



# NUGENIA-present & future

## (November 2017 – JOPRAD Workshop Prague)

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International association dedicated to  
**safe, reliable and competitive nuclear**  
energy technology

Nuclear Decommissioning & Waste Management Summit 2016

Presented by Anthony Banford, on behalf of Technical Area 5b – Waste Management and Decommissioning

NUGENIA is mandated by SNETP to coordinate  
nuclear Generation II & III R&D



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# What is NUGENIA?



- NUGENIA is an **international non-profit association** founded under Belgian legislation in November 2011 and launched in March 2012
- Its **mission** is to be an integrated framework for **safe, reliable and competitive Gen II & III fission technologies**, which:
  - Fosters collaboration between industry, SMEs, RTOs, academia and technical safety organisations
  - Builds knowledge and expertise
  - Generates results with added value



# NUGENIA operates under the mandate of SNETP since 2012



***Brussels, 21 March 2012: Signature of the mandate***

***Brussels , 18 March 2015: Mandate renewal for 3 years***

[www.nugenia.org](http://www.nugenia.org)

# Overall NUGENIA objectives



- Facilitate the emergence of innovation
- Achieve projects with high added value to the community,
- Maintain and develop the needed skills, competences and infrastructures to tackle the upcoming challenges (LTO, new build, dismantling..)
- Strengthen the involvement of NUGENIA-bodies in the decision making process to:
  - Prioritize the project topics;
  - Valorize the R&D results;
  - Increase the visibility of NUGENIA;
  - Establish balanced collaboration with international organisations;
  - Harmonize public and private R&D programming

# Development route



- **2006-2010: building the bricks**
  - Development of several networks addressing different aspects of Gen II & III research: NULIFE, SARNET, SNETP Gen II/III TWG, ENIQ
- **2011: the consolidation process**
  - **Integration between TWG Gen II& III and NULIFE**
  - **Legal establishment of NUGENIA** with **7** initial members
- **2012: the birth of NUGENIA**
  - **Official launch and First General Assembly**
  - Signature of mandate from SNETP to NUGENIA
  - First NUGENIA Plenary (NUGENIA Forum) meeting
- **2013: NUGENIA matures**
  - NUGENIA open innovation platform (NOIP) launched
  - October: NUGENIA Roadmap published
  - NUGENIA becomes international: 3 non-European members from Russia and South Korea
- **2014 to date : NUGENIA growth and strengthening**

# Development route



## ■ 2015: NUGENIA strengthening

- **January/February: Independent evaluation** and negotiation **NUGENIA pilot** projects (14 out of 29 proposals);
- **March: Nuclear Days 2015** in Brussels – the Stakeholders conference and the 4th General Assembly;
- **April:** Fourth Annual Forum in Ljubljana (**kick off the 14 pilot R&D projects**)
- **April:** Publication of NUGENIA “**GLOBAL VISION**”
- **May:** NUGENIA labelled projects cofunded by Euratom H2020 are being launched (SOTERIA, FASTNET, IVMR, INCEFA Plus, ANNETTE)
- **June:** Call **for Mobility grants** for visiting “NUGENIA community infrastructures”
- **September:** NUGENIA signed with **IAEA practical arrangement** to foster future scientific and technical collaboration
- **October:** launch of NUGENIA **monitoring platform** that facilitates monitoring of deliverables and milestones of projects in the NUGENIA portfolio
- **October:** launch of the NUGENIA **Funding Watch Dashboard** mapping relevant financing opportunities for project ideas
- **November:** NUGENIA **Coordinators Day** allowed for sharing experience in R&D project preparation between experienced and junior project managers
- **December:** NUGENIA was **shortlisted** as one of the PIME 2016 Award candidates

