

Metrology for the harmonisation of measurements of environmental pollutants in Europe

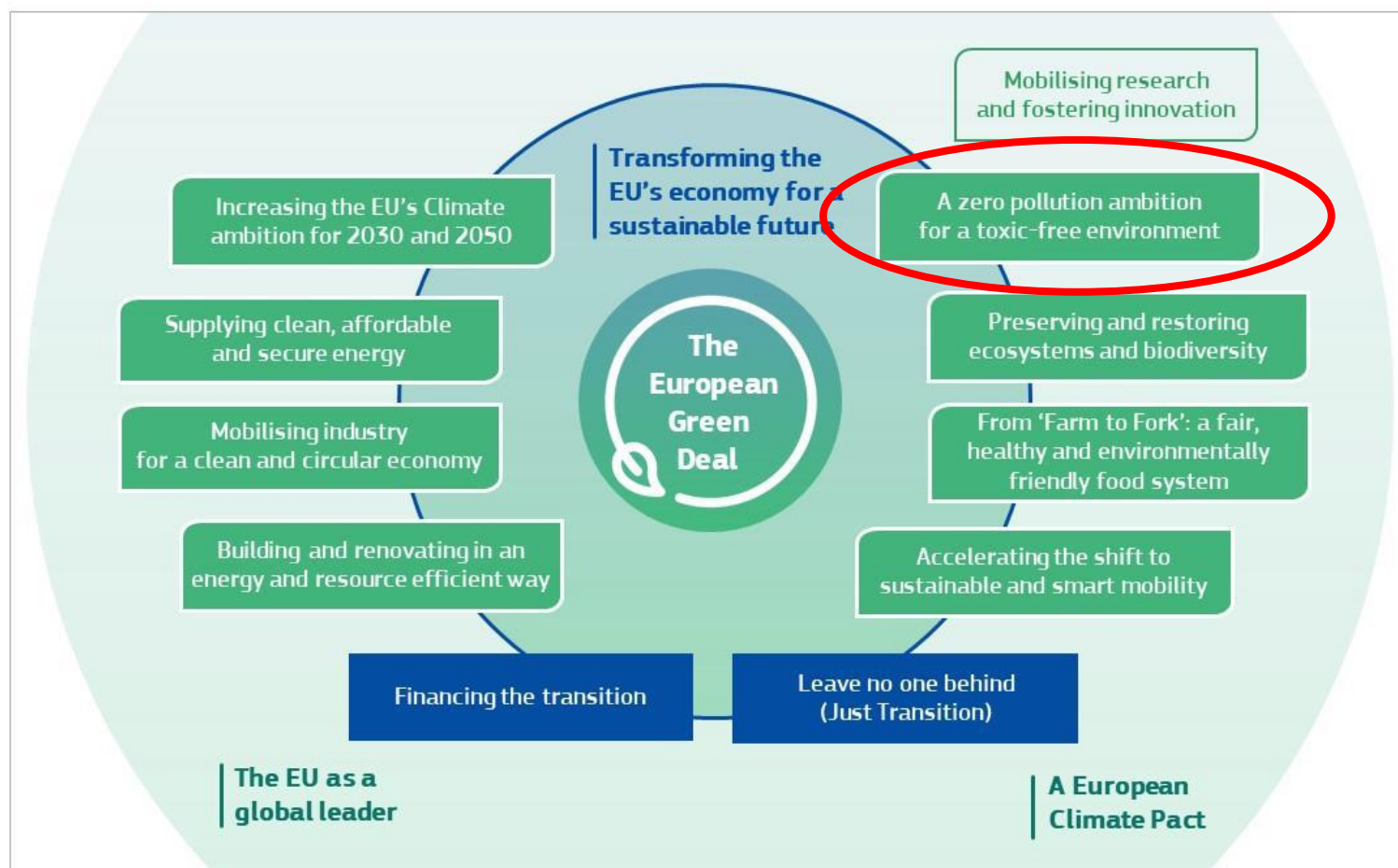
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Introduction of MetroPOEM

➤ Key facts:

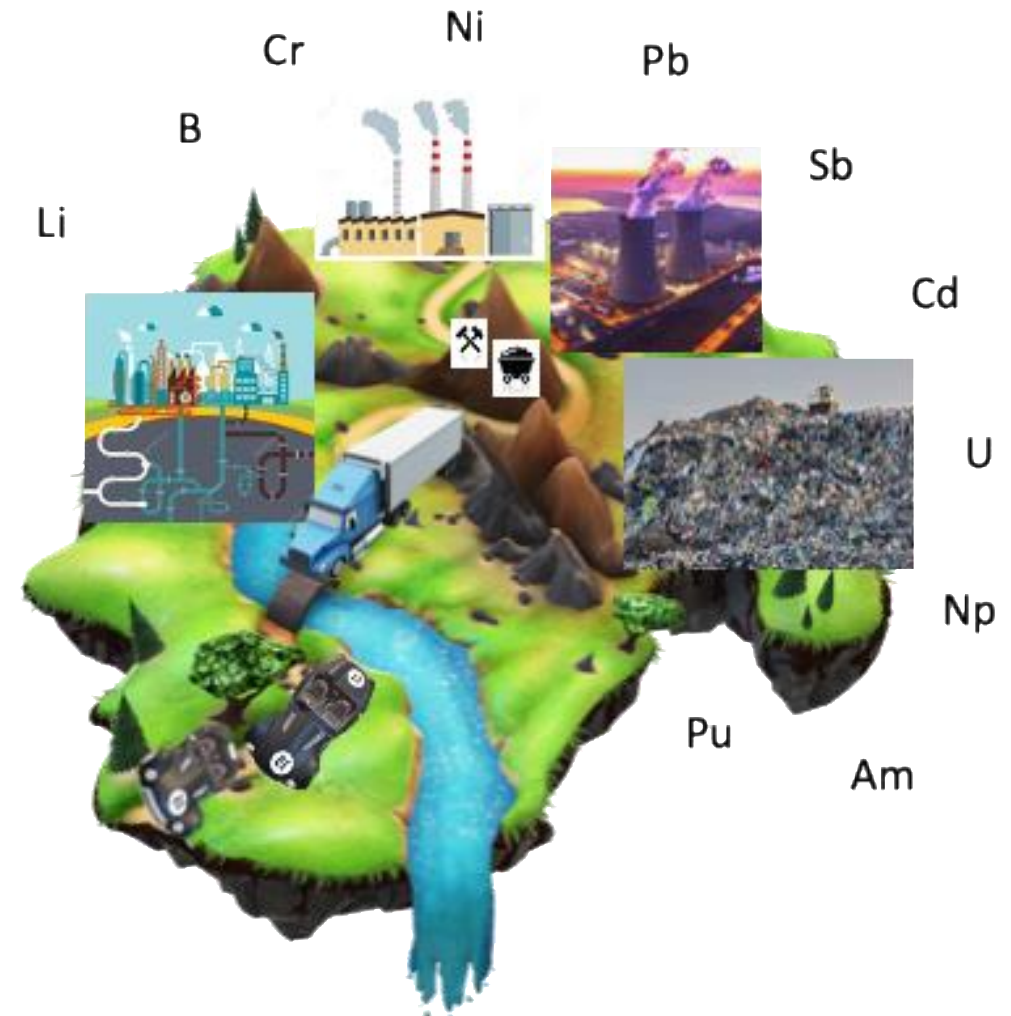
- ✓ Start date: 01 October 2022
- ✓ Duration: 36 months
- ✓ **23 partners from 14 countries will contribute with in total 320 months of work!**
Austria, Czech Republic, Denmark, Finland, France, Germany, Norway, Romania, Serbia, Slovenia, Sweden, Switzerland, Türkiye and United Kingdom
- ✓ Project Website: <https://www.npl.co.uk/euramet/metropoem>
- ✓ This project was selected for funding from the Green Deal Call 2021 of the European Partnership on Metrology research funding program: <https://www.metpart.eu/>

The European Green Deal, Document: "COM/2019/640 final"



Introduction of MetroPOEM

- **Key Aspects:**
- **The zero-pollution ambition promoted by the European Green Deal**, requires highly sensitive and state-of-the-art detection techniques for the measurement of ultra-low amounts of pollutants.
- **Mass spectrometry** is a key method,
 - ✓ with high potential for reducing measurement uncertainties and detection limits,
 - ✓ but there is no existing traceability chain for **radioactive elements**,
 - ✓ and there is a lack of SI-traceable isotope reference materials for **stable isotope ratios**.



