Our operations

MINING
Our mining operations cover uranium exploration, production and marketing worldwide, as well as the remediation of the former mining sites. The group ranks among the world’s leading uranium producers.

URANIUM CONVERSION AND ENRICHMENT
With a unique integrated industrial platform and the world’s most modern facilities – the Philippe Coste conversion plant and the Georges Besse II enrichment plant –, Orano is recognized throughout the industry for its technical skills and cutting-edge processes.

USED FUEL RECYCLING
Thanks to the performance of its La Hague and Melox plants – which are the only ones to operate on an industrial scale –, Orano is the recognized international leader in the reprocessing and recycling of used fuel.

NUCLEAR PACKAGES AND SERVICES
Throughout the fuel cycle, Orano provides its unique expertise in the design, certification and production of casks, as well as the associated transport, whether overland, by sea or by rail, with the highest level of risk control.

DISMANTLING AND SERVICES
With fifty years’ experience, Orano is a benchmark supplier in the field of operations support for nuclear sites (work site logistics, specialized maintenance and radiological security), as well as the management of radioactive waste and the dismantling of end-of-life equipment and facilities.

ENGINEERING
Engineering operations involve engineering consulting services, contracting and project management assistance, design and construction engineering, plant commissioning and operational support. The teams operate in the group’s own facilities as well as for external customers, in France and worldwide.

ORANO MED
Orano Med – a subsidiary of Orano – is a company that brings together biotechnologies and nuclear technology to develop new therapies to fight cancer.

Our ambition

- Making nuclear energy increasingly reliable and competitive
- Getting the most out of nuclear materials, in particular through recycling, so that they contribute to the development of society
- Remaining the world’s leading player in the production and recycling of nuclear materials, waste management and dismantling
- Continuing to reduce our carbon footprint and remaining on course as a responsible industrial player

Our strengths

- An uncompromising culture of safety and security
- Leading technologies and expertise that is unique in the world
- A unique customer portfolio in the nuclear industry
- Men and women who are recognized for their skills, their commitment and their ability to meet new challenges
- Recognized industrial know-how and state-of-the-art facilities
The nuclear fuel cycle

Orano Tricastin
2nd stage of conversion
(Philippe Coste plant)
Enrichment
(Georges Besse II plant)
Storage of valuable materials
Depleted uranium
(Tricastin and the Bessines mining site), reprocessed uranium, etc.

Orano Malvési
1st stage of conversion

Orano Mining
Natural uranium concentrate
Extraction – Ore processing

Orano La Hague
Reprocessing of used fuel

Cigéo project
Medium-high level long-life waste

Fuel production

Nuclear power plants
Electricity generation

Orano Melox
Recycling – Production of MOX fuel

MOX fuel

Reprocessing
of used fuel

Recycling
of used fuel

Mining

Uranium conversion and enrichment

Uranium
conversion and
enrichment
The latest IPCC(1) report published in October 2018 confirmed that there is an urgent need for action on a global scale to tackle climate change effectively. It is a simple equation: the rise in temperatures must be limited to a maximum of +1.5°C, with the aim of being “carbon-neutral” by 2050, while doubling electricity production to meet global demand. The solutions already exist, such as implementing a low-carbon electricity mix based on renewables and nuclear energy. France is at the forefront of this, with electricity that is already more than 95% carbon-free.

The decisions taken by the French President last November as part of the Multiannual Energy Program (Programmation pluriannuelle de l’Énergie - PPE) confirm this strategy: nuclear energy, which has the dual advantage of not producing CO₂ emissions and of being continuously available, will serve as the backbone for power generation in France. It will be supported by an industry with more than 220,000 employees and 2,500 companies across France, to which Orano brings its recognized know-how in fuel production and the recycling of nuclear materials.

“The 21st century will be that of carbon-free electricity.”

