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Successful strategy development in Used Fuel Management: an industry perspective

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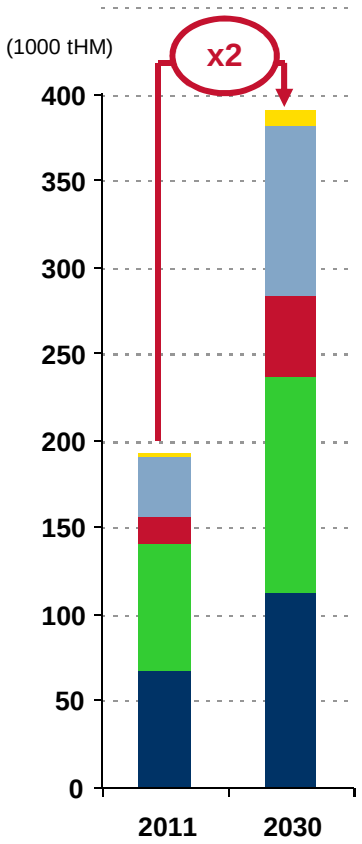
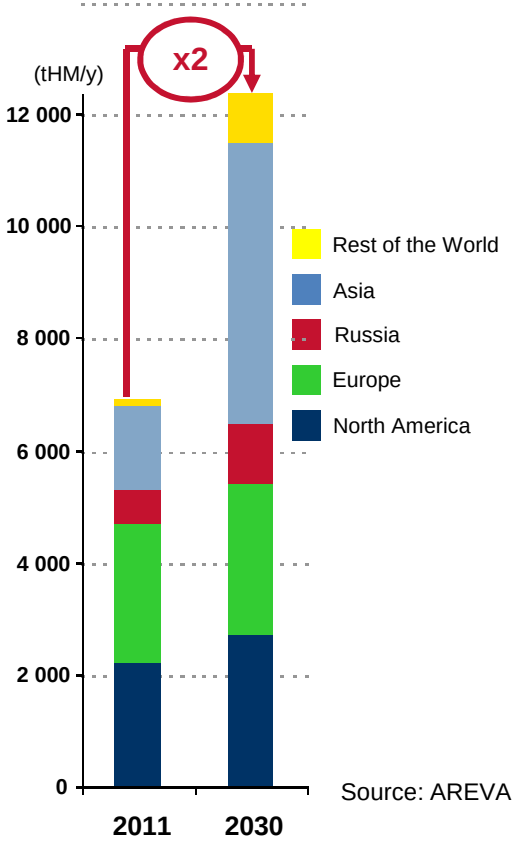
Global nuclear capacity is expected to increase by~+50% by 2030

Used fuel inventories



Annual unloading



Source: AREVA

Main drivers of used fuel management

Risk Reduction

- Non-proliferation & security
- Nuclear safety
- Environmental impact & footprint
- Public acceptance

Nuclear System Performance

- Increase energy independence
- Optimize cost of nuclear electricity
- Preserve natural resources
- Minimize waste generated

Optimizing the fuel cycle will become even more crucial to ensure the sustainable growth of nuclear energy

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Setting up a deep geological disposal repository is a long term project

		Start of Research	License to build application	Foreseen Start of operations	Corresponding Electricity output TWh	Status/ comments
Closed cycle		1982	2032	>2050	1860	Under discussion
		1991	2017	2025	18 000	Siting in progress Research to operation cycle > 35 years
		2002	2020	2036	16 400	Under discussion
Open & Closed cycle		2008	2026	>2050	1 300	Siting under discussion
Open cycle		1982	2008	2048	Project stopped by the Obama administration in 2010	Research to operation cycle >50 years
		1995	2012	2021	2 900	Building authorisation expected in 2015
		1980	2010	2025	-	Application submitted – criticality safety concerns to be addressed

Deep geological disposal repository remains a scarce resource

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Henri Zaccai, Vice President, International Development, AREVA and
Chairman of the Sustainable Used Fuel Management Working Group, World Nuclear Association

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How is industry developing a successful strategy?

The industry aims to enhance global used fuel management.
Industry strategy is to:

- **Share and promote** sound, safe, sustainable and proliferation-proof used fuel management
- **Gather the views** of the nuclear industry and stakeholders (including newcomers) on the back-end of the fuel cycle and consider how the industry can best respond to these needs
- Explain how used fuel management **could further contribute to the sustainability of nuclear energy**

Perpetual storage of Used Fuel and Waste **infringe** one of the nine principles set forth in the Safety Fundamentals approved by the IAEA's Board of Governors in September 2006.

