

# ESLS 2022

*European Synchrotron  
Light Source Workshop*



## Discussion on reliability and sustainability

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The European Synchrotron

# DISCUSSION ON RELIABILITY AND SUSTAINABILITY

- In Europe we all connected to the same electrical grid and the same suppliers... but the cost is largely different between the institutes....due to speculation... it is not politically normal
- Do you have strong requirement from management to reduce energy consumption ...ESRF yes but not touching user delivery, Elettra, Soleil, Astrid reduce US
- Reducing the research production by reducing the operation time is for me a negative approach. We are loosing our effectiveness. Next step would be to stop running facilities....
- Are your institute sensitive to energy sobriety or is it only the consequence of the high price of the energy? ... ESRF very recent sensitivity !
- Do you have a sustainability department and a sustainability manager ....ESRF no, DESY yes
- Do you include specifically sustainability in the call for tenders? ESRF no, but include efficiency for power sources
- For projects, it is now mandatory to include sustainability and societal approach ! Already include and effective for ESRF-EBS
- We had already strong constraints from Radioprotection to work efficiently (no beam if not needed), we have consequently adapted our work organisation ... which is then adapted and in line with energy saving.
- Long lifetime allows reduced injection and consequently energy saving. Frequent top-up is maybe not the best solution for the design of a machine.
- Damping wiggler is a solution to further reduce the emittance, but is the (small) gain compatible with sustainability?
- Do you have specific expertise in your lab related to sustainability .. ESRF: permanent magnet expertise development, SSA development
- Do you have a detailed analysis of your power consumption with remote access to data. Do you have a twin model for analysis?
- Do you manage heat waste (the only energy we can recuperate)?
- Are you taking care of equipment life cycle. Lifetime of a light source is only 20 or 30 years...

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ARW 2022: energy crisis or the end of the  
abundance age: SOLEIL situation



- Only 14 plants in total
- 2-3 plants provide 80% of supply
- Multiple supply disruptions
  - Gas leaks, fires and explosions
  - Sanctions against Russia



Due mainly to two major fires in **Russia** and the **USA**, helium production fell by between 30 and 50% at the beginning of the year. Annual demand is holding at around 3.7%. Asia is the main customer, especially for semiconductors.

- **Europe is therefore not a priority and is struggling to obtain volumes... Most gas manufacturers no longer supply either in liquid or in cylinders.**
- **Currently the U.S. and Qatar** generate most of the world's helium, but Russia is gearing up to be a major exporter. Some of the world's largest-known reserves of natural gas with high levels of helium are found in Siberia, where **Russian natural gas giant Gazprom is building a massive new production facility.** The complex of factories is set to go online next year.

# Helium Shortage

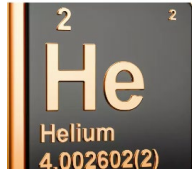


Explosion at Gazprom's Amur natural gas processing facility on 5th January 2022



Freeport's LNG facility in Texas June 2022





# Helium shortage

- The top producer is the United States, which runs the Federal Helium System, a massive reserve and enrichment facility in Amarillo, Texas.
  - shut down in July 2021 amid safety concerns
- Multi factors aggravating the Helium shortage
  - Supply chain is fragile and prone to shortages whenever production is disrupted.
  - Covid-19 crisis
  - Helium Stewardship Act of 2013" [1].
  - National defense, Semi-conductor Industry, Medical World.
  - Industrial disaster leading to major supply disruption
  - International context with the war in Ukraine
- **Impossibly for many labs to sign a contract for the year to come**
- Production boost in the coming months and years
  - Gazprom new massive production facility
  - Total Helium to Construct Helium Storage Cavern in the United States Nov 16, 2022
  - Production boost in Canada, Qatar, etc.
- **Expectation: Price inflation, price volatility, speculation**
  - **Helium will become much more expensive and a scarce resource for our facilities**



Federal Helium Reserve (FHR) in Amarillo, Texas