



Research infrastructure in Europe: practicalities

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Overview of presentation

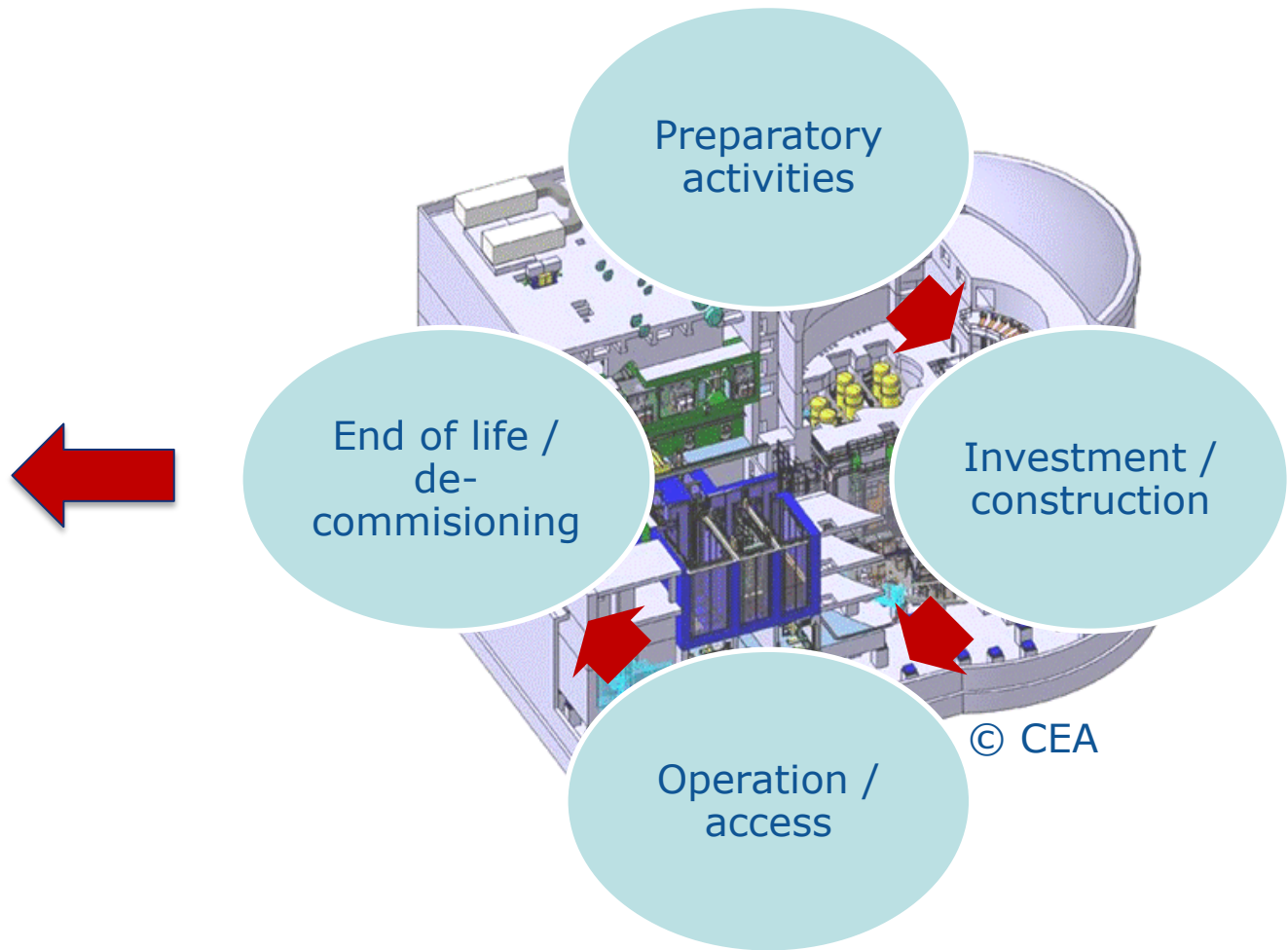
- 1. Infrastructure cycle*
- 2. Infrastructure in EU framework RD&I programmes (H2020)*
- 3. Beyond EU framework RD&I programmes*

Overview of presentation

1. *Infrastructure cycle*
2. *Infrastructure in EU framework RD&I programmes (H2020)*
3. *Beyond EU framework RD&I programmes*

Infrastructure cycle / 1

Integrated infrastructures /
distributed / networks



Infrastructure cycle / 2

Funds / investment

Know-how

Effort

Overview of presentation

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Overview of presentation

1. *Infrastructure cycle*
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Infrastructure & H2020 / 1

Preparatory activities

Yes

Investment

No

Operational costs

Yes

Access

Yes

Decommissioning*

No

Integration / netw.

