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Results of surveys of the Supply of and Demand for Nuclear Experts within the EU-28 Civil Nuclear Energy Sector

An EHRO-N Report

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Abstract

Today, more than 25% of electricity power in the European Union is produced by the nuclear energy sector. This corresponds to more than 50% of EU's low carbon electricity.

The EU's Energy Strategy Plan foresees that nuclear energy will remain an important factor of the EU's energy mix until 2050 – and even beyond. The EU promotes the highest safety standards for all types of civilian nuclear activity, including the Nuclear Energy Sector. Having sufficient skilled and trained Human Respources (HR) is an important component for ensuring safe operation nuclear power plants.

The objective of EHRO-N is to develop strategic plans addressing potential human resource and skills gaps in the EU nuclear sector. Initial studies have already triggered several new education and training initiatives in the Member States and at EU level.

The report presents the results from two stakeholder surveys performed in 2018; one with the higher education institutions (HR supply side) and one from nuclear stakeholders (HR demand side). When possible the report makes comparisons with data from the previous EHRO-N surveys in 2010 and 2014. Finally, the report proposes a way forward for a more robust methodology to assess the nuclear workforce in the sector

1 Introduction

In 2007 the European Nuclear Energy Forum (ENEF), an initiative of the European Commission, was launched to discuss on transparency, opportunities and risks of nuclear energy. As a recommendation from the ENEF working group on "risk" and follow-up of several EU Council decisions addressing to face the rising scarcity of adequate skilled professional resources for the nuclear energy sector, the European Human Resources Observatory for the Nuclear Energy Sector was set up in 2008 to observe and monitor the nuclear human resource in the European Union.

The Joint Research Centre was appointed as the Operating Agent, responsible for the support and execution of the tasks under the general direction of the Senior Advisory Group, which is composed by high-level experts representing different types of nuclear stakeholders coming from EU Member States.

The mission of EHRO-N is to provide qualified data on human resources needs in the nuclear field within the European Union and high-level expert recommendations on EU-wide nuclear Education and Training action, thus promoting lifelong learning and cross border mobility.

The objective is to produce a regular updates of a quality-assured analysis on the short, medium and long-term needs of human resources for the nuclear energy sector and analyse the gaps and deficiencies in the European nuclear education and training in order to elaborate recommendations, in close cooperation with other relevant actors in the area.

The civil nuclear energy sector in EU currently employs around 500,000 people, including those working in the supply chain. It is estimated that Nuclear Experts with formal education in the nuclear field represent 16 %, other nuclearized graduates, engineers and technical staff amounts to 74% and other (nuclear aware) support staff amounts to 10% of the total work force.

Nuclear Experts are the core experts, mainly nuclear scientists and nuclear engineers, needed to adequately and successfully perform nuclear projects in a nuclear organisation. For the purpose of this report is Nuclear Experts defined as those nuclear engineers, nuclear physicists, nuclear chemists, etc. that have a formal nuclear education background (bachelor, master, PhD). Some Technicians (see the definition below) have acquired the appropriate competences through thorough nuclear training and professional experience and fall under this category but are, strictly speaking, part of another category with its own specificities.

2010 Survey: In 2012 the European Human Resources Observatory for the Nuclear Energy Sector (EHRO-N) released its first bottom-up report analysing how the supply of Nuclear Experts responds to the demand of the same experts in the nuclear energy sector within EU-27. The analysis was based on data from 2 surveys collected from spring 2010 until spring 2011.

2014 Survey: In 2014 EHRO-N published a second bottom-up report taken into account the effects following the Fukushima-Daiichi disaster, which affected public opinion in relation to nuclear energy exploitation, leading some member states to gradually phase out nuclear energy, decreasing interest in nuclear studies and even abandoning of nuclear education at some faculties.

2018 Survey: In 2018 EHRO-N launched two new surveys; one to higher education institution (supply side) and one to nuclear stakeholders (demand side) in the nuclear energy sector. The surveys were extended to cover data on gender balance and workforce needs for decommissioning of nuclear facilities and plants. This report provides the results from the two surveys and compares the data with the previous two reports.

2 Survey methodology and limitations

The supply and demand surveys from 2010 and from 2014 were repeated in 2018 with various extension of the scope in the questionnaires. The methodology according to which data was gathered and analysed followed the following principle:

1. Review and establish a list of relevant stakeholders,
2. Review and develop the survey questions,
3. Conduct the survey. (Questionnaires were transmitted to stakeholders by e-mail and the responses were collected by phone),
4. Analysis of received data,
5. Putting the results in perspective by comparing data with previous surveys and other relevant data.

2.1 Survey for higher education institutions – supply side

The 2018 survey for the higher education institutions was submitted to 90 institutions. The list was based on institutions invited to participate in the previous surveys.

The survey contained the following questions in relation to bachelor (EQF 6), master (EQF 7) and PhD (EQF 8) level nuclear students:

1. Number of students enrolled for the academic year 2017-18
2. Number of students graduated in 2017
3. Number of visiting students (ERASMUS+, from outside EU, etc.) enrolled for the academic year 2017-18

The institutions were in addition requested to provide numbers of male and female students and graduates. The questionnaire is available in annex 1.

In total 36 higher education institutions responded to the survey which corresponds to a response rate of 40%. In comparison the response rates were 90% in the 2010 survey and 15% in the 2014 survey.

2.2 Survey for nuclear stakeholders – demand side

The 2018 survey for the nuclear stakeholders was submitted to 308 companies and organisations. The list of stakeholders was based on a list of organisation from previous surveys.

The survey contained the following questions from the previous surveys; type of organisation, number of Nuclear Experts and their age span. The stakeholders in the 2018 survey were requested the following additional information in comparison with previous surveys:

- to report number of nuclearized staff (no formal nuclear education) and administrative staff,
- Education level of nuclear staff (Nuclear Experts and nuclearized),
- Gender balance,
- Business situation the last 2 years (recruited and departed staff),
- Number of staff in employed in nuclear decommissioning projects and predictions for staff needs in 2025 and 2030,

- Most wanted position in case of enlargement of business,
- Position most likely to be dropped in case of cutback

The full survey is available in annex 3.

Altogether 119 nuclear stakeholders responded to the survey which corresponds to a response rate of 38%. In comparison the response rates were 68% in the 2010 survey and 30% in the 2014 survey.

2.3 Limitations of methodology

The main limitations related to the above methodology were:

Supply side:

- The lists of Higher Education Institutions offering nuclear engineering and nuclear energy related studies might not be complete and only 40% of the invited Institutions participated.
- The benchmarking of the data from Higher Education Institutions has proved difficult due to lack of a central source of information on national level against which received data could be checked.
- Higher Education Institutions reported 3.5 times more new enrolled students than graduated students. It is assumed that several institutions have reported the total enrolled students.

Demand side:

- The list of Nuclear Stakeholders from the demand side might not encompass the totality of all organisations actually involved in the nuclear energy in the EU-28. It is especially difficult as a significant number of subcontracting companies operate in the nuclear energy sector.
- There seems to be a certain understanding of what a “Nuclear Expert” is, but when it gets down to numerically defining the term, the definition loses clarity as some organisations may refer to the term differently. Thus, the definition and interpretation of a Nuclear Expert” is limited to this report.

3 Data received from Higher Education Institutions

3.1 New enrolled nuclear students

Figure 1 shows the number of new students enrolled in nuclear engineering and nuclear energy studies at level EQF 6 (BSc), EQF 7 (MSc) and EQF 8 (PhD) in the academic year 2017-18.The total number of new students reported in the survey is 7181 which is much higher than for previous surveys. It could be explained by that the institution have reported all enrolled student rather than the new enrolled students. This is supported by the fact that the number of reported new students is 3.5 times higher than the number of graduated students. However, it has not been possible to cross check this assumption with information from other sources. The available data from the current and previous surveys does not allow identifying trends in number of nuclear students. It has further been difficult to find sufficient national data on new nuclear students to compare the data from the survey against.

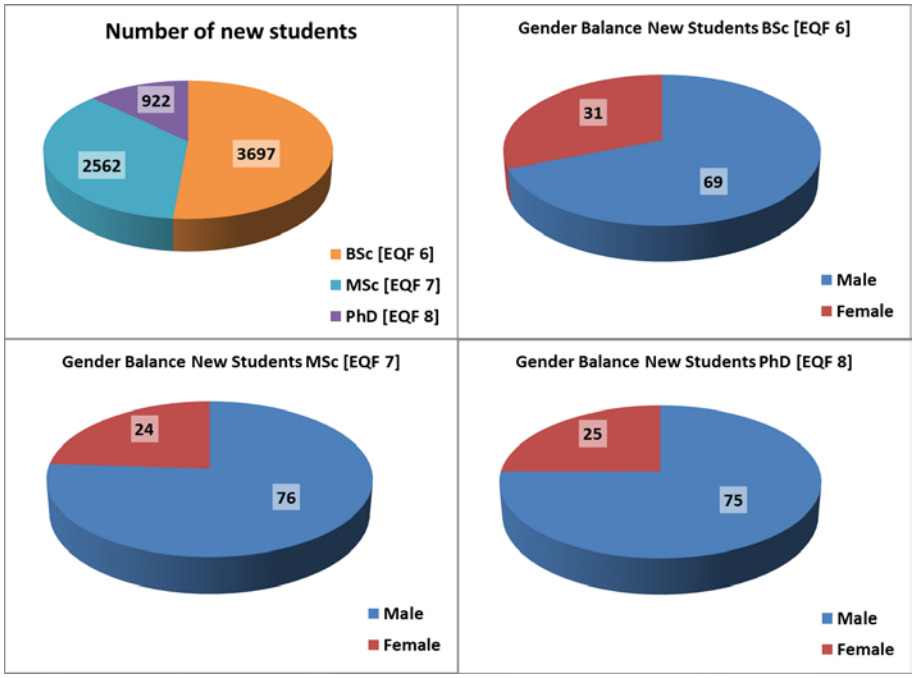

Figure 1 Number of new students enrolled in nuclear engineering and nuclear energy studies in 2017-18 and the gender balance between the students and education level.

