTIONS, THANKS FOR ATTENTION