Yes

(Exceptions are possible)

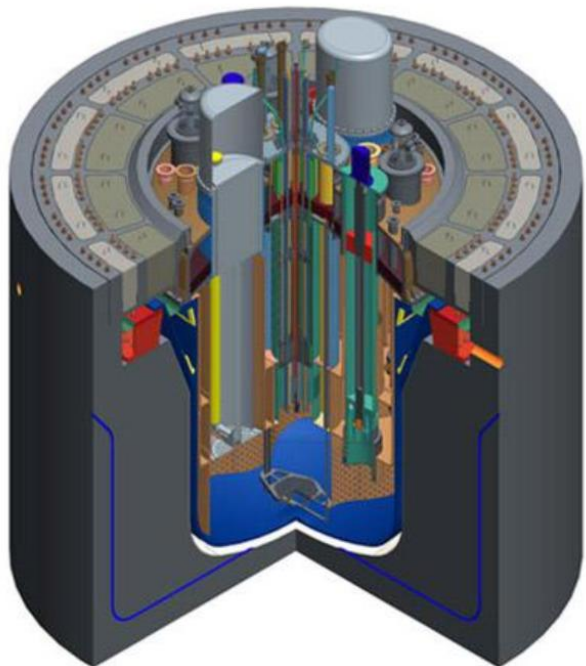
Infrastructure & H2020 / 2

Preparatory activities

Yes

MYRRHA

Multi-purpose hYbrid Research Reactor, Belgium



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- *preparatory studies*
- *safety assessment of design*
- *environment impact assessment report*



via R&DI **projects** as a result of **competitive** call for proposals

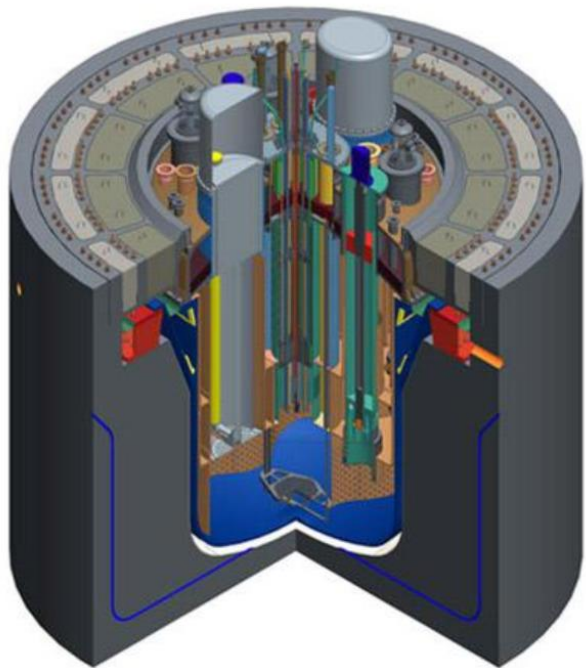
Infrastructure & H2020 / 3

Investment

No

MYRRHA

Multi-purpose hYbrid Research Reactor, Belgium



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- *budget ~1,3-1,5 bln €*
- *at least 40% - Belgium*
- *40% - international partners*

Phases (planning):

- *2017-2026 – 100 MeV accelerator*
- *2026-2033 – 600 MeV accelerator
reactor construction*
- *2033+ - operation*

Infrastructure & H2020 / 4

Investment

EC owned

HFR

High Flux Reactor, Netherlands



- *critical in 1961*
- *entrusted to NRG, Netherlands in 1962*
- *NRG is operator of HFR*
- *Netherlands and France pay "basic" operational costs*