The figure also shows the gender balance for the different education levels and shows that 31% of new student for EQF 6 (BSc) is female and about one quarter for EQF 7 (MSc) and EQF 8 (PhD) for new nuclear students.

The survey also included data for visiting nuclear students following e.g. ERASMUS+ programme and visiting students from outside EU. Figure 2 shows that the received data in relation to gender balance for visiting students with 38% females for EFQ 6, 36% for EFQ 7 and 45% for EFQ8. This shows number of female nuclear student amongst visiting students higher than for the overall number of nuclear students.

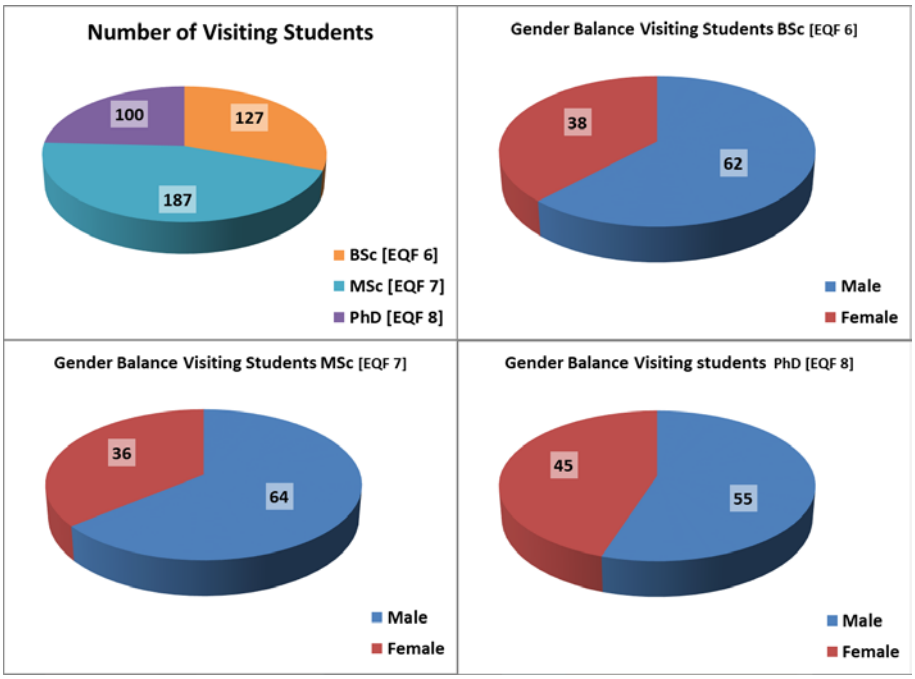

Figure 2 Number of visiting students (e.g. ERASMUS+ and non-EU students) enrolled in nuclear engineering and nuclear energy studies in 2017-18 and the gender balance between the students and education level.

3.2 Graduated Nuclear Students

Figure 3 shows the reported number of graduates in nuclear engineering and nuclear energy studies in 2017 and the gender balance between the students in the different education levels. It should be noted that in some countries is it not possible to complete Bachelor of Science in nuclear engineering or nuclear energy as the specialisation in nuclear subjects will only take place in the EQF 7 and EQF 8 level.

The figure shows that 34 % of new graduate EQF6 (BSc) students are female and about one quarter for EQF 7 (MSc) and for EQF 8 (PhD). This balance is comparable with the number of new enrolled students.

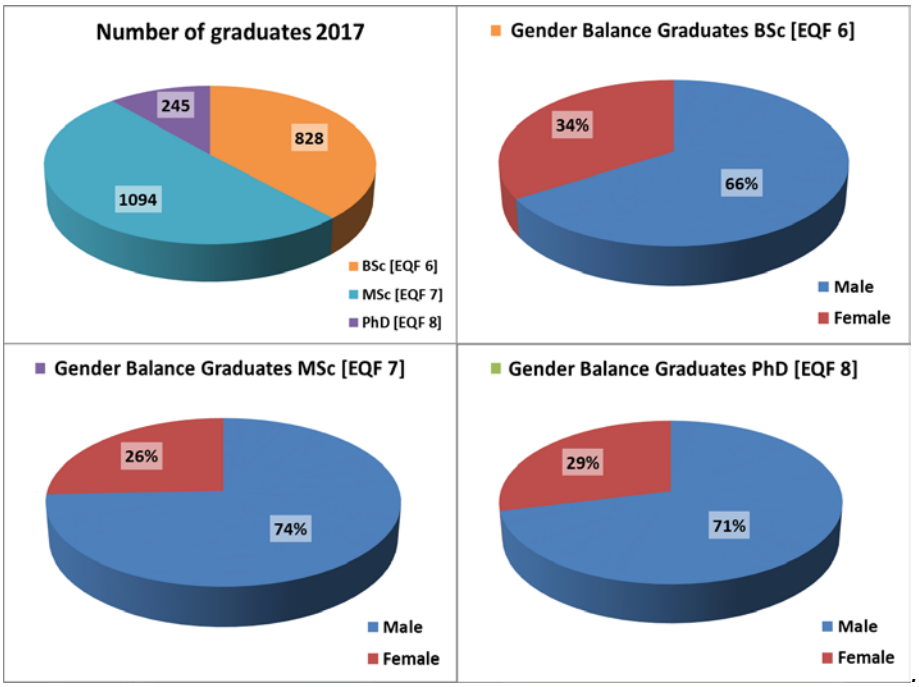

Figure 3 Number of graduates in nuclear engineering and nuclear energy studies in 2017 and the gender balance between the students and education level.

The total number of graduates in 2017 reported in the survey is 2167. In comparison the number of graduates was 2833 in 2010 survey and 707 in the 2014 survey. The available data from the current and previous surveys does not allow identifying trends in number of graduated nuclear students. It has further been difficult to find national or European data on graduated nuclear students to compare the data from the survey against.

4 Data received from Nuclear Stakeholders

119 of the 308 invited nuclear stakeholder organisations participated in the 2018 survey. They reported a total of 16.119 nuclear staff of which 6.949 was reported as Nuclear Experts, 5.198 as nuclearized STEM professionals and 3.972 as nuclear administrative staff. In comparison the number of reported Nuclear Experts (including benchmarking) was 77.605 in the 2010 survey and 17.342 in the 2014 survey.

4.1 Age distribution Nuclear Experts

The reported age distribution for Nuclear Experts in all 3 surveys is shown in figure 4. The figure shows that the age category between 45 and 55 years has been the most numerous in all 3 surveys. The two Nuclear Experts groups "between 45 and 55" and "above 55" amounted in 2010 to just above 50% and in 2014 these groups amounted to 52% and they have increase to 56% in 2018. This suggests that that there still is a strong need in for additional Nuclear Experts in the next decades to replace the aging workforce in the EU-28.

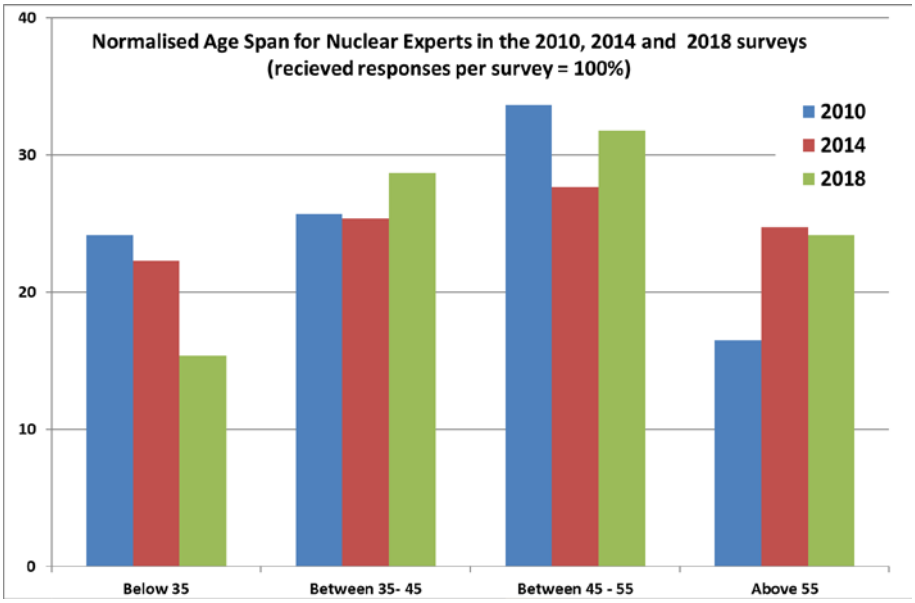

Figure 4 Normalised age span distribution for Nuclear Experts reported in the 2010, 2014 and in the 2018 surveys

4.2 Nuclear staff categories and gender balance

The first survey report (putting into perspective 2010) suggest that the nuclear workforce could be divided in the following way

16% Nuclear Experts

74% Nuclearized staff (STEM professionals and other graduates)

10% Support and administrative staff

Figure 5 shows the distribution of staff in the different staff categories reported in the 2018 survey. The received data indicate that group of Nuclear Experts in the nuclear workforce could be much larger than the estimated 16% in the 2010 report. The group of support and administrative staff (25%) are also larger than suggested by the 2010

report. It should be noted that the response rate to the 2010 survey was much higher than to the 2018 survey.

