



Ansaldo Nucleare Companies

Krsko “Post Stress Test Projects”: The Safety Upgrade Program

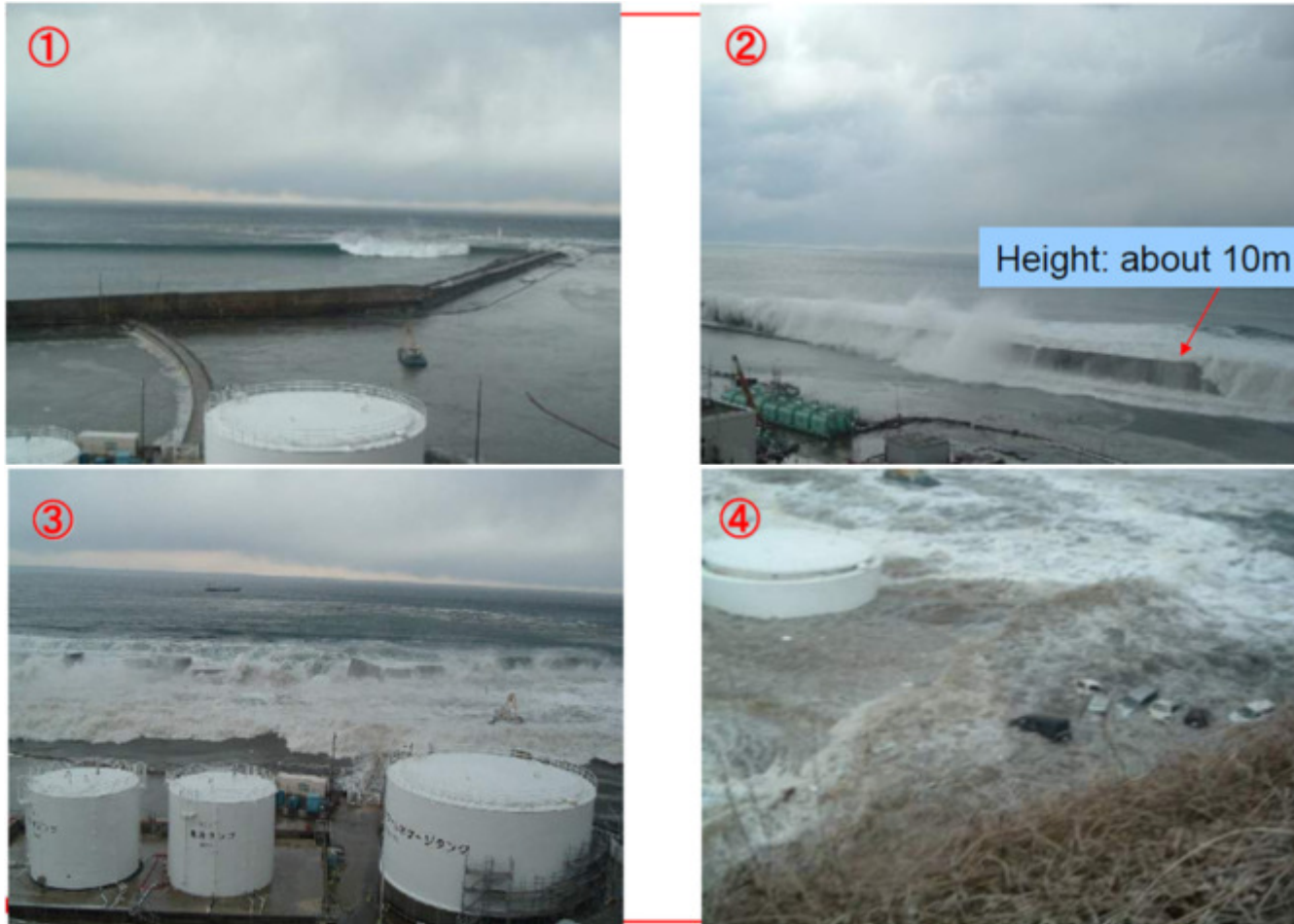
Sala del Chiostro, Facoltà Ingegneria Civile ed Industriale – San Pietro in Vincoli, Roma