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# Development route



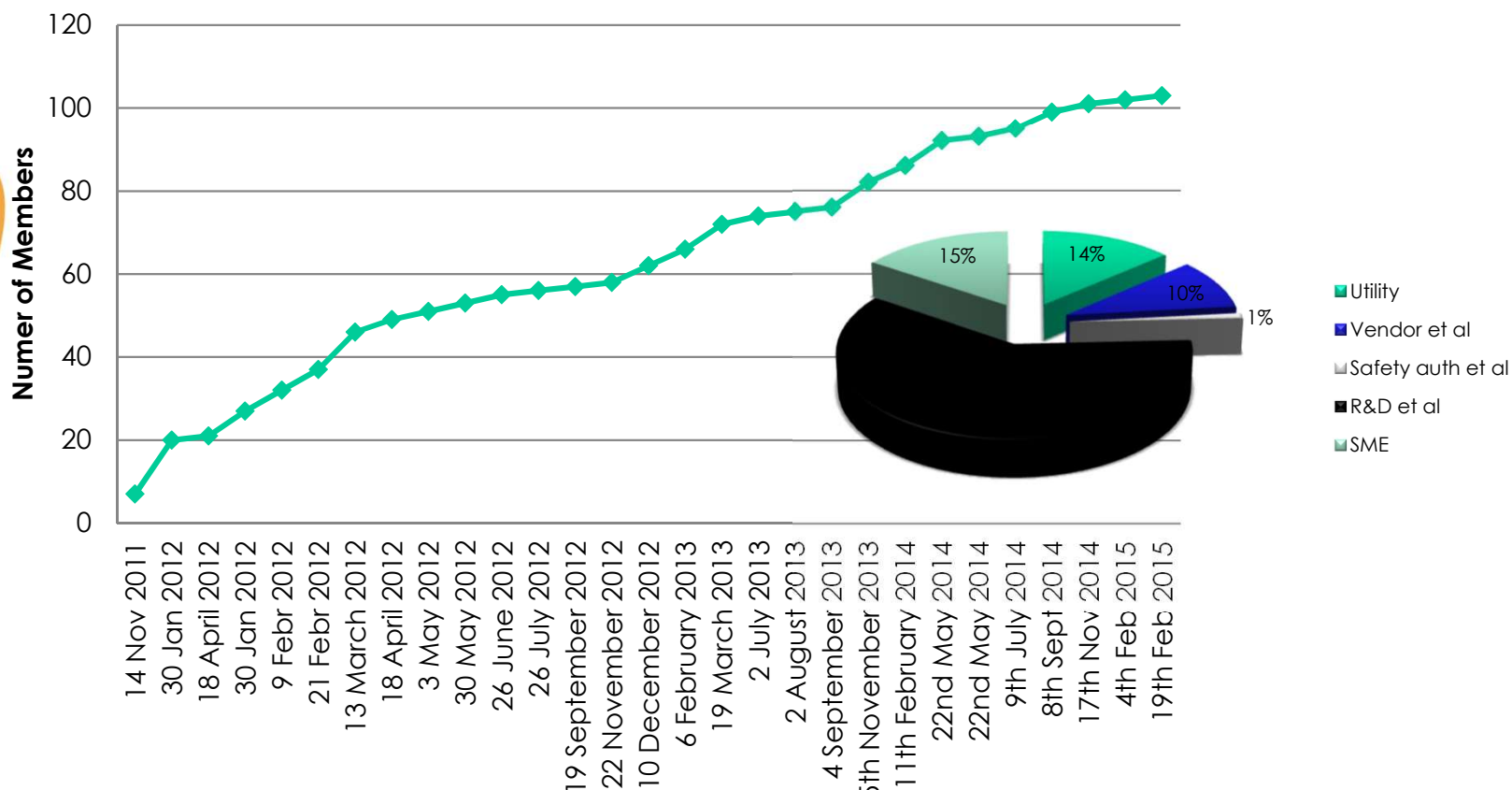
- **2016: NUGENIA anchorage in the landscape**
  - **January: Publication of the SNETP deployment strategy**
  - **April: 5th annual Forum 2016** at Marseille / France, in collaboration with the Jules Horowitz Reactor consortium (more than 220 delegates)
  - **May: Open Academia day 2016**, within NESTet conference in close collaboration with EHRO-N, ENEN, SNETP ETKM, IAEA NKM, GENTLE and other partners
  - **June: Open SME day** in conjunction with the Word Nuclear Exhibition (Paris/France)
  - **August: final seminar FP7-NUGENIA+ project**, Helsinki
  - **September: Strengthening Excellence in NPP Operations™ and 2d stakeholder conference:** side event at the 60<sup>th</sup> IAEA general conference
  - **Nov'2016: Nuclear Days:** together with SNETP ()



