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Magazine

#1 Autumn 2020



Doing
business the
sustainable
way

FOCUS

A standard for
circular products

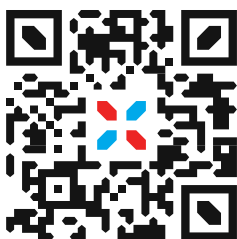
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I'm really pleased to welcome you to the very first edition of *Crossroads Magazine*, Luxembourg's new publication aimed at companies across the globe looking for a perfect location to launch or expand their business in Europe.

Sasha Baillie, CEO of Luxinnovation



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Doing business the sustainable way



Clean technologies and the circular economy are more than just buzzwords in Luxembourg – they are essential tools for building a more sustainable and resilient country. The approach is practical.

Luxembourg develops a European standard for providing circular data about products as well as models for assessing the impact of clean technologies, from technology development and production to use and end-of-life treatment.

A leading centre for green and sustainable finance, Luxembourg is also a promising testbed for emerging circular economy business models.





Building a sustainable economy

Interview with Minister of the Economy Franz Fayot

Internationally renowned for its strong economic performance, Luxembourg has a determinedly green outlook towards the future. *Crossroads Magazine* spoke to Minister of the Economy Franz Fayot about his vision for combining successful economic development with long-term sustainability.

Some claim that economic development and sustainability are fundamentally opposed. What is your view on this matter?

Franz Fayot: The two can, and must, go together. The linear economy, as we know it, is facing an increasing number of challenges linked to the scarcity of raw materials and pollution. Implementing a circular economy, where sustainability and economic development are complementary rather than contradictory, would offer solutions to these problems. The circular economy implies a holistic management of stocks as well as of product and material flows, and aims at creating positive economic, environmental and social impact at all stages of the value chain.

How does the Luxembourg government work with economic sustainability?

We see clean technologies in general, and the circular economy in particular, as essential tools for building a more sustainable and resilient country. These topics are strongly embedded into the 2018-2023 government

agreement, and the circular economy is a transversal theme of our strategy for data-driven innovation. Several national projects with the aim of strengthening clean technologies and the circular economy are underway. Our next major milestone is the launch at the end of 2020 of our national circular economy strategy, involving all stakeholders concerned including the relevant ministries.

Could you please outline some of the main initiatives that are being implemented in order to strengthen cleantech and the circular economy in Luxembourg?

One of our flagship projects linked to Luxembourg's expertise in data handling is the Circularity Dataset Initiative. Its objective is to develop a European industry standard that offers a regulated framework for providing circular data about products all the way through the value chain. My team has recently finished the first proof of concept of a Product Circularity Data Sheet (*see pages 10-11*) which will be used to document such circular product data.





The sustainability perspective is also reflected in a bill approved in July this year, implementing a new aid measure for companies that have suffered the impact of the COVID-19 crisis. By means of high subsidy levels (up to 50% of eligible costs), this new financial aid encourages firms to carry out economic development, digitalisation and environmental protection projects. An addition level of subsidy is awarded for projects that include a circular economy aspect. As circular products require appropriate business models to be successful, my ministry, together with the Ministry of Finance, has launched a new study to support the emergence of circular business models. The goal is to define first-class financial and business services that would help such business models flourish in the future.

Circular construction is another key theme in Luxembourg. It is worth mentioning the on-going building of a dismantlable parking garage, the components of which can be taken apart and reused in new buildings, and of a cleantech incubator in Bissen north of Luxembourg City. In addition, Luxinnovation, the national innovation agency, and the Luxembourg Institute of Science and Technology (LIST) are exploring the potential creation of a deconstruction platform that would be used to improve the recovery and resale of materials and secondary products resulting from deconstruction in Luxembourg.

What future opportunities do you see for Luxembourg in the field of clean technologies and circularity?

With its expertise in IT and finance, as well as its close interactions between social, institutional and economic players, Luxembourg is a promising testbed for emerging circular economy business models. Thanks to its entrepreneurial tradition, our country is well positioned to trigger successful pilot projects by using an intelligent combination of regulatory, financial and communication tools to provide long-term visibility to companies investing in circular business models and products. The forthcoming national circular economy strategy will take Luxembourg's development into a living lab and European hub for circular businesses yet another step forward.

Other cleantech priority fields include urban farming – in 2019, Luxembourg was the first country to adopt an urban farming strategy on a national scale – and energy efficiency. We wish to attract more innovative companies active in these fields to Luxembourg.

We see clean technologies in general, and the circular economy in particular, as essential tools for building a more sustainable and resilient country.

The COVID-19 pandemic has had a profound impact on our society and economy. Has it also influenced Luxembourg's policies in terms of sustainability?

Already before the pandemic, many governments in the world – including that of Luxembourg – had adopted circular economy policies for a sustainable resource management. The “European Green Deal”, the EU's plan for becoming climate neutral by 2050, includes a circular economy action plan. In addition to bringing environmental benefits, the circular economy will provide greater resilience in view of expected shortages of raw materials in key industrial sectors.

I think the COVID-19 crisis can be seen as a catalyst that has accelerated important trends, and it has indeed strengthened the need for sustainability even more. Sustainability and resilience are two of the major market trends in the post COVID-19 economy identified by Luxinnovation (*see pages 24-27*). At the national level, we have launched a programme called Fit 4 Resilience that

offers companies the opportunity to carry out a strategic assessment on how resilient they are and on what actions to take to increase their resilience so that they are better geared up for any future crises. On behalf of Luxembourg, I have also argued for putting sustainable growth and digitalisation at the centre of the EU’s relaunch strategy.

What opportunities do you see for international cooperation in this field?