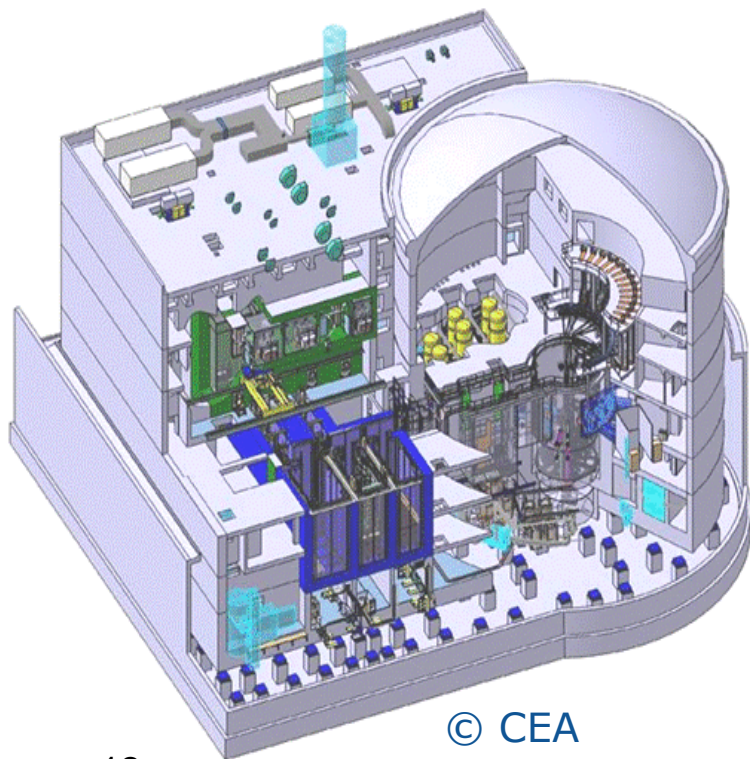
Infrastructure & H2020 / 5

Investment

access rights

JHR

Jules Horowitz Materials Test Reactor, France



- *budget 1,5+ bln €*
- *international consortium, but owner&operator CEA, France*
- *Euratom helped with preparatory phase – via competitive call for proposals / project*
- *Euratom should have 6% of the access rights for 38 M€*

Infrastructure & H2020 / 6

Investment

loans or equity-like

InnoFin

EU Finance for innovators

- H2020 + *European Investment Bank Group*
- *Large Projects, Emerging Innovators, Science, Infectious Diseases Finance Facility, Energy Demonstration Projects, MidCap Growth Finance, MidCap Guarantee*
- *InnoFin Science: including financing of buildings and other infrastructure directly related to R&I activity – in form of **debt** or **equity-type financing from 25 M€***
- *Euratom WP 2016-2017: Support for fission research & innovation (R&I) investment projects of pan-European relevance through the InnovFin instrument.*
 - *Up to **20 M€** guarantee for **EIB loan**, with multiplication factor **6-7***
 - *Assessment by EIB*
- *Example: 305 M€ EIB loan to 2 RD&I centres in Poland*

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Operational costs

Yes

- in R&I-type of projects or coordination/support
- **depreciation** of equipment (**proportional** to use)
- “indirect depreciation” – internal **service cost**
- acquisition of **minor items** / consumables



Stellarator **Uragan 2M**
in Kharkiv, KIPT

Tasks are performed
for and paid by H2020
Euratom project
EUROFUSION (EJP)

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Access

Yes

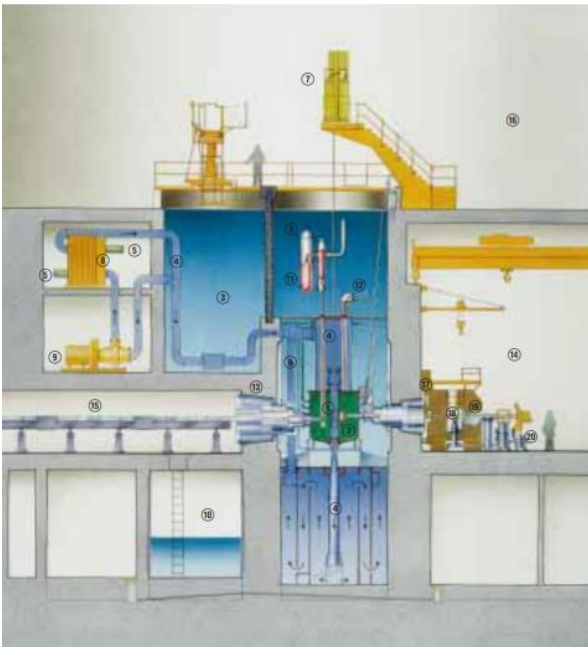
- targeted **transnational access** projects
- either **transnational** access, based on call for proposals, or **virtual** access (online services)
- Research Infrastructure landscape
https://ec.europa.eu/info/files/research-infrastructures-landscape_en
- RI offering **free access** with EU support:
https://ec.europa.eu/info/sites/info/files/research_and_innovation/ris_offering_tna_october2018.docx
- **RICH**, the European Network of National Contact Points (NCPs) for Research Infrastructures in Horizon 2020
<http://www.rich2020.eu/>
- http://www.rich2020.eu/tas_calls
- <http://www.rich2020.eu/proposals>