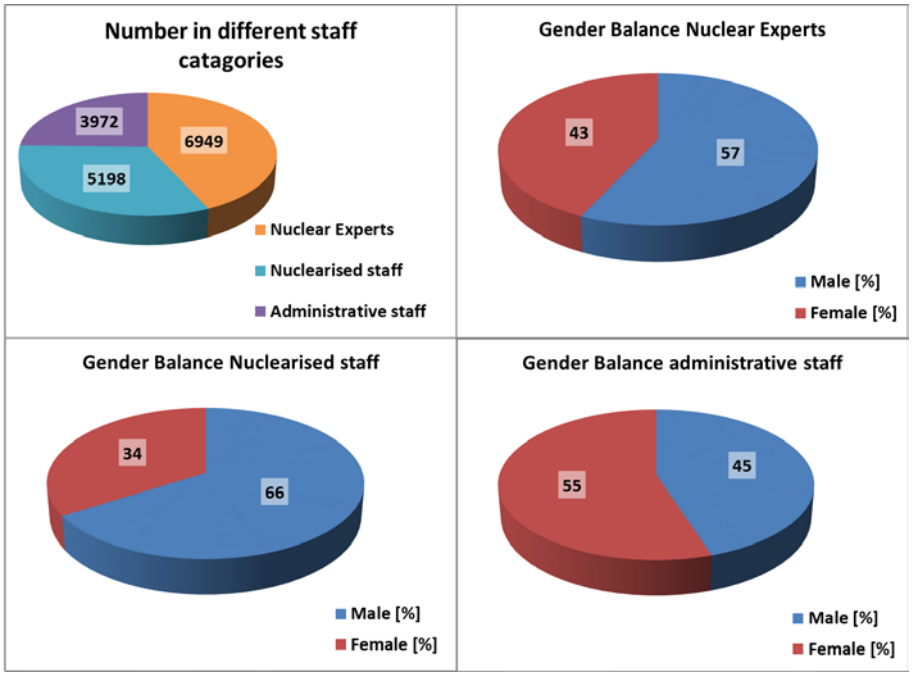

Figure 5 Number of staff in the different staff categories and the gender balance for each category.

The figure also shows that gender balance is better for Nuclear Experts (43% female) than for nuclearized staff (34%). The relative high numbers female among Nuclear Experts are especially noteworthy as the number female graduates in nuclear areas only range from 26 to 34%. The figure also shows that the female is over represented (55%) in administrative and support functions. This is in line with the common observation that female are generally overrepresented in administrative and support functions in all sectors.

4.3 Nuclear staff in different sectors

Figure 6 shows the survey result in relation to the sectors in which Nuclear Experts are employed. Surprisingly only 7 percent of the stakeholders reported to work for the Utility sector, which is likely to be a large underestimate. In comparison did the Utilities count for 50% in the 2010 survey and 25% in the 2014 survey.

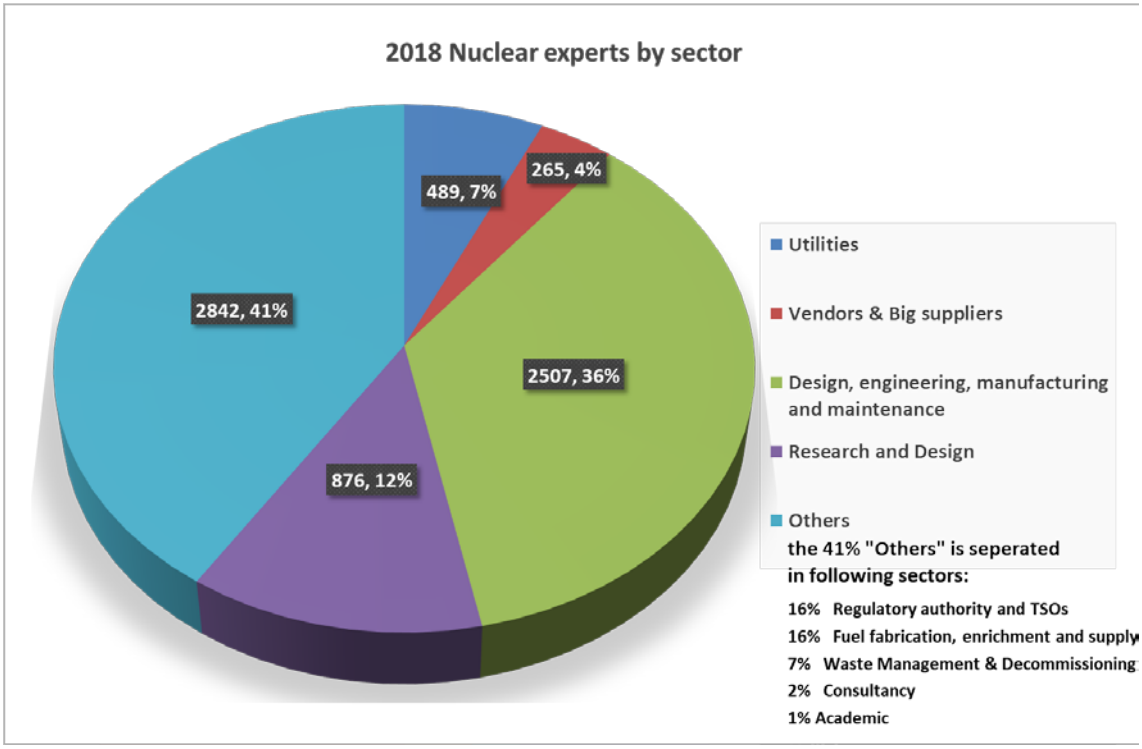

Figure 6 Distribution of the reported Nuclear Experts in 2018 by type of nuclear sector (numbers and percentage).

Table 1 is showing the distribution of nuclear experts in the different sectors for all 3 stakeholder surveys. It indicates that Vendors represent 4% of the Nuclear Expert's in 2018 and in 2014 whereas the number in 2010 was 18%. On the other hand the Design and Manufacturing sector increased from 7% in 2010 to 36 % in 2014 and 2018.

Table 1 Distribution of Nuclear Experts in nuclear sectors in 2010, 2014 and 2018 surveys.

Sector	2010 [%]	2014 [%]	2018 [%]
Utilities	51	25	7
Vendors & Big suppliers	18	4	4
Research and Design	13	15	13
Design, engineering, manufacturing and maintenance	7	36	36
Waste Management & Decommissioning		14	7
Regulatory authority and TSOs		4	16
Fuel fabrication, enrichment and supply		1	16
Consultancy		1	2
Academic			1
Training provider			0
Others	11		

4.4 Nuclear Decommissioning Staff and estimates for 2025 and 2030

Figure 7 shows the reported nuclear workforce in decommissioning in the 2018 survey. The survey indicates that the number will remain stable until 2025, but will increase by 30% by 2030.

The reported workforce for decommissioning in the survey is very low (about 7000). Recent published data indicates a current decommissioning workforce of 10.000 for UK alone.

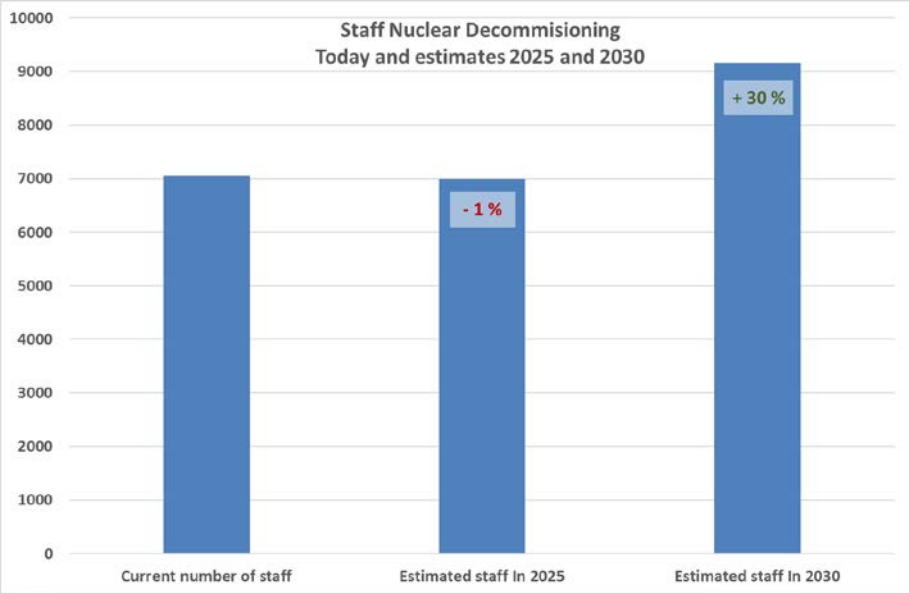

Figure 7 Nuclear workforce in nuclear decommissioning projects and estimated needs in 2025 and 2030.

4.5 Business Situation in Nuclear Power Sector 2015-17

Figure 8 shows that a majority of stakeholders (63%) considered the business situation stable for the organisation the last 2 years. Only 11% of organisation reported a decrease in business activities during the last 2 years.

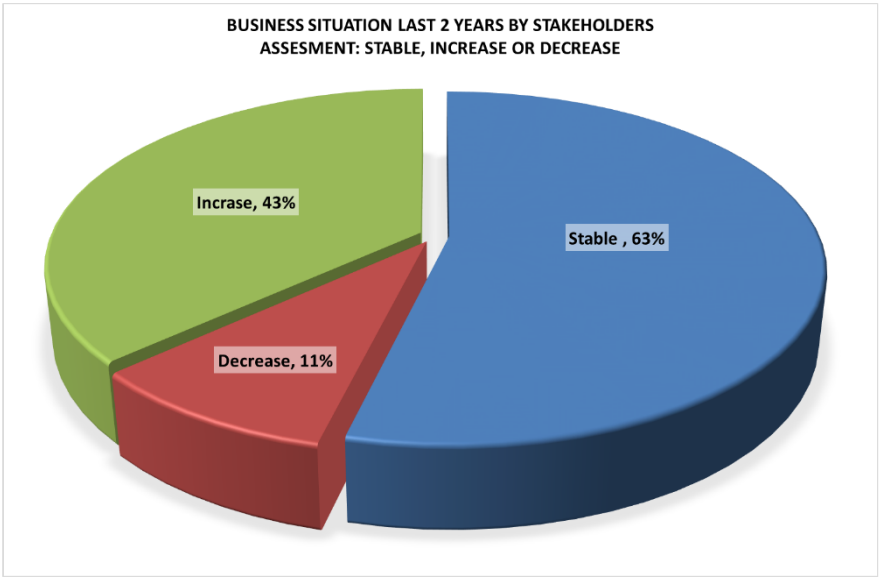

Figure 8 Assessment of the business situation by the stakeholders for the last 2 years

Figure 9 shows the new recruitment and the departed Nuclear Experts the last 2 years. It indicates that 18% more experts were recruited than departed from the organisations.