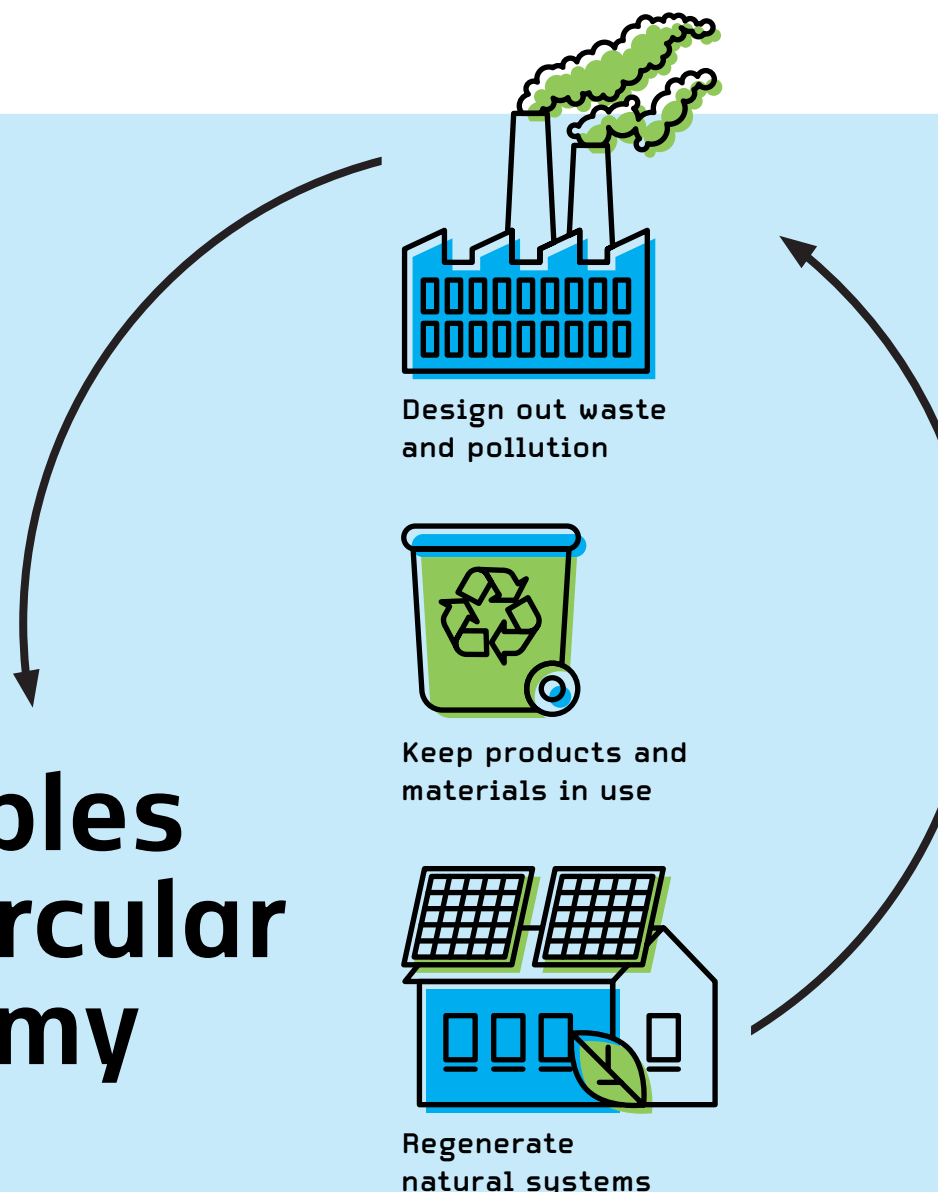
The need for a more resilient and sustainable economy is of course not limited to Luxembourg – it is a global trend, and a key priority in the EU. Luxembourg is involved in the European Circular Economy Stakeholder Platform, which brings together public and private European stakeholders

to discuss, present their strategies and exchange good practice and knowledge. We are also involved in the National Circular Hotspot Network, where the Scandinavian and Benelux countries are very active. In addition, we collaborate closely with our neighbouring regions. Luxembourg was selected to host the next edition of the Cleantech Forum Europe, a major get together for all players investing in cleantech start-ups and innovative solutions. Although the pandemic will prevent us from welcoming the international delegates on site in Luxembourg, we are proud to host this digital event and share our experience with colleagues from other countries. Cooperation is key, and I am convinced that it will help promote our technologies and build attractive markets for companies doing business in Luxembourg.

Text: Lena Mårtensson
 Photo: Anne Lommel
 Illustrations: Quattro Creative

The 3 principles of a circular economy


Source: Ellen MacArthur Foundation





A standard for circular products

Clean technologies and the circular economy are central themes in Luxembourg's strategy for data-driven innovation. The country is at the forefront of developing data-related standards that will drive the clean technologies of the future.



Christian Tock, Ministry of the Economy

“We wanted to find a simple way for companies to provide relevant, reliable information without having to reveal any trade secrets.”

Luxembourg is renowned for its advanced capacities for storing, handling and processing data and is now investing to become a leading data economy. Clean technologies is one of the priority sectors in the data-driven innovation strategy published by the government in 2019, and the circular economy is a transversal theme.

Linking data with circularity

“For us, there is an obvious link between the use of data and the circular economy,” confirms Christian Tock, Director Sustainable Technologies at the Ministry of the Economy. “No product is circular in itself unless it is at the centre of an appropriate business model. In order to achieve this, circular data needs to be available.” Dr Tock is playing a leading role in the Circularity Dataset Initiative launched in Luxembourg in 2018 with the aim of developing an International industry standard that provides a regulated framework for circular data on products. It will cover the whole value chain, from raw materials to finished products and from the use phase to re-usage and recycling.

“Information about a product’s circular characteristics rarely travels the whole way through the value chain, and some data can be highly confidential,” says Dr Tock. “We wanted to find a simple way for companies to provide relevant, reliable information without having to reveal any trade secrets.

Datasheets: a pragmatic solution

The solution is called the “Product Circularity Data Sheet” (PCDS) which includes all information known about the product and the type of end of use cycle for which it has been designed. It shows, for example, whether a product is biodegradable and can be reused, repaired, recycled or used as a material bank for new products.

When different components are integrated into the same product, the accompanying PCDS has to be updated accordingly. The data confirming the product’s circular characteristics remains with the producer, but will be audited in order to verify the accuracy of the statement.

“With this approach, we avoid having a central storage for data that is heavy to administer and difficult to keep up to date,” Dr Tock points out. “Companies can also be confident that there is no risk that the PCDS will give their competitors access to information that they want to keep confidential.” The project group is now working on an auditing model of the data behind each PCDS that is both cost effective and reliable, and accessible for all companies including SMEs.

Towards an industry standard

Around 50 companies from 12 countries are part of the working group that has formulated and initially tested the PCDS. “The next step is to launch tests on a larger scale, including suppliers, and to involve authorities in other countries,” says Dr Tock. “Our ambition is to formalise the approach into an ISO standard, but we hope that it will become an industry standard even before that. If a company such as ArcelorMittal, Tarkett or Saint Gobain, which are members of the dataset working group, would decide that they want to establish a PCDS for each of their products, the approach would spread through their network of suppliers and cut the costs linked to the tedious requests and questionnaires used today. It should become a competitive advantage for them to report this standardised information and leave no doubt about the circularity of their products.”