[1] Intergovernmental Panel on Climate Change.
Executive Committee

Standing, from left to right:
Guillaume Dureau,
Projects – Innovation and R&D BU
Patrick Champaloune,
Sales & Marketing
Pascal Aubret,
Recycling BU
Jacques Peythieu,
Chemistry–Enrichment BU
Alain Vandercruyssen,
Dismantling & Services BU
Corinne Spilios,
Performance

François Nogue,
People & Communications
Frédéric de Agostini,
Nuclear Packages & Services BU

Sitting, from left to right:
Stéphane Lhopiteau,
Finance, Legal, IT &
Digital Transformation
Philippe Knoche,
Chief Executive Officer
Nicolas Moes,
Mining BU

© Frédérique Veyssat
Interview with Philippe Knoche
Chief Executive Officer

After one year of operation, the Orano brand makes its mark

2018 marks the end of the restructuring operation, as well as the start of a new chapter for our group. Now refocused on the entire nuclear fuel cycle, Orano provides the nuclear industry with solutions to contribute to the production of reliable and competitive low-carbon electricity. We have a strong ambition – that of being the leading player in the production and recycling of nuclear materials, the management of waste, and dismantling. Orano is now a transformed, solid group with a workforce of 16,000 committed employees. Ranking among the top global players for its main activities, the group is recruiting new employees to preserve and enhance its skills and talents. In this respect, 1,500 recruitments took place during the year, resulting in over 800 new employees on permanent contracts and 500 on work-study contracts. This trend marks the renewed attractiveness of Orano’s employer brand. The presence of Orano’s plants in various regions supports economic activity while also creating sustainable jobs.

A transformed, solid group

At a time when nuclear energy is becoming increasingly essential for power generation, Orano outperformed its targets in its first year of trading. There has been a marked improvement in our key performance indicators for safety and security. At an economic level, the objective of a positive net cash flow has been exceeded, at +158 million euros, marking the start of deleveraging. The results linked to the group’s industrial performance rose significantly (+493 million euros) but were impacted by the financial markets’ negative performance. Lastly, all of our teams rallied behind the “Value 2020” performance plan to deliver €102 million in savings. With these results, Orano confirms its recovery, as well as its ability to perform over the long term.

Dynamic sales

With the recovery of the uranium and conversion market, our group recorded nearly 2 billion euros’ worth of new orders, particularly in Asia, which now accounts for 24% of our revenue. Examples include the contracts signed with JAEA in Japan for the transport and recycling of used fuel, as well as the framework agreement signed with JNFL for engineering services and studies for the processing and recycling of used fuel from the Rokkasho reprocessing plant and, ultimately, the J-MOX plant. In China, with the backing of CNNC, we launched the preliminary work for a Chinese used fuel processing-recycling plant, with the objective of a win-win contract, based on technology which Orano is the only company in the world to master on an industrial scale. These are markers of our development in Asia, as well as in services. Our commercial dynamism was also reflected in contracts in the United States for the supply of transport and storage casks. Other contracts were signed in France with EDF and CEA for services to nuclear sites.

Innovation at the heart of our development

Another strong market for Orano is that of innovation. Our teams won three of the six SFEN awards, including the “Technological Innovation” Award for IRIS (biological protection against radiation during investigations in highly radioactive environments). It also won the first prize in the “Innovation” category at the World Nuclear Exhibition (WNE) for a NanoPix gamma mini camera co-developed with CEA. At the forefront of technological development, we obtained ASN approval for new-generation casks. We also made significant progress in nuclear medicine with the launch of clinical trials, and signed a partnership agreement with Cellectar Biosciences for the development of new cancer therapies. Innovation is paving the way for our future competitiveness, and thus our future success.

Assets and outlook

2019 is a year that will confirm the recovery and growth of Orano through our sustained efforts in terms of competitiveness and performance, our innovation culture, the successful deployment of our operational and managerial excellence system which has already resulted in the training of 1,500 leaders, and our dynamic sales on our markets in France and worldwide. The objectives set in our strategic action plan will be maintained: over 30% of our revenue earned in Asia by 2020 (compared with the current 24%), the ongoing generation of positive net cash flow, and 50% of our workforce in services by 2020. Orano’s recovery obviously implies compliance with the highest requirements in terms of safety, security,
L’École des métiers, to meet the challenges of maintaining and developing skills, ensures the acquisition, transmission and adaptation of technical skills for all our employees, as well as the provision of the required regulatory training.
health and the environment, as well as strict abidance by the compliance rules laid down by the group. This is the responsibility of each and every employee and executive within the group. It must be reflected in our actions and our commitments on a daily basis. The achievement of our Value 2020 performance plan—which targets recurrent gains of 250 million euros in net cash flow by 2020—will enable us to comply with the financial objectives we have set ourselves: the stabilizing of our revenue starting this year, followed by an increase in 2020, as well as the consolidation of our EBITDA margin between 21% and 24% by 2020.