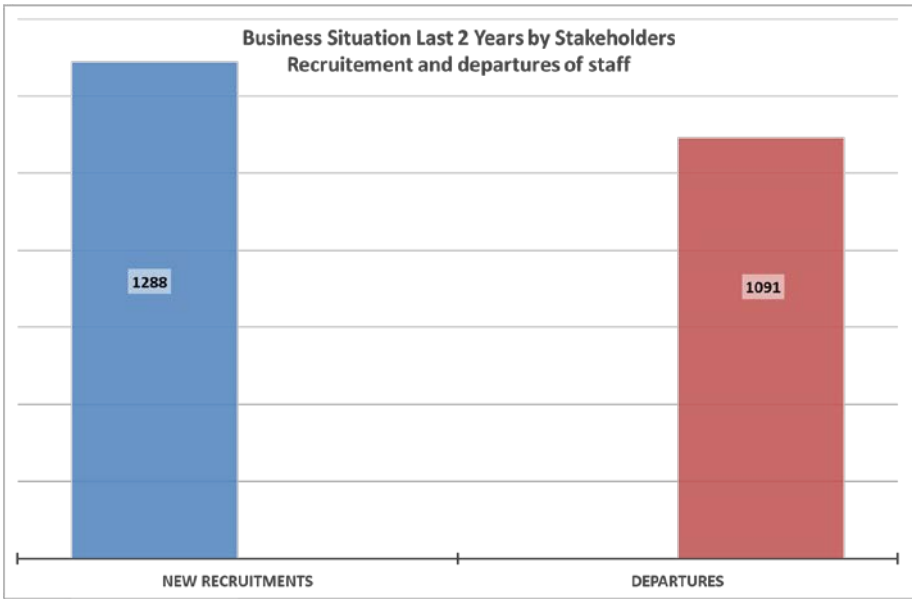

Figure 9 Recruitment and departures of staff within the organisation the last 2 years.

When answering the question of the "most wanted positions in case of enlargement of business", the stakeholders did not indicate the quantity of wanted position needed. The 3 most needed positions in case of enlargement with the number of stakeholder giving this answer in brackets were;

- nuclear engineer (39)
- chemical scientist /chemist (33)
- nuclear technician (22)

5 Discussion

5.1 Improved data quality and method of working

A good data quality control process is imperative to establish high quality trends and gaps of the supply and demand of human resources from surveys. The EHRO-N SAG played a key role in data validation and quality control of the data in the first survey from 2010. This proved to be a difficult and time consuming process not always delivering the expected results. Subsequently less quality control steps were implemented in the 2014 and 2018 surveys resulting in less founded predictions of trends.

Similarly, in the 2018 stakeholder survey, the responses were disappointingly low. Only 38% of the invited stakeholders responded to the survey which has an impact on the representativeness of the data. Whereas surveys can be valuable in analysing specific aspects of the workforce then a more robust approach is needed to in confidence establish trends and gaps in the supply and demand needs.

It is proposed that EHRON in the future will collect data and information through existing European nuclear groups or networks e.g. ENEN (supply data) and FORATOM (demand data).The advantage of using and collaborating with existing groups is that they already are operational and contains the required expertise and knowledge for collecting and ensuring data quality check of collected data. They could further act as a liaison platform for harmonisation of methodologies for workforce assessments in the Member States.

Alternatively, EHRO-N could setup new dedicated network of National Focal Points (NFP) dealing with the human resource supply and demand in the civil nuclear power sector, but this would require significant additional resources for launching and coordination of such network.

The UK Nuclear Skills Strategy Group has in 2017 published a comprehensive Nuclear Workforce Assessment followed Strategic Skills Plan in 2018. Not all Member States have published assessment and strategic plan to this level of detail although such assessments and plans are tools for ensuring compliance with article 6 and 7 of the Safety Directive and article 5, 6 and 7 of the Spent Fuel and Waste Directive.

Member States and nuclear stakeholders could benefit from having national nuclear workforce assessments by using it as a tool to steer Education and Training efforts. Providing nuclear workforce assessment data to EHRO-N would in further allow coordination of Nuclear Education and Training efforts at EU level.

5.2 Simplified Organisation

The control and management of EHRO-N is vested in a Senior Advisory Group (EHRO-N SAG) composed of high-level experts representing different types of nuclear stakeholders made-up from the different EU Member States. The group has grown large and less efficient. It is proposed to reduce its size so that it will mainly be composed of highly qualified representatives of existing European groups/networks and international organisations, such as:

- Civil Nuclear Industry: FORATOM
- Education and Training: ENEN
- Technical Safety Organisations: ETSON

- European Nuclear Society: ENS
- International Organisations: IAEA, OECD-NEA
- Relevant Commission Services

This would reduce the number of members in the EHRO-N SAG from around 30 to less than 10. The new streamlined SAG should continue to steer and guide EHRO-N, mainly focusing on conceptual issues, such as:

- definition of the types of required data as well as supervision of the analysis of data and its quality assurance
- approval of reports as well as preparation of major communication campaigns.
- drafting of recommendations on EU-wide nuclear education and training actions and European qualification schemes for lifelong learning and cross border mobility for the nuclear sector in cooperation with the National educational authorities

The JRC shall continue as impartial Operating Agent OA and the day-to-day management of EHRO-N, providing the necessary infrastructure (web-platform), administer validated databases, preparing EU wide reports and recommendation through available data, further analysis and modelling activities, ensuring effective communication. The OA is responsible for the support to the execution of the tasks under the general direction of the SAG.

5.3 Output priorities

EHRO-N remain a central information portal for all stakeholders interested in the optimisation of current and future human resource needs in nuclear sector within EU. The main outputs of EHRO-N are:

- Formulate EU level strategic skills plan based on national workforce assessments,
- Providing a common platform for sharing best practices and methodologies for conducting national nuclear workforce assessments,
- Produce a regular update data on the short-, medium- and long-term needs for human resources for the different stakeholders in the nuclear sector,
- Identify gaps and deficiencies in European nuclear education and training (E&T) infrastructures and recommend potential remedial action and optimization,
- Monitor and report on the development of nuclear qualification frameworks and mutual recognition in the EU,
- Provide observations on socio-economic factors in the nuclear sector and disseminate fact based information to the public,
- Provide support to other European Commission services.

6 Recommendations to improve efficiency and the quality of output

1. The SAG should be redefined and revitalised to steer and guide EHRO-N, mainly focusing on conceptual EU-wide issues, such as:
    - propose methodology and specific HR topics to be analysed
    - actively seek cooperation and support and participation from Member States
    - monitor EHRO-N output and endorse of recommendations and reports
2. SAG should be composed mainly of highly level representatives of existing European groups/networks and international organisations, and limited to about 10 persons.
3. Data quality control and validation will be strengthened in EHRO-N by implementing a network of National Focal Point (NFP), possible through existing groups and networks (e.g. ENEN and FORATOM).
4. EHRO-N should build modelling capabilities to supplement (not duplicate) modelling activities performed in the Member States. This could be either EU wide topics or in specific subjects where only little data is available (e.g. socio-economic aspects).

References

[1] Council of the European Union, *Conclusions on the need for skills in the nuclear field*, 2891 Competitiveness Council meeting, Brussels, 1st and 2nd December 2008,

[2] Council Directive 2009/71/EURATOM of 25th June 2009 establishing a Community framework for the nuclear safety of nuclear installations,

[3] COUNCIL DIRECTIVE 2014/87/EURATOM of 8 July 2014 amending Directive 2009/71/EURATOM establishing a Community framework for the nuclear safety of nuclear installations

[4] Council Directive 2011/70/EURATOM OF 19th July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste,

[5] Conclusions from 12th European Nuclear Energy Forum (ENEF) Prague, 22-23 May 2017. https://ec.europa.eu/energy/sites/ener/files/2017_07_24_enef_2017_conclusions_website.docx

[6] First situation report on education and training in the nuclear energy in the European Union, COM (2011) 563,

[7] Second situation report on education and training in the nuclear energy in the European Union, SWD (2014) 299,

[8] Nuclear Illustrative Programme presented under Article 40 of the Euratom Treaty, COM (2017) 237 final

[9] Simonovska, V. and von Estorff, U., *Putting into Perspective the supply of and demand for Nuclear Experts by 20202 within the EU-27 Nuclear Energy Sector,* EUR 25291 EN, Publications Office of the European Union, Luxembourg, 2012, doi:10.2790/47738

[10] Brancucci, R., Flore, M. and von Estorff U., *Post-Fukushima analysis of HR supply and demand, EUR 27017 EN,,* Publications Office of the European Union, Luxembourg, 2014, doi:10.2790/895611,

[11] FORATOM, European Atomic Forum, https://www.foratom.org/

[12] ENEN, European Nuclear Education Network, http://www.enen.eu/

[13] NSSG, *Nuclear Strategic Skills Plan*, 2016, https://www.nssguk.com/media/1319/publications-national-nuclear-skills-strategic-plan.pdf,

[14] NSSG, *Strategic Plan Update Winter 2018 – Skills planning to drive sector productivity*, 2018, https://www.nssguk.com/media/1472/nssg-strategic-plan-update-2018.pdf.