Infrastructure & H2020 /9

Access

Yes

- Neutron source, reactor **Orphée** at **Laboratoire Léon Brillouin**, France
- LLB is part of **NMI3** - Integrated Infrastructure Initiative for Neutron Scattering and Muon Spectroscopy



access via **call for proposals**

- for whole NMI3

<https://nmi3.eu/about-nmi3/access-programme/facilities---submit-a-proposal.html>

- for LLB

http://www-llb.cea.fr/en/Web/avr2000_e.php

Infrastructure & H2020 /10

Access

Yes

- **Joint Research Centre (JRC)** of EU - six sites in five different countries
- **10** scientific areas, including **nuclear safety and security**
- In **Euratom Work Programme 2019-2020**
OA-05: Administrative arrangement with the JRC on a pilot action on open access to JRC research infrastructure
- JRC contributes by **personnel** costs and **operational** costs
- DG RTD contributes by **visiting** costs (750 k€ in total)
- competitive call for proposals (run by JRC)
- should be in place from 01/01/2020

Infrastructure & H2020 /11

Access

Yes

- “indirectly financed” access
- tasks as part of R&I action or coordination/support action
- Marie Skłodowska-Curie Actions
 - Research and Innovation Staff Exchange (RISE) funds short-term exchanges of personnel
 - Research networks (ITN) supports joint research training and/or doctoral programmes
- ERC grants

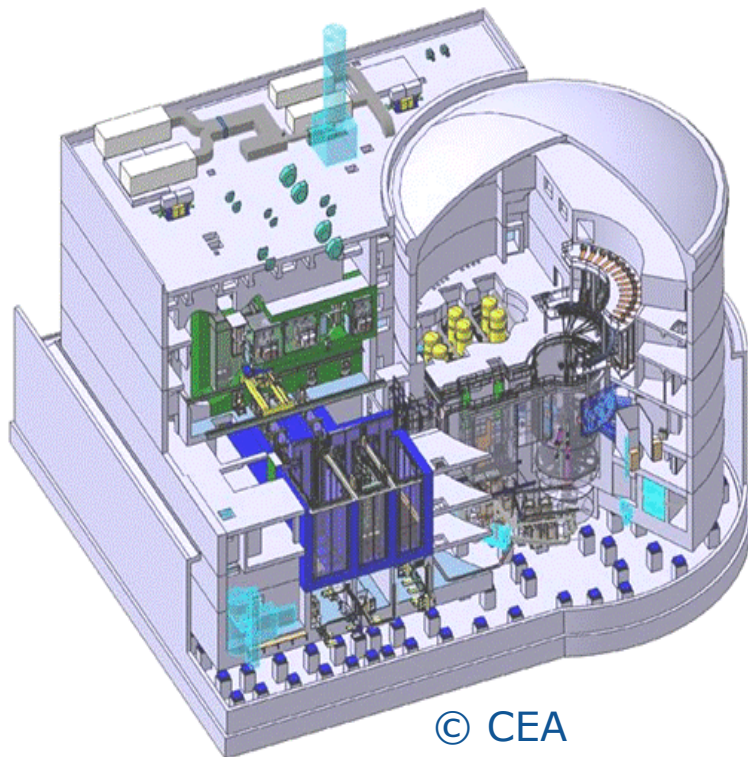
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Decommissioning*

No

JHR

Jules Horowitz Materials Test Reactor, France



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*all liability costs
&
decommissioning
costs*

stay with operator

Infrastructure & H2020 /13

Integration / networking

Yes

Objectives:

- **reduce fragmentation** of the research and innovation ecosystem
- **avoid duplication** of effort
- **better coordinate** the development and use of research infrastructures
- **establish strategies** for new pan-European, well-established intergovernmental or national research infrastructures
- **join forces** internationally to construct and run large, complex or expensive infrastructures