To achieve these objectives, Orano relies on its diversified mining portfolio, the world’s most modern conversion and enrichment facilities, state-of-the-art recycling plants, and internationally recognized expertise in services (transport, cask production, dismantling, operational support and engineering). Its success also rests on the confidence of our customers and the know-how of the group’s employees who uphold our ambition of “giving nuclear energy its full value” on a daily basis.

Ahead of the COP24 summit, the IPCC (1) published a report on global warming. What are its conclusions? Once again, the IPCC has sounded the alarm bells. If we carry on in this fashion, we will not manage to limit global warming to +1.5°C. Four scenarios have been defined to achieve this goal. In each of these, nuclear energy is indispensable. We will need more and more electricity in the future for lighting, heating and also for travel. Over recent months, we have seen the deployment of an electric mobility offer on the part of vehicle manufacturers. All of this leads to a well-known equation: by 2050, we will need to double global electricity production while halving CO₂ emissions. This is due to the fact that the world’s population is set to increase by 2 billion people, two-thirds of whom will live in cities. Solutions exist: they combine nuclear and renewable energies.

In France, 2018 was marked by the presentation of the PPE. Ahead of the COP24 summit, the IPCC has published a report on global warming. What are its conclusions? Once again, the IPCC has sounded the alarm bells. If we carry on in this fashion, we will not manage to limit global warming to +1.5°C. Four scenarios have been defined to achieve this goal. In each of these, nuclear energy is indispensable. We will need more and more electricity in the future for lighting, heating and also for travel. Over recent months, we have seen the deployment of an electric mobility offer on the part of vehicle manufacturers. All of this leads to a well-known equation: by 2050, we will need to double global electricity production while halving CO₂ emissions. This is due to the fact that the world’s population is set to increase by 2 billion people, two-thirds of whom will live in cities. Solutions exist: they combine nuclear and renewable energies.

In France, 2018 was marked by the presentation of the PPE. What impact does this have on the nuclear industry? The PPE lays down the government’s priority energy actions over the next ten years. The plan was preceded by a public debate on the energy transition, mobilizing experts and citizens between March 19 and June 30, 2018. It was heartening to see that the French President reiterated that France’s absolute environmental priority was to combat climate change, with the French goal of being carbon neutral by 2050 through the use of low-carbon energy sources. Even though the schedule for the early shutdown of reactors is not in line with the position we had upheld, nuclear energy remains the mainstay of power generation in France. Over 95% of the used fuel can be recovered. Thus, 10% of France’s nuclear power currently stems from recycled materials. This rate could increase to 30% with the multi-recycling of nuclear fuel. Another benefit of recycling: a five-fold reduction in the volume of the most radioactive final waste and its safe, permanent packaging for storage. France’s expertise in the recycling of used fuel provides a lasting solution to the issue of high-level waste.

— Nuclear energy — an indispensable answer to the world’s energy equation

Philippe Knoche, Chief Executive Officer

(1) Intergovernmental Panel on Climate Change.

— Through the efforts made by all of our teams, savings of 102 million euros were achieved under our Value 2020 performance plan.
Orano across the world

Canada
China
European Union
France
Gabon
Germany
Japan
Kazakhstan
Mongolia
Namibia
Niger
South Korea
United Kingdom
United States

REVENUE BY REGION

- Americas: 17%
- Asia-Pacific: 24%
- Europe (excluding France): 10%
- Africa and Middle East: 2%
- France: 47%
**2018 key figures**

- **€3,623 M** in revenue
- **€31.8 bn** Order backlog, i.e. nearly 9 years of revenue
- **53%** of revenue from international market
- **17** industrial sites in France
- **121** events reported by Orano (Not important from a safety point of view)
- **121** events reported by Orano (Giving rise to an off-site risk)
- **5.58%** employees with disabilities
- **16,000** employees, of whom 12,000 in France
- **Over 900 recruitments in France**
- **18 patents filed**
- **€101 million spent on R&D** (i.e. 2.79% of revenue)
- **45** internal inspections carried out for the safety of the facilities
- **€300 million** invested in the safety of the facilities