Settembre 27, 2019

Fukushima Dai-ichi Nuclear Power Plant



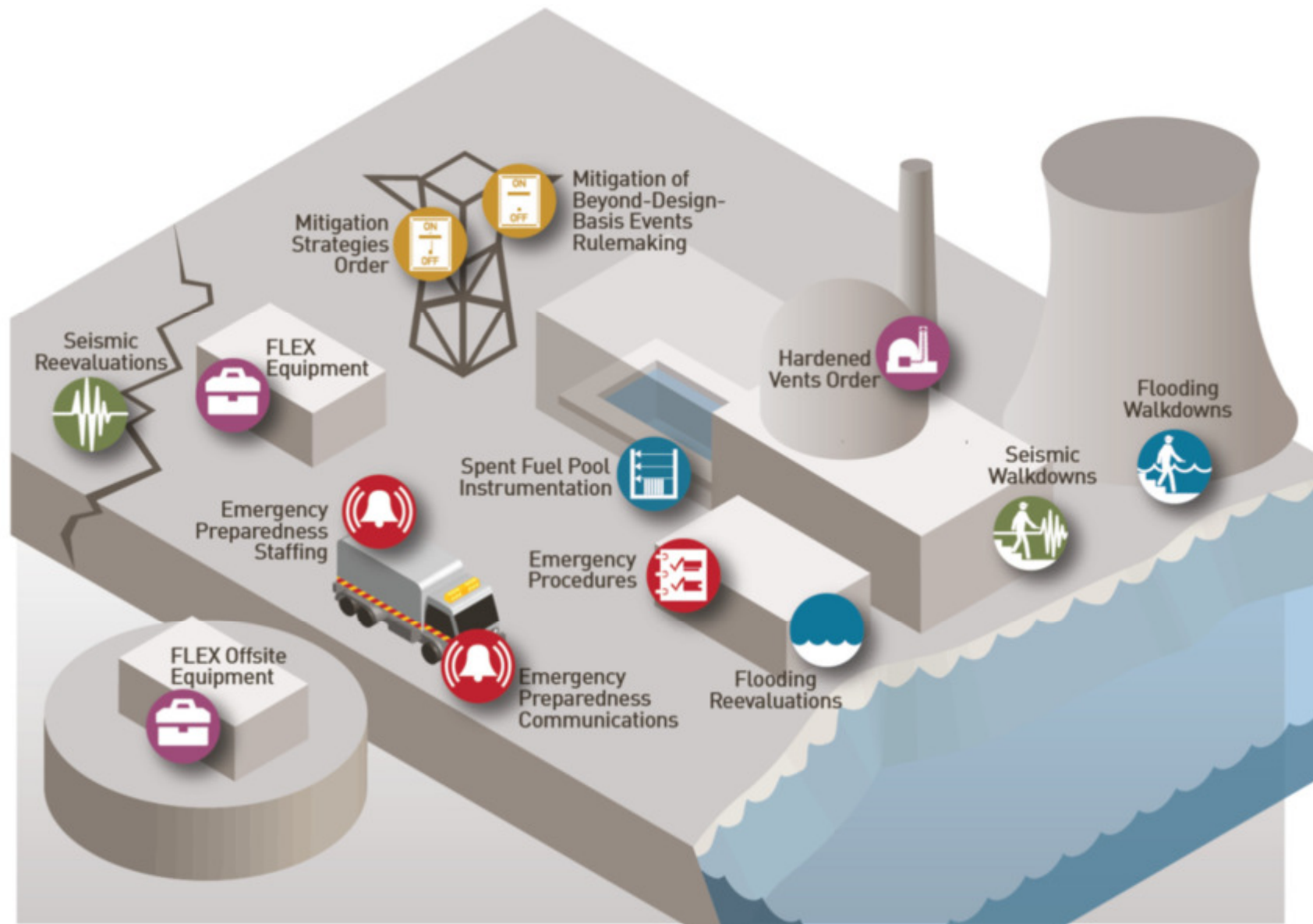
Fukushima Dai-ichi Nuclear Power Plant Lo Tsunami



Fukushima – Condizioni dell'area a seguito dello Tsunami



Fukushima Accident – Lesson Learned



In risposta all'incidente nucleare di Fukushima del 2011, sono state condotte valutazioni del rischio e della sicurezza ("prove di stress") su tutte le centrali nucleari operative.

