European Commission

Hotlab, Idaho Falls, September 22-26, 2013

The JRC-ITU infrastructure renovation plan

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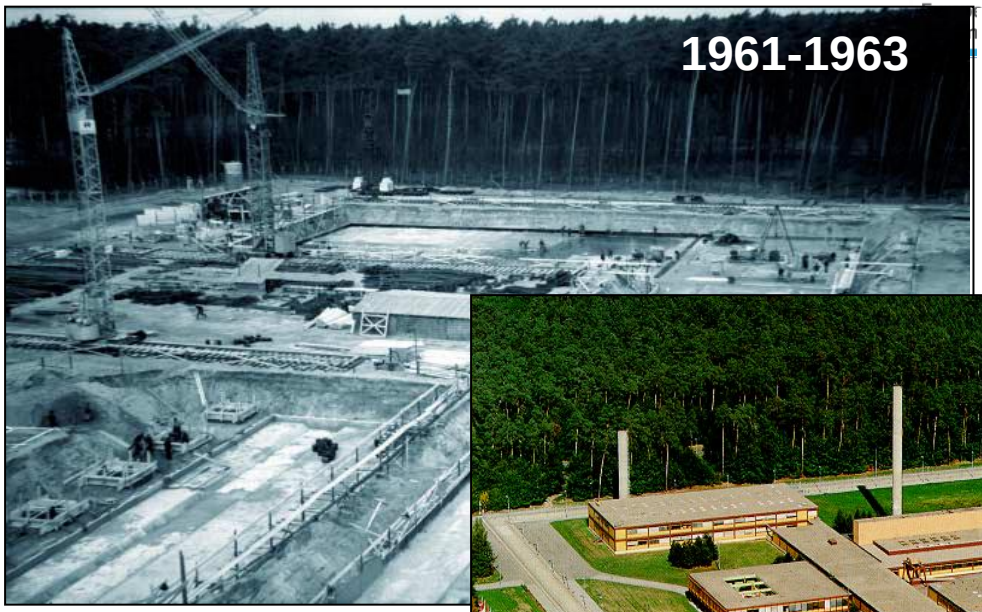
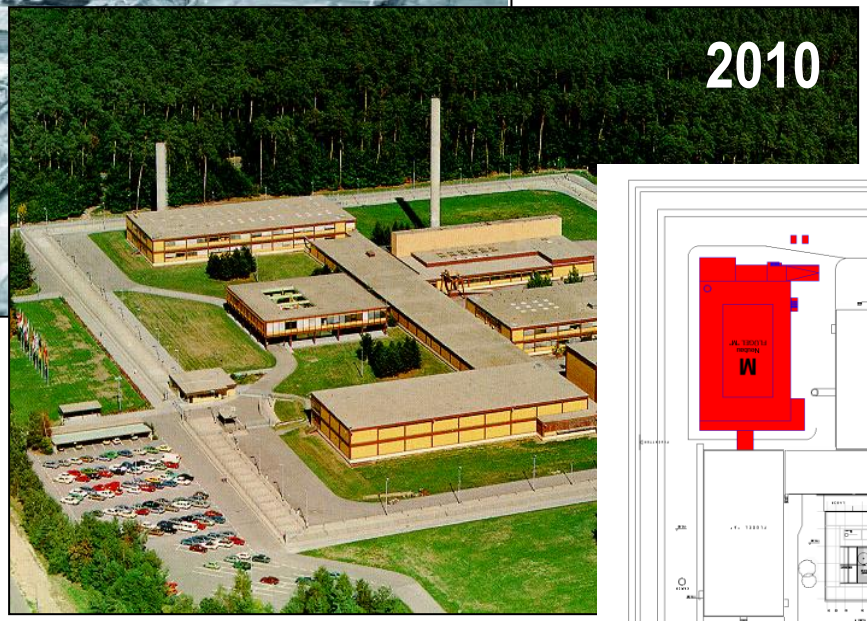
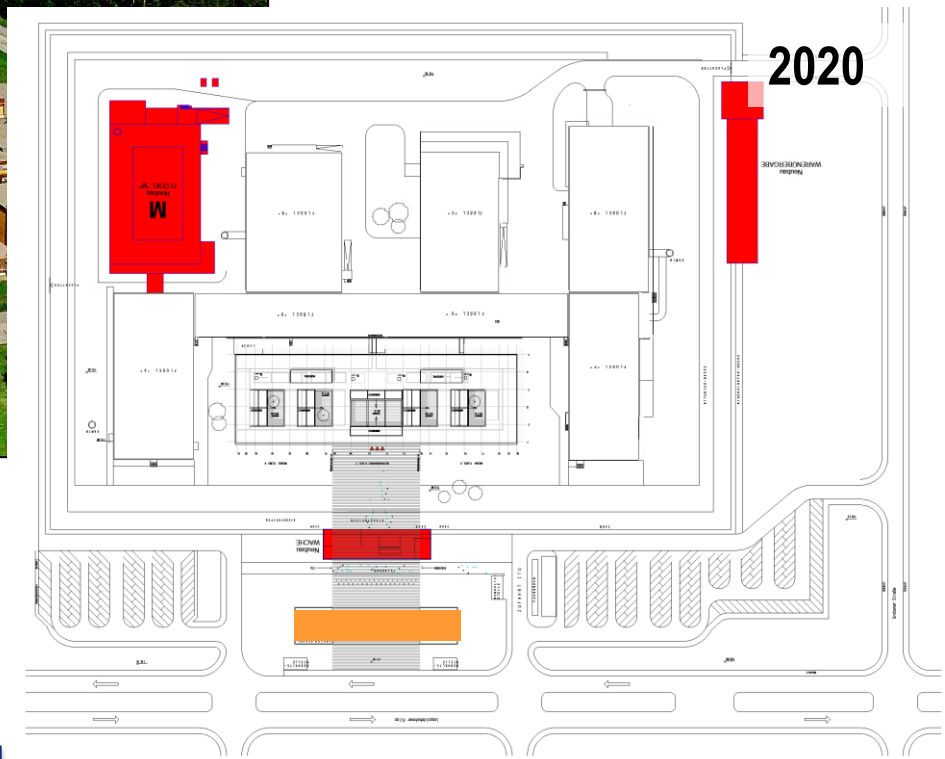
Outline