Industry response: the WNA Working Group on Sustainable Used Fuel Management

A new **Working Group** within the World Nuclear Association:

Providing the nuclear industry with a regular forum to discuss the achievements, best practices and challenges surrounding the sustainable management of used nuclear fuel.

The Working Group is designed to support industrial approaches to

- Create a **sound framework with available industrial solutions** with the view to avoid “Wait & See” strategies which create an unresolved issue in the long term
- Share and promote among members **good practices** on all approaches to the SUFM.
- Encourage national efforts and international collaboration on the R&D **of advanced nuclear reactor and fuel cycle technologies**

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Achievements to date

Working Group established April 2013

Comprehensive membership of the Group including Europe, Russia, Asia and North America

As of today, the Working Group has achieved the following:

* **Definition** of a Sustainable Used Fuel management
* Identification of:
  - **Key messages** and best practices
  - **Key success factors**
* **Used Nuclear Fuel report**

* Others:
  - Relationships with **IAEA**
  - First survey launched on **current practises**
  - **Country views** presented (Russia, Japan, US (EPRI), France, Sweden, The Netherlands, Finland, India,…)

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The Industry's definition of sustainable (1/2)

A used fuel management is a **Sustainable Option** if it meets to the following key criteria:

- It covers **all the steps** of used fuel management from the generation of used fuel up to and including final disposal in accordance with a well-defined practical plan
- It proves **to be feasible** with a sustainable impact level
- It includes a **realistic financing plan**
- It is able to demonstrate to a practicable extent that it is **technically and economically viable**
- It protects **human health and the environment** and has no greater impact on the health of future generations than is allowed today
- It answers to a present need but does not impose burdens on **future generations**

Due to the long-term nature of these management plans, a sustainable option could have one or more pre-defined milestones where a decision could be taken on which option to proceed with.

Example of options

Recycling (closed cycle)

- Interim (wet or dry) storage of the used fuel, if any
- Treatment of the used fuel and recycling of reusable materials in outlets
- Storage of the vitrified and compacted waste (flexibility on the storage period)
- Final disposal of the waste

Conditioning or Packaging (open cycle)

- Interim storage (wet or dry) of the used fuel, if any
- Conditioning or packaging of the used fuel
- Aging management to assure sustainability of storage methods
- Final disposal of the conditioned or packaged used fuel

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Key messages

Working Group **key messages** will be targeted at various different stakeholders

Key Messages will include industry views on:

- **Definition** of a Sustainable UFM
  - See Definition as endorsed by the WG
- The **characteristics** of used fuel
  - Quantitative data (What are we talking about?)
- **Strategic requirements** on UFM
  - One possible reference: EU Directive of 07/2011
- **Vision** of used fuel management inside the nuclear fuel cycle
- **Regional repository**
- **The funding**

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Key success factors

* **Defined roadmap** till and including Final Disposal

* **Site selection**

* Secure **funding**

* **Public acceptance**

Working with international organisations such as the IAEA

Established effective relationships with the IAEA through participation:

- In technical meetings
- In technical workshops
- In conferences

The Working Group aims to share industry views with other international bodies to

- Promote SUFM towards the main players among the nuclear international bodies
- Review any new initiatives in connection with Used Fuel Management
- Maintain or, if needed, develop active participation in the IAEA, OECD/NEA and other International or key Organizations

The Survey

The WG performed an industry-wide survey in 2013/14 which looked at

- current policy practises
- current discourse
- current regulations
- what industry would like to see in future

The responses will feed into the Used Fuel Management Report and a further survey will be issued to gather further quantitative and qualitative data.

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The Action plan
Used Fuel Management Report

* The objective is to have an overview and a shared vision of the **used fuel management perspectives worldwide for the next 20 years** (as per the World Nuclear Fuel Report)

* The perspective will cover
  - Assumptions on the used fuel discharged on a yearly basis
  - Make assumptions on the way the used fuel are managed
  - Assess the sustainability of such management
  - All fuel dischared including LWR, VVER and CANDU

* This will allow WNA be able to contribute to
  Communcation plan
  The sustainability of the used fuel management

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The Action plan
Used Fuel Management Report

The Report will examine:

- Forecasts for yearly used fuel unloadings across all civilian reactor types
- Storage: wet and dry, and on- and off-site options
- The reprocessing of used fuel
- Other management options, both long and short term solutions. The report will evaluate the sustainability of these options according to our agreed industry definition
- The prospects for final disposal

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Thank you for your attention