The hope is, however, that having a PCDS for each product will be a legal requirement in a not too distant future. Dr Tock is confident. “We think that this is a potential game changer that could clear some of the obstacles that the circular economy is currently facing.”

www.pcds.lu



Text: Lena Mårtensson

Photo: Anne Lommel



Sustainability by design



Enrico Benetto, Luxembourg Institute of Science and Technology

“We need to understand the impact of our use of technology and adapt our behaviour.”



What makes a technology truly clean? Specialists at the Luxembourg Institute of Science and Technology (LIST) argue that a holistic perspective, spanning from technology development and production to use and end-of-life treatment, is needed.

Determining whether a technology is really “clean” or not is far from easy. It requires a holistic approach, and not just focusing on its performance during the production or use phase.

“Take electric vehicles, for example,” says Enrico Benetto, who heads the Environmental Sustainability Assessment and Circularity (SUSTAIN) unit of LIST’s Environmental Research and Innovation department. “Although their adoption is a major step towards cleaner mobility, different aspects all along their lifecycle need to be carefully considered when designing their deployment. They will only generate significant environmental gains if the electricity used comes from renewable sources, for example. Batteries should be reused at the end of their lives, for example to store renewable energy in buildings, and potential social issues related to the extraction of raw materials have to be transparently addressed.”

Sustainable hydrogen production

Two of LIST’s current flagship research projects focus on making hydrogen production easier, cheaper and more environmentally friendly. The institute is working on innovative



techniques for the fractionation of water molecules – composed of oxygen and hydrogen – in order to recover the hydrogen component directly, without the need for costly and energy-intensive catalysis processes. LIST is also developing special materials capable of capturing the solar energy needed to implement the fractionation of water molecules by a photo-electrochemical reaction.

“Hydrogen can be an important source of energy in the future, in particular for aviation and maritime transportation, but current production methods are dependent on non-renewable energies,” comments Dr Benetto. “The development of these new techniques powered by solar energy can be a significant step forward when steered by a ‘sustainable by design’ approach.” The objective is to extend this emerging technology on an industrial scale by 2030.

Ensuring a positive impact

Defining holistic models for evaluating clean technologies is an important task for Dr Benetto and his team. Around 10 members of his units work as expert evaluators for the Solar Impulse Foundation, which is labelling 1,000 solutions that can protect the environment in a profitable way. LIST’s role is to ensure that the labelled technologies will really generate a positive impact throughout their complete lifecycle, thereby fostering the transition to a more sustainable society.

The team is also working on an evaluation matrix for characterising clean technologies at different levels of maturity in order to help financial investors assess their environmental friendliness and business potential. The work contributes to European and

national sustainable finance initiatives, the objective of which is to channel private investment towards the transition to a climate-neutral economy.

Adapting user behaviour: the data approach

Although clean technologies are essential to achieve the EU’s objective of becoming climate-neutral by 2050, Dr Benetto is convinced that they are not enough. “We, as individuals and consumers, need to understand the impact of our use of technology and adapt our behaviour. Companies also have to better understand how their products really are being used, as reality might differ considerably from the design requirements.”

LIST is in the starting blocks for developing “digital twin” models and apps allowing users to be better informed and to share data, in a fair and secure way, with technology developers on how they actually use their products in everyday life. “I’m certain that client-centric technology development with a participatory approach, which involves users already from the design phase, will become increasingly important. This will be essential to sustain the energy and sustainability transitions in the next decade.”

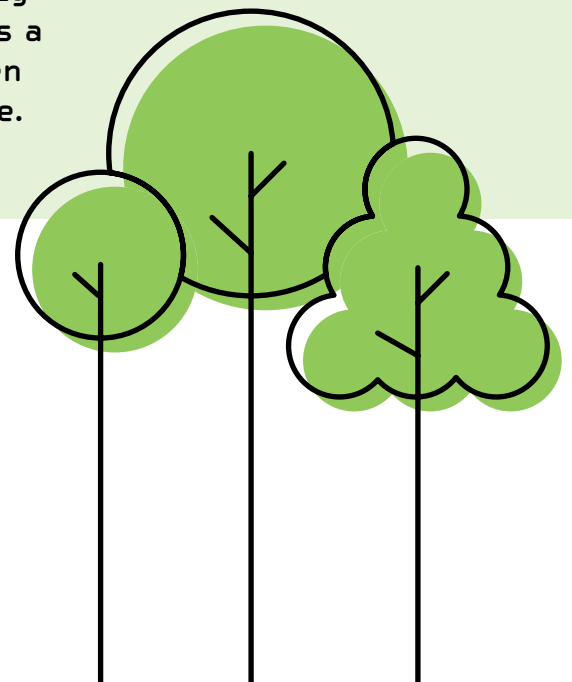
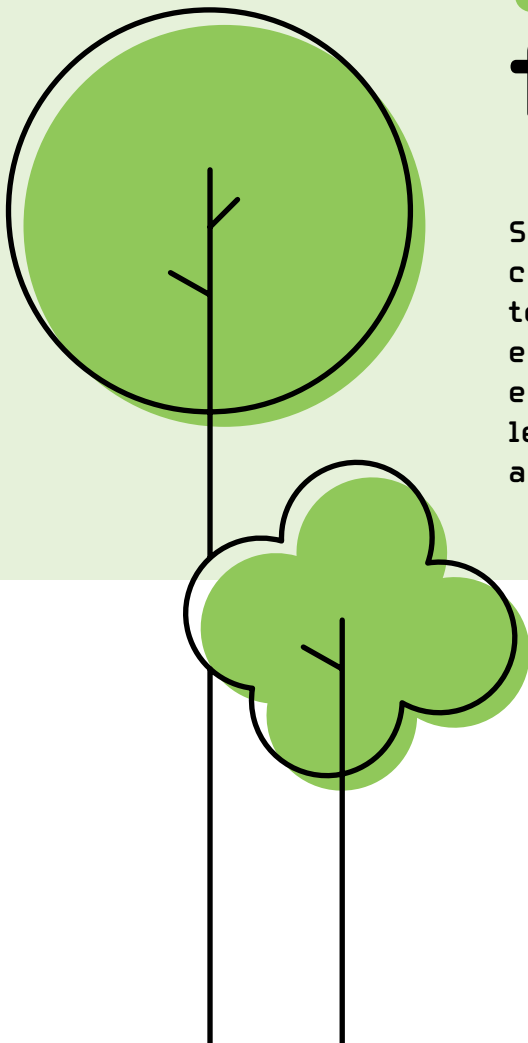
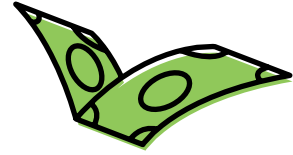
Text: Lena Mårtensson

Photos: Laurent Antonelli

and Sabino Parente



3 things to know about green finance



Securing financing is crucial for the transition to a sustainable, environmentally friendly economy. Luxembourg is a leading centre for green and sustainable finance.