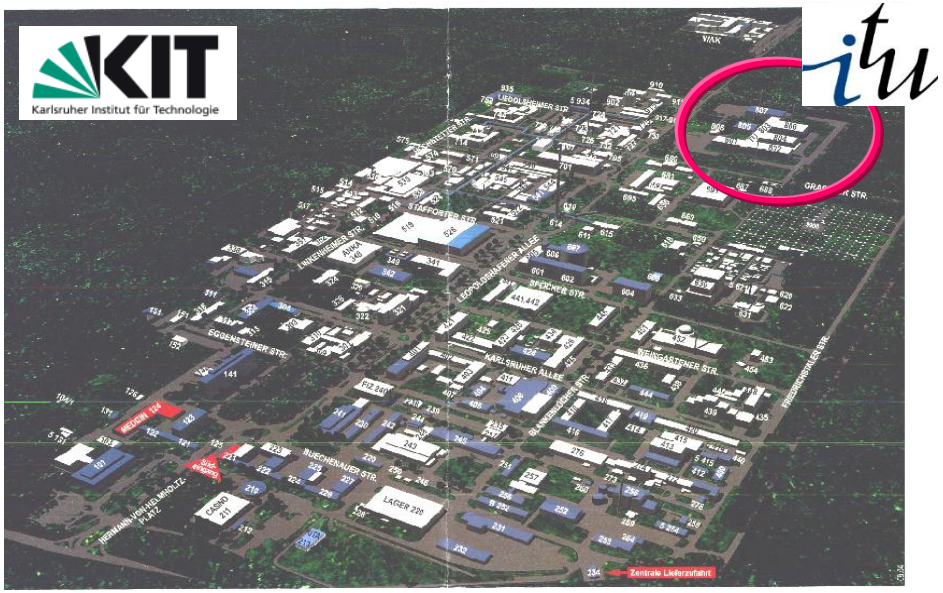
Quick view into the past and the future



Joint Research Centre
Institute for Transuranium Elements (JRC-ITU)

The Institute for Transuranium Elements (JRC-ITU) was set up to investigate the technical applications, the safety and environmental aspects of elements ranging in the Periodic Table beyond element 92, Uranium.

1 April 1963: official laying of the corner stone
1964: first laboratories of ITU became operational.



http://itu.jrc.ec.europa.eu/

JRC-ITU Karlsruhe is located on the premises of the Karlsruhe Institute of Technology-Campus North (KIT).

It is a **nuclear facility**, and owns a **licence** according to **§9 of the German Atomic Law**, as well as a **licence** according to **§3 of the Radioprotection Act**.

The **Regulatory Authority** is the **Ministry of the Environment, Climate Protection and the Energy Sector,** Baden-Württemberg

Ministerium für Umwelt, Klima und Energiewirtschaft
Baden-Württemberg

JRC-ITU

The mission of JRC-ITU is to provide the scientific foundation for the protection of the European citizen against risks associated with the handling and storage of highly radioactive material.

JRC-ITU's prime objectives are to serve as a reference centre for basic actinide research, to contribute to an effective safety and safeguards system for the nuclear fuel cycle, and to study technological and medical applications of radionuclides/actinides.

Staff:
Approx. 300 plus externals @ KA-site

Approx. 70 @ Ispra-Site

Institutional budget FP7 ~ 45 M€
Means 12 M € / Specific 6 M € / Decommissioning 3 M €
- JRC EURATOM programme (85%)

Competitive activities 15% (8-10 M€)
- EC's FP7 "indirect actions"
- Support to Commission
- Work for Third Parties

JRC and Horizon 2020

JRC direct actions objectives within Horizon 2020:

1. *Improve nuclear safety: nuclear reactor and fuel safety, waste management including final geological disposal as well as partitioning and transmutation; decommissioning, and emergency preparedness;*

2. *Improve nuclear security: nuclear safeguards, non-proliferation, combating illicit trafficking, nuclear forensics;*

3. *Raising Excellence in the nuclear science base for standardisation;*

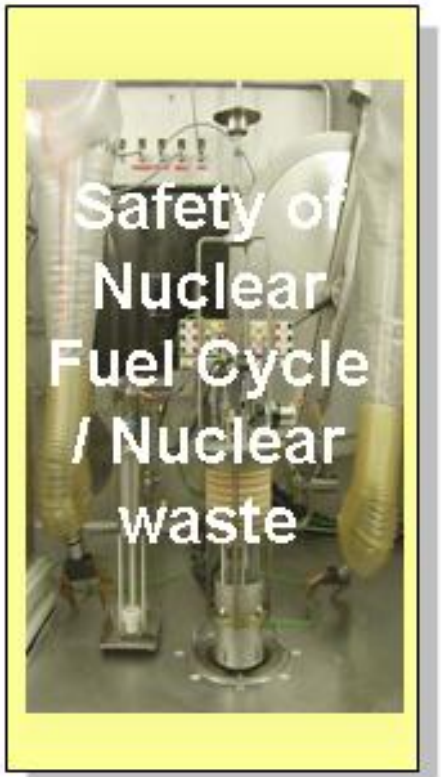
4. *Foster knowledge management, education and training;*