Mass spectrometry systems included in the project

- **ICP-QMS** Inductively Coupled Plasma Quadrupole Mass Spectrometer
- **ICP-MS/MS** Inductively Coupled Plasma Tandem Mass Spectrometer
- **ICP-SFMS** Inductively Coupled Plasma Sector Field Mass Spectrometer
- **MC-ICP-MS** Multi-Collector Inductively Coupled Plasma Mass Spectrometer
- **SIMS** Secondary-Ion Mass Spectrometer
- **TIMS** Thermal Ionisation Mass Spectrometer
- **AMS** Accelerator Mass Spectrometer
- **ICP-TOF-MS** Inductively Coupled Plasma Time of Flight Mass Spectrometer
- **SNMS** Secondary Neutral Mass Spectrometer
- **HR-ICP-SF-MS** High Resolution Inductively Coupled Plasma Sector Field Mass Spectrometer
- **ICP-QQQ-MS** Triple quadrupole Inductively Coupled Plasma Mass Spectrometer

Work packages

WP6: Management and coordination

Radioactive Pollutants

WP1: Establish and compare the selectivity and detection limits of different mass spectrometers

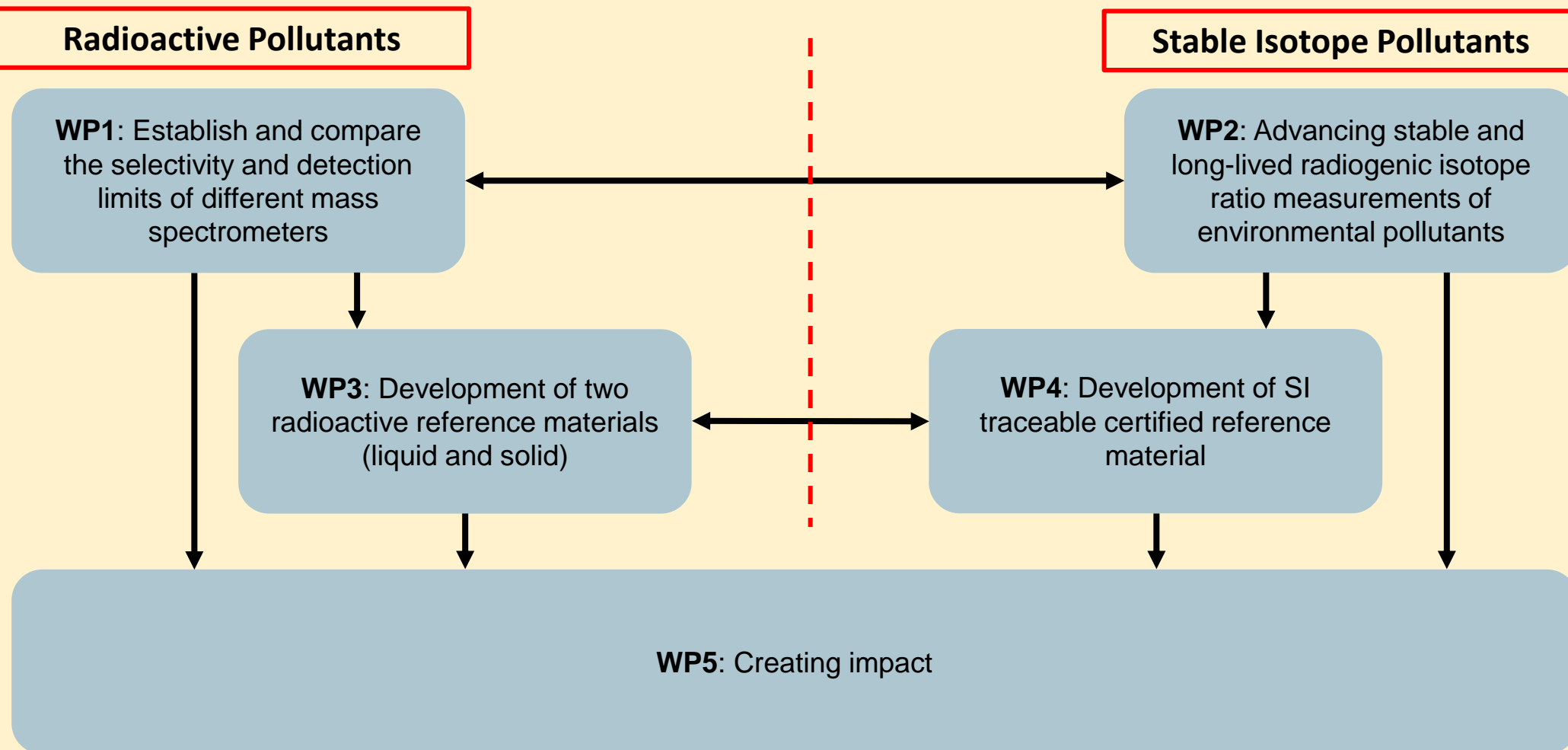
WP3: Development of two radioactive reference materials (liquid and solid)

