Goals and Objectives of Workshop

4th Workshop Energy for Sustainable Science at Research Infrastructures

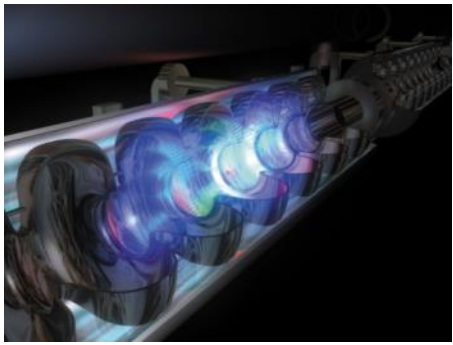
Frank Lehner, DESY

Workshop Energy for Sustainble Science at RIs
ELI-NP, Magurele, Romania
23 November 2017

-on behalf of the organization committee-

Research Infrastructures

- Large-scale facilities that are used by the research communities to conduct research and foster innovation in their fields
  - e.g. particle accelerators for particle collisions or for X-ray generation
  - used by large collaborations of research teams
  - offer unique research opportunities at forefront of S&T
  - attract and host best researchers in the world, promote young talents!
  - Important role in the advancement of knowledge and technology, liberating creative potential of staff, users and providers, thus being crucial socio-economic drivers



- Essential for Europe's researchers for excellence science and key component of Europe's competitiveness

Science is energy intensiv

Laboratories
(bio/chem/phys)

~300 kWh/(m^{2}a)

Universities

~150 kWh/(m^{2}a)

Residential areas

~40 kWh/(m^{2}a)

Science is energy intensive

Dimension of the challenge

- A typical accelerator RI can consume the equivalent energy of a city with ~30 000 inhabitants (DESY, 160GWh/a) or considerably more (CERN, ~1 TWh/a)
- Both, the demand of RIs AND the cost of energy (tens of €/MWh) are increasing non-linearly with time
- Even energy-efficient RIs can cause secondary effects, being drivers for data handling, demands at HPC facilities with large energy consumption

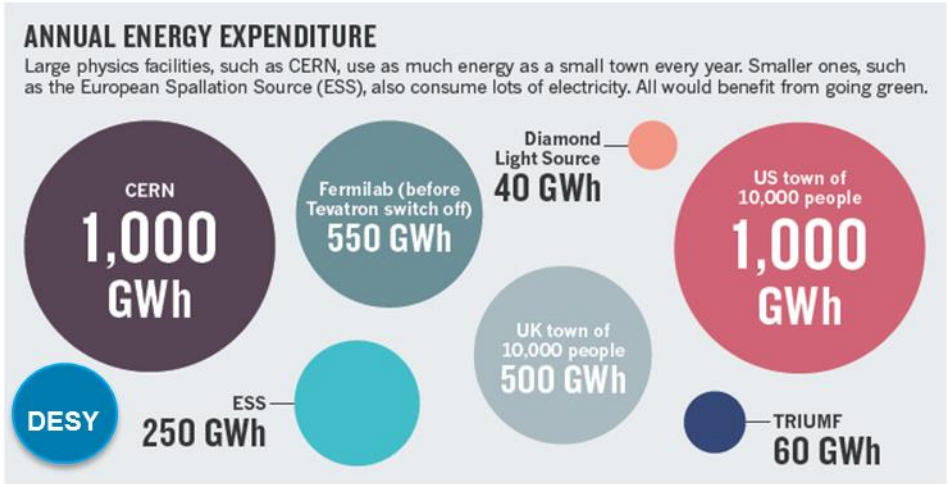
COMMENT

Cutting science's electricity bill

Large-scale research facilities need to reduce their energy consumption and begin moving towards sustainability, says **Thomas Parker**.

Major research facilities such as accelerators and reactors each consume roughly as much electricity as a small town — hundreds of gigawatt hours (GWh) of energy per year or more (see 'Annual energy expenditure'). International environmental impact, greater even than the radioactive waste that many produce. Radioactivity can be contained and handled safely; climate change cannot.

The European Spallation Source (ESS) — a neutron source to be built in Lund,



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Long-term sustainability

- RIs are cornerstones in the knowledge system
  - offer research intensive environment for scientific users from all over the world
  - but also energy intensive
- Energy may be one of the strategic factors for long-term sustainability of RIs
- Need to treat energy and energy management over life cycle at RIs more in a systematic approach – for reasons of operational costs, budget allocation and environmental goals

- **Major actors within the European RI landscape started in 2011 to dedicate own workshop on that topic: Energy for Sustainable Science at RIs**

Energy for Sustainable Science at Research Infrastructures

Previous workshops

Workshop Energy for Sustainable Science

Lund 2011

2nd Workshop Energy for Sustainable Science at Research Infrastructures

CERN 2013

3rd Workshop Energy for Sustainable Science at Research Infrastructures

DESY 2015

Organisers

Accelerator Research and Innovation for European Science and Society, an IA under H2020

+ ELI-NP

host lab of 4th workshop

Frank Lehner

ERF-AISBL
Association of European-level Research Infrastructure Facilities

The institutions behind ERF, co-organisers together with CERN, ESS and ARIES

Single sited RIs

ALBA
GSI
BNC
HZB Helmholtz Zentrum Berlin
DESY
MAX IV LABORATORY
Elettra Sincrotrone Trieste
PAUL SCHERRER INSTITUT PSI
FRM II Forschungs-Neutronenquelle Heinz Maier-Leibnitz
SOLEIL SYNCHROTRON
GANIL Soleil2
diamond

Distributed RIs & networks

eric
Laserlab Europe
EGI
PRACE
eli delivery consortium

Members of ERF-AISBL

Represented in distributed RIs / networks

Energy for Sustainable Science at RIs

So far three workshops: a total of 32 (2011), 44 (2013) and 37 (2015) presentations and talks from international RIs, organisations and politics

"*Energy efficiency is a source of energy*"
(Antonio di Giulio – EC, 2015)

"Energy is one of the biggest issue for society. As scientists, we want to be part of the solution, not the problem"
(John Womersley – ESFRI Chair, 2015)

"The Research Infrastructures are very appropriate tools for addressing scientific issues to confront global Climate and Energy challenges."
(Catherine Césarsky - CEA, 2011)

"Increasing energy efficiency is a major goal"
(Beatrix Vierkorn-Rudolph - Federal Ministry of Education and Research, Germany, 2011)

Energy for Sustainable Science at RIs

- Workshop series represents a most important platform to bring all relevant stakeholders together
- Since 2011 we have collected best-practice examples on
  - Energy management
  - Energy efficiency, recovery, storage, quality
  - Sustainable technology development at RIs
  - Energy procurement schemes, innovative financing, government legislation
- We have also identified a number of problems, including non-scientific/sociological ones
  - Reluctance to add costs, complexity and risks to RI construction and management by introducing novel energy concepts
  - Reluctance of research ministries (Commissions) to address problems of another ministry (Commission)
- major knowledge pool to build up a systematic approach to energy at RIs

This workshop

- Is the fourth in the series, hosted by ELI-NP
- parallel and plenary talk structure
- Plenaries:
  - overview talks, political landscape etc.
  - foster cooperation with international labs, have representatives from China, Japan, MidEast
  - advanced energy technologies
  - …
- Parallel sessions focus
  - energy management at labs
  - energy efficiency, storage, new developments
- Total: 31 Talks

Goals of the workshop

- Create a regular forum and platform for all stakeholders
  - raise the necessary awareness on energy issues at RIs
  - exchange information, knowledge and share best practice
- Foster a continuous and close cooperation
  - identify key technological challenges
  - initiate joint projects and R&D for sustainable solutions

- Mobilize all relevant actors
  - discuss and identify appropriate opportunities for governments and EU actions towards a sustainable pathway for RIs, including access to funding
  - define strategies, policies and management practices to develop and implement sustainable solutions at RIs and to advance sustainability
  - encourage cooperation/coordination on national/EU/international level
  - facilitate strategic RI partnerships towards better effective energy management.

Longer-term Goals

- Take the next steps towards long-term vision
- Combine energy efficiency goals with the overall EU objectives for RIs (scientific excellence, innovation, access …) and making them an integral part to the long-term sustainability strategy for RIs
- "*There shall be no future research infrastructure without energy management and efficiency as part of the objectives*"

Finally …

Wishing you a successful workshop !

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Sustainability

- „**Sustainable development** meets the needs of the present without compromising the ability of future generations to meet their own needs.“

(Brundtland Commission, UN World Commission on Environment and Development 1987)

- Long-Term Sustainability of RIs (ESFRI Scripta Vol 2; Oct 2017)
  - Establish and maintain scientific excellence
  - Ensure RIs have the right people in the right place at the right time
  - Harmonise and integrate a vision for convergent operation of RIs and e-Infrastructure
  - Fully exploit the potential of RIs as innovation
  - effective means of determining and implementing economic and wider social value of RIs
  - effective governance and sustainable long-term funding for RIs
  - Foster broader coordination at National and European level