

A NEW STEP IN THE FUTURE DEMONSTRATION OF ADVANCED FUEL TREATMENT

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Nuclear energy: 28% of the total electricity generated, cost effective, CO₂-free emitting, an essential option in Europe for the future.

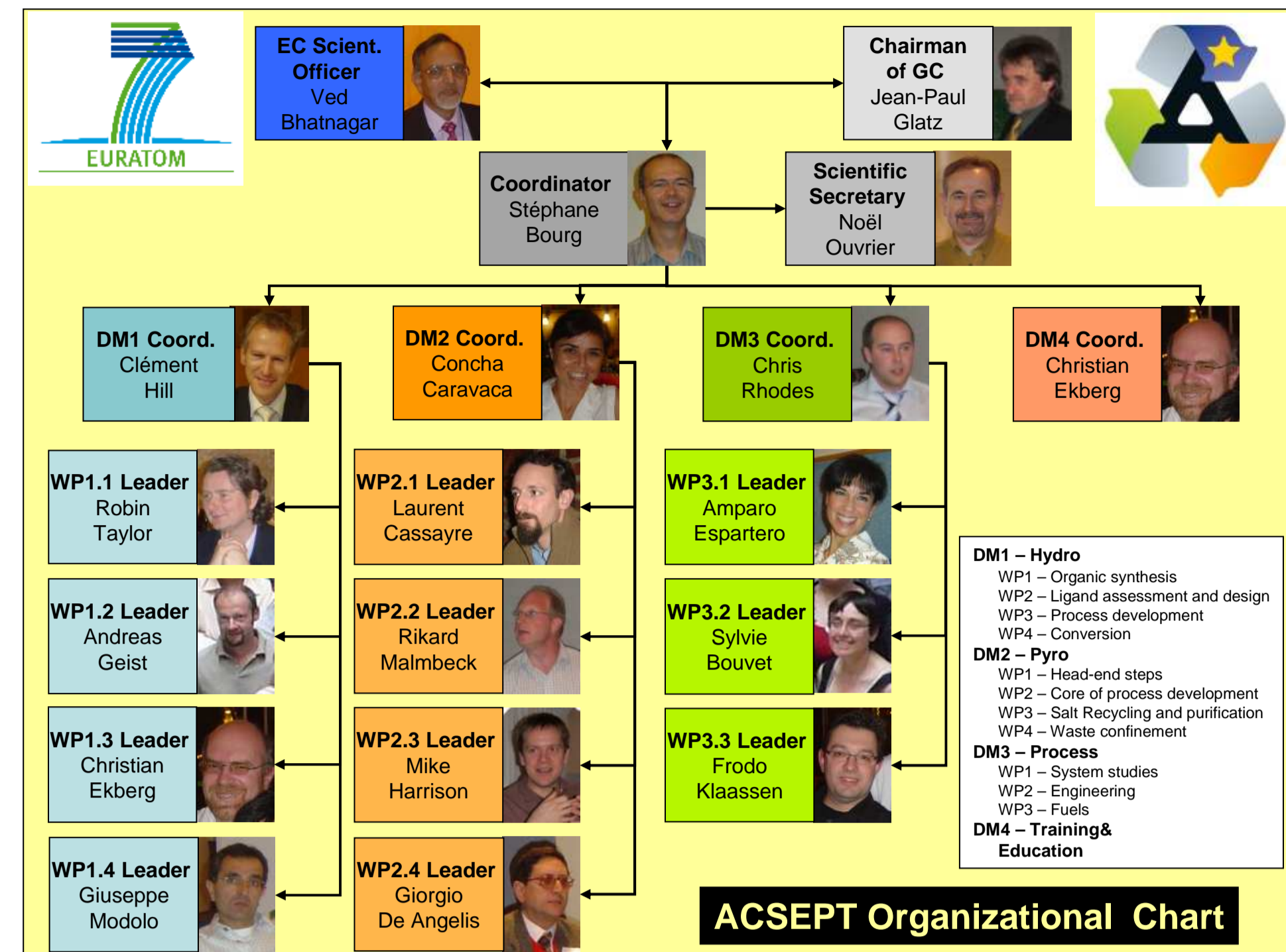
Highly active nuclear wastes issuing the reprocessing: vitrified, poured into stainless steel canisters, to be disposed of into deep underground disposal geological sites.

Final disposal in an underground repository: contain long-lived radionuclides with high radiotoxicity and this for a very long period of time.

Actinide recycling by separation and transmutation
reduce the inventory of radioactive waste, and contribute to **making nuclear energy sustainable** by recycling.