5. *Support the policy of the Union on nuclear safety and security*

JRC-ITU
Core competences

Reference Centre for
policy makers, stakeholders and citizens
in the nuclear field

NUCLEAR SAFETY and NUCLEAR SECURITY

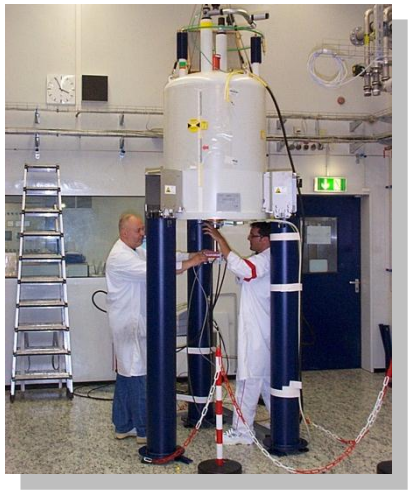


Renovation & innovation

European Commission

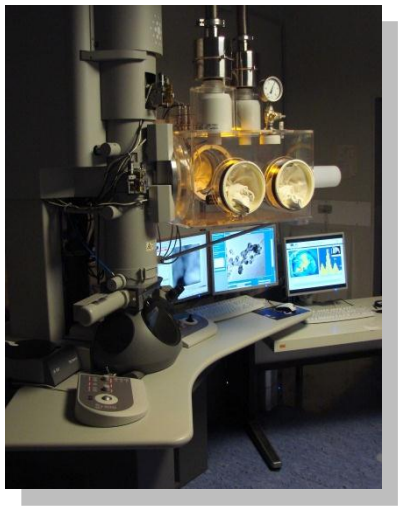
- ongoing continuous renovation and innovation of equipment and facilities to keep state of the art capabilities
- complementary to other hotlabs – common effort worldwide
- key to be in line with the strategy and the planning
- actions at the equipment/facilities level must now be accompanied by a strong site infrastructure development plan

(Unique) equipment & facilities



Solid State NMR

Hot cells (24)

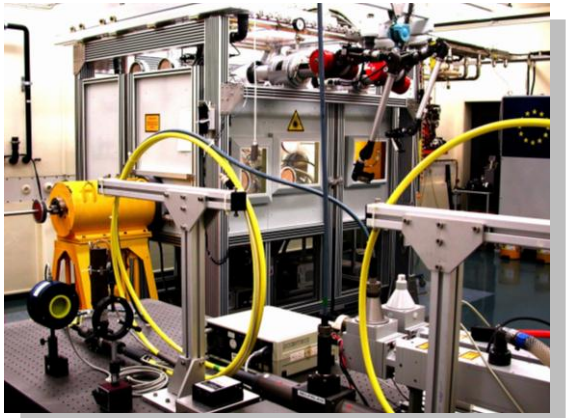


Transmission electron microscopy

Minor Actinide laboratory

Surface Science

Large Geometry secondary ion mass spectrometry (SIMS)



Thermophysics & Thermodynamics

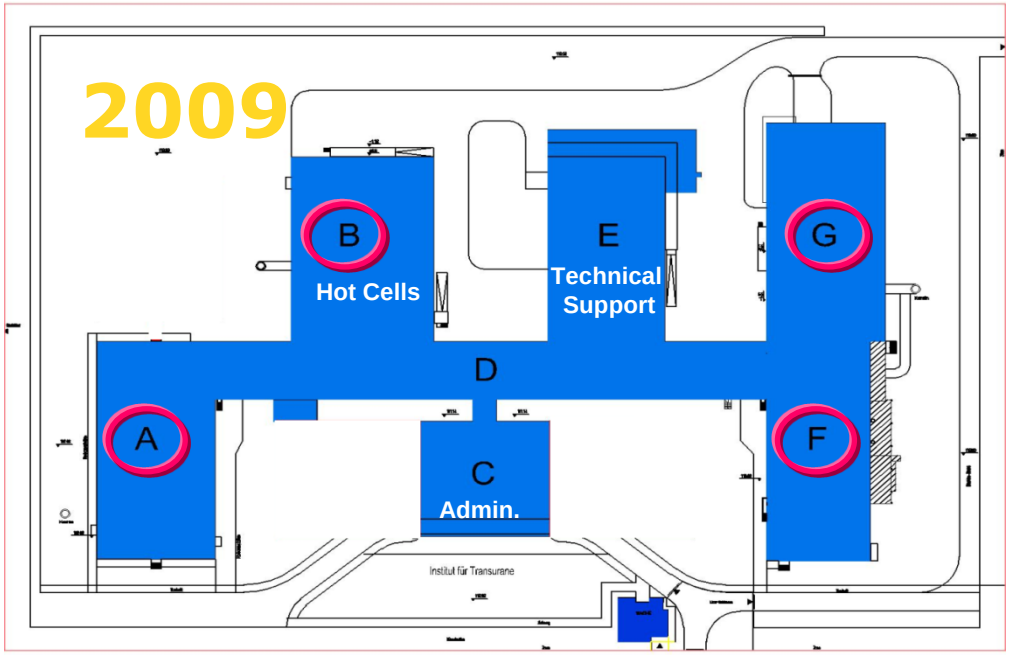
Controlled area and ageing infrastructure

Controlled areas (**unsealed radioactive materials)** currently in **wings A, B, F, G**.