1

Exponential growth

Counted in billions of dollars today, the sustainable finance sector across the world is expected to reach trillions in the next five years. “Many investors – in particular millennials and large institutional investors such as pension funds – have realised that the move towards sustainable finance is an existential question,” explains Nicolas Mackel, CEO of Luxembourg for Finance (LFF), the agency for the development of the financial centre.

“In addition, people start to see that green finance also makes sense from a business point of view. The transition from traditional manufacturing and processing to new, more climate-friendly and sustainable methods, needs to be financed, and this opens attractive opportunities for investors.”

2

Luxembourg, a global centre

According to LFF, 35% of assets invested by European investment funds into renewable energy projects are managed via Luxembourg investment funds, and the country is the world’s largest listing venue for green bonds. 50% of all green bonds are listed on the Luxembourg Green Exchange. As of 30 September 2020, this corresponds to over 800 securities with a total value exceeding €300 billion.

“As we are an important financial centre for investment funds and capital markets, it is not astonishing that a lot of the new trends, such as the pivoting towards green and sustainable finance, to a large extent happen here,” says Mr Mackel. “A second factor is our openness to financial innovation. We have a long track record of being first in many areas, such as being the earliest to list green bonds. Being a first mover very often gives us a leading market share.”

3

A competitive advantage

Luxembourg-based private equity firm ORAXYS is one of the forerunners in sustainable finance. “When we created Oraxys more than 10 years ago, we were really a pioneer in our choice to focus on sustainability,” recalls Managing Partner Grégory Fayolle. “We decided to create a specific investment vehicle aimed at helping European companies develop new solutions that would benefit resource efficiency, health and/or the environment. For me, it was obvious that creating a network, knowledge and know-how in this specific field would give us a competitive advantage.”

Oraxys targets a range of sectors, for example green chemistry, waste management, eco-materials, organic food, healthy living solutions, IT and smart electrical equipment. Its first fund, Oraxys Environment 1, has up until now a successful track record of investing in 9 SMEs, while its second fund is ramping up its investments.

Text: Lena Mårtensson

Illustrations: Quattro Creative



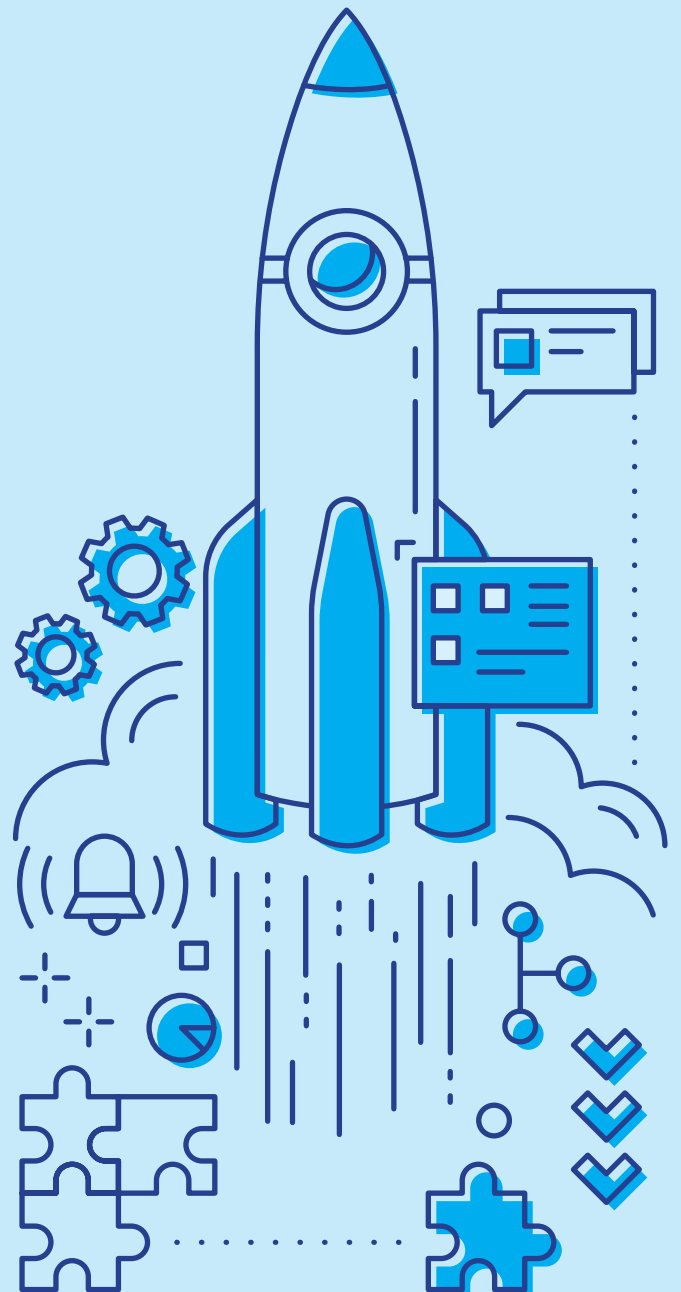
Fit 4 Start: A launch pad for start-ups

“Fit 4 Start is a catalyst for growth that helps start-ups point their launch pad in the right direction: the moon!”

Kevin Muller, co-founder & CEO, Passbolt

Text: Jean-Michel Gaudron

Illustrations: Quattro Creative



For the past five years, the start-up acceleration programme Fit 4 Start has provided a great springboard for young innovative companies in the early stage of their development.