L'obiettivo delle valutazioni era verificare se gli standard ed i requisiti di sicurezza utilizzati quando tali centrali erano state progettate e costruite, fossero sufficienti a far fronte ad eventi estremi imprevisti.

In particolare, i test hanno misurato la capacità delle strutture degli impianti nucleari di resistere agli effetti causati da eventi d'area catastrofici quali terremoti di magnitudo superiore a quella di progetto, inondazioni, attacchi terroristici o collisioni di aeromobili.

Inoltre è stato posto l'accento sulla capacità di gestire l'incidente mediante sistemi di sicurezza esterni qualora questo si rivelasse necessario.

POST FUKUSHIMA RESPONSE MOBILE EQUIPMENT

Beyond Design Basis Event
Emergency Equipments

Emergency Spent Fuel
Pond Water Cooling Skid

Reactor Re-Pressurization
Emergency System

Post Fukushima
Emergency Systems

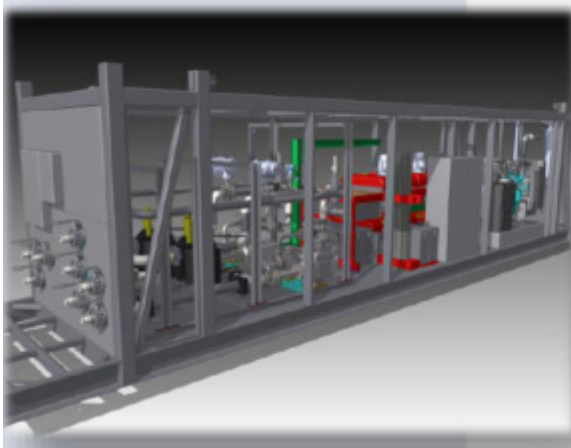
Post Fukushima Mobile Equipments

In the frame of a Contract with EdF Energy (UK):