List of abbreviations and definitions

IAEA	International Atomic Energy Agency
EQF	European Qualifications Framework
EHRO-N	European Human Resource Observatory in the Nuclear energy sector.
OECD-NEA	Nuclear Energy Agency – an agency within the Organisation for Economic Co-operation and Development
ENEN	European Nuclear Education Network
FORATOM	European trade association for the nuclear energy industry
ETSON	European Technical Safety Organisation Network
ENSREG	European Nuclear Safety Regulators Group
E&T	Education and Training
EHRO-N OA	EHRO-N Operating Agent (Joint Research Centre)
EHRO-N SAG	EHRO-N senior Advisory Group

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Annex 3. **Questionnaire submitted to Higher Education Institutions (Universities and Research Centres) – Supply Side.**

ANNEX 1: List of Nuclear Stakeholders – Demand side

COUNTRY	COMPANY NAME	TYPE OF ORGANISATION
Austria	Atomic Institute of the Austrian Universities (ATI)	Research and Development
Austria	ENCONET Consulting Ges.m.b.H.	Consultancy, Project Management, Training
Austria	University of Applied Sciences FH Campus Vienna	Research and Development
Belgium	Alstom Power	Vendors & Suppliers
Belgium	Assystem	Design, Engineering, Manufacturing, Maintenance
Belgium	Ateliers de la Meuse - Division Seraing	Design, Engineering, Manufacturing, Maintenance
Belgium	BEL V.	Regulatory Authorities, TSO, Reactor Safety
Belgium	BELGONUCLEAIRE	Fuel Fabrication, Enrichment, Supply
Belgium	Belgoprocess	Radioactive Waste Management, Decommissioning
Belgium	Cockeril Maintenance and Ingénierie	Design, Engineering, Manufacturing, Maintenance
Belgium	GDF Suez Group - BEE	Utilities
Belgium/France	GDF Suez Group - BES	Design, Engineering, Manufacturing, Maintenance
Belgium	Federal Agency for Nuclear Control (FANC)	Regulatory Authorities, TSO, Reactor Safety
Belgium	FBFC International (AREVA)	Fuel Fabrication, Enrichment, Supply
Belgium	ONDRAF/NIRAS	Regulatory Authorities, TSO, Reactor Safety
Belgium	SCK CEN	Research and Development
Belgium	Universiteit Hasselt/XIOS dptm. Nucleaire Technologie Universitaire	Research and Development
Belgium	VNS Vinçotte Nuclear Safety (ex AVN)	Consultancy, Project Management, Training
Belgium	Westinghouse Electric Belgium	Vendors & Suppliers
Bulgaria	Astro Engineering LTD	Design, Engineering, Manufacturing, Maintenance

Bulgaria	AtomEnergoproekt Ltd	Design, Engineering, Manufacturing, Maintenance
Bulgaria	Atomenergoremont Plc.	Design, Engineering, Manufacturing, Maintenance
Bulgaria	DPRAO	Radioactive Waste Management, Decommissioning
Bulgaria	Enemona S.A.	Design, Engineering, Manufacturing, Maintenance
Bulgaria	Energoremont Holding	Design, Engineering, Manufacturing, Maintenance
Bulgaria	EnergoService AD	Utilities
Bulgaria	ENERGOSTROYMONTAJ-ENGINEERING	Design, Engineering, Manufacturing, Maintenance
Bulgaria	Energy Institute JSC	Research and Development
Bulgaria	Enpro Consult	Consultancy, Project Management, Training
Bulgaria	Eqe Bulgaria	Design, Engineering, Manufacturing, Maintenance
Bulgaria	INRNE Institute of Nuclear Research and Nuclear Energy	Research and Development
Bulgaria	Montagi EAD	Design, Engineering, Manufacturing, Maintenance
Bulgaria	National Electric Company (NEK EAD)	Utilities
Bulgaria	NRA	Regulatory Authorities, TSO, Reactor Safety
Bulgaria	Quantum engineering	Design, Engineering, Manufacturing, Maintenance
Bulgaria	RISK ENGINEERING LTD	Design, Engineering, Manufacturing, Maintenance
Bulgaria	Sakar	Consultancy, Project Management, Training
Bulgaria	Theta Consult	Consultancy, Project Management, Training
Croatia	ABB	Design, Engineering, Manufacturing, Maintenance
Croatia	APO d.o.o.	Radioactive Waste Management, Decommissioning
Croatia	Axpo	Vendors & Suppliers
Croatia	Böhler-Uddeholm Zagreb d.o.o.	Vendors & Suppliers
Croatia	Bureau Veritas Group	Consultancy, Project Management, Training

Croatia	CMS	Consultancy, Project Management, Training
Croatia	DLA Piper	Consultancy, Project Management, Training
Croatia	Duro Dakovic	Design, Engineering, Manufacturing, Maintenance
Croatia	EKONERG	Consultancy, Project Management, Training
Croatia	EKOTEH Dosimetry Radiation Protection Co.	Radioactive Waste Management, Decommissioning
Croatia	EMKA	Vendors & Suppliers
Croatia	Enconet	Consultancy, Project Management, Training
Croatia	Hilti Croatia d.o.o.	Design, Engineering, Manufacturing, Maintenance
Croatia	Hrvatska Elektroprivreda (HEP)	Utilities
Croatia	INETEC	Research and Development
Croatia	Kuehne und Nagel	Vendors & Suppliers
Croatia	Mace	Consultancy, Project Management, Training
Croatia	Pipe Supports	Consultancy, Project Management, Training
Croatia	Siemens d.d.	Design, Engineering, Manufacturing, Maintenance
Croatia	The Croatian Radiation Protection Association (CRPA)	Research and Development
Croatia	The Ruder Boskovic Institute (RBI)	Research and Development
Czech Republic	ČEZ, a. s.	Utilities
Czech Republic	I&C Energo	Design, Engineering, Manufacturing, Maintenance
Czech Republic	OSC	Design, Engineering, Manufacturing, Maintenance
Czech Republic	Pro Engineering s.r.o.	Consultancy, Project Management, Training
Czech Republic	ŠKODA JS a.s.	Vendors & Suppliers
Czech Republic	SÚJB - The State Office for Nuclear Safety	Regulatory Authorities, TSO, Reactor Safety
Czech Republic	SURAO	Radioactive Waste Management, Decommissioning
Czech Republic	UJP Praha a.s.	Design, Engineering, Manufacturing, Maintenance
Czech Republic	UJV Rez	Radioactive Waste Management, Decommissioning

Czech Republic	VF a.s.	Radioactive Waste Management, Decommissioning
Czech Republic	Vitkovice Machinery Group	Design, Engineering, Manufacturing, Maintenance
Denmark	Risø National Laboratory for Sustainable Energy	Research and Development
Estonia	Eesti Energia AS	Utilities
Estonia	Estonian Radiation Protection Centre	Regulatory Authorities, TSO, Reactor Safety
Finland	Fennovoima Oy	Utilities
Finland	Fortum Power and Heat	Utilities
Finland	Lappeenranta University of Technology	Research and Development
Finland	Posiva	Radioactive Waste Management, Decommissioning
Finland	Pöyry PLC	Consultancy, Project Management, Training
Finland	STUK - Radiation and Nuclear Safety Authority	Regulatory Authorities, TSO, Reactor Safety
Finland	TVO Teollisuuden Voima Oyj	Utilities
Finland	University of Jyväskylä	Research and Development
Finland	VTT Technical Research Center	Research and Development
France	Alstom Power	Vendors & Suppliers
France	Altran Energy Industry and Life Sciences	Consultancy, Project Management, Training
France	ANDRA	Radioactive Waste Management, Decommissioning
France	AREVA HQ	Vendors & Suppliers
France	AREVA Marcoule	Research and Development
France	AREVA Risk Management Consulting SAS	Consultancy, Project Management, Training
France	AREVA Service - Chalon sur Saone	Design, Engineering, Manufacturing, Maintenance
France	AREVA TA - Aix-en-Provence	Design, Engineering, Manufacturing, Maintenance
France	AREVA TA - Saclay	Consultancy, Project Management, Training
France	AREVA TA - St-Paul-Lez-Durance	Design, Engineering, Manufacturing, Maintenance
France	ASN	Regulatory Authorities, TSO, Reactor Safety

France	Assystem	Design, Engineering, Manufacturing, Maintenance
France	Atos Origin	Design, Engineering, Manufacturing, Maintenance
France	CANBERRA France (AREVA)	Design, Engineering, Manufacturing, Maintenance
France	CANBERRA Lingolsheim (AREVA)	Design, Engineering, Manufacturing, Maintenance
France	CANBERRA Usine de Loches (AREVA)	Design, Engineering, Manufacturing, Maintenance
France	CEA / Marcoule	Research and Development
France	CEA / Saclay	Research and Development
France	CEA/Cadarache	Research and Development
France	CEA/Fontenay-aux-Roses	Research and Development
France	CEDOS (AREVA)	Design, Engineering, Manufacturing, Maintenance
France	CETIC (AREVA)	Consultancy, Project Management, Training
France	CEZUS (AREVA)	Fuel Fabrication, Enrichment, Supply
France	Chalon/Saint-Marcel plant (AREVA)	Vendors & Suppliers
France	CORYS T.E.S.S.(AREVA)	Consultancy, Project Management, Training
France	Creusot Forge (AREVA)	Design, Engineering, Manufacturing, Maintenance
France	Creusot Mécanique (AREVA)	Design, Engineering, Manufacturing, Maintenance
France	EDF	Utilities
France	FBFC Lyon (AREVA)	Fuel Fabrication, Enrichment, Supply
France	FBFC Pierrelatte (AREVA)	Fuel Fabrication, Enrichment, Supply
France	FBFC Romans (AREVA)	Fuel Fabrication, Enrichment, Supply
France	Grenoble INP	Research and Development
France	INSTN Institut National des Science et Techniques Nucleaires	Research and Development
France	Intercontrole (AREVA)	Design, Engineering, Manufacturing, Maintenance
France	IRSN Institut de Radioprotection et de Surete Nucleaire	Research and Development
France	JSPM - EQUIPEMENT (AREVA)	Design, Engineering, Manufacturing, Maintenance
France	La Hague (AREVA)	Radioactive Waste Management, Decommissioning
France	MELOX (AREVA)	Fuel Fabrication, Enrichment, Supply