# Membership Development (Full Members-since the launch)



Membership development (full members)



**Industry (Utility, vendor, suppliers, etc.) : 9 EU countries + China + Switzerland**

**SMEs : 9 EU countries + Ukraine**

**R&D : 15 EU countries + Canada, Japan, Russia, Republic of South Korea, Switzerland**

**Academia: 9 EU countries + Republic of South Korea**

# Who is NUGENIA today?



## ■ Members: major nuclear stakeholders

- 106 full members and 7 honorary members from 24 countries (as of Oct 2015): Industry, utilities, research institutions, SMEs and technical safety organisations



## ■ Honorary Members



# NUGENIA activities:

## Since March 2015



- **NUGENIA and IAEA signed a practical arrangement (for next 3 years) on 16 September 2015 in Vienna**
- The Signatory ceremony was organised as side event at the IAEA general conference, to foster future scientific and technical collaboration in the area of safe, reliable and competitive operation and construction of nuclear power plants.

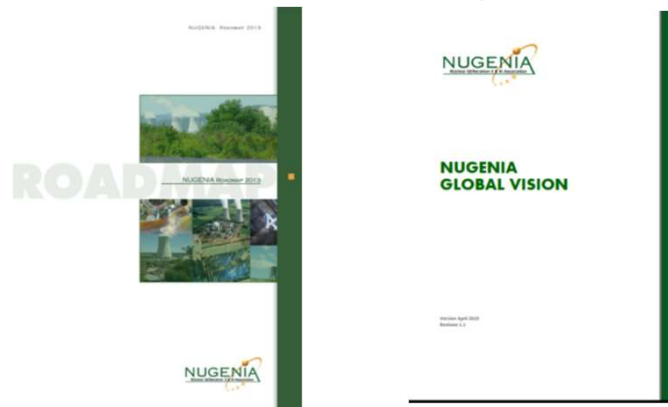


# Technical Scope: 8 Technical Areas (TAs)



1. Plant Safety and Risk
  2. Severe Accidents
  3. Improved Reactor Operation
  4. Integrity of Systems, Structures and Component
  5. **Fuel Development, Waste & Spent Fuel Management and Decommissioning**
  6. Innovative LWR Design & Technology
  7. **Harmonisation**
  8. **In-Service Inspection and Qualification**
- } **Cross Cutting areas**

*In addition to the Roadmap, October 2013, NUGENIA Global vision has been published on April 2015*



# NUGENIA Project portfolio



- **In total over 30 finished or running projects**
- **2012-2014:** 17 collaborative projects with a total budget ~80M€
  - TA1: 2 projects running
  - TA2: 1 finished and 3 on-going
  - TA3: 1 finished
  - TA4: 6 finished and 5 on going
- **2015:** 19 collaborative projects have been launched (14 in the framework of NUGENIA +) with a total budget of 39M€
  - TA1: 5 , TA2: 2, TA3: 1, TA4: 6, TA5: 1; TA6: 2, TA8: 2