Safety and security of the site, as well as good staff working conditions maintained at required level through maintenance programme for the buildings and the equipment included in the yearly budget of the Institute; *recent example: wing roofs progressively refurbished - tightness checked.*

- After 50 years, *ad hoc* refurbishing has reached its limits
- **Regulations and norms** for nuclear facility have evolved since the '60s, especially concerning **radioprotection and security (and seismic)**
- increasing maintenance costs

→ **time has come for a comprehensive renovation plan**



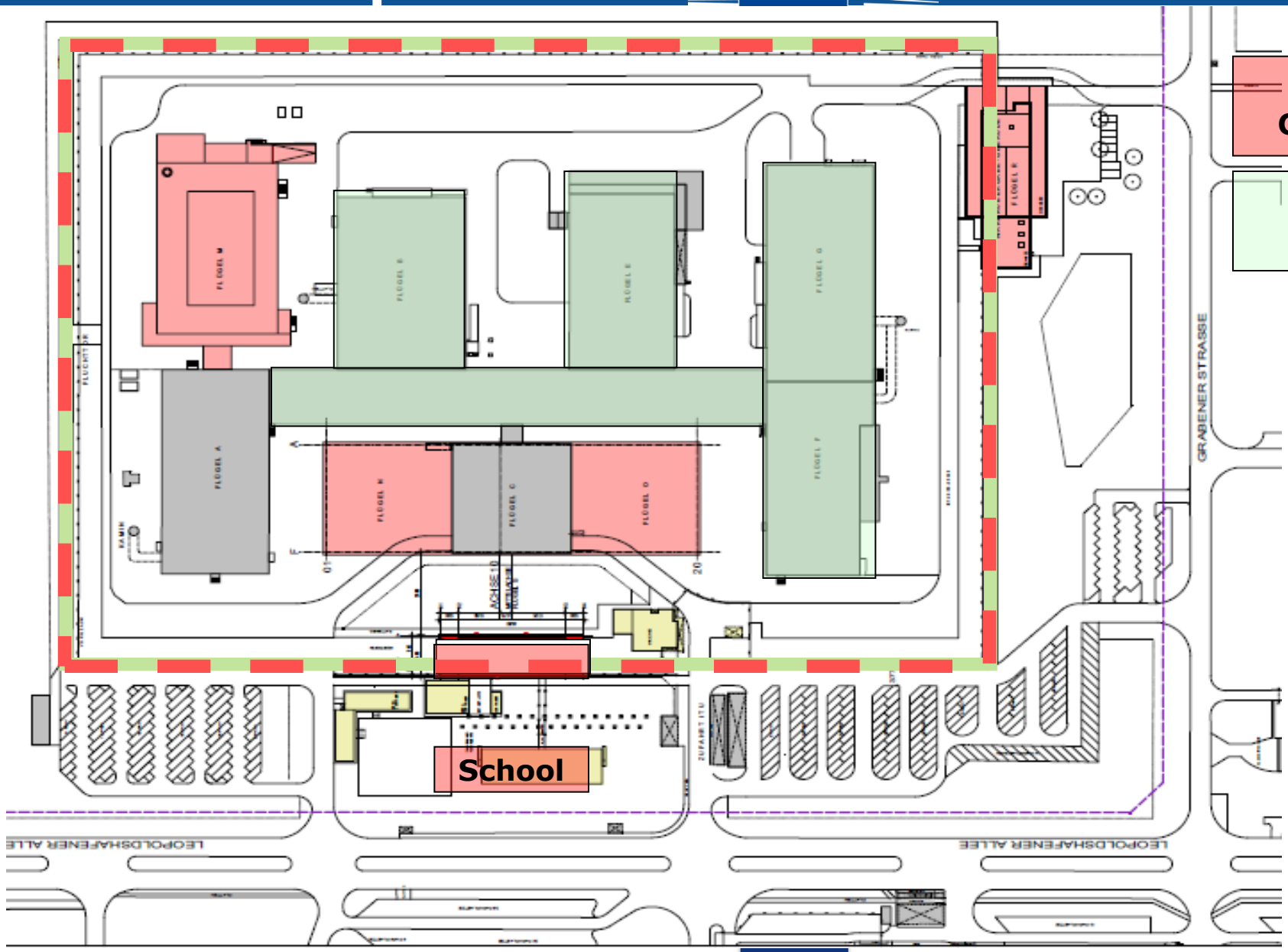
REQUIREMENTS
- **Safety** and **Radioprotection** standards
- **Security** standards (Physical Protection)
- Energy standards
- Research Programme Development