France	Oakridge	Design, Engineering, Manufacturing, Maintenance
France	Onet Technologies	Design, Engineering, Manufacturing, Maintenance
France	Oxand	Consultancy, Project Management, Training
France	Réel	Fuel Fabrication, Enrichment, Supply
France	RISKAUDIT IRSN/GRS International	Consultancy, Project Management, Training
France	Salvarem	Radioactive Waste Management, Decommissioning
France	SOM (Groupe Ortec)	Consultancy, Project Management, Training
France	SPIE Nucleaire	Fuel Fabrication, Enrichment, Supply
France	STMI (AREVA)	Radioactive Waste Management, Decommissioning
France	Technical Centre (AREVA)	Design, Engineering, Manufacturing, Maintenance
France	Technoplus Industries (AREVA)	Design, Engineering, Manufacturing, Maintenance
France	TRIHOM (AREVA)	Design, Engineering, Manufacturing, Maintenance
France	Westinghouse France	Vendors & Suppliers
Germany	ANF Duisburg (AREVA)	Fuel Fabrication, Enrichment, Supply
Germany	ANF Lingen (AREVA)	Fuel Fabrication, Enrichment, Supply
Germany	AREVA NP GmbH (AREVA and Siemens company)	Design, Engineering, Manufacturing, Maintenance
Germany	Babcock Noell GmbH	Design, Engineering, Manufacturing, Maintenance
Germany	Barlage GmbH	Design, Engineering, Manufacturing, Maintenance
Germany	BFS Bundesamt für Strahlenschutz	Regulatory Authorities, TSO, Reactor Safety
Germany	DBE Technology	Radioactive Waste Management, Decommissioning
Germany	Deutsche Gesellschaft zum Bau und Betrieb von Endlagern für Abfallstoffe mbH (DBE)	Radioactive Waste Management, Decommissioning
Germany	E.ON Energie AG	Utilities
Germany	Eckhert & Ziegler Nuclitec	Radioactive Waste Management, Decommissioning
Germany	EnBW	Utilities
Germany	Evonik Energy Services GmbH	Design, Engineering, Manufacturing, Maintenance

Germany	EWN Gruppe - Energie Werke Nord	Radioactive Waste Management, Decommissioning
Germany	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety	Regulatory Authorities, TSO, Reactor Safety
Germany	GRS Berlin	Regulatory Authorities, TSO, Reactor Safety
Germany	GRS Braunschweig	Regulatory Authorities, TSO, Reactor Safety
Germany	GRS Cologne	Regulatory Authorities, TSO, Reactor Safety
Germany	Helmholtz-Zentrum Berlin fur Materialen und Energie GmbH	Research and Development
Germany	Helmholtz-Zentrum Dresden-Rossendorf (HZDR)	Research and Development
Germany	IKP Forschungszentrum Jülich	Research and Development
Germany	IntelligeNDT (AREVA)	Design, Engineering, Manufacturing, Maintenance
Germany	Joint Research Centre - Institute for Transuranium Elements	Research and Development
Germany	KIT - Karlsruhe Institute of Technology	Research and Development
Germany	Lisega SE	Vendors & Suppliers
Germany	Nuclear Services Erlangen (AREVA)	Fuel Fabrication, Enrichment, Supply
Germany	NUKEM Technologies GmbH	Fuel Fabrication, Enrichment, Supply
Germany	RWE Power AG Zentrale	Utilities
Germany	Siemens AG (AREVA NP)	Vendors & Suppliers
Germany	Siempelkamp Nukleartechnik GmbH	Design, Engineering, Manufacturing, Maintenance
Germany	Studsvik GmbH & Co. KG	Radioactive Waste Management, Decommissioning
Germany	URENCO Deutschland (Gronau)	Fuel Fabrication, Enrichment, Supply
Germany	Vattenfall Europe AG	Utilities
Germany	VGB PowerTech e. V., Nuclear Power Plant Department	Consultancy, Project Management, Training
Germany	Westinghouse Electric Germany GmbH	Vendors & Suppliers
Greece	Aristotle University of Thessaloniki, Department of Physics, Nuclear Physics Laboratory	Research and Development
Greece	Greek Atomic Energy Commission	Regulatory Authorities, TSO, Reactor Safety
Greece	National Technical University of Athens	Research and Development

Greece	NCSR Demokritos, Institute of Nuclear Physics and Institute of Nuclear Technology & Radiation Protection	Research and Development
Hungary	Budapest University of Technology, Institute of Nuclear Techniques	
Hungary	ETV-ERŐTERV Power Engineering and Contracting Co.	Design, Engineering, Manufacturing, Maintenance
Hungary	Hungarian Atomic Energy Authority	Regulatory Authorities, TSO, Reactor Safety
Hungary	Centre for Energy Research Hungarian Academy of Sciences	Research and Development
Hungary	Magyar Villamos Művek Zrt.(MVM Zrt.)/PAKS NPP	Utilities
Hungary	Public Limited Company for Radioactive Waste Management, Decommissioning	Radioactive Waste Management, Decommissioning
Italy	Ansaldo Nucleare	Design, Engineering, Manufacturing, Maintenance
Italy	ENEA Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile	Research and Development
Italy	ENEL	Utilities
Italy	GRNSPG University of Pisa	
Italy	Gruppo Sogin	Radioactive Waste Management, Decommissioning
Italy	INFN National Institute of Nuclear Physics	Research and Development
Italy	ISPRA	Regulatory Authorities, TSO, Reactor Safety
Italy	Nucleco Società per l'Ecoingegneria Nucleare	Radioactive Waste Management, Decommissioning
Italy	Università degli Studi di Palermo	Research and Development
Italy	Politecnico di Torino, Energy Department	Research and Development
Latvia	JSC Latvenergo	Utilities
Latvia	Radiation Safety Centre of the State Environmental Service	Regulatory Authorities, TSO, Reactor Safety
Lithuania	Lithuanian Energy Institute	Research and Development
Lithuania	Lietuvos Energija UAB	Utilities
Lithuania	RATA - Radioaktyviųjų atliekų tvarkymo agentūra	Radioactive Waste Management, Decommissioning
Lithuania	State Enterprise Ignalina NPP	Radioactive Waste Management, Decommissioning

Lithuania	VATESI	Regulatory Authorities, TSO, Reactor Safety
Netherlands	COVRA N.V	Radioactive Waste Management, Decommissioning
Netherlands	Delta	Utilities
Netherlands	Energy Resources Holding B.V. - ERH	Utilities
Netherlands	JRC - Institute for Energy	Research and Development
Netherlands	KINT Foundation Stichting Kennis Infrastructuur Nucleaire Technologie	Research and Development
Netherlands	Laborelec (GDF Suez Group)	Research and Development
Netherlands	N.V. EPZ	Utilities
Netherlands	NRG Nuclear Research & Consultancy, Project Management, Training Group	Research and Development
Netherlands	URENCO Nederland BV	Fuel Fabrication, Enrichment, Supply
Netherlands	VROM-KFD Ministry of Housing, Spatial Planning and the Environment (now Ministry for Infrastructure and Environment)	Regulatory Authorities, TSO, Reactor Safety
Poland	IFJ PAN Instytut Fizyki Jądrowej	Research and Development
Poland	INCT Instytutu Chemii i Techniki Jądrowej	Research and Development
Poland	Narodowe Centrum Badan Jadrowych (NCBJ – National Centre for Nuclear Research)	Research and Development
Poland	PAA Państwowej Agencji Atomistyki	Regulatory Authorities, TSO, Reactor Safety
Poland	POLATOM Instytut Energii Atomowej	Research and Development
Poland	Polska Grupa Energetyczna SA (PGE)	Utilities
Portugal	ITN (INSTITUTO TECNOLÓGICO E NUCLEAR)	Research and Development
Romania	ANDRAD - Agentia Nucleara Si Pentru Deseuri Radioactive	Radioactive Waste Management, Decommissioning
Romania	ANRE - Autoritatea Nationala de Reglementare in Domeniul Energiei	Regulatory Authorities, TSO, Reactor Safety
Romania	CITON	Design, Engineering, Manufacturing, Maintenance
Romania	CNCAN - Comisii Nationale pentru Controlul Activitatilor Nucleare	Regulatory Authorities, TSO, Reactor Safety
Romania	CNU	Fuel Fabrication, Enrichment, Supply

Romania	Nuclear Fuel Plant Pitesti (FCN Pitesti)	Fuel Fabrication, Enrichment, Supply
Romania	ICN Pitesti	Research and Development
Romania	ICPMRR National Institute for Metals and Radioactive Resources	Research and Development
Romania	ICSI	Research and Development
Romania	IFA Institul De Fizica Atomica	Research and Development
Romania	IFIN HH Horia Hulubei National Institute of Physics and Nuclear Engineering	Research and Development
Romania	SN Nucleaelectrica S.A./CNE Cernavoda	Utilities
Romania	Nuclearmontaj	Design, Engineering, Manufacturing, Maintenance
Romania	RAAN - Regia Autonoma Pentru Activitati Nucleare Romania	Regulatory Authorities, TSO, Reactor Safety
Romania	ROMAG-PROD	Research and Development
Romania	TITAN ECHIPAMENTE NUCLEARE S.A	Fuel Fabrication, Enrichment, Supply
Slovakia	AREVA NP Controls, s.r.o.	Design, Engineering, Manufacturing, Maintenance
Slovakia	JAVYS a.s.- Jadrová a vyraďovacia spoločnosť a.s.	Radioactive Waste Management, Decommissioning
Slovakia	JESS	Utilities
Slovakia	REAKTORTEST s.r.o.	Design, Engineering, Manufacturing, Maintenance
Slovakia	RELKO Ltd, Engineering and Consulting Services	Consultancy, Project Management, Training
Slovakia	SES Tlmače, a.s (SLOVENSKÉ ENERGETICKÉ STROJÁRNE, a.s)	Design, Engineering, Manufacturing, Maintenance
Slovakia	Skoda Slovakia a.s.	Vendors & Suppliers
Slovakia	Slovenské elektrárne, a. s. - Enel	Utilities
Slovakia	UJDSR	Regulatory Authorities, TSO, Reactor Safety
Slovakia	VUJE, a.s.	Vendors & Suppliers
Slovenia	ARAO	Radioactive Waste Management, Decommissioning
Slovenia	GEN Energija d.o.o.	Utilities
Slovenia	IBE d.d.	Design, Engineering, Manufacturing, Maintenance