**REVENUE BY BUSINESS LINE**

- **Mining** 31%
- **Front end** 23%
- **Back end** 45%
- **Other** 1%

**SAFETY**

- Reporting of events rated on the INES scale:
  - 0 – Deviation
  - 1 – Anomaly
  - 2 – Incident
  - 3 – Serious incident
  - 4 – Accident
  - 5 – Accident
  - 6 – Serious accident
  - 7 – Major accident

- Accident frequency rate with lost time (excluding commuting accidents):
  - 1.5 (2.4 in 2017)

- Accident severity rate (accidents reported during the year, excluding commuting accidents):
  - 0.03 (0.07 in 2017)

**Order backlog**

- i.e. nearly 9 years of revenue

**Top 3 worldwide in our key activities**

**Workplace Safety**

- Over 900 recruitments in France
MOX is a mix of uranium and plutonium oxides used for the production of nuclear fuel. This process makes it possible to recycle the plutonium stemming from the treatment of used fuel.
— We are Orano! New identity and new chapter in the history of the group.

— Orano wins a major contract for the supply of used fuel storage solutions in the United States.

— Japanese companies JNFL and MHI acquire a stake in Orano.

— Orano signs a new contract with Ukraine for the recycling of used fuel.

— Orano wins two major service contracts with EDF.

— Inauguration of the Philippe-Coste conversion plant on Orano’s Tricastin site.

— Orano signs an agreement with NDA in the UK in the field of dismantling.

— Signing of a service provision agreement by Orano and JNFL, and first J-MOX contracts.

— Orano TN wins a major contract for nuclear waste logistics in the UK.

— Orano and CNNC launch the preparatory work for the Chinese used fuel treatment and recycling plant.

— Orano wins a preparatory works contract with JAEA for the transportation and recycling of used fuel in Japan.

— PPE: confirmation of the nuclear treatment-recycling strategy, promoting nuclear energy as a competitive carbon-free energy.

— Cancer research makes significant progress at Orano Med with the FDA’s granting of “orphan drug” status to AlphaMedixTM in the United States.

— Orano Med expands its production capacities in France and the United States.

The use of robots and drones, equipped with increasingly efficient cameras or various types of sensors, make it possible to optimize inspection and surveillance operations at industrial and mining sites. Orano uses drones for indoor as well as outdoor operations.
Given that Asia is the world’s nuclear growth driver, Orano is expecting to generate 30% of its revenue in that region by 2020, versus 24% today. China is launching the construction of additional nuclear reactors, while Japan is recommissioning its reactors (nine to date). In November 2018, Orano won a preparatory works contract with the Japan Atomic Energy Agency (JAEA) for the transportation and recycling of used fuel. The signing of this contract confirmed Orano’s global expertise in transport cask fleet operations and the choice of nuclear recycling as a responsible and efficient management solution for used fuel.

Orano also strengthened its cooperation with its Asian partners, as confirmed by the signing of a framework agreement with JNFL (Japan Nuclear Fuel Limited) in June 2018 for engineering services and studies for the processing and recycling of used fuel from the Rokkasho reprocessing plant and, subsequently, the J-MOX plant, which produces MOX fuel. The group also carried out the preparatory work with CNLA (a subsidiary of CNNC) for the construction of a used fuel recycling plant in China. The objective is a win-win contract, based on technology which Orano is the only company in the world to master on an industrial scale.
Thanks to Orano’s technologies, which are world-unique on the industrial scale, 96% of used fuel can be recycled. Nearly 10% of the nuclear power consumed in France comes from recycled materials.
In 2019, Orano’s support for the NGO François-Xavier Bagnoud (FXB) and the FXB Village of Dornogobi in Mongolia was renewed for a period of three years. This community development program – called “FXB Village” – simultaneously tackles five predominant factors of poverty in the world – malnutrition, disease, lack of education, substandard housing, and insufficient revenue – particularly in South Africa, Niger, Namibia, China and Panama, among other countries. The families identified receive practical and theoretical advice on how to get out of poverty in a sustainable manner, as well as capital to start up income-earning activities. At the end of a three-year period, these families are expected to be financially independent, with positive repercussions on their community and country. An identical program had been implemented by FXB in Mongolia in 2016 with the support of the AREVA Foundation and the backing of our local teams. On the strength of that success, Orano decided to continue this initiative by providing support to 100 new needy families, covering around 500 to 600 beneficiaries. This initiative fits into the responsible and sustainable management of Orano Mining’s activities in its countries of operation. For over twenty years now, Orano has been conducting successful mining exploration operations in southeastern Mongolia. In 2015, it secured three mining licenses. In 2018, it completed the installation of a pilot ISR(1) facility for the deposit of Zuuvch Ovoo (54,640 tons of uranium), in cooperation with its partners – the Mongolian national company Mon-Atom and Mitsubishi Corporation. Mongolia currently ranks 12th in the world for its proven uranium mineral reserves.