**Funding:** 60% from private and national sources while 40 % from the EC-Euratom mainly



# NUGENIA+: outcome



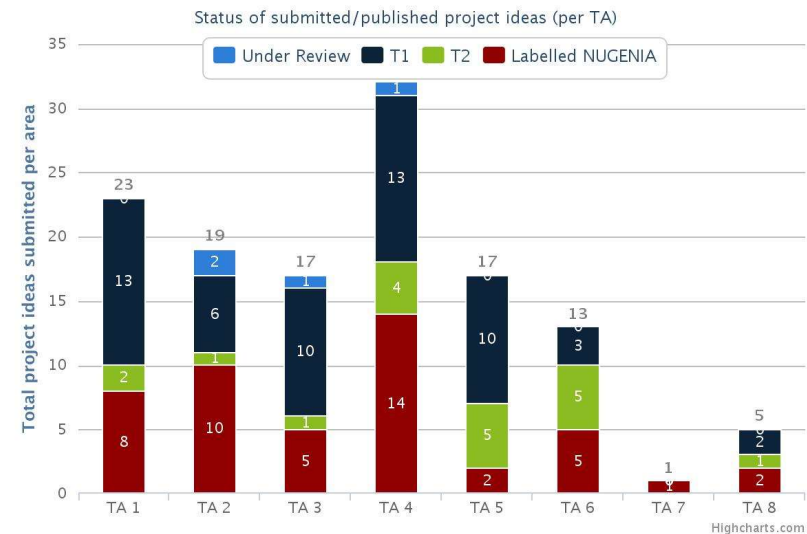
- Confirmation of the association organisation as appropriate to foster R&D collaboration
- Establishment of a transparent open-innovation process: NUGENIA facilitates the bottom-up emergence of projects within the roadmap
- Labelisation of projects with added value(s) to the end users
- Monitoring and valorisation platform of project's results
- Definition of annual work plans setting priorities, involving public authorities and private organisations
- Scheme to increase public awareness and implication
- Strong involvement of utilities, vendors, suppliers, safety, R&D centres, academia and SMEs
- Balanced cooperation with European/ International counterparts

# NUGENIA Project ideas

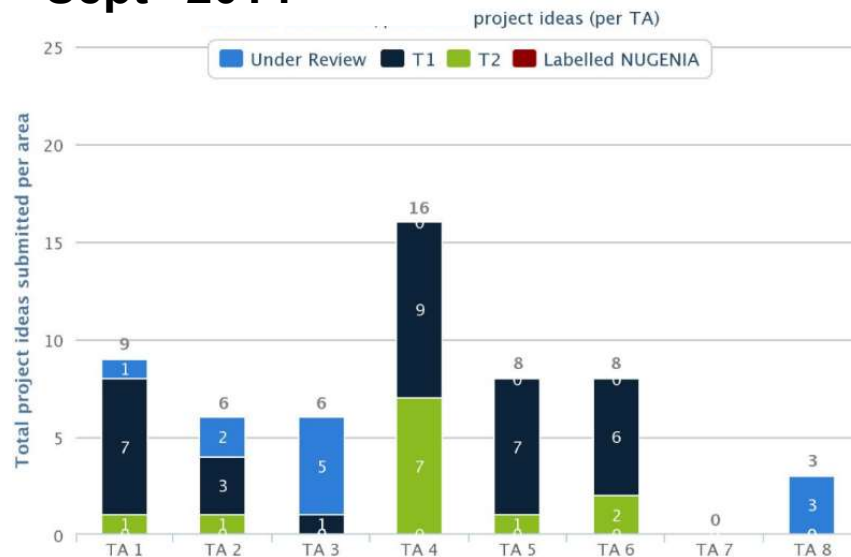



- NUGENIA Open Innovation Platform (NOIP) allowed identification of more than 140 project ideas (more than 1000 users)
- 47 project ideas labelled since May 2014

Sept' 2016



Sept' 2014





# NUGENIA within the SNETP deployment strategy

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peak of activity

[illegible]



# TOWARDS THE FUTURE

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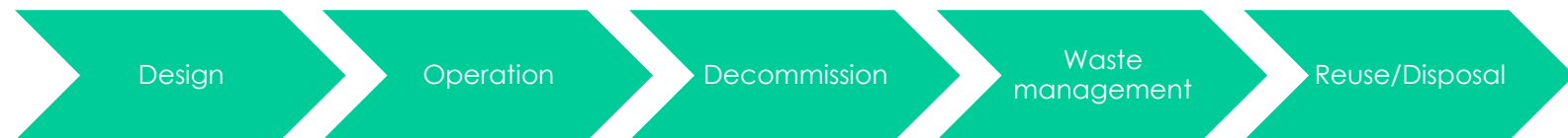
## Emergence of Waste Management and Decommissioning in Technical Area 5

- **Development of a waste management and decommissioning strategic research agenda through:**
  - Workshops 2014 and 2015 to develop the roadmap
  - Engaged utilities, research organizations, supply chain and academia from the Nugenia community
  - Identified technical focus areas
- **Technical focus areas include:**
  - Waste characterization,
  - Waste reduction, treatment, storage and disposability
  - Asset management
  - Decommissioning planning
  - Post operation phase or POCO
  - Decontamination and dismantling including remote ops
  - Effluent treatment and land remediation