Slovenia	IJS - Institut Josef Stefan	Research and Development
Slovenia	IMK - Institute for metal constructions	Research and Development
Slovenia	IMT Institute of metals and technology	Research and Development
Slovenia	Krško Nuclear Power Plant (NEK)	Utilities
Slovenia	NUMIP Engineering, Construction, Maintenance and Production Ltd and Q Techna	Design, Engineering, Manufacturing, Maintenance
Slovenia	Slovenian Nuclear Safety Administration	Regulatory Authorities, TSO, Reactor Safety
Slovenia	SRPA Slovenian Radiation Protection Administration	Regulatory Authorities, TSO, Reactor Safety
Slovenia	University of Ljubljana Faculty of Mathematics and Physics	Research and Development
Slovenia	Welding Institute	Research and Development
Spain	Analisis-DSC	Design, Engineering, Manufacturing, Maintenance
Spain	ANAV - Asociacion Nuclear Asco-Vandellos A.I.E.	Utilities
Spain	AREVA NP Services Spain SLU.	Design, Engineering, Manufacturing, Maintenance
Spain	CIEMAT Centro de Investigaciones Energéticas Medioambientales y Tecnológicas	Research and Development
Spain	CNAT - Centrales Nucleares Almaraz-Trillo	Utilities
Spain	CSN - Consejo de Seguridad Nuclear	Regulatory Authorities, TSO, Reactor Safety
Spain	Empresarios Agrupados	Design, Engineering, Manufacturing, Maintenance
Spain	ENDESA Generación	Utilities
Spain	ENRESA	Radioactive Waste Management, Decommissioning
Spain	ENSA - Equipos Nucleares SA	Vendors & Suppliers
Spain	ENUSA Industrias Avanzadas	Fuel Fabrication, Enrichment, Supply
Spain	ENWESA Operaciones	Design, Engineering, Manufacturing, Maintenance
Spain	GES SIEMSA SPAIN, SIEMSA INDUSTRIA	Design, Engineering, Manufacturing, Maintenance
Spain	GHESA	Design, Engineering, Manufacturing, Maintenance

Spain	IBERDROLA Generación	Utilities
Spain	Iberdrola Ingeniería y Construcción	Design, Engineering, Manufacturing, Maintenance
Spain	Iberinsa Ingeniería	Consultancy, Project Management, Training
Spain	Idom Ingeniería y Consultoría S.A.	Design, Engineering, Manufacturing, Maintenance
Spain	Ingenieria, Estudios y Proyectos NIP S.A.	Design, Engineering, Manufacturing, Maintenance
Spain	INITEC Energía (part of ACS Grupo - Industrual Services)	Design, Engineering, Manufacturing, Maintenance
Spain	Instalaciones Inabensa S.A.	Design, Engineering, Manufacturing, Maintenance
Spain	INYPSA Informes y Proyectos S.A.	Design, Engineering, Manufacturing, Maintenance
Spain	NUCLENOR, S.A	Utilities
Spain	Ringo Valvulas (RV)	Design, Engineering, Manufacturing, Maintenance
Spain	Gas Natural Fenosa Engineering (previously SOCOIN)	Design, Engineering, Manufacturing, Maintenance
Spain	Tamoin Grupo	Design, Engineering, Manufacturing, Maintenance
Spain	TECNALIA Research & Innovation	Research and Development
Spain	Tecnatom S.A.	Design, Engineering, Manufacturing, Maintenance
Spain	Técnicas Reunidas S.A.	Design, Engineering, Manufacturing, Maintenance
Spain	THUNDER ESPAÑA SIMULACIÓN S.L.	Design, Engineering, Manufacturing, Maintenance
Spain	Gas Natural Fenosa	Utilities
Spain	Vector & Wellheads Engineering, S.L.	Design, Engineering, Manufacturing, Maintenance
Spain	Westinghouse Electric Spain	Vendors & Suppliers
Sweden	ÅF-Engineering s.r.o	Consultancy, Project Management, Training
Sweden	AREVA NP Uddcomb AB	Design, Engineering, Manufacturing, Maintenance
Sweden	Barseback Kraft AB	Radioactive Waste Management, Decommissioning
Sweden	E.ON Sverige AB	Utilities

Sweden	ES Konsult	Consultancy, Project Management, Training
Sweden	Fagerström Industrikonsult AB	Radioactive Waste Management, Decommissioning
Sweden	FS Dynamics Sweden AB	Consultancy, Project Management, Training
Sweden	KSU Kärnkraftsäkerhet och Utbildning AB	Consultancy, Project Management, Training
Sweden	KTH - Royal Institute of Technology	Research and Development
Sweden	SANDVIK AB	Radioactive Waste Management, Decommissioning
Sweden	SKB - Svensk Kärnbränslehantering AB	Radioactive Waste Management, Decommissioning
Sweden	SSM	Regulatory Authorities, TSO, Reactor Safety
Sweden	Studsvik Nuclear AB	Radioactive Waste Management, Decommissioning
Sweden	Vattenfall AB	Utilities
Sweden	Westinghouse Electric Sweden	Vendors & Suppliers
United Kingdom	Aker Engineering and Technology Ltd	Radioactive Waste Management, Decommissioning
United Kingdom	Alstom Power PLC	Vendors & Suppliers
United Kingdom	Amec PLC Bristol	Radioactive Waste Management, Decommissioning
United Kingdom	Amec PLC Gloucester	Radioactive Waste Management, Decommissioning
United Kingdom	Amec PLC Kent	Radioactive Waste Management, Decommissioning
United Kingdom	Amec PLC Thatcham	Radioactive Waste Management, Decommissioning
United Kingdom	AREVA PLC	Design, Engineering, Manufacturing, Maintenance
United Kingdom	AREVA Risk Management Consulting Ltd	Consultancy, Project Management, Training
United Kingdom	ARUP	Consultancy, Project Management, Training
United Kingdom	Atkins PLC	Design, Engineering, Manufacturing, Maintenance
United Kingdom	BAE Systems PLC	Vendors & Suppliers

United Kingdom	Balfour Beatty PLC	Design, Engineering, Manufacturing, Maintenance
United Kingdom	Balfour Kilpatrick Ltd.	Design, Engineering, Manufacturing, Maintenance
United Kingdom	BAM Nuttall	Design, Engineering, Manufacturing, Maintenance
United Kingdom	BARTEC Ltd.	Design, Engineering, Manufacturing, Maintenance
United Kingdom	Bechtel Ltd.	Design, Engineering, Manufacturing, Maintenance
United Kingdom	Bendalls Engineering Ltd	Design, Engineering, Manufacturing, Maintenance
United Kingdom	EDF ENERGY – Generation (excluding Customers & New Build)	Utilities
United Kingdom	Canberra UK LTD. (AREVA)	Design, Engineering, Manufacturing, Maintenance
United Kingdom	Carillion	Radioactive Waste Management, Decommissioning
United Kingdom	Cavendish Nuclear Ltd. (Formerly BNS)	Design, Engineering, Manufacturing, Maintenance
United Kingdom	Costain Group PLC	Design, Engineering, Manufacturing, Maintenance
United Kingdom	DBD Nuclear	Design, Engineering, Manufacturing, Maintenance
United Kingdom	Doosan Babcock	Vendors & Suppliers
United Kingdom	Dounreay Site Restoration Ltd	Radioactive Waste Management, Decommissioning
United Kingdom	E. ON UK	Utilities
United Kingdom	Environmental Agency	Radioactive Waste Management, Decommissioning
United Kingdom	Fluor Ltd	Design, Engineering, Manufacturing, Maintenance
United Kingdom	Halcrow Ltd	Design, Engineering, Manufacturing, Maintenance
United Kingdom	Jacobs Babtie Ltd	Radioactive Waste Management, Decommissioning
United Kingdom	JGC Engineering & Technical Services Ltd	Design, Engineering, Manufacturing, Maintenance
United Kingdom	Jordan Engineering Services Ltd	Design, Engineering, Manufacturing, Maintenance
United Kingdom	Laing O'Rourke PLC	Design, Engineering, Manufacturing, Maintenance

United Kingdom	Lloyds Register Group Ltd	Consultancy, Project Management, Training
United Kingdom	LLW Repository Ltd.	Radioactive Waste Management, Decommissioning
United Kingdom	Magnox Limited	Radioactive Waste Management, Decommissioning
United Kingdom	Mitsubishi Heavy Industries Europe Ltd.	Vendors & Suppliers
United Kingdom	Morgan Est PLC	Consultancy, Project Management, Training
United Kingdom	Mott Macdonald Group Ltd.	Consultancy, Project Management, Training
United Kingdom	NG Bailey	Design, Engineering, Manufacturing, Maintenance
United Kingdom	NIS Integrated Engineering	Design, Engineering, Manufacturing, Maintenance
United Kingdom	Nuclear Directorate (ND)	Regulatory Authorities, TSO, Reactor Safety
United Kingdom	Nuclear Institute	Research and Development
United Kingdom	Nuvia Ltd	Design, Engineering, Manufacturing, Maintenance
United Kingdom	Parsons Brickerhoff	Design, Engineering, Manufacturing, Maintenance
United Kingdom	Research Sites Restoration Limited	Research and Development
United Kingdom	Rolls-Royce	Vendors & Suppliers
United Kingdom	Sallafield Ltd.	Radioactive Waste Management, Decommissioning
United Kingdom	Serco Assurance Ltd	Consultancy, Project Management, Training
United Kingdom	Sheffield Forgemasters International Ltd.	Design, Engineering, Manufacturing, Maintenance
United Kingdom	Shepherd Engineering Services	Design, Engineering, Manufacturing, Maintenance
United Kingdom	Studsvik UK Ltd	Radioactive Waste Management, Decommissioning
United Kingdom	Harwell Oxford	Research and Development
United Kingdom	UKAEA	Radioactive Waste Management, Decommissioning
United Kingdom	URENCO UK Limited	Fuel Fabrication, Enrichment, Supply