Stable Isotope Pollutants

WP2: Advancing stable and long-lived radiogenic isotope ratio measurements of environmental pollutants

WP4: Development of SI traceable certified reference material

WP5: Creating impact

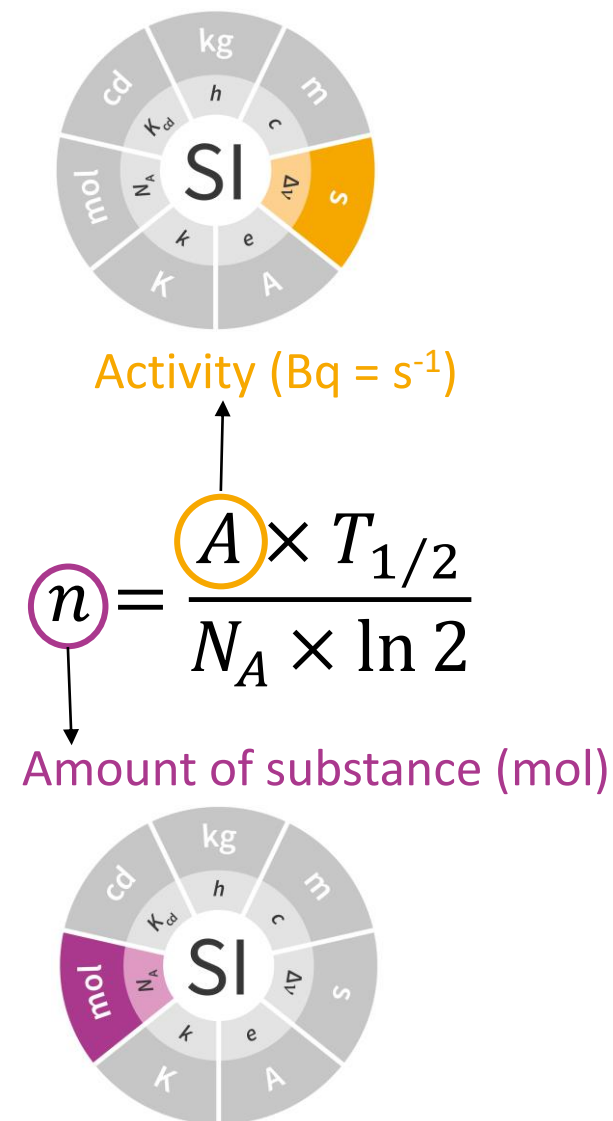


Work Progress

- Single and mixed radionuclide standard solutions have been prepared at very low activity levels
- Participating laboratories performed evaluations of different calibration approaches for isotope ratio measurements of Li, B, Cr, Cd, Ni, Sb, Pb, U
- 250 liters of seawater were collected from the North Sea
- 470 bottles with 250 ml of solution spiked with Li, B, Cr, Cd, Ni, Sb, Pb, U were produced
- A new procedure to synthesise a spikable solid reference material was developed

Impact of MetroPOEM

- **Establish link** between radiometric techniques and mass spectrometry, bridging the gap between the activity (Bq) and the amount of substance (mol) of an isotope
- Traceable aqueous radionuclide standards (U, Np, Pu, Am, Sr, Ra) suitable for mass spectrometry systems
- Close the **traceability gap** for isotope ratio measurement resulting from isotopic fractionation (mass bias)
- Guide on the use of mass spectrometry for **low level radionuclide detection**
- Report of different instrument's **advantages and limitations**
- Three SI-traceable **reference materials**
- Establish SI-traceable **calibration chain** for single collector ICP-MS
- **Harmonized methods** for measurement of polluting elements using mass spectrometric techniques





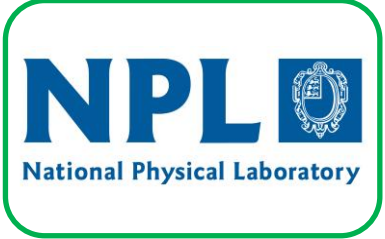
WP6



WP3



WP2



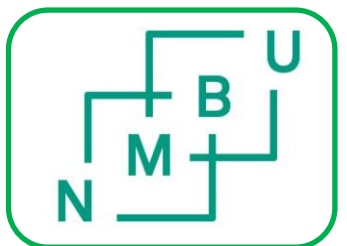
WP1



WP4



Consortium



WP5



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