AGR NITROGEN
REPRESSURIZATION

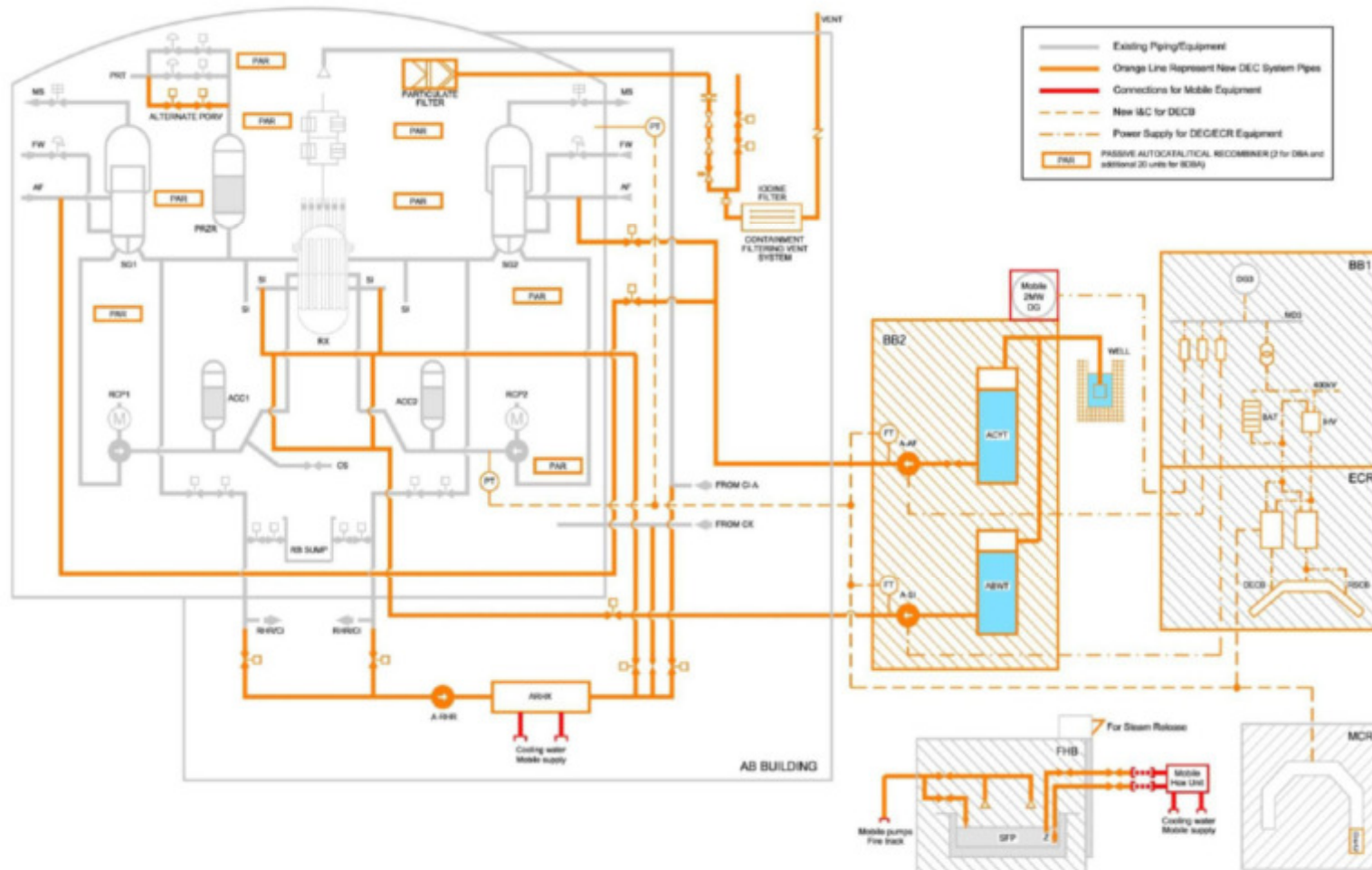
DUNGENESS
EMERGENCY POND
WATER COOLING
SKID