→ Comprehensive Infrastructure development plan

→ Nuclear licensing

Infrastructure renovation plan

Global Concept 2008-2018



Controlled area and wing NCO

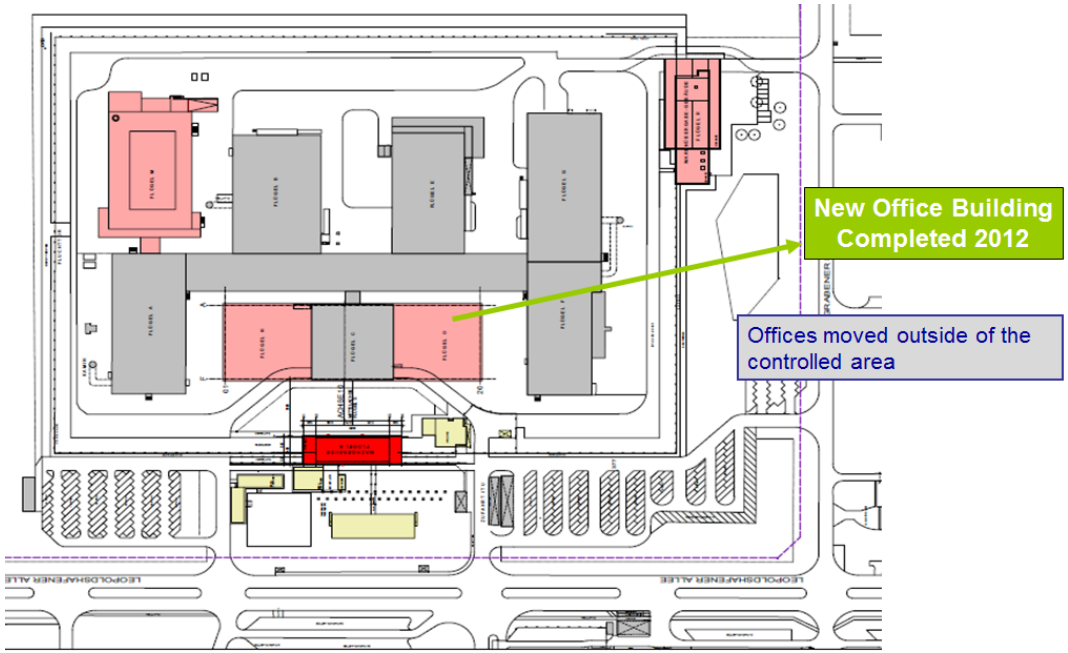
2008-2013

Completed

a) Reorganisation of the controlled area 2008
(full body monitors and material inspection facility)

b) Construction of a new office building 2010 – 2012
(staff relocation completed May 2013)


New organisation of the controlled area with full body monitors and material inspection facility.

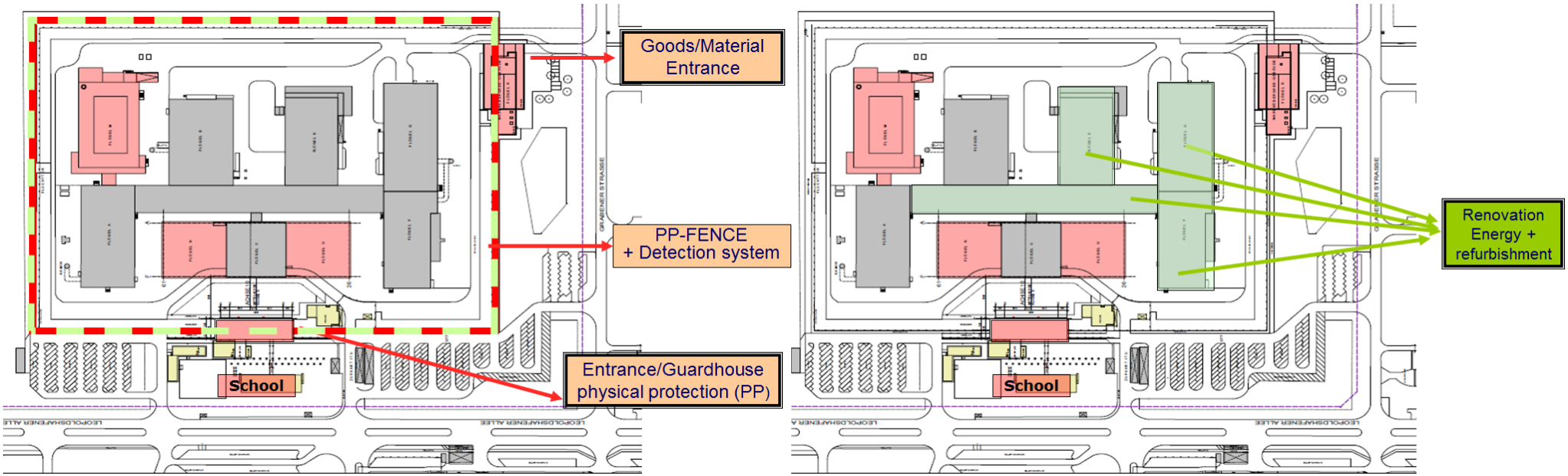


Site security

Technical infrastructures

Physical Protection-PP (2013-2015)

Renovation/upgrading e.g. ventilation, energy efficiency (2013-2016)