➔ multiple RI networks / distributed instruments

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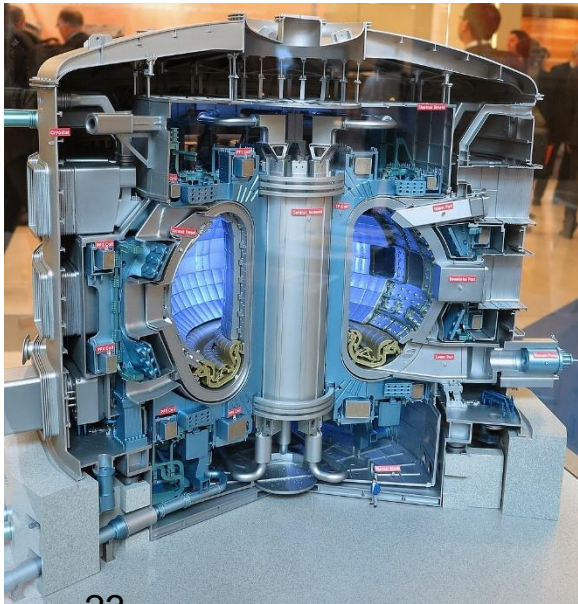
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Beyond EU framework RD&I programmes / 1

International Thermonuclear Experimental Reactor, ITER

Members of **ITER consortium**: European Union, India, Japan, China, Russia, South Korea and the United States
Built in **France**, budget **~25 bln €**, start of constr. **2013**



First plasma – **2025**

Deuterium/tritium operation – **2035**

Heating – **50 MW**

Fusion power – **500 MW**

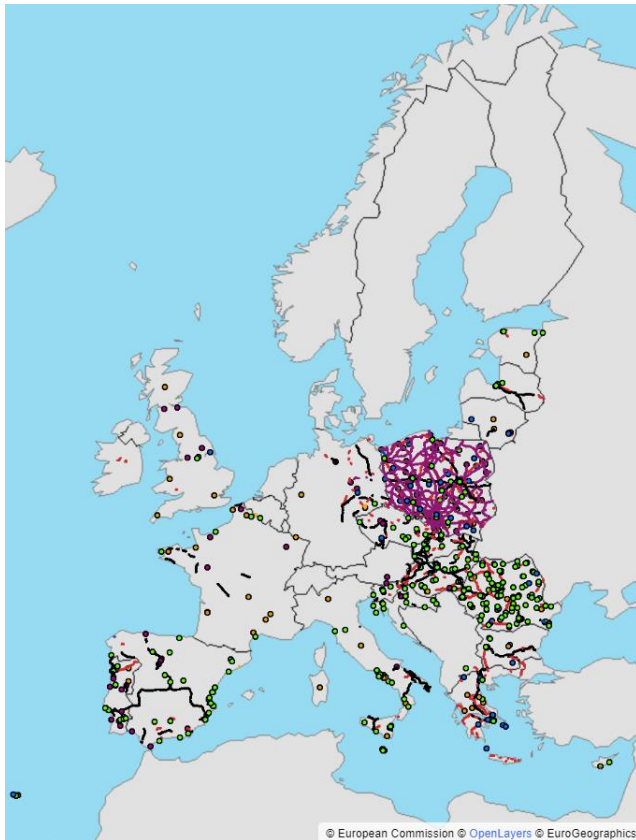
Continuous operation – up to **1000 s**

**EU financing - outside of Multiannual
Financial Framework**

Beyond EU framework RD&I programmes / 2

European Structural & Investment Funds

Major ESIF projects



- European regional develop. fund, European social fund, Cohesion fund, European agricultural fund for rural development, European maritime and fisheries fund
- More than **50%** of EU budget