(1) In-Situ Recovery.
Natural uranium is a metal which is present everywhere on earth, in rocks as well as in seawater. Its low radioactivity generates the main source of heat that maintains the high temperatures of the earth’s mantle, thereby limiting its cooling. Thanks to this property, uranium has become the raw material used by the nuclear power industry.
To support the Chemistry-Enrichment Business Unit’s (BU) €300 million investment program in Aude (France), Orano’s Engineering division decided, in May 2018, to move its teams into the heart of the Malvési site, located near Narbonne. Between now and 2025, the dedicated engineering team will notably work on the modernization and perpetuation of hydrofluorination, the commissioning of a new nitrate treatment plant, and a new workshop for the treatment of aqueous effluents. By being based in the heart of the Malvési site, the engineering teams can work in close proximity with the operating teams and provide all the required technical support for the commissioning of facilities.

The on-site monitoring of the work and close contact between teams aim to make it possible to keep track of the progress of the site’s various industrial projects and conduct them in compliance with the targets in terms of costs and deadlines. The teams’ proximity will make it easier to understand the customers’ needs, their requirements, and the issues at stake. The Engineering team’s added value also rests on its ability to bring together the skills required for the proper unfolding of the projects (thermal modeling, structural calculations, process equipment sizing calculations, and feasibility studies) and to obtain key skills through a network of companies that have already worked with Orano’s Engineering division, particularly on the Tricastin site.

The engineers recruited or transferred to the Malvési site include two engineers from Narbonne. Jean-Guillaume Thomières is a mechanical design engineer. He worked in the aerospace industry in Toulouse for six years prior to his return to his home area to participate in securing the future of the hydrofluorination building at Malvési. Pierre-Jean Rigaud, also a mechanical design engineer, seized the opportunity to join Orano’s engineering team and return to his native Narbonne region, and thereby reconcile working and family life. Other employees are being recruited or transferred. The goal is to set up a dedicated engineering team at the Malvési site by the end of 2019, growing to around 50 people between mid-2020 and mid-2023.
From around 100 hours of work...

to several million!

Every year, our employees conduct over 300 engineering projects.
PPE: nuclear energy to support the energy transition

— In France, 2018 was marked by the PPE, which lays down France’s priority actions for the energy transition over the next ten years. The conclusions are clear: the need to rely on low-carbon energy sources to achieve France’s zero-carbon objective by 2050, and confirmation of the treatment-recycling strategy for the management of used fuel. Our country’s goal is to maintain secure, competitive, low-carbon electricity generation, capable of supplying continuous power for tomorrow’s travel, heating and lighting needs. Electricity is a basic need. Nuclear energy provides France’s population with the lowest electricity prices in Western Europe. In comparison, a German household pays nearly 70% more than a French household for its power supply. According to the figures of the Intergovernmental Panel on Climate Change IPCC, nuclear energy – just like wind power – emits around 12 grams of CO₂ per kilowatt-hour. That is a quarter of that emitted by solar energy, 40 times less than gas, and 80 times less than coal. In its latest report in October 2018, the IPCC stated that, to limit global warming to +1.5°C, nuclear energy is not the only solution but remains an indispensable ally. In fact, if CO₂ emissions continue to rise, global nuclear capacities will need to be increased six-fold to enable us to comply with our climate targets.

Recycling: a sustainable solution to nuclear waste

Thanks to Orano’s world-unique treatment-recycling technologies, nearly 96% of used fuel from power-generating nuclear reactors or nuclear research reactors can be recovered. The nuclear material can be reused to make new fuel that will in turn generate electricity. Another benefit of recycling: saving natural resources. One gram of plutonium or 100 grams of recycled uranium are equivalent to 1 metric ton of oil, 2.5 metric tons of wood or 1.5 metric tons of coal. Thanks to innovation, 10% of France’s nuclear electricity currently stems from recycled materials. With the expected industrial developments — in particular the use of recycled MOX fuel in reactors and the multi-recycling of nuclear fuel — it should be possible to increase that ratio to 30%. Last but not least, another major advantage of recycling is a 5-fold reduction in the volume of the most radioactive waste and a 10-fold reduction in its long-term radioactivity. This high-level waste is packaged in a safe and lasting way. It undergoes calcination and is then mixed with molten glass and poured into stainless steel containers to ensure safe and stable packaging for tens of thousands of years. Coupled with geological storage, this constitutes the safest solution, according to the Autorité de Sûreté Nucléaire - ASN - French nuclear safety authority.