JRC-ITU Infrastructure

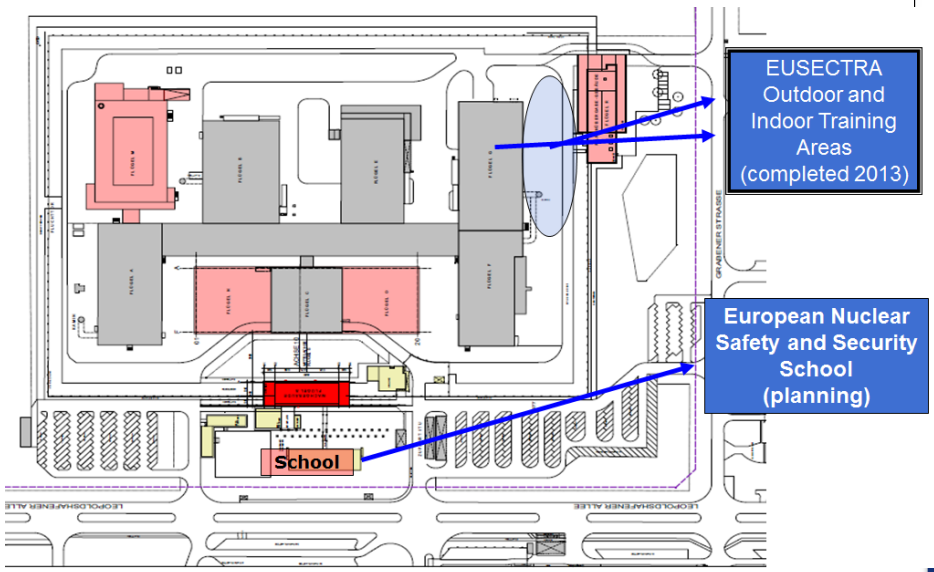
EN3S

European Commission

European Nuclear Safety and Security School – EN3S

a. *Indoor and Outdoor Training Areas (EUSECTRA, European nuclear SECurity TRAining centre)* (completed 2013)

b. Construction new building for seminars, lecture rooms and low activity laboratories *(including information centre)*



RPM farm: Training of First Responders (Detection): The focus is on nuclear security training for border guards and Train the trainers.

Dedicated Security Training area in the EUSECTRA caisson offering a large collection o equipment and scenario capabilities, including contaminated crime scene management

Non-Destructive Analysis Training for Safeguards Inspectors from EURATOM and IAEA. Dedicated floor in the EUSECTRA Caisson training area.

Highly Specialised Training on Nuclear Forensic Methods: Mass spectroscopy, Electron Microscopy, Advanced Gamma Spectroscopy, etc. in dedicated laboratories

EN3S
European Nuclear Safety and Security School

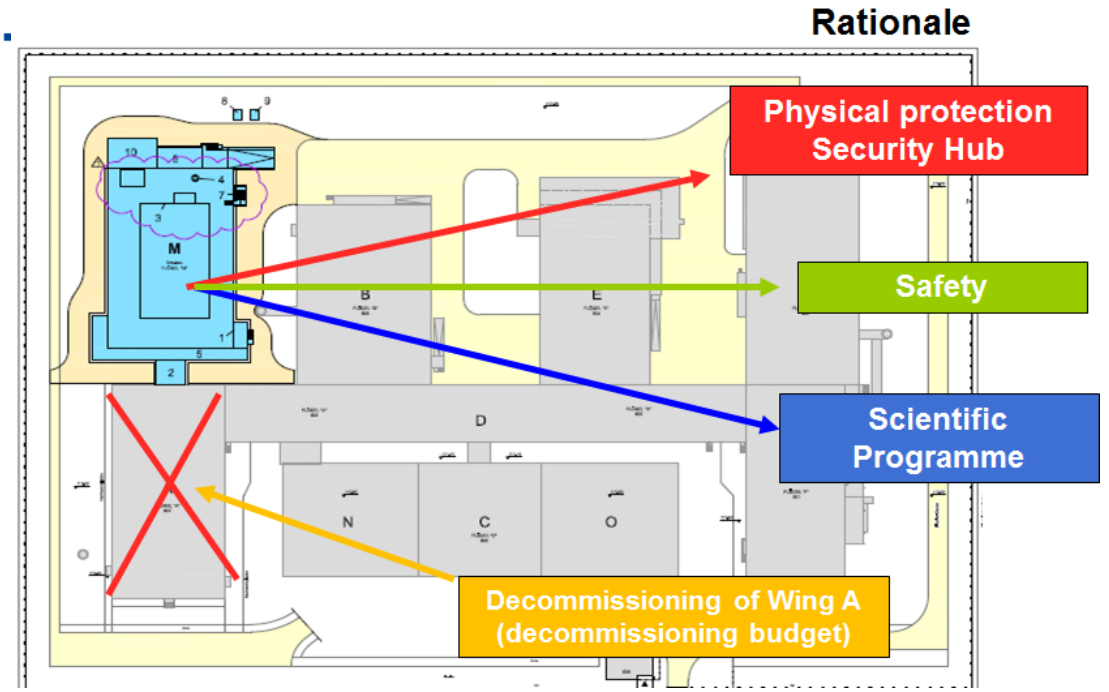
Safety and Security

a) Construction of new laboratory (Wing M)

- Fully self-sustaining building
- Enhancement of security (physical protection security hub)
- Enhancement of safety (full containment according to beyond design-basis accidents scenarios)

b) Scientific infrastructure + transfer of scientific equipment from wings A, F and G to wing M

c) Decommissioning Wing A (2016-2020)



JRC-ITU Infrastructure

Wing M

Transfer of all activities involving handling of radioactive/nuclear materials (pursuant to § 9 of the Atomic Energy Act in conjunction with § 7 of the Radiation Protection Ordinance), that are today performed in wings A, F, G, to wing M:

- Nuclear safeguards and security

- Nuclear fuel safety, Waste management and Decommissioning

- Training and education

- Medical Applications and fundamental research

Laboratories for:

- Preparation of Advanced Fuels
- Partitioning & Transmutation
- Microanalysis*
- Power Laser Apparatus for Reactor Irradiated Samples (POLARIS)*
- High-Temperature and Surface Analyses*
- Mechanical Properties*
- Kinetic and Thermodynamic*
- Electron Microscopy*
- Sample Preparation and Characterisation*
- Alpha-Emitters Medical Applications