Initiated by the Luxembourg Ministry of the Economy and managed by the national innovation agency, Luxinnovation, it is supported by two of the country's major incubators – Technoport and the Luxembourg City Incubator – as well as by the Luxembourg Space Agency.

The programme, which is open to start-ups from all over the world, offers four months of personalised coaching, combined with financial support of €50,000. An additional €100,000 is awarded to start-ups that have successfully completed the entire programme and succeed in raising private capital within the six months following their graduation.

Short-listed applicants to the programme are invited to pitch to a jury of international experts that selects the participants. The only condition for selected foreign start-ups is to establish a legal entity in Luxembourg, where they will also benefit from a vast and dynamic ecosystem.

“Shortly after the programme, we closed a €1 million seed round which took our company on an unprecedented path of growth.

Tom Michels, co-founder & CEO, Salonkee

“Fit 4 Start is amazing, because it helps you to plan your entrepreneurial roadmap very strategically.

Aida Nazari, co-founder & CEO, LuxAI

Launched in 2015, Fit 4 Start originally targeted companies active in the ICT sector. Since then, it has opened up to the health and space technology sectors. Two editions are generally organised per year.

In five years, more than 1,800 start-ups from over 90 countries have applied. 78 of them have joined the programme and 56 have graduated. The companies that participated in the first nine editions of Fit 4 Start have raised over €15.2 million from private investors since their creation.

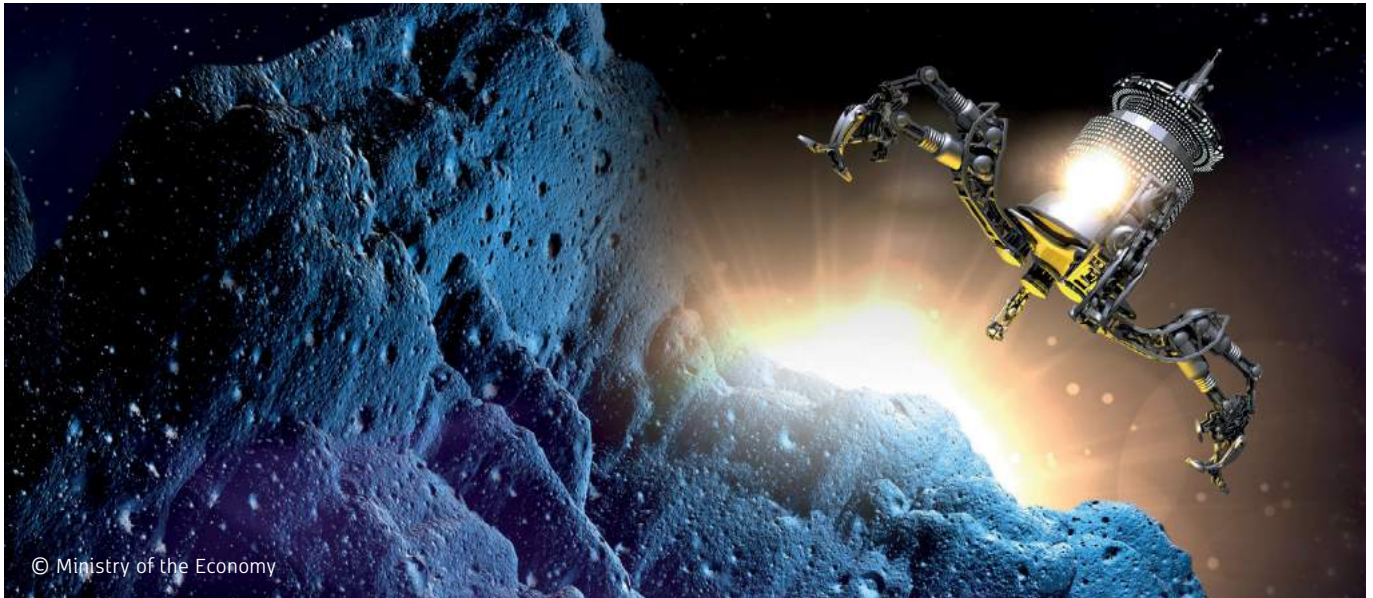
No less than 476 start-ups from 60 countries applied for participation in the 10th edition of Fit 4 Start due to begin in early 2021. 79 pitched in front of the jury. 20 start-ups from 11 countries – including 2 from Asia – were selected for participation: 10 in ICT, 5 in health technologies and 5 in space.

“The programme's tremendous development over the past 5 years and the growing interest of start-ups from all over the world in Fit 4 Start demonstrate both its relevance and its importance in our start-up ecosystem,” said Luxembourg Minister of the Economy Franz Fayot when announcing the results of the latest selection. “And this is true both nationally and internationally.”

The 20 lucky participants will start their programme of support and coaching in January. At the same time, the call for applications for the Fit 4 Start edition #11 will be launched, with increasingly international ambitions.

News

SPACE Luxembourg will host European space resources innovation centre



The Luxembourg Space Agency (LSA) and LIST (Luxembourg Institute of Science and Technology) are jointly setting up the European Space Resources Innovation Centre (ESRIC) in Luxembourg. The European Space Agency (ESA) is a strategic partner of this initiative. The new innovation centre is planned to be operational by the end of 2020.

The creation of ESRIC is part of the government initiative SpaceResources.lu, which was launched in 2016 in order to create a favourable ecosystem for the development of activities related to the exploration and use of space resources. It is based on a Memorandum of Cooperation signed between ESA and LSA in November 2019.

Unique of its kind, ESRIC aims to become the internationally recognised centre of expertise for scientific, technical, business and economic aspects related to the use of space resources for human and robotic exploration, as well as for a future in-space economy. It will partner with public and private European players in this field in order to create a hub of excellence for space resources in Europe.

ESRIC's activities will be based on four main pillars: space resources research and development; support for economic activities; knowledge management and community management. "The project will strengthen Luxembourg's international position in this area by continuing the activities planned under the SpaceResources.lu initiative and adding an additional dimension that does not exist elsewhere in Europe," explained Luxembourg Minister of the Economy Franz Fayot.

"After the launch of the Interdisciplinary Space Master at the University of Luxembourg in February 2019, the creation of the European Space Resources Innovation Centre as part of LIST is the second initiative in Luxembourg undertaken by a public research and higher education institution in order to develop and support the space sector on a national and European level. It shows the good collaboration with the Luxembourg Space Agency," added Minister of Higher Education and Research Claude Meisch.