97% carbon-free electricity in France thanks to nuclear and hydraulic energies

40 years now, the nuclear industry has been a pioneer in the field of recycling
Temporary storage
The French waste is stored on Orano’s la Hague site in dedicated halls pending its transfer to the permanent storage site (Cigéo project). Waste from foreign customers is returned to the country of origin.
A new generation of nuclear packages

— As a major player in nuclear logistics, Orano has developed new solutions for the transportation and storage of used fuel. Their common objective: providing customers with a competitive edge and maximum safety. In 2018, the ASN certified Orano’s TN® G3 and TN® 17 MAX casks. This is an essential step in the development of these casks intended for the transportation of used fuel to Orano’s recycling plant in La Hague. While meeting the latest regulatory safety standards, they will be able to transport fuel with a higher enrichment level and thermal capacity, and are suited to the future generation of fuel elements. Their commissioning is expected in 2020 for the TN® 17 MAX and in 2022 for the TN® G3. The NUHOMS® system accounts for nearly half of the used fuel dry storage market in the United States. With MATRIX, it has undergone a major development. Its unique configuration means a 45% reduction in the floor space taken up by the storage facility – a “sizable” benefit for utility operators. In 2018, American operator WCNOC opted for NUHOMS® MATRIX for its power plant in Wolf Creek (Kansas). Numerous utility operators are interested in this revolutionary storage system that offers a solution that is totally in keeping with their requirements. The latest innovation developed by Orano is the TN® Eagle cask intended for transportation and dry storage. While using proven technologies like the forged metal containment vessel, its modular design will provide a decisive competitive edge. It targets a global market.

Certified, ultra-resistant casks

Acting like a genuine fortress, a cask can weigh more than 100 metric tons when empty and transport around 6 metric tons of material. The casks are designed to ensure the containment of radioactive material and the protection of people and the environment in all circumstances. They meet the stringent requirements of the International Atomic Energy Agency and are certified by the safety authorities of the various countries through which they travel. To ensure their resistance during transport, the casks undergo extremely severe upstream crash-testing, including: a 9-meter drop onto an unyielding surface, a 1-meter drop onto a spike, an engulfing oil fire for thirty minutes, and immersion to a depth of 200 meters.

5,000 transportation operations per year by road, rail, sea or air, including the following in 2018-2019:
• transportation of used research fuel from ANSTO in Australia to France
• transportation of primary sources for the start-up of the Taishan 2 reactor

1,500 dry storage casks loaded worldwide

Nearly 60 years’ experience in the transportation of radioactive materials
Collaborative design, training, and remote assistance. Orano offers a full range of virtual reality and augmented reality solutions providing added value to its customers.
As the world leader in the nuclear fuel cycle, Orano takes steps to attract talents by organizing job forums, such as the event that took place at the end of 2018 at the Velodrome of Saint-Quentin-en-Yvelines (France). On the agenda: ten hours of non-stop recruitment through speed interviews, the discovery of the group’s activities and diverse business lines, conferences on topics such as factory 4.0 or the job of project manager, meetings with experts, and areas dedicated to technological innovation (virtual reality and augmented reality demonstrations).

There were 1,000 jobs to be filled in a wide variety of fields and for some 100 different occupations including those of radiation protection technician, safety engineer, process expert, project manager, test manager, and dismantling specialist. The forum was aimed at a broad audience, ranging from technicians to engineers, with or without experience, holding a degree or on a degree program. The event was a resounding success with nearly 800 job applicants present during the day.

For Orano, the challenge was sizable: recruiting the best talents to support the generation of low-carbon energy.