JER
EMERGENCY POND
WATER COOLING
SKID

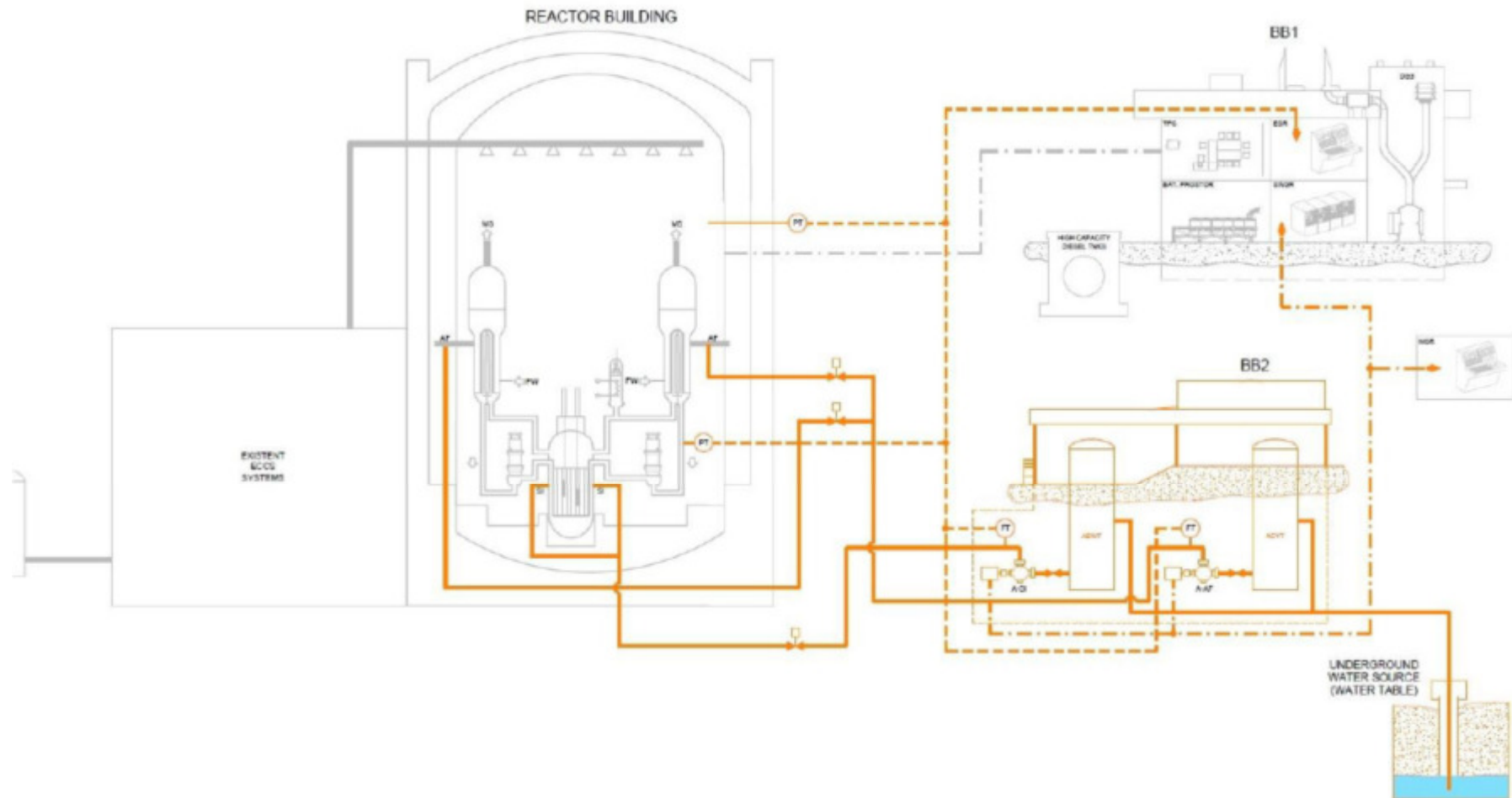


Safety Upgrade Program overview – without SFDS

NEK PLANT SAFETY UPGRADE PROJECT SCOPE - NEW DESIGN EXTENSION CONDITION (DEC)



SUP – Phase 3 – schematic presentation



SUP – Phase 3 – BB2 building

- BB2 dimensions - (48/38x32 m)
 - Contains:
 - Additional sources of water for:
 - injection to SG - (min capacity of 824m³ of demineralized water for DD vode for AAF and a and
 - Injection to RCS – addition tank of min 1367 m³ of borated water for ASI;
 - Both tanks will be refilled by the water from underground water well located near BB2 building or by mobile means (FLEX approach)
 - AAF pump with capacity same as the existing MD AF pump;
 - ASI pump :
 - With head and flow capacity similar to existing SI pump
- All that equipment belong to DEC A equipment and will be **operated and controlled from both locations MCR in ECR**



KRSKO SAFETY UPGRADE PROJECT

Delivery Models

Ansaldo Nucleare è il Main Contractor che coordina un gruppo di «suppliers»

Tractebel France ha cooperato con Ansaldo per la progettazione delle opere civili