# Mind the operation – waste management gap !



**A holistic life-cycle approach is needed to drive safety, efficiency and sustainability**



**International collaboration will drive innovation**

## Towards better integration of innovation

- **Integration of SME and Start-up's in collaborative R&D projects:**
  - Set up of an open innovation platform to facilitate the link
  - Set up a close collaboration with WNA, FORATOM... to enhance the integration of innovation
  
- **Decrease time to market through dedicated R&D:**
  - Support the qualification and the standardization of innovation
  - Active participation to the harmonization in Europe

# In general



- Prepare the **next generation** of researchers and engineers
- Future **structuring** within public-private (PPP) and/or public-public partnerships (P2P)
- Play a **driving role** in the implementation of **H2020/SETPLAN** objectives (**EJP?,...?**)
- Increase the **integration of innovation** (shorten the time to market through R&D)
- Development of methodologies to increase **public engagement**
- **Yes we can do it, provided the continuous support of the Stakeholders, the EC and our international partners**

# Conclusions:



## NUGENIA has achieved:

- Strong **involvement** of utilities, vendors, suppliers, safety and R&D
- Annual **work plans** setting priorities, involving public authorities and private organisations
- A transparent **open-innovation process**: NUGENIA facilitates the bottom-up emergence of projects within the roadmap
- Balanced cooperation with **international counterparts**

## ...still to do:

- Prepare the **next generation** of researchers and engineers
- Future **structuring** within public-private (PPP) and/or public-public partnerships (P2P)
- Play a **driving role** in the implementation of **H2020/SETPLAN** objectives
- Increase the **integration of innovation** (shorten the time to market through R&D)
- Development of Concordat through **public engagement**

## ...waste management and decommissioning:

- Increase engagement, collaboration and innovation

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**Thank you for your attention**

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# NUGENIA Portfolio

## Example projects

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# **NUGENIA Projects (1/3)**

launched in 2015



**INCEFA-Plus : INcreasing Safety in NPPs by Covering gaps in Environmental Fatigue Assessment**

**IVMR : In-Vessel Melt Retention Severe Accident Management Strategy for Existing and Future NPPs**

**SOTERIA : Safe long term operation of light water reactors based on improved understanding of radiation effects in nuclear structural materials**

**FASTNET : FAST Nuclear Emergency Tools (FASTNET)**

**MAPAID: Modelling and Application of Phased Array ultrasonic Inspection of Dissimilar metal welds**

**ASATAR: Development and Analysis of the Suitability of Accelerated Testing methods for Assessing the long term Reliability of Environmentally assisted cracking of nuclear components**

# **NUGENIA Projects (2/3)**

**launched in 2015**



**McSCAMP: Minimising nuclear component Stress Corrosion Cracking (SCC) through Advanced Machining Parameters**

**PowderWay : Roadmap for powder metallurgy applications for nuclear components**

**SPRINT: Spark Plasma sintering Research In Nuclear Technology**

**AIR-SFP: Spent Fuel Pool behaviour in loss of cooling or loss of coolant accidents**

**APLUS: Development of Standard Protocols for the Analysis of Atom Probe Data to support Improved Modelling & Mechanistic Understanding of Radiation Damage in LWRs**

**DEFI-PROSAFE: DEFInition of reference case studies for harmonized PRObabilistic evaluation of SAFETy margins in integrity assessment for long-term operation of reactor pressure vessel**

# **NUGENIA Projects (3/3)**

**launched in 2015**



**LOSSVAR: Assessing effect of LOcal SubSoil VARIability and Uncertainty in soil-structure interaction**

**SPH-2PHASEFLOW: Simulation of two-phase flow patterns with a new approach based on Smoothed Particle Hydrodynamics**

**INTEGRID: Impact of New Technologies and GRId codes on the local Distribution network of nuclear power plants**

**AGE60+: Applicability of ageing related data bases and methodologies for ensuring safe operation of LWR beyond 60 years**

**MICRIN+ : Mitigation of CRack Initiation**

**REDUCE: Justification of Risk Reduction through In-Service Inspection**

**ESSANUF : European Supply of SAfe NUClear Fuel**