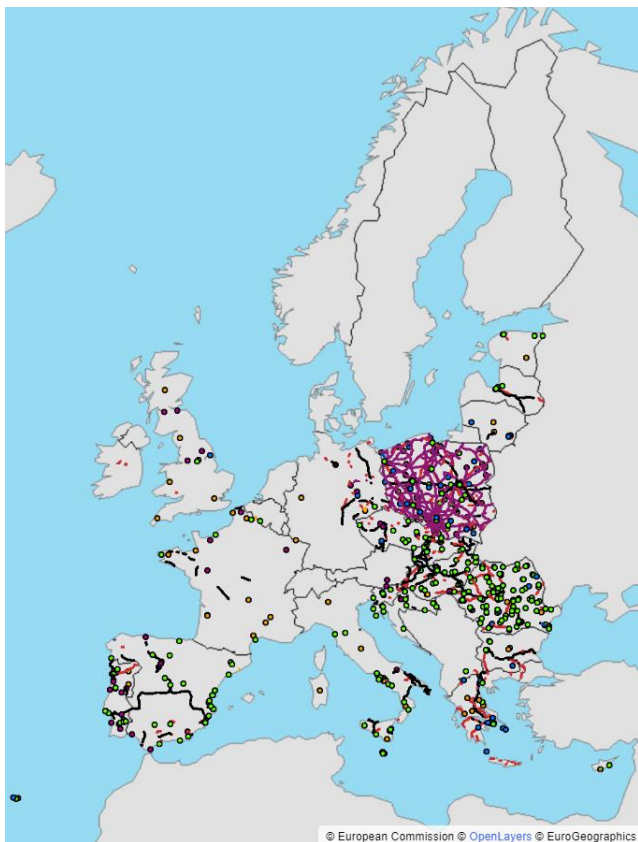
5 priorities

- research and innovation
- digital technologies
- supporting the low-carbon economy
- sustainable management of natural resources
- small businesses

Beyond EU framework RD&I programmes / 2

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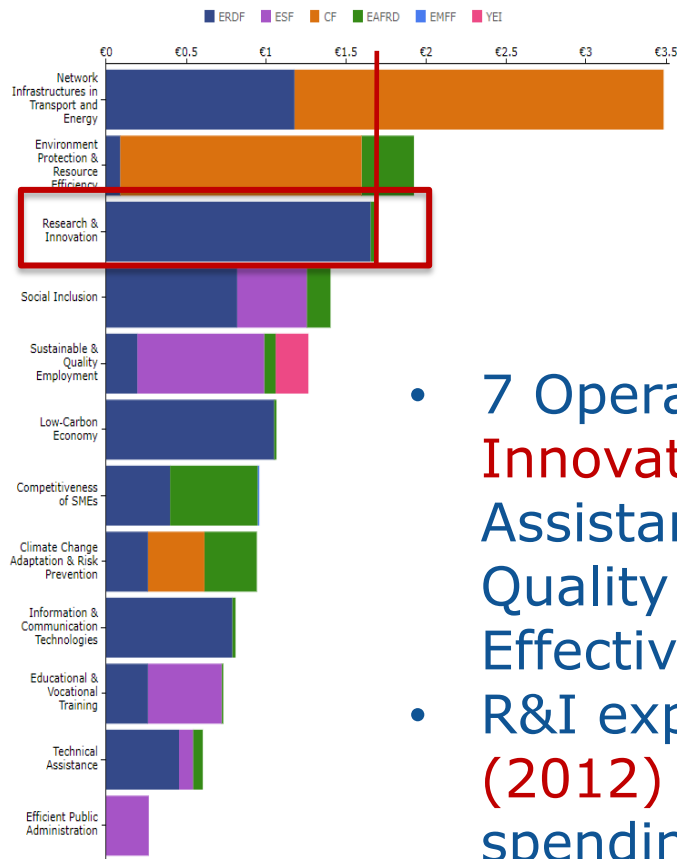
Beyond EU framework RD&I programmes / 3

European Structural & Investment Funds

Total Budget by Theme (daily update): Slovak Republic, EUR Billion

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- managed by the EU countries **themselves**, by means of partnership agreements
- example – **Slovakia, 2014-2020**
 - total budget – **19,3 bln €**
 - ESIF contribution – **15,2 bln €**

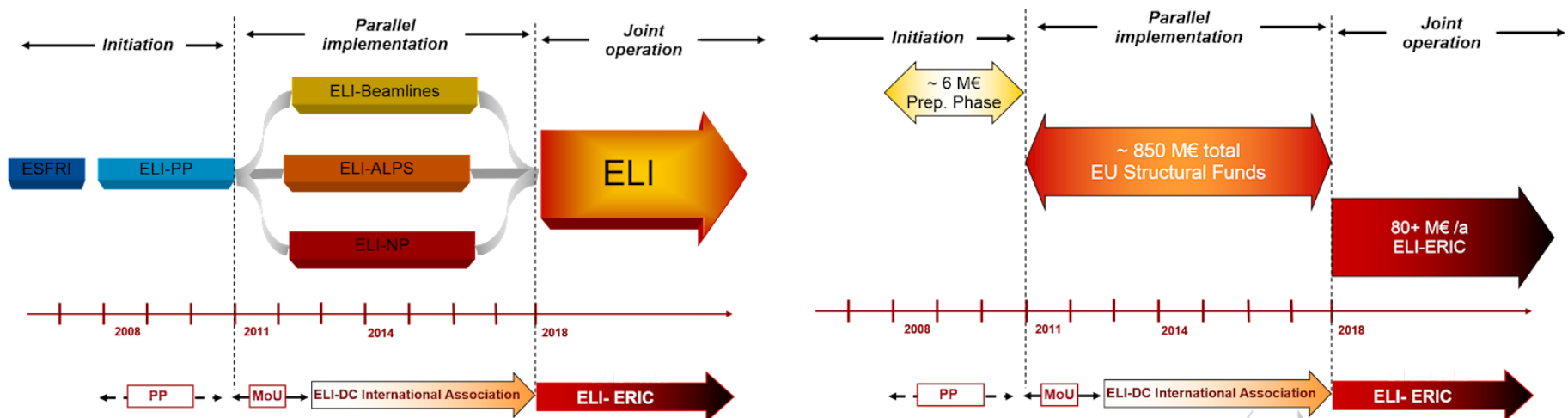
- 7 Operational Programmes: **Research and Innovation**, Integrated Regional, Technical Assistance, Integrated Infrastructure, Quality of Environment, Human Resources, Effective Public Administration
- R&I expenditure is to increase from **0.8% (2012)** to **1.2% (2020)** leveraging private R&I spending from **0.34%** to **0.8% GDP**

Beyond EU framework RD&I programmes / 4

European Structural & Investment Funds

Extreme Light Infrastructure

- on ESFRI roadmap in 2006, 150 mln € (estimated)
- distributed research infrastructure: ELI Beamlines (Cz), ELI Attosecond (Hu), ELI Nuclear Physics (Ro)
- will become ERIC in operational phase
- ELI-PP, FP7, 6/8 mln €; ELITRANS, H2020, 3,4/3,4 mln €



Beyond EU framework RD&I programmes / 5

INTERNATIONAL COOPERATION AND DEVELOPMENT

Instrument for Nuclear Safety Co-operation

- **TACIS**: 1991-2006, **INSC**: 2007-2020
- **521** (!) contract on nuclear safety (468 closed)
- *Establishing of the NDT Center for Training, Qualification and Certification of Personnel of Ukranian NPP ~ 1 M€*
- *Disposal concepts for radioactive waste in Ukraine ~ 2 M€*
- *National Maintenance and Management Training Centre for Energoatom personnel at Zaporizhzhia NPP ~ 5,7 M€*

Conclusions

1. Investment in research infrastructure – primarily responsibility of **a state** and **a business**
2. “Big scientific instruments” nowadays have strong **international** character
3. EU RD&I Framework programmes play **strategic** role in terms of **vision** and **needs** of RI in Europe, but rather **complementary** role regarding **financing** RI
4. EU RD&I Framework programmes are of **crucial** importance for **transnational access** to RI and their **networking**
5. Neighbouring to Ukraine EU countries strongly improved their RI capacity. This RI should be **rather easy to access** for UA scientists, using different means
6. Future is bright. But ...

Future is bright.

But can only be achieved via knowledge intensive path requiring, among other,

modern high-end Research Infrastructure

European Neighbourhood Instrument

Ukraine: Single Support Framework 2018-2020

Sectors	Indicative allocation	%
Sector 1: Strengthening institutions and good governance , <i>including</i> the rule of law and security	EUR 108.45 million - EUR 132.55 million	25
Sector 2: Economic development and market opportunities , <i>including</i> private sector development and improvement of the business climate	EUR 86.76 million – EUR 106.04 million	20
Sector 3: Connectivity, energy efficiency, environment and climate change.	EUR 65.07 million – EUR 79.53 million	15
Sector 4: Mobility and people-to-people contacts , <i>including</i> social inclusion	EUR 86.76 million – EUR 106.04 million	20
Complementary support for capacity development	EUR 65.07 million – EUR 79.53 million	15
Complementary support to civil society	EUR 21.69 million – EUR 26.51 million	5