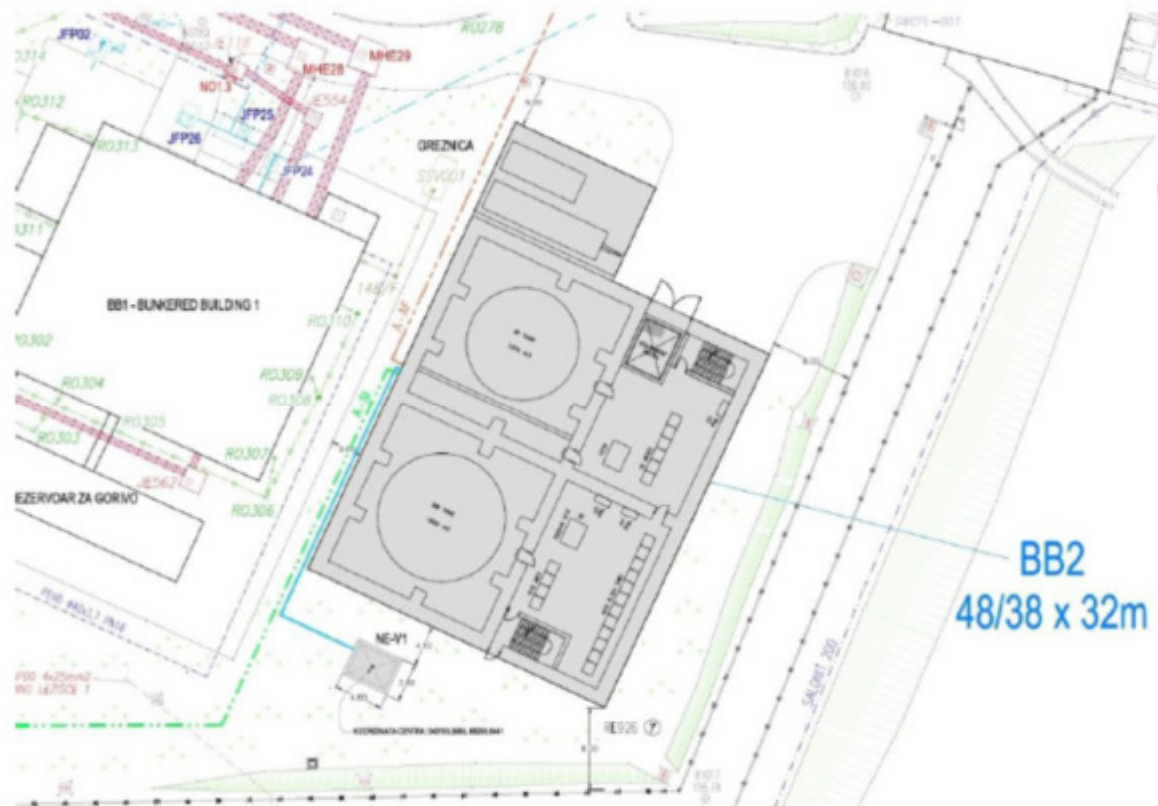
Il più grande contributo è fornito dalle società Slovene:

- KOLEKTOR d.o.o. – civil works
- Zakladani – Pit excavation and diaphragm wall
- NUMIP d.o.o. – mechanical installation
- ELMONT d.o.o.- electrical installation
- IBE-SIPRO-EKONERG consortium – detailed design and ZGO design

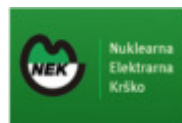
La cooperazione e le relazioni stabilite con tali società sono state essenziali per riuscire ad essere competitivi in fase di gara e ci consente ottenere ottime performances nell'implementazione del progetto.

Construction of BB2 building

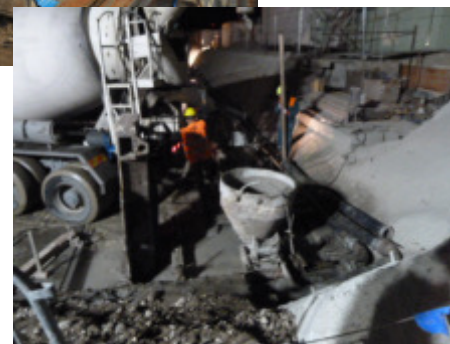
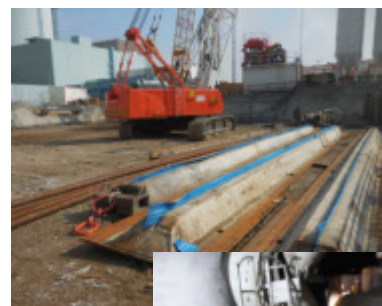
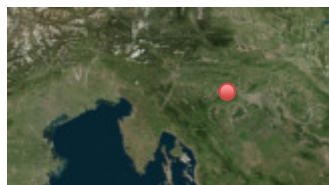
- Optimization: smaller building with less equipment
- Location – near existing BB1 building, near new underground water well;
- Shorter pipe connection between BB2 in NSSS;
- At BB2 existing 2MW DG with connection to MD3