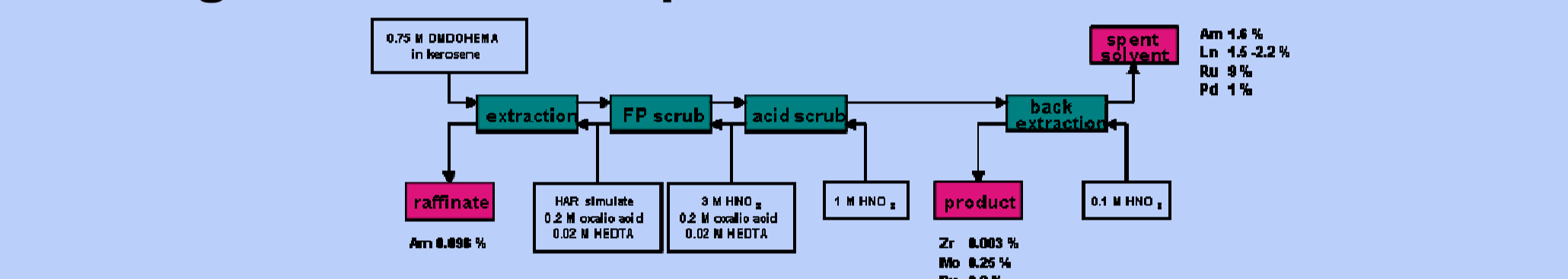
FP6-EUROPART and now FP7-ACSEPT aim to develop and **validate separation processes** that could be implemented in any fuel cycle scenarios, in line with the time-scale proposed in the SRA of the SNE-TP.

By showing a **technically feasible recycling of actinides strategy**, ACSEPT will produce positive arguments in the sense that European decision makers, and more globally public opinion, could be convinced that **technical solutions** for a **better management of the nuclear wastes** are now technologically feasible.

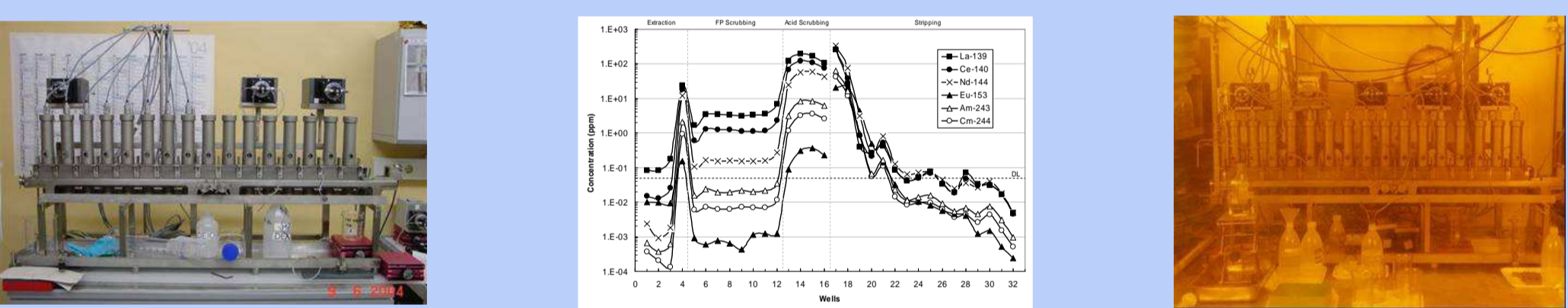


Hydrometallurgy – Main Achievements of EUROPART

- More than 100 new ligands synthesized
- Adoption of a charter for screening tests
- Optimization of systems for An(III)+Ln(III) co-extraction
- Optimization of systems for An(III)/Ln(III) separation
- Design of associated process flowsheets