"The creation of ESRIC will offer great opportunities for synergies and will definitely position Luxembourg as a European reference in the space resources sector," commented Thomas Kallstenius, CEO of LIST.

esric.lu

Text: Jean-Michel Gaudron
and Lena Mårtensson

LOGISTICS

Luxembourg company delivers world's first Airbus A321 converted aircraft

Mature aircraft asset specialist Vallair has delivered its pioneering Airbus A321 passenger to freighter conversion to launch operator Quantas. Converting a passenger plane to cargo is an extremely complex undertaking, and the Luxembourg-based company has developed expertise related to the physical conversion process as well as to engineering and project management in order to succeed with delivering the very first conversion of this type.

“The A321 is the future of freighter conversions,” says CEO Gregoire Lebigot. “Not only is this freighter variant better for the environment due to its 20% reduction in fuel burn, but it offers enhanced performance across range, payload and volume. Thanks to its fly by wire technology, the A321 is more advanced and the aircraft is still in production.” A number of future aircraft deliveries by Vallair are already scheduled.

SMART MOBILITY

Start-up partnership

Silicon Valley start-up Civil Maps and the University of Luxembourg's Interdisciplinary Centre for Security, Reliability and Trust (SnT) announced a research partnership focused on autonomous driving technology.

Civil Maps has developed a unique, scalable high definition, 3D mapping and localisation solution suitable for routing autonomous vehicles. In 2019, the company set up its European headquarters in Luxembourg in order to address the European market for self-driving cars and logistics.

The research project launched with the SnT will expand the capabilities of Civil Maps' high definition Maps Service.

INNOVATION SCOREBOARD

Luxembourg one of Europe's innovation leaders

The *European Innovation Scoreboard*, published by the European Commission, ranks Luxembourg among the EU's innovation leaders. The main reason is the country's attractive and efficient research ecosystem.

Luxembourg joins a Scandinavian trio – Sweden, Finland and Denmark – and the Netherlands. “Attractive research systems’, ‘Employment impacts’ and ‘Human resources’ are Luxembourg's strongest innovation dimensions,” says the report. “The strong increase in 2019 is mainly due to improved performance in doctorate graduates and broadband penetration.”

DIGITALISATION

Luxembourg in 10th position

Luxembourg is ranked in 10th place in the 2020 issue of the *Digital Economy and Society Index (DESI)*, published by the European Commission. The index is a good indicator of the progress made by EU member states in the digital domain.

With a score of 57.9 points, Luxembourg has improved its previous score by more than three points and remains well above the European average (52.6), particularly in the area of connectivity where it ranks 3rd.

“Significant progress is observed on digital public services, rising two positions in the ranking, mainly thanks to digital public services for business and pre-filled online forms of public services,” the study analyses.

Luxembourg's overall performance in the area of digital public services has even improved faster than the EU28 average and in the provision of digital public services to businesses, the country scores 99 out of 100 (compared to an EU28 average of 88).

HPC Luxembourg acquires petscale high performance computer



Luxembourg has acquired its high performance computer (HPC). Named MeluXina, it will become part of the European HPC network.

The new supercomputer will be inaugurated in spring 2021 and made available to the economy and research sectors. “We will in particular focus on its use by SMEs, start-ups and health services (eHealth) in order to strengthen national and European innovation. I am particularly pleased that the Grand Duchy has also been chosen as the seat of the managing entity of the new European network of supercomputers,” said Prime Minister Xavier Bettel.

The HPC model acquired by Luxembourg is a BullSequana XH2000, with a computing capacity of 10 petaflops (i. e. 10 million billion calculation operations per second). With this performance, MeluXina should be able to attain the top 30 in the ranking of the world’s 500 most performing HPCs. This approach will pave the way for “exascale” supercomputers a

hundred times faster than the most powerful current systems. The acquisition of the HPC is part of Luxembourg’s strategy to become a leading data economy. “This flagship project aimed at supporting the digitalisation of our economy and our businesses fits perfectly into the data-driven innovation strategy of the Ministry of the Economy,” commented Minister of the Economy Franz Fayot. “Our Luxembourg supercomputer MeluXina is helping to build a digital, sustainable and reliable economy by making high performance computing accessible to companies of all sizes.”

By the time of the launch in spring 2021, a team of around 20 experts will be set up to operate and market the supercomputer and provide services to users. They will form a dedicated competence centre that will guide and support companies and help them structure their projects so that they can make the best possible use of Luxembourg’s HPC capacities.

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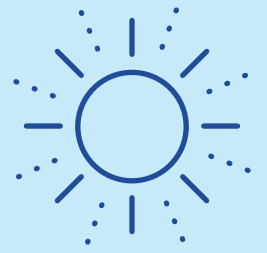
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Post COVID-19: New beginnings



The COVID-19 pandemic has radically changed business and consumer behaviour. The companies that will come out strongest from the crisis are probably those that are best able to adapt their business models to this new reality.

Crossroads Magazine analyses the innovations, technologies and trends that will shape the economic reality in the months and years to come. It also highlights Luxembourg's efforts to help companies become more sustainable and resilient.



Business opportunities after COVID-19

The global crisis brought on by the COVID-19 pandemic will have an enormous impact on the economy and society of the future. The radical interruption of “business as usual” has resulted in huge challenges, but new opportunities also emerge from every crisis.

2020 will go into the history books as the year when the world stopped, at least for a while. Many businesses are today fighting for survival, and their traditional markets might never again become what they once were. However, this does not necessarily mean only bad news. Crises also bring new opportunities and spur innovation, and companies that are open to change and learn from the past turbulent months could emerge stronger, more competitive and more resilient.

Uncovering main market trends

The key to success is therefore to spot and seize new opportunities. “We are convinced that many of the changes are here to stay, and that the most successful companies will be those that are able to adapt their business models to take changes into account,” comments Sara Bouchon, Head of Market Intelligence at Luxinnovation, Luxembourg’s national innovation agency.

Her team has recently released an in-depth study entitled “Post COVID-19 Market Trends”. It is part of a national effort, initiated by the Luxembourg government, to help

companies come out of the crisis stronger and more competitive than before. The study provides a unique overview of the innovation, technologies and trends that will shape the economic reality in the months and years to come. Four major market trends are identified: digitalisation, sustainability, resilience and new business strategies.