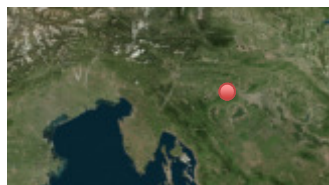
KRSKO SAFETY UPGRADE PROJECT - Phase 3



PIT



PIT



FIRST LEVEL



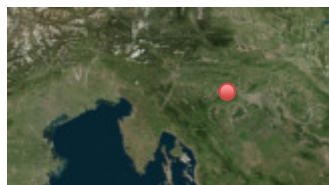
SECOND LEVEL



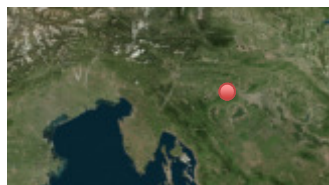
THIRD LEVEL



BB2



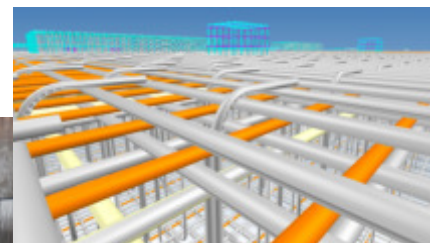
BB2



Water proofing membrane



Reinforced bar



Foundation slab poured – Ph. 1 & 2

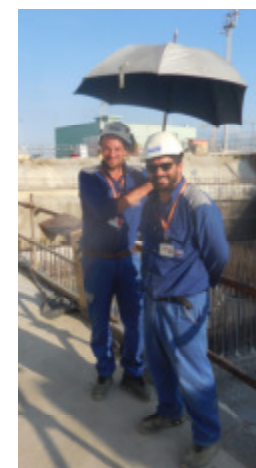
Foundation slab pouring – Ph. 3



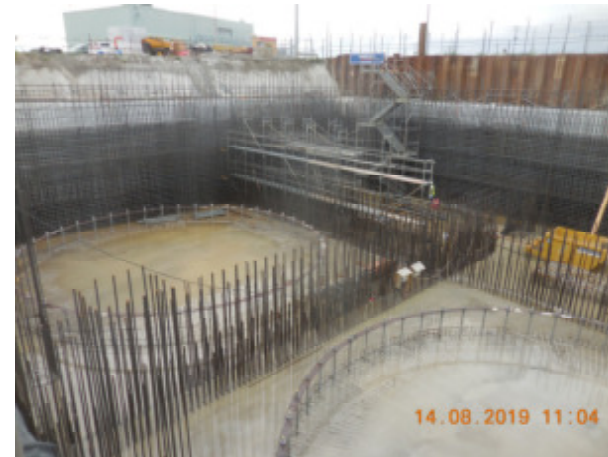
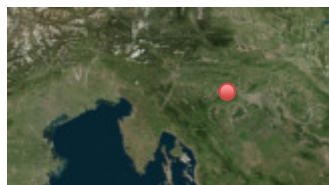
Grounding connection



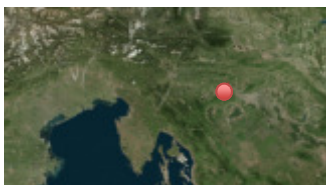
Workers (???)



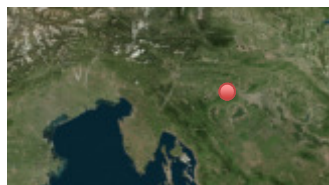
BB2



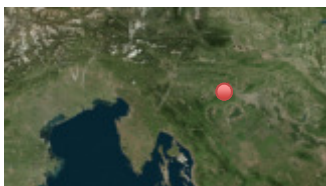
BB2



BB2



BB2



Renewed nuclear energy for a safe growth

Reliable and innovative solutions for plant design, operation and dismantling

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Gianfranco Saiu
Head of Customers and Sales
Nuclear New Builds and Services

☎ 010 655 8591

☎ Gianfranco.saiu@ann.ansaldoenergia.com