In 2018, Orano launched a campaign on the Internet and social media to promote its employer brand under the hashtag #OranoRecrute. The goal: attracting new talents to a strategic industry of excellence involved in the energy transition and the fight against global warming, and focused on innovation and high technologies. The recruitment target is particularly ambitious in services to nuclear operations (engineering, dismantling and rehabilitation, logistics, etc.), where the group expects to attain 50% of its headcount target by 2020 to support its development. Orano is also investing in training using a network-based approach and is setting up new modes of collaboration based on digital technology, cross-functionality and experience sharing. Centered on continuous improvement, as well as added value for the customer and a search for efficiency, Orano creates a genuine culture of excellence that promotes team work, problem-solving, self-reliance, flexibility, skill development, motivation and change.

Renewed attractiveness of Orano’s employer brand

No. 1 in nuclear training in France

1,500 new employees recruited in 2018, of which 800 on permanent contracts, 500 on work-study contracts and 200 on fixed-term contracts in 250 different jobs.
Meetings with target schools and universities

On Wednesday June 5, 2019, the group brought together some 50 representatives of 20 target schools and universities on the theme of "Nuclear energy: jobs and skills." To what end? To build closer relations with the schools and reassert its ambitious objective of 1,500 recruitments, including 500 people on work-study contracts in 2019.
In 2018, the group won two major service contracts with EDF for the nuclear power plants of Penly (Seine-Maritime) and Dampierre (Loiret), for terms of five and six years, respectively. Some 50 Orano employees specialized in dismantling and services provide assistance to ensure the proper operation of the six reactors of the two EDF power plants. This involves the provision of services linked to the installation and removal of scaffolding and industrial thermal insulation (heat insulating materials).

These services are provided either in the production phase or during scheduled site maintenance shutdowns. Moreover, in 2019, the group is bidding in a call for proposals covering similar worksite logistics activities, in this case for 18 reactors in the French nuclear fleet. Orano is hoping to win several significant contracts through this tender. This strong involvement in services to the nuclear industry is a priority focus of Orano’s strategic plan, which is to achieve balanced development between its production operations and services by 2020.

To support the operation of nuclear facilities, Orano is entrusted with intervention logistics and worksite assistance services: installation and removal of scaffolding or thermal insulation, management of tool storage facilities or the protective wear chain, coordination of various service providers, handling of parcels, radiation protection checks, etc. On a broader level, the group offers an extensive range of assistance services for the handling and management of nuclear facilities under operation, under maintenance or at the end of their useful life. This includes maintenance of sensitive equipment, operation of nuclear workshops, and the management of waste, whether the waste stems from plant operation (clothing, gloves, used tools, etc.) or whether it involves repackaging legacy waste prior to dismantling operations.
Staying close to customer needs

By being based on the sites or nearby, Orano’s service employees are in the customer’s industrial environment on a daily basis. Orano is thus present on all French nuclear sites, ensuring a quick response and an offer tailored to local needs.
WNE: showing off Orano’s innovation!

— MANUELA™, RIANA™ SC or NanoPix, these are just a few of the innovations presented by Orano at the third World Nuclear Exhibition, held in Paris in June 2018. What do these innovations have in common? They provide high-performance solutions to nuclear facilities. Highlighted at the Orano stand: virtual reality and augmented reality, which improve the sites’ safety and operating excellence. At the exhibition, visitors were able to test out a polar crane driving simulator that can move the large components required for the operation of a reactor or to carry out maintenance operations.

Another innovation showcased at the WNE: MANUELA™ (Mobile Apparatus for Nuclear Expertise and Localisation Assistance). Dedicated to dismantling operations, this portable device maps out a contaminated area in real time through 3D and radiological sensors. The measurements are instantly transferred to a control screen. This technology limits the radiological exposure of operators through a 10-fold reduction in the time required for on-site operations.

Another innovation is called RIANA™ SC (Robot for Investigations and Assessments of Nuclear Areas). This decontamination robot is used in nuclear areas to map out the area, take samples, and measure radioactivity without exposing any employees. During the WNE Awards ceremony, Orano was awarded a prize in the “Innovation” category for its NanoPix camera. Co-developed with CEA-List, it is the world’s smallest gamma camera for the remote viewing of radioactive sources to support nuclear investigation operations.

Innovation culture

In a rapidly changing energy market, Orano makes innovation a priority in order to closely meet customer requirements and anticipate the future by inventing tomorrow’s new activities. Because innovation is firstly collaborative and feeds on inspiration and openness to the world, Orano has taken steps to promote collective intelligence and open innovation: new working methods, sharing within internal technical communities, online events, MOOC-based digital transformation training, creativity in design and idea prototyping facilities (FabLabs) and cooperation with a network of start-ups and SMEs.