The digital leap forward

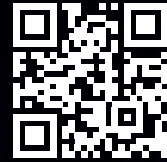
Defining digitalisation as a megatrend does not sound very original, but the rapid adoption of digital technologies to manage business as well as basic aspects of everyday life during the pandemic moved us forward 3-4 years virtually overnight, according to some experts.

“This development made us take a big step forward towards the data economy,” Dr Bouchon points out. “The use of digital technologies gives companies new opportunities to collect data on client behaviour, for example, or on what is going on in their supply chain. Smart companies will use this data to improve their offering and to take strategic decisions based on facts, not feelings. The data itself is also a precious asset that could be bought and sold.”

Industrial companies will probably ramp up their investments in big data, the internet of things, cloud computing and other technologies needed in “smart factories”. “In China, firms with a high degree of automation and with systems making it possible to control equipment remotely, managed to weather the lockdown much better than others. The COVID-19 crisis will certainly accelerate the digitalisation and automation of industrial production even further, also in other parts of the world.”

Text: Lena Mårtensson

Photo: Laurent Antonelli



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**“This development
made us take a
big step forward
towards the
data economy.**

Sara Bouchon, Luxinnovation





Resilient supply chains

The COVID-19 crisis has also highlighted the urgent need to design smarter, stronger and more diverse supply chains that are resilient and can withstand crises. “We expect global companies to diversify their supply chains much more in the future and rely less on single-sourcing models driven exclusively by cost control,” comments Dr Bouchon. “More firms will also decentralise their manufacturing capacity and look to bring parts of their production closer to home.”

Digital technologies are essential. “With technologies such as artificial intelligence and the internet of things, companies can obtain a real-time view of all suppliers and their stocks. When regular suppliers face disruption, they can react by quickly switching to alternative providers.”

Towards a new, sustainable paradigm

COVID-19 has been a radical eye opener when it comes to sustainable business and societal practices.

“The lockdown gave us a simulation of how to drastically reduce our negative environmental footprint,” says Dr Bouchon. “If we want the economic recovery post COVID to last over time, we need to ‘build back better’ as the OECD says.”

Romain Poulles, who chairs Luxembourg’s Higher Council for Sustainable Development, goes a step further. “We need a complete paradigm shift towards an economic model based on well-being, social equality, reduced environmental risks and much less pressure on finite resources,” he claims. “This would probably result in the biggest business opportunities of the last 200 years.”

Key sustainability trends identified in the Luxinnovation report include the transition towards clean, renewable energy sources, reusable medical equipment, healthy and locally produced foodstuffs, and the construction of sustainable and resilient public infrastructure. Circular business models, such as product-as-a-service and the sharing economy, are also emerging. “Every product is a service waiting to happen,” Mr Poulles agrees. “I think that companies will increasingly change their business models and sell services rather than products in order to have more control over their resources and get them back, after their initial use, into their own value chains.”

Business strategies: a shift of focus

One thing is clear: COVID-19 will leave its mark on the strategies of numerous companies. Luxinnovation predicts that changes in consumption patterns, the emergence of new forms of entertainment and tourism, the increased importance of remote working and other factors will lead to new business models. Numerous companies are now analysing their offering to see whether it still corresponds to what clients want and whether they are focusing on the most relevant target groups.

“This crisis has forever transformed the way we work together,” comments Thierry Ravasio, Head of Corporate and Public Sector at KPMG Luxembourg. “We have

Digitalisation

1. Digital transformation acceleration
2. Tracking privacy & security
3. Embracing industry 4.0

Sustainability

1. Achieving the energy transition
2. Shifting to a circular economy
3. Rethinking the food value chain
4. Investing in sustainable infrastructure

seen a shift of focus on what really matters: customers, employees and citizens. Our *CEO Outlook Survey* of September 2020 illustrates that the crisis has accelerated digital transformation and social responsibility strategies, and these mindset shifts are likely to go the distance. A motivated workforce, resilient and agile operations and outstanding customer experience are also hot topics that will continue to shape the business strategies of the future.”

He sees exciting opportunities arise in several fields, for example in the healthcare sector that has received a huge boost by innovative medical technologies driven by tech companies. “The need to be able to provide an exceptional customer experience during the lockdown has increased the demand for digital tools that enable paperless processes

and remote team working. The intense focus on minimising the risk of productivity and data loss when working remotely is also creating opportunities in the field of cybersecurity.” Luxinnovation points out innovation as one of the most important factors for being able to adapt to the “new normal” and benefit from these new opportunities. “Before the pandemic, we spoke about innovation as a way of improving products and services. Now, we focus more on innovative business models, innovative ecosystems and innovation in policy and decision making,” says Dr Bouchon. She mentions the many partnerships set up very rapidly this spring by companies pooling their resources and innovation capacity in order to respond to urgent needs for medical equipment. “Innovation and cooperation are effective means for becoming more resilient to challenges in the future.”



Post COVID-19 market trends

Resilience

1. **Focusing on the healthcare system**
2. **Building regional supply chains**
3. **Investing in education & re-skilling**
4. **Committing to an inclusive democracy**

New business strategies

1. **Reconsidering business strategies**
2. **Embedding innovation**
3. **New working trends**
4. **Consumption patterns evolution**
5. **Emerging entertainment trends**



The way forward

When the coronavirus pandemic first hit Western Europe, Luxembourg quickly put health measures in place to protect its population. The country also launched a massive programme to safeguard the economy, followed by a range of measures aimed at stimulating innovation and helping companies become more sustainable and resilient.