*of conventional, innovative and advanced fuels

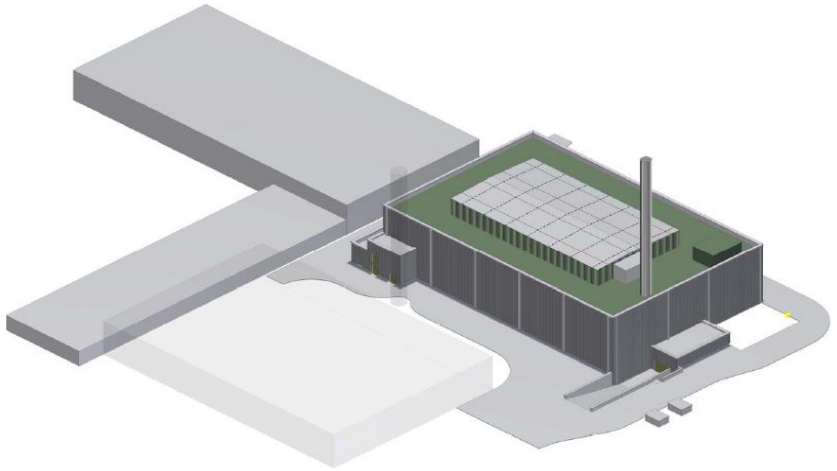
European Commission

Wing M

Requirements:

- Nuclear License

- Construction License



Both licenses granted 2012

Mediation process 2011

5 public meetings held between 09/2011 and 11/2011. At the end of the process, all participants acknowledged and welcomed JRC-ITU's transparency. Subsequently, both *Ministerium für Umwelt, Klima und Energiewirtschaft Baden-Württemberg* (nuclear license) and *Landratsamt Karlsruhe* (construction license) approved their respective applications on the legal grounds of nuclear and construction regulations.
Nuclear license approved February, 2012.
Construction permit issued March, 2012.

Wing M

Nuclear License

European Commission

Licence A: Licence granted in the 1960s

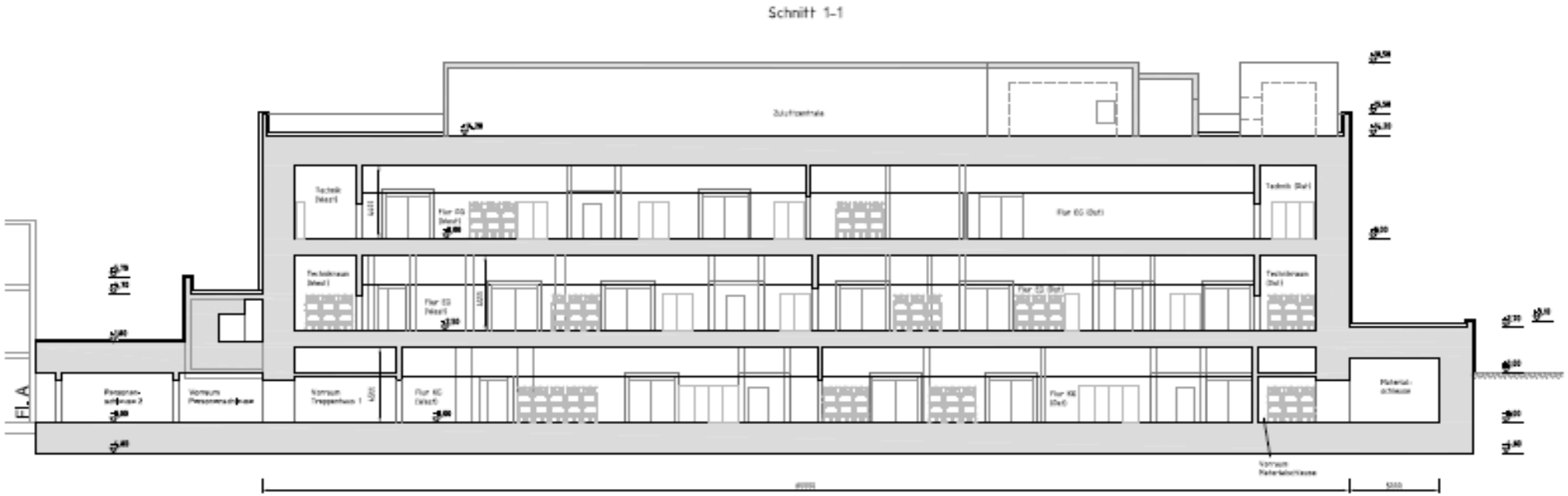
Licence B: extended licence 2012

	Pu (kg)	U-235 (kg)	U-233 (kg)	U-232 (kg)	nat. U (kg)	Light enriched U (kg)	Depleted U (kg)	Irradiated Uranium fuel	Irradiated Actinide Fuel (Pu, Am, Np, Cm)
Licence A	**180**	**50**	**0,3**	**0**	**750**	**350**	**0**	**0**	**0**
Licence B	**-**	**-**	**80**	**0.32**	**475**	**300**	**465**	**0.05**	**0.05**

Am-241 (kg)	Am-242m (kg)	Am-243 (kg)	Th-229 (kg)	nat. Th (kg)	Th-232 irradiated (kg)	Cm-243 (kg)	Cm-244 (kg)	Cm-245 (kg)	Cm-246 (kg)	Np (kg)	Ra-226 (kg)	Pa-231 (kg)	X exemption limit
2				**100**			**0,02**						**E8**
10	**0.6**	**3.7**	**6e-4**	**450**	**0.02**	**0.01**	**0.6**	**0.15**	**0.04**	**60**	**0.015**	**0.04**	**E9**

JRC-ITU Infrastructure

Wing M



Characteristics:

- High activity (hotlabs, Fissile materials storage)
- Physical Protection hub for the whole Institute
- 3 Floors (5m high), about 3.300m²
- Underground connection to other Wings
- 180 cm concrete walls
- Accident conditions: No release of radioactive materials
- Fully self-sustaining building

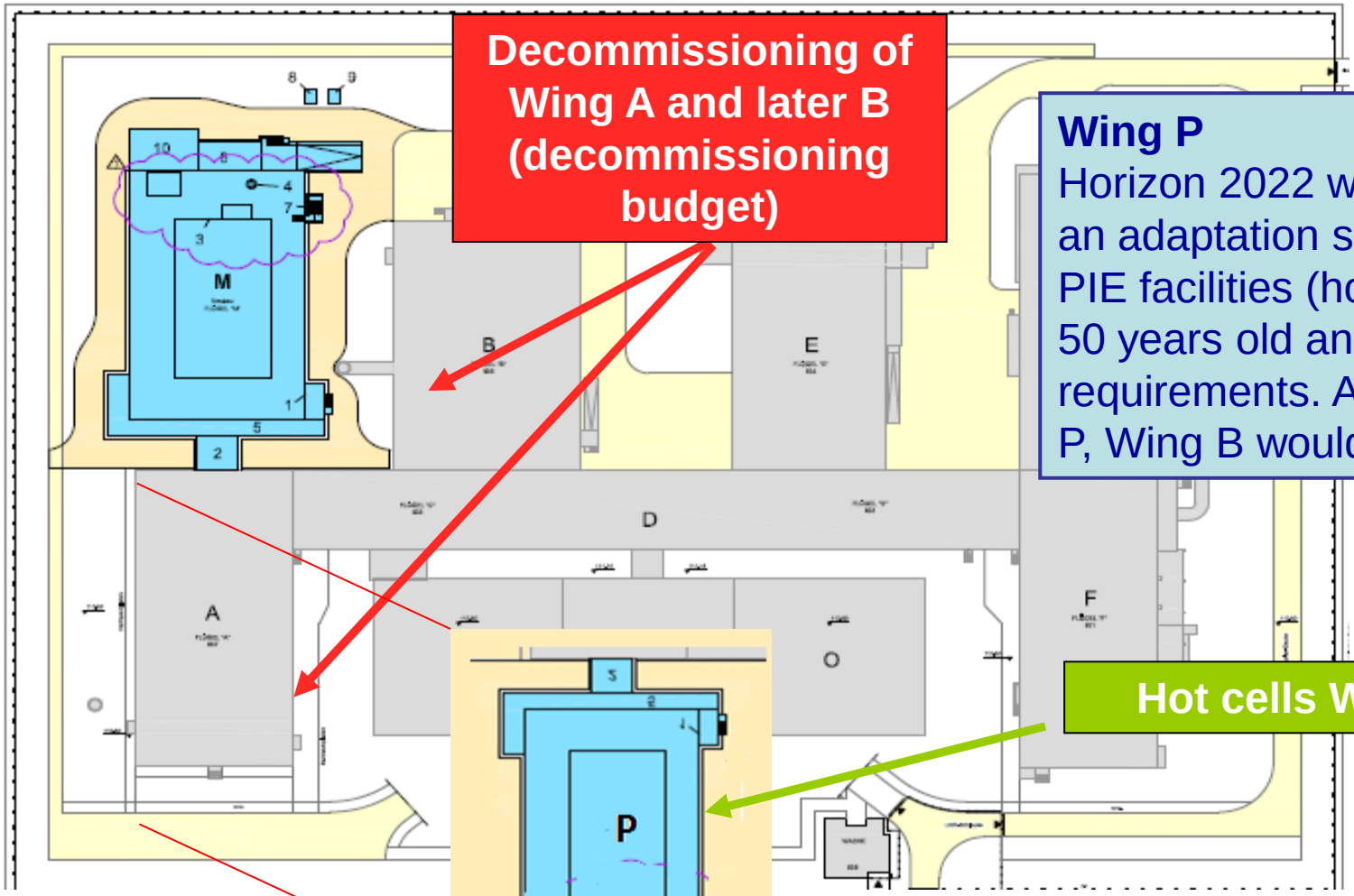
Perspectives

- Programme endorsed by local authorities, Commissioner
- under discussion for HORIZON 2020 investments programmes
- funding depends on outcome of negotiation at the Council level in a financial crisis (affected by competitive considerations among RTD, JRC, fusion and fission)
- unanimity between Member States is required (Euratom Treaty).
- Further evolution: Wing P

Long-term potential vision

European Commission

Wing P 2020+



Decommissioning of Wing A and later B (decommissioning budget)

Wing P

Horizon 2022 would need to consider an adaptation similar to wing M for the PIE facilities (hot cells). Also Wing B is 50 years old and needs to adapt to new requirements. After construction of Wing P, Wing B would be decommissioned.

Hot cells Wing

Conclusions

- **Comprehensive long term vision for ITU infrastructure has been developed taking into consideration:**
  - Safety and Radioprotection standards
  - Security standards (Physical Protection)
  - Energy standards
  - Research Programme Development

- **Major technical planning and licencing steps have been completed**

- **Technical aspects are just one of the challenges**

- **Support and endorsement by Member States essential for the future of ITU**


50
HOT
LAB


50
YEARS
itu
JOINT RESEARCH CENTRE