

REPP-CO₂ – Czech-Norwegian research project to prepare a CO₂ storage pilot in the Czech Republic

- Coordinator: Czech Geological Survey (CGS)
- Partners: IRIS, VŠB – Technical University of Ostrava, ÚJV Řež, a.s., Research Centre Řež, Miligal, s.r.o., Institute of Physics of the Earth, Masaryk University (UFZ)
- Funding: Norway Grants
- Budget: 77 mil. CZK \approx 2.85 mil. €
- Grant provider: Ministry of Finance
- Project partner: Ministry of Environment
- Project duration: 23/1/2015 – 30/11/2016

Project objectives

- (i) **Assess the selected geological structure** (a depleted oilfield) as a possible geological storage site for a research CO₂ storage pilot project, utilising the methodology according to the Czech national law No 85/2012 Coll. on the storage of carbon dioxide in natural geological structures;
- (ii) Strengthen the **Czech-Norwegian cooperation** in the area of CO₂ geological storage and related research and development;

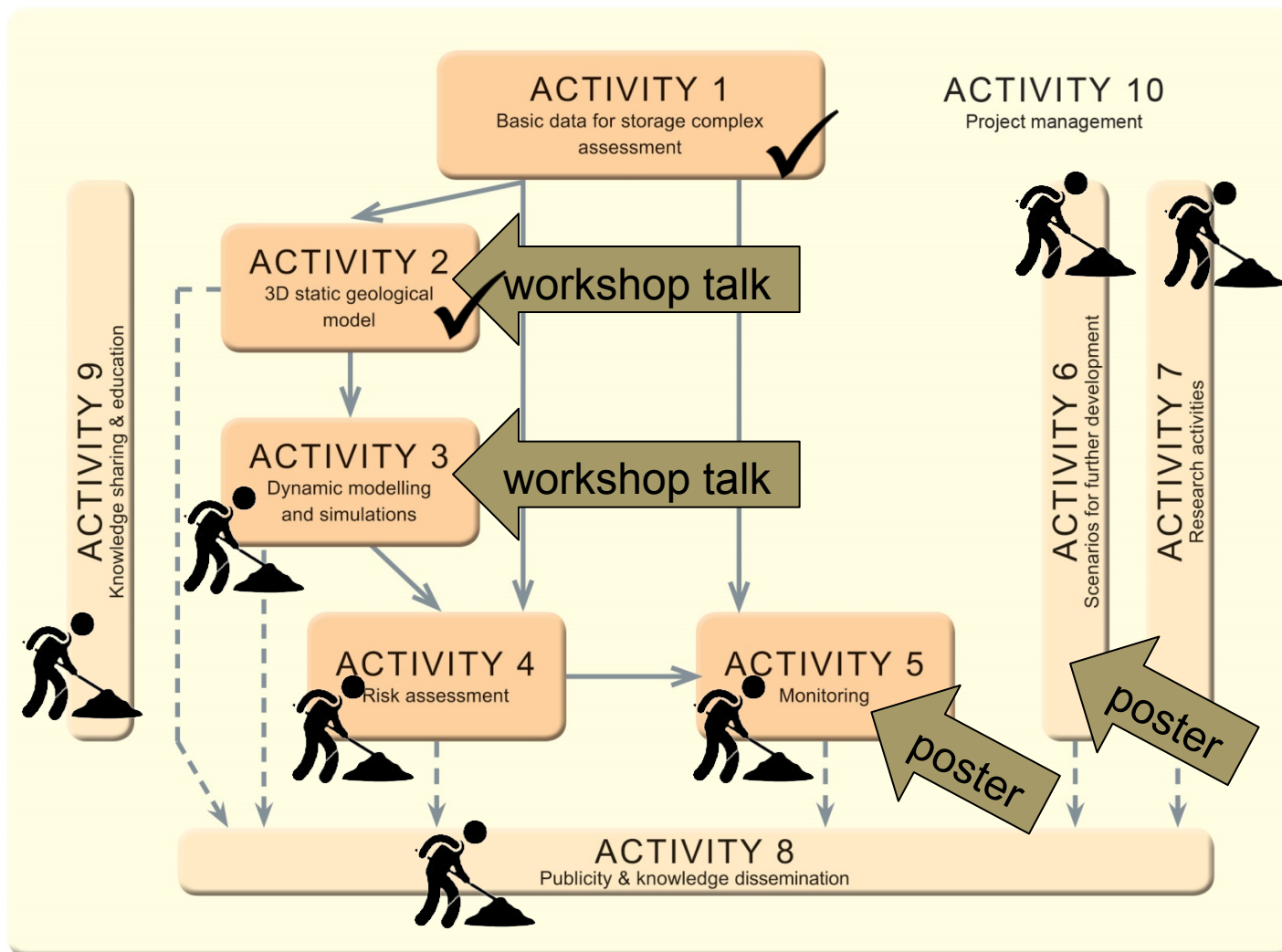
Project objectives

- (iii) **Test the methodology**, procedures and criteria for description and assessment of a planned CO₂ storage complex as specified by the **law No 85/2012 Coll.** on the storage of carbon dioxide in natural geological structures under real conditions of a concrete storage site preparation;
- (iv) Perform **geological modelling** of the storage site and subsequent **numerical simulation of CO₂ injection**;

Project objectives

- (v) Perform a **risk analysis of the storage site**, including assessment of conflicts of interest, proposal of risk mitigation measures and compilation of **storage site monitoring plan**;
- (vi) Newly **assess the potential of the Carpathian** rock formations in the area of the Czech Republic from the CO₂ storage point of view.