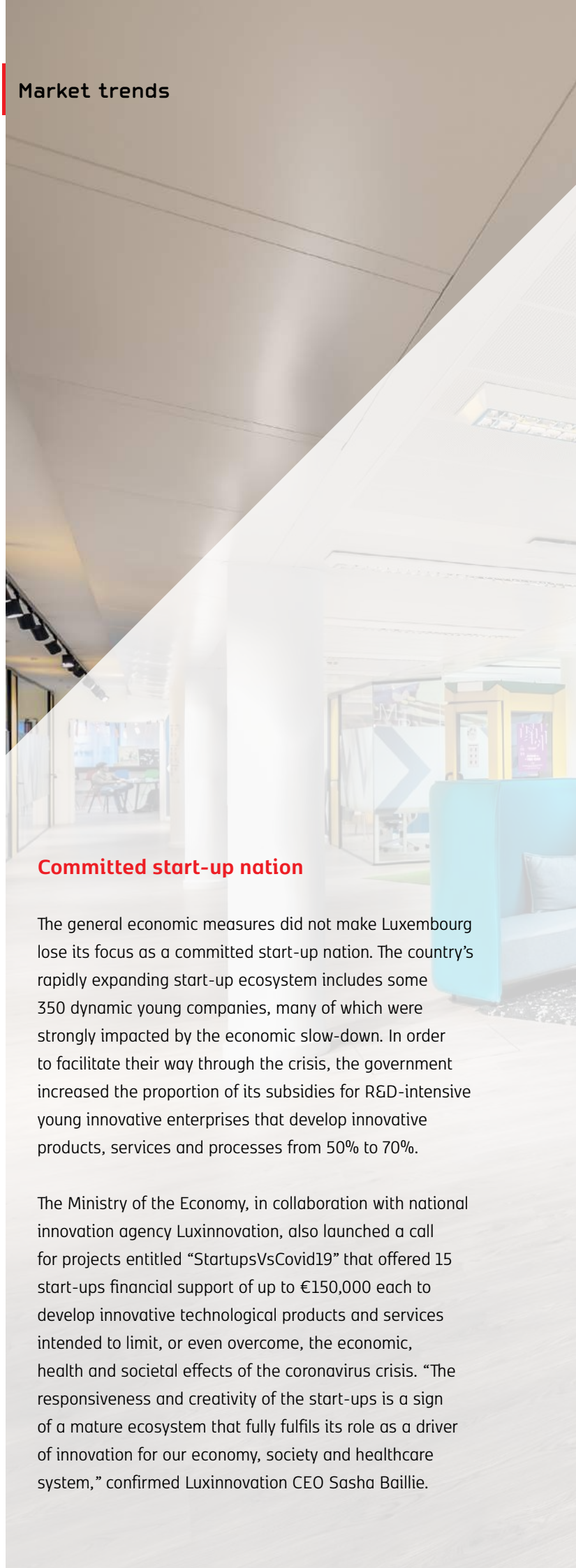
Confinement, social distancing, face masks... The measures implemented in Luxembourg resemble, to a large extent, those of other countries. What stands out, however, is the determination to detect, trace and treat COVID-19 cases demonstrated by the country's fairly unique large-scale testing programme. During its first phase, which ran from end-July to mid-September, over 307,000 residents were tested, which roughly corresponds to 50% of the national population.

The government was also quick to present a substantial economic stabilisation programme with a total budget corresponding to over 14% of the national GDP – a move that, according to Prime Minister Xavier Bettel, was made possible by Luxembourg's "very performing economy and strong finances". The economy actually suffered a comparatively light hit during the spring, reported national statistics agency STATEC, which also predicted this summer that it will recover from its losses quickly, with growth of 3% already in the third and fourth quarters of 2020.

Committed start-up nation

The general economic measures did not make Luxembourg lose its focus as a committed start-up nation. The country's rapidly expanding start-up ecosystem includes some 350 dynamic young companies, many of which were strongly impacted by the economic slow-down. In order to facilitate their way through the crisis, the government increased the proportion of its subsidies for R&D-intensive young innovative enterprises that develop innovative products, services and processes from 50% to 70%.

The Ministry of the Economy, in collaboration with national innovation agency Luxinnovation, also launched a call for projects entitled "StartupsVsCovid19" that offered 15 start-ups financial support of up to €150,000 each to develop innovative technological products and services intended to limit, or even overcome, the economic, health and societal effects of the coronavirus crisis. "The responsiveness and creativity of the start-ups is a sign of a mature ecosystem that fully fulfils its role as a driver of innovation for our economy, society and healthcare system," confirmed Luxinnovation CEO Sasha Baillie.



Innovating a sustainable, resilient future

Luxembourg clearly sees innovation as a way out of the crisis. Already in April, the government introduced financial support measures for companies carrying out research projects in fields such as drugs and treatments, medical equipment or diagnostic tools, or investments targeting the fight against COVID-19.

A new law, adopted in July, provides government support aimed at substantially stimulating investment projects in the post COVID-19 era. Co-funding is available for development projects, process and organisational innovation projects, and projects focused on energy efficiency or on exceeding current environmental standards. Companies developing circular projects and solutions can count on additional support amounting to 20% of project costs – a measure that Luxembourg is the first EU country to put in place.

In order to help companies manage their way out of the crisis and develop resilient long-term development strategies, Luxinnovation and the Ministry of the Economy launched the “Fit 4 Resilience” programme. Participants receive expert support to analyse the impact of COVID-19 on their business and define how they can best reposition themselves and relaunch their activity. “Ideally, the future strategies will include a more digital, circular and regional perspective,” says Ms Baillie. “With the feedback that we receive, we will develop good practices that can be shared with all the stakeholders in the national ecosystem.”



Startups Vs Covid19 projects

Augmented reality temperature screening

Specialised in the design of novel augmented reality (AR) solutions for the healthcare market, Arspectra is developing thermal cameras for screening the temperature of people in places with a high throughput, such as airports. Its ArviGuard mobile headsets equipped with thermal sensors and AR capabilities will allow police officers, security agents or healthcare staff to measure the temperature of multiple people simultaneously and detect potential COVID-19 cases without any close contact. “ArviGuard will significantly reduce the risk of contamination and enable agents to make quick and fluid health controls,” says Head of Product Development Arnaud Legros.

arspectra.com

Optimised ambulance dispatching

Mobility tech start-up Utopian Future Technologies provides an end-to-end Software-as-a-Service platform for on-demand ride pooling to Europe’s largest operators and transport authorities. “With COVID-19, the number of non-urgent ambulance trips increased strongly,” says co-founder and CEO Jean-Luc Rippinger. “The dispatching is handled manually and lacks optimisation and transparency.” The company is now developing a smart dispatching system that optimises and coordinates ambulance routes through algorithms and automatically schedules vehicle disinfection following interventions related to COVID-19 cases.

uft.lu

Enhancing communication with intensive care patients

SOVI Solutions is specialised in assistive technologies, in particular augmentative and alternative communication (AAC) software. It is currently adapting its communication tool for intubated and hospitalised COVID-19 – and other – patients. “Intubated patients generally have difficulties expressing themselves verbally and making their needs understood,” explains co-founder Alessio Weber. “Our software will include artificial voice communication for intubated patients, as well as a cloud-connected symbol-based communication system to be used between patients and care givers