United Kingdom	URS Europe and Middle East HQ	Design, Engineering, Manufacturing, Maintenance
United Kingdom	Weir Group	Design, Engineering, Manufacturing, Maintenance
United Kingdom	Westinghouse Electric Company LLC (Springfields Site)	Vendors & Suppliers
United Kingdom	Wyman Gordon	Design, Engineering, Manufacturing, Maintenance

ANNEX 2: List of Higher Education Institution (Universities and Research Centres) – Supply Side

COUNTRY	NAME
AUSTRIA	Institute for High Energy Physics (HEPHY)
AUSTRIA	University of Applied Sciences, FH Campus Wien/Fachhochschule FH Campus Wien
AUSTRIA	University of Applied Sciences Wiener Neustadt/Fachhochschule Wiener Neustad
BELGIUM	BNEN
BELGIUM	Brussels High Engineers Institute/ Institut Supérieure des Ingénieurs de Bruxelles (ISIB)
BELGIUM	Free University of Brussels/Université Libre de Bruxelles (ULB)
BELGIUM	Ghent University/Universiteit Ghent
BELGIUM	SCK-CEN
BULGARIA	Sofia University St. Kliment Ohridski
BULGARIA	Technical University of Sofia
CZECH REP	Academy of Sciences of the Czech Republic/Akademie věd ČR
CZECH REP	Brno University of Technology/Vysoké Uceni Technické v Brne
CZECH REP	Charles University in Prague/ Univerzita Karlova v Praze
CZECH REP	Czech Technical University in Prague/Ceské Vysoké Ucení Technicke
DENMARK	Aarhus University/Aarhus Universitet
FINLAND	Tampere Univeristy of Technology/ Tampereen Teknikkinen Yliopisto
FRANCE	Chemistry Paris Tech/Chimie Paris Tech
FRANCE	Consortium established by the Paris Tech, the University Paris-Sud 11/Université Paris-Sud11, the École Central Paris (ECP), the National Institute for Nuclear Science and Technology/Institut National des Sciences & Techniques Nucléaires (INSTN) and EDF
FRANCE	Engineering National High School of Caen/École Nationale Supérieure d'Ingénieurs de Caen (ENSICAEN)

FRANCE	ENSTA Paris Tech/École Nationale Supérieure de Techniques Avancées
FRANCE	French Atomic Energy Commission/ Commissariat à l'énergie atomique
FRANCE	Grenoble Institute of Technology/Institute Polytechnique de Grenoble
FRANCE	High School of Arts and Crafts/École National Supériure d'Arts et Métiers
FRANCE	Mines Paris Graduate School/ École des Mines Paris (ENSMP)
FRANCE	Mines School of Alés/École des Mines d'Alés
FRANCE	Mines School of Nantes/École des Mines de Nantes
FRANCE	National Academy of Arts and Crafts/Conservatoire National des Arts et Métiers (CNAM)
FRANCE	National Chemistry High School of Montpellier/École Nationale Supérieure de Chimie de Montepellier
FRANCE	National Institute for Nuclear Science and Technology/Institut National des Sciences & Techniques Nucléaires (INSTN)
FRANCE	National Mines High School of Saint-Étienne/École Nationale Supérieure des Mines de Saint-Étienne
FRANCE	University Bordeaux/Université Bordeaux 1
FRANCE	University Joseph Fourier/Université Joseph Fourier
FRANCE	University of Montpellier 2/Université Montpellier 2
FRANCE	University of Paris VII/Université Paris Diderot
FRANCE	University Pierre and Marie Curie - Paris VI/Université Pierre et Marie Curie - Paris VI
GERMANY	Aachen University of Applied Sciences/Hochschule Aachen
GERMANY	Clausthal University of Technology/ Technische Universität Clausthal
GERMANY	European Nuclear Energy Leadership Academy (ENELA)
GERMANY	Hannover University/Leibniz Universität Hannover
GERMANY	Johannes Gutenberg University Mainz/Johannes Gutenberg Universität Mainz
GERMANY	Justurs Liebig University Giessen/Universität Gießen

GERMANY	RWTH Aachen University/Rheinisch-Westfaelische Technische Hochschule Aachen
GERMANY	Technical University of Munich/ Technische Universitat München
GERMANY	University of Göttingen/Georg-August-Universität Göttingen
GREECE	Greek Atomic Energy Commission/Ελληνική Επιτροπή Ατομικής Ενέργειας (GAEC)
GREECE	National Centre of Scientific Research Demokritos/Εθνικό Κέντρο Έρευνας Φυσικών Επιστημών Δημοκριτοσ
HUNGARY	Budapest University of Technology and Economics/Budapesti Műszaki és Gazdaságtudományi Egyetem (BUTE)
HUNGARY	University of Debrecen/Debreceni Egyetem
ITALY	Milan Polytechnic/ Politecnico di Milano
ITALY	Milan Polytechnic/Politecnico di Milano
ITALY	Technical University of Turin/ Politecnico di Torino
ITALY	Torino University/ Università di Torino
ITALY	University of Bologna/Università di Bologna
ITALY	University of Palermo/Università degli Studi di Palermo
ITALY	University of Pisa/Università di Pisa
ITALY	University of Roma/Sapienza Università di Roma
LITHUANIA	Kaunas University of Technology/ Kauno Technologijos Universitetas
LITHUANIA	Vilnius University/ Vilniaus Universitetas
NETHERLANDS	Delft University of Technology/ Technische Universiteit Delft
NETHERLANDS	Eindhoven University of Technology/ Technische Universiteit Eindhoven
NETHERLANDS	Radboud University Nijmegen/Radboud Universiteit Nijmegen
NETHERLANDS	University of Groningen/ Rjksuniversiteit Groningen
POLAND	AGH University of Science and Technology/Akademia Górniczo-Hutnicza Im. Stanislawa Staszica w Krakowie

POLAND	Maria Curie-Sklodowska University/Uniwersytet Marii Curie Sklodowskiej
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SPAIN	Energy, Environmental and Technology Research Center/Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas
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U.K.	Lancaster University
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Annex 3. Questionnaire for Nuclear Stakeholders– Demand Side

EHRO-N SURVEY 2017

Please answer the following questions by filling in the grey fields and return it to: JRC-PTT-EHRON@ec.europa.eu

1. **Name of your organization:**

2. **Country:**

3. **Address:**

4. **Type of organization:** *(Please tick one category only)*

- ☐ Utilities (NPPs)
- ☐ Vendors and big suppliers
- ☐ Fuel fabrication, enrichment and supply
- ☐ Waste management and decommissioning
- ☐ Design, engineering, manufacturing and maintenance
- ☐ Consultancy
- ☐ Regulatory authority and TSOs
- ☐ R&D organization/institution
- ☐ Training provider
- ☐ Academic

5. Total number of nuclear staff[1] employed in 2017:

	MALE	FEMALE
NUCLEAR		
NUCLEARIZED		

6. Total number of administrative staff[2] employed in 2017:

MALE	FEMALE

7. Education level of nuclear staff employed in 2017:

	BACHELOR (EQF 6)	MASTER (EQF 7)	PhD (EQF 8)
MALE			
FEMALE			

8. Age of nuclear staff employed in 2017:

	<35 YEARS OLD	35-45 YEARS OLD	45-55 YEARS OLD	>55 YEARS OLD
MALE				
FEMALE				

9. Business situation in the last 2 years:

☐ Stable

☐ Increased

☐ Decreased

10. Number of nuclear staff <u>recruited</u> in the last 2 years:

11. Number of nuclear staff <u>that left</u> the company in the last 2 years:

[1] ''Nuclear'' refers to working positions filled by: nuclear engineers, nuclear physicists, nuclear chemists, or radioprotection specialists that have a nuclear higher education background (i.e. Bachelor, Master or PhD). "Nuclearized" refers to staff that have a non-nuclear technical higher education background (i.e. Bachelor, Master or PhD) but with relevant competences/skills in the nuclear field (acquired, for instance, through in-house or other training).

2 Who holds a position with significant secretarial or clerical duties. E.g. Administrative assistants, accountants, clerks, communication officers.

12. Number of nuclear staff employed in decommissioning projects:

Current number:	
In 2025:	
In 2030:	

13. Most wanted positions in case of enlargement of business:

14. Most probable positions cut in case of shrinking of business:

ANNEX 4: Questionnaire for Higher Education Institutions (Universities and Research Centres) – Supply Side

EHRO-N SURVEY 2017

Please answer the following questions by filling in the grey fields and return it to: JRC-PTT-EHRON@ec.europa.eu

We only need data on the number of 2017 graduated and 2017-2018 enrolled students at Bachelor, Master and PhD level in nuclear related fields *(e.g. Nuclear physics, Nuclear Engineering, Nuclear Chemistry, Physics, Nuclear Science, Mechanical Engineering (nuclear), Nuclear Safety Engineering, Engineering Physics, etc.).*

1. **Institution name:**

2. **Country:**

3. **Address:**

4. **Number of students enrolled for the Academic Year 2017-2018:**

	MALE	FEMALE
BACHELOR (EQF 6)		
MASTER (EQF 7)		
PhD (EQF 8)		

5. **Number of students graduated in 2017:**

	MALE	FEMALE
BACHELOR (EQF 6)		
MASTER (EQF 7)		

PhD (EQF 8)		

6. Number of <u>visiting students</u> (Erasmus+, from outside EU, etc.) enrolled for the Academic Year 2017-2018:

	MALE	FEMALE
BACHELOR (EQF 6)		
MASTER (EQF 7)		
PhD (EQF 8)		

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