Project progress

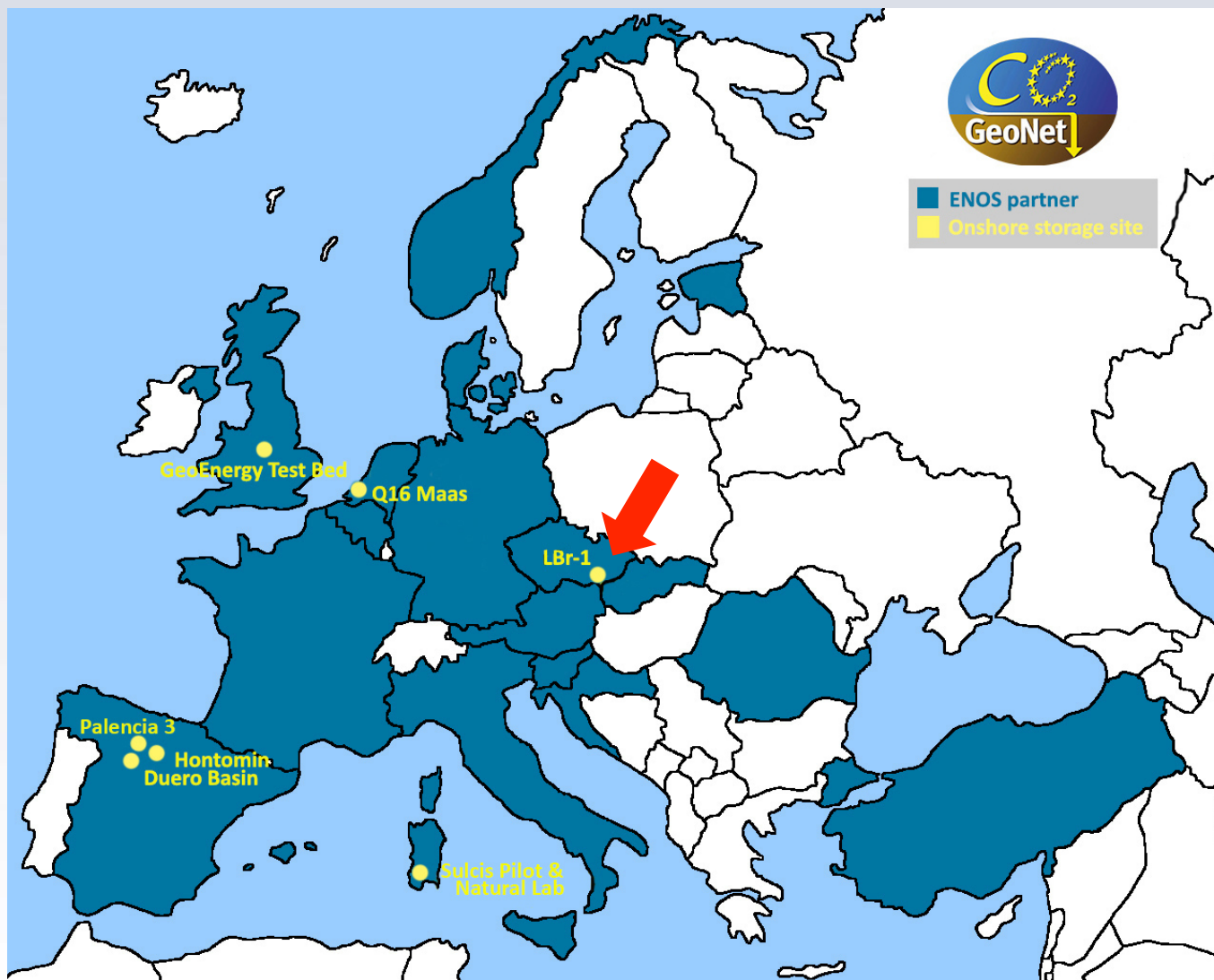


Project complexity

Team work, cooperation and keeping deadlines are essential:

- 10 Activities
- 54 Tasks
- 106 deliverables
- >110 researchers and technicians from
7 institutions

LBr-1 location



Storage capacity estimation

- $M_{CO_2} = \rho_{CO_2} * R_f (1 - F_{IG}) * OGIP * ((P_s * Z_r * T_r) / (P_r * Z_s * T_s)) \cong \text{produced gas volume} * Bg \text{ factor} * \rho_{CO_2}$
for gas
- $M_{CO_2} = \rho_{CO_2} * (R_f \times OOIP / B_f - V_{iw} + V_{pw})$
 $\cong \text{produced oil volume} * \rho_{CO_2}$
for oil

Recovery factor, fraction of injected gas, pressure, temperature, gas compressibility factor, formation volume factor, injected and produced water.

(Bachu et al. 2008, CSLF)

Fundamental assumption:

- The volume previously occupied by the produced hydrocarbons becomes, by and large, available for CO₂ storage.
- ... but not for reservoir in hydrodynamic contact with an underlying aquifer

Storage capacity estimation

Estimation for LBr-1

- Production history: 72.4 th. m³ oil, 75.4 mill. m³ gas
- CO₂ density: 630 kg m⁻³
- Bg factor (compress.) = 0.0078169
- **Estimated capacity = 417 kt CO₂**

- „Digging“ for information from old archive data is time consuming and requires specific „local“ knowledge but results can be excellent
- Supplementary site investigation is necessary, especially to get fresh cores for geomechanical and geochemical experiments and allow in-situ borehole tests (stress field, permeability)
- Local conditions need to be taken into account for choice of monitoring methods (high seismic noise level, periodical flooding, etc.)
- A promising CO₂ source revealed (95.5 % purity) – 240 th. t/yr released into the atmosphere
- Bureaucracy can exceed all expectations

- Future steps planned within the ENOS project:
 - detailed risk analysis of faults and legacy boreholes
 - simulations of possible leakage (threatening potable groundwater)
 - scenarios combining storage with EOR
 - trans-boundary issues (CZ-SK)
 - EOR potential of the Vienna Basin (CZ-SK-AT)
- Progress towards CO₂ injection depends on industrial & governmental co-funding; recovery of oil prices needed
- Possible additional funding opportunities:
 - next round of Norway Grants
 - European funds

www.geology.cz/repp-co2