1,000 start-ups and SMEs. A network with which Orano cooperates through the Orano Innovation PME platform.
In 2018, the WNE – a true concentrate of the world’s nuclear expertise – welcomed some 20,000 highly qualified visitors. A not-to-be-missed event for Orano, which showcased its innovation culture and its vision of nuclear energy as a competitive, low-carbon energy that creates jobs.
Inauguration of the new Philippe Coste conversion plant

— Inaugurated on September 10, 2018, the new Philippe Coste conversion plant, located on Orano’s Tricastin site (Drôme), was commissioned on December 12. This conversion plant, which is the world’s most modern, reinforces Orano’s position on the conversion market. Meeting the highest safety and environment standards, the Philippe Coste plant allows the recycling of chemical reagents and a 90% reduction in water consumption. Its instrumentation and control system have been further automated to improve the management of the process. A second building, dedicated to fluorne production, will be delivered in 2020, making it possible to double the installed production capacity to 15,000 metric tons of uranium. Orano is the world’s first industrial player to renew and modernize its industrial conversion plant. A world-class facility made in France and involving some 240 partner companies, 99% of which are French.

The Philippe Coste conversion plant and the Georges Besse II enrichment plant at Orano’s Tricastin site are part of the site’s industrial facility renewal program, in which the group has invested over €5 billion. The uranium enriched by the platform will be used to make nuclear fuel to produce low-carbon electricity capable of supplying power to over 90 million households every year, while maintaining permanent industrial jobs in France. Boasting the world’s most modern integrated industrial platform, Orano guarantees its customers a predictable and reliable supply of uranium that meets safety and environmental standards.

90 million households supplied with low-carbon electricity, i.e. the equivalent of France, Germany and England combined

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The Tricastin-Malvési platform currently has an industrial facility which has been fully renewed and over 90% modernized, with improved safety and a lower environmental footprint.
— After the launch of a second clinical trial, the Orano group’s nuclear medicine subsidiary reached a major milestone in November 2018 when “orphan drug” status was granted by the Food and Drug Administration (FDA) in the United States for AlphaMedix™. This designation is an incentive to continue research into the development of new treatments for diseases affecting less than 200,000 people in the United States.

Targeted alpha therapy is an innovative therapeutic approach that makes it possible to recognize and destroy cancer cells while limiting the impact on surrounding healthy cells. AlphaMedix™ is an example of a targeted alpha therapy treatment for neuroendocrine tumors. It was developed by Orano Med and RadioMedix, relying on the expertise of Orano Med to extract high-purity lead-212 (212Pb) and develop treatments using this isotope. Combining biotechnologies and nuclear technology, Orano Med now develops its own molecules – peptides labeled with 212Pb – to develop new treatments for different forms of cancer against which current therapeutic solutions are limited or non-existent.

Orano Med will invest €15 million in its two main facilities in France and the United States to step up the development of therapeutic solutions using the radioactive properties of lead-212 (212Pb) to combat cancer. In concrete terms, these investments will make it possible to double the floor space of the Maurice-Tubiana laboratory in Bessines-sur-Gartempe (France), in order to increase its lead-212 production capacities. They will also finance the installation of a white room in the aim of obtaining “Pharmaceutical Establishment” status from the Agence nationale de sécurité du médicament et des produits de santé - French agency for the safety of drugs and health products – an essential step prior to the sending of clinical doses for therapeutic trials in Europe. In the United States, the capacities of the Domestic Distribution and Purification Unit located near Dallas, Texas, will also be expanded. This will allow the handling of several clinical trials at the same time, while accelerating Orano Med’s preclinical research into peptides radiolabeled with lead-212, thanks to new R&D laboratories and the purchase of specific equipment for the development and synthesis of new molecules.

(1) Peptides are chemical entities composed of amino acids and are one of the main sources of medication currently on the market. They may be natural or chemically synthesized. They have the capacity to bind to a molecular target (such as certain cancer-specific receptors).
Orano Med develops in its facilities new targeted alpha therapy treatments with $^{212}$Pb to combat cancer.
Business corporation with a Board of Directors (Société anonyme à Conseil d’administration) and capital of €132,076,389
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Energy is our future. Don’t waste it!