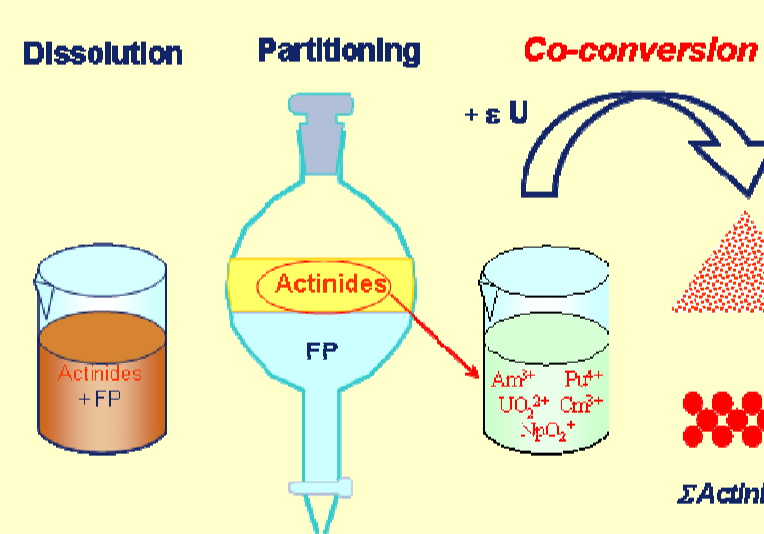


➢ A TODGA/TBP hot test was successfully performed



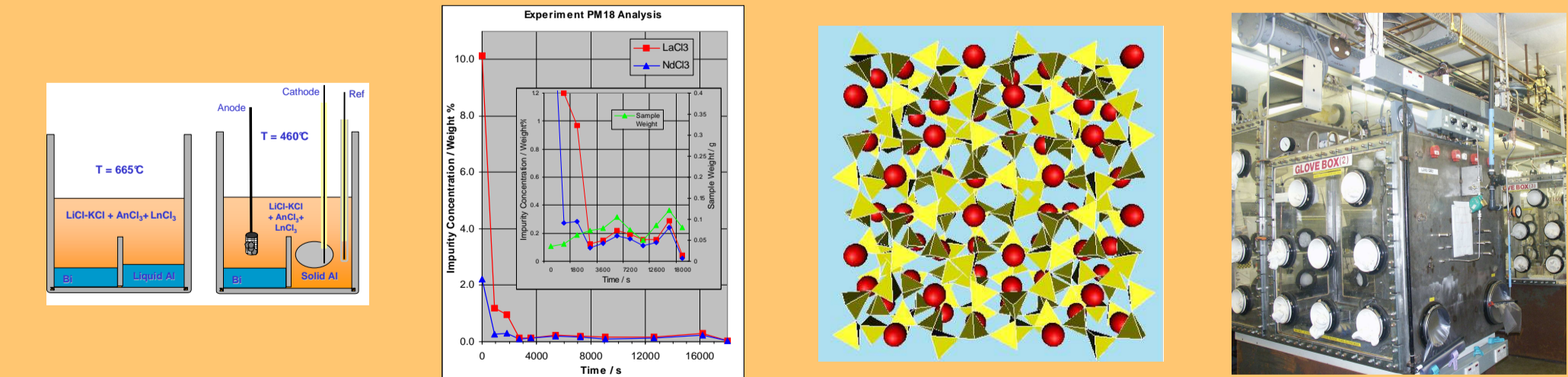
Conversion – Main Achievements of EUROPART

- Co-precipitation studies
- Internal and external Gelation studies
- Infiltration studies
- Colloidal sol-gel studies



Pyrometallurgy – Main Achievements of EUROPART

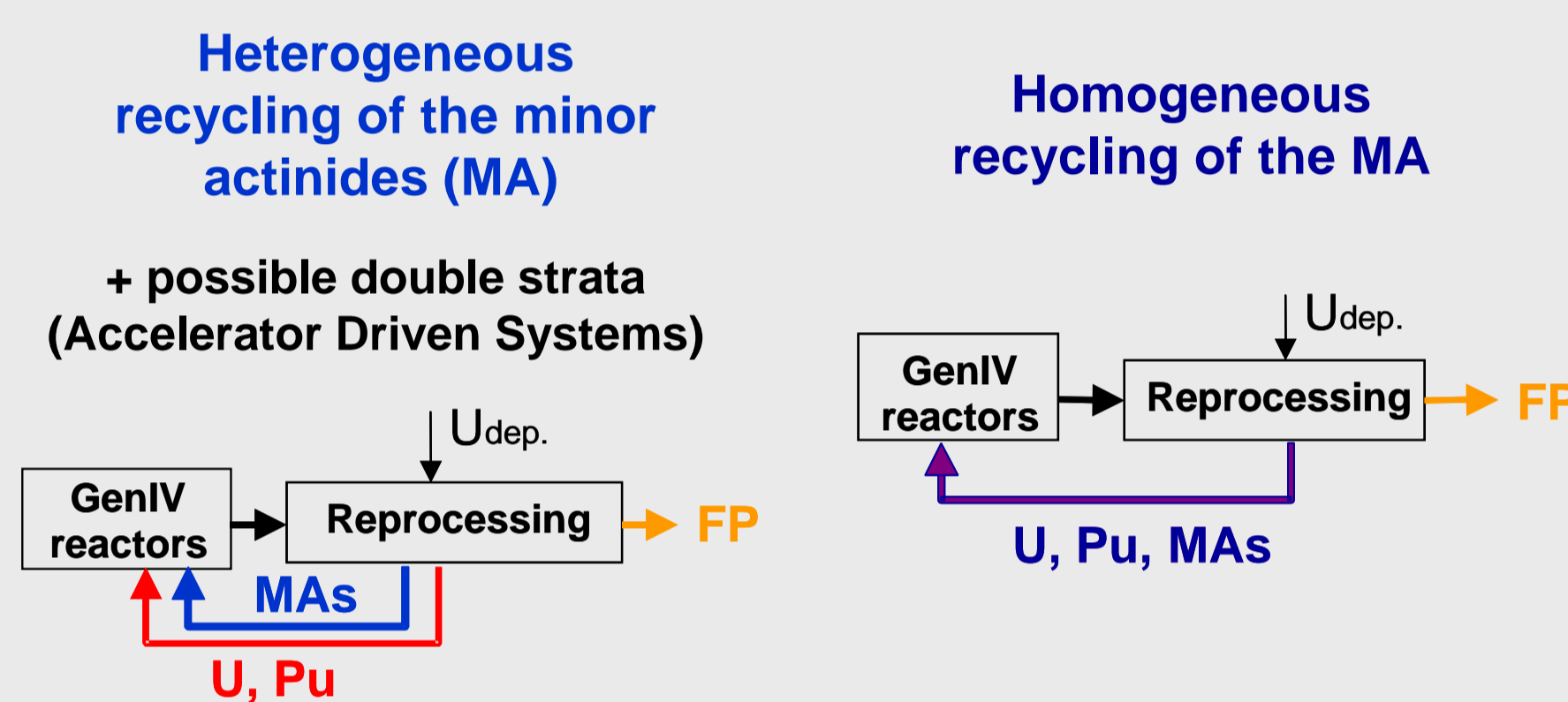
- Selection of two promising core of process
- a comprehensive behavior of An, Ln in molten chloride
- some technical bricks for salt purification and recycling
- identification of potential matrices for salt confinement
- New facilities/devices, new methodologies (process approach – system studies), new skills



For more than 15 years, Charles MADIC played a leading role in the building of a European community in partitioning. This community has grown with the years and with the successive integration of different projects, of different teams. Thanks to his great contribution, there is now a large network, joined today within the ACSEPT Project. He passed last March 2008. The whole ACSEPT Project is dedicated to his memory.

General Objectives of ACSEPT

- Prepare future demonstrations of fuel treatment and refabrication at the pilot scale



Objectives in DM1 “Hydrometallurgy”

- Support laboratory scale demonstrations of advanced dissolution, separation and refabrication processes
- Studies not only focussing on solvent extraction
 - Head-end steps (dissolution)
 - Fuel refabrication (sol-gel...)
- Validation of the technical feasibility at the laboratory scale
 - Taking into account the diversity of future nuclear fuels and fuel cycles
 - Feasibility of each technological brick should be validated

Objectives in DM2 “Pyrometallurgy”

- Develop pyrochemical separation processes beyond the current state of the art
- Propose reprocessing schemes based on the two reference cores of process identified during EUROPART
- Go further in the alternative electrochemistry in molten fluoride and in the liquid-liquid reductive extraction in molten chloride
- Validation of the scientific feasibility of each technological brick, at laboratory scale

Objectives in DM3 “Process”

- Industrialisation
- Provide active feedback to Domains 1 & 2
- Integrate with work packages across Europe (SNE-TP)
- Identify early challenges & refine axis of research
- “Educate” about early integration
- studies on scale-up issues, on-line monitoring, corrosion
- Design of MA bearing targets prior their fabrication and irradiation in HFR within the FAIRFUELS project

Education and Training

- Investing in people**
- 4 one year “post doc” scholarships are planned
- Dissemination of knowledge, training**

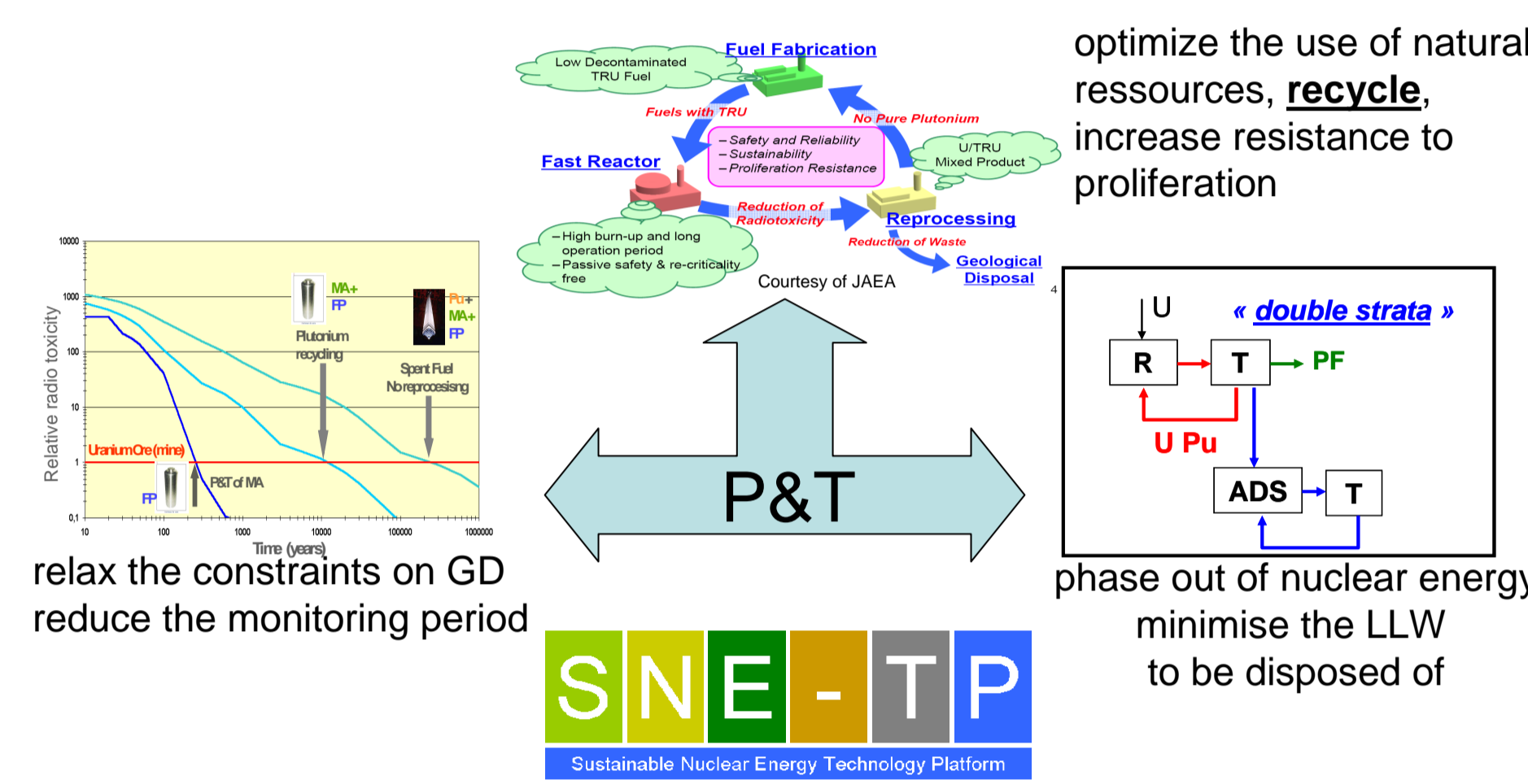
- Appointing lecturers during ACSEPT meetings .
- Organising two international workshops during the project.
- Funding the organisation of seminars, workshops, summer schools

Communication / fostering visibility

- Developing a website for information and advertisements
- Making representations or presentation on ACSEPT
- Promoting actions that improve the visibility of the project or consortium

P&T Strategies

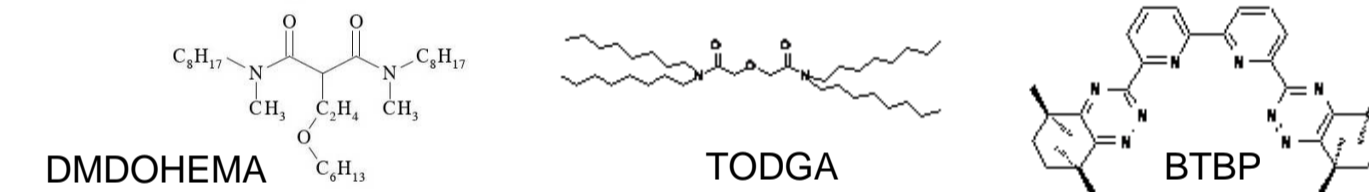
a significant common trunk despite the different national strategies envisaged for managing nuclear wastes in Europe



Hydro - Separation Processes

- Heterogeneous recycling
- From the less challenging to the more challenging

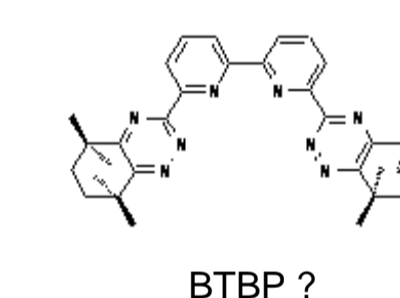
- “regular” SANEX (on a DIAMEX raffinate), selective actinide extraction
- “innovative” (stripping) SANEX (on a PUREX raffinate), Extraction of An, Ln and selective stripping of An.
- “1 cycle” SANEX (on a PUREX raffinate), selective extraction of An



- Homogeneous recycling

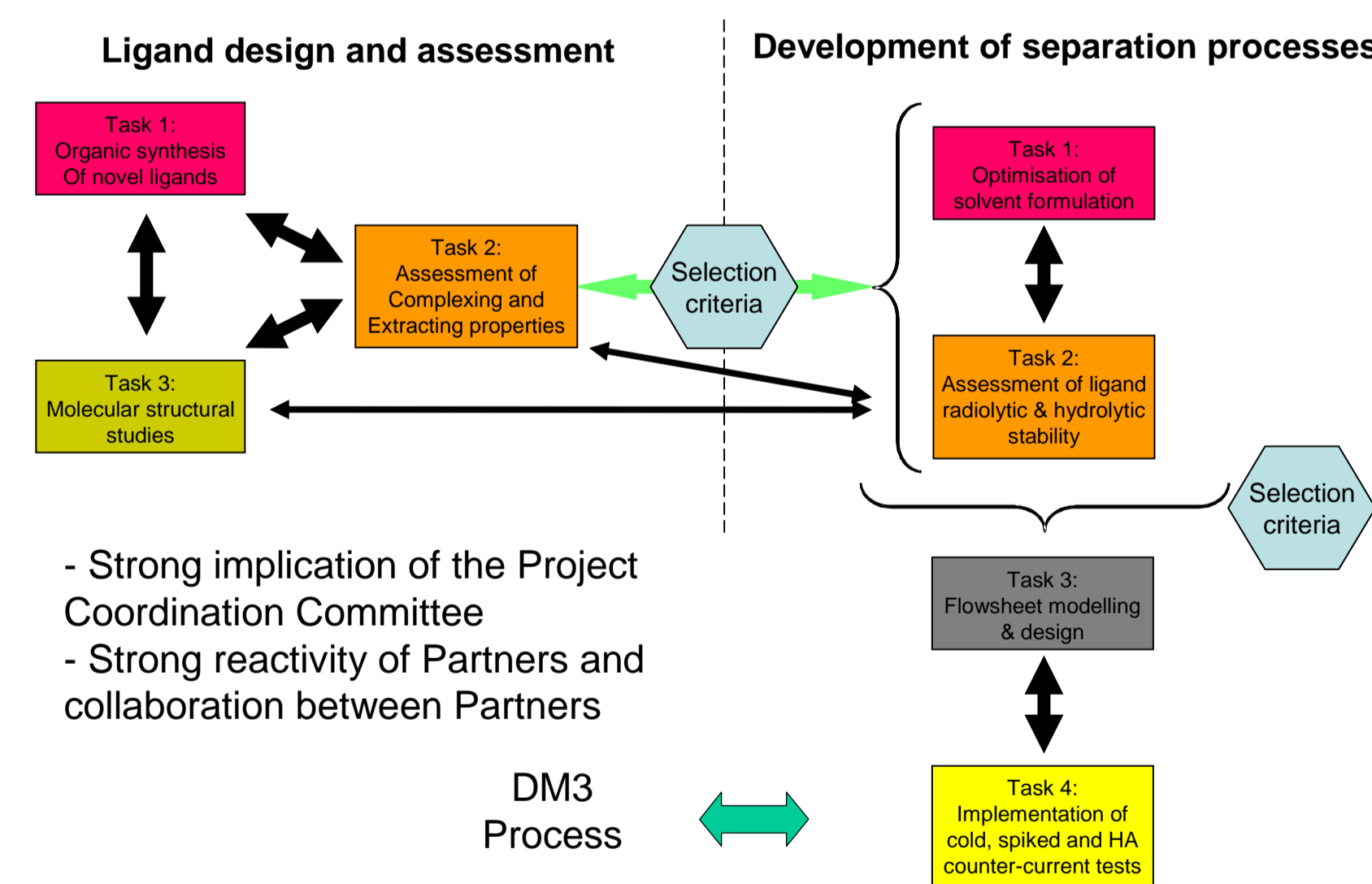
- GANEX, group actinide extraction

Two cycles:
1st cycle : quantitative Uranium extraction,
2nd cycle : group actinide extraction

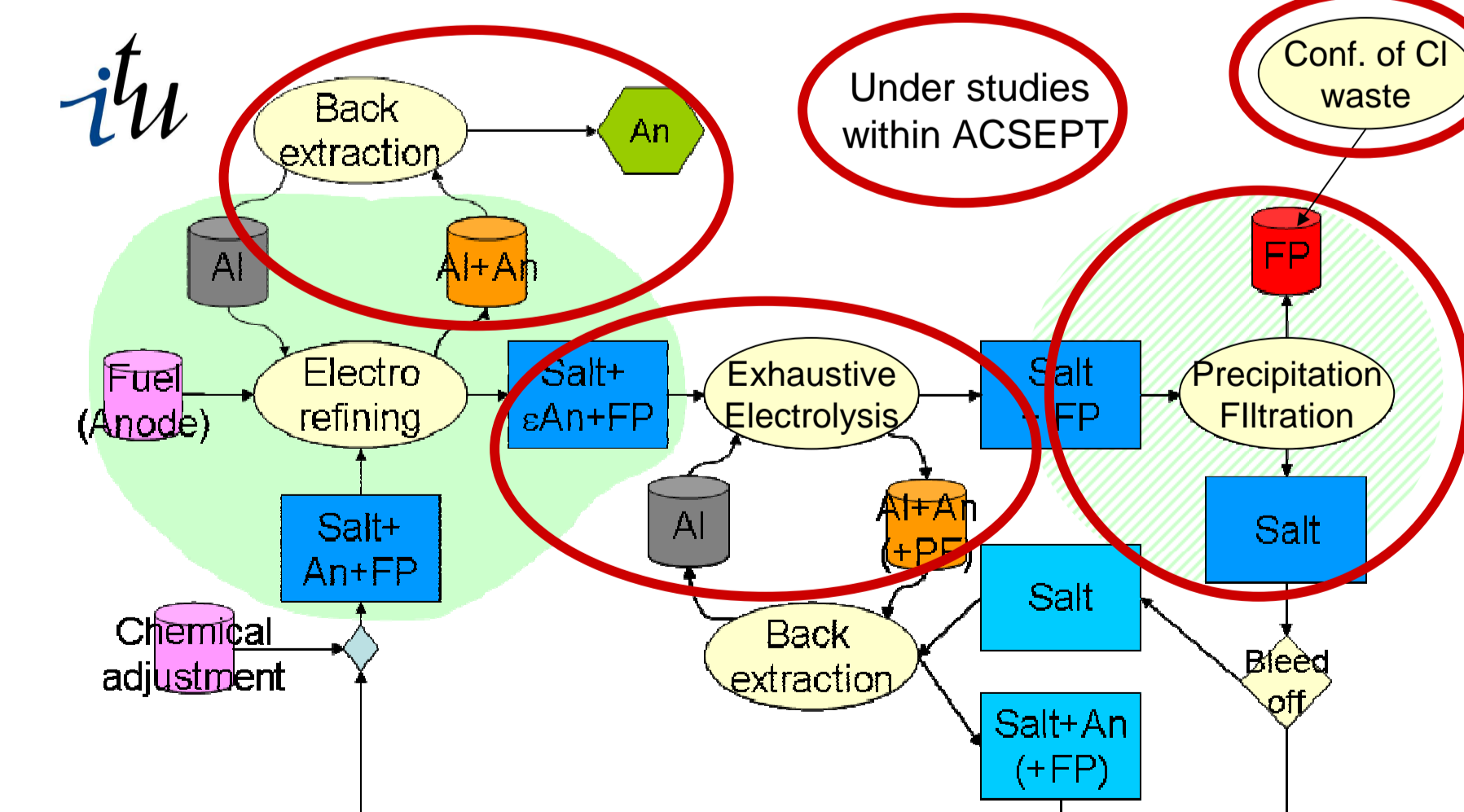


Only the second cycle is under studies within ACSEPT

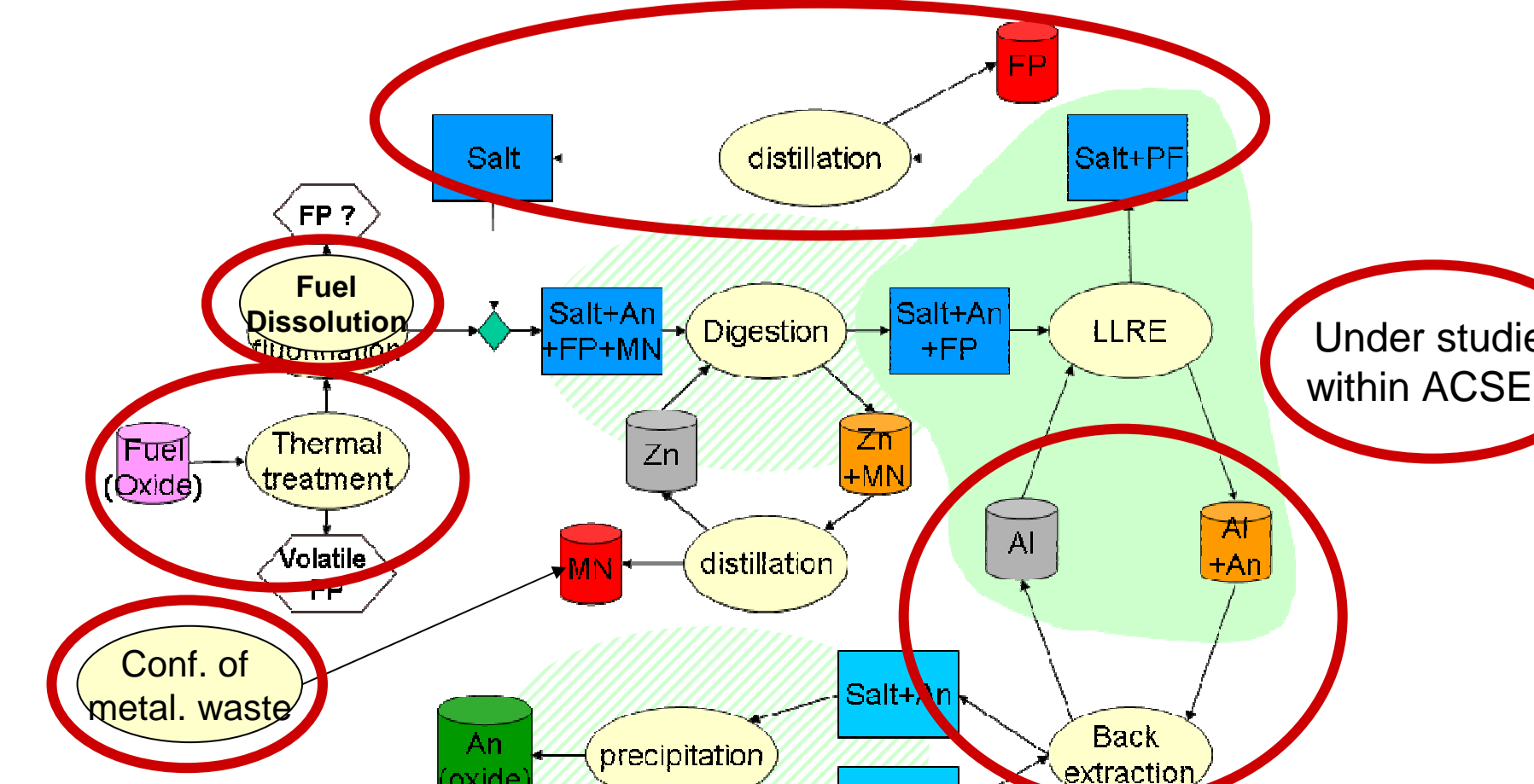
Hydro - Strategy in process development



Pyro - Electrorefining in molten chloride



Pyro - Liquid-liquid reductive extraction



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Members of the Consortium
ALCAN, AREVA-NC, CEA, CHALMERS, CIEMAT, CINC, CTU, CNRS, CSIC-ICMAB, CUNI, EDF, ENEA, FZJ, FZK-INE, ICHTJ, ICIQ, IIC, ITN, JRC-ITU, NNL-UK, NRG, NRI, Polimi, PSI, RUG, Twente, UEDIN, ULG, ULP, UNIPR, UPMC, UReading, ANSTO, CRIEPI

Countries
Belgium, Czech-Republic, France, Germany, Italy, Netherlands, Poland, Portugal, Spain, Sweden, Switzerland, United-Kingdom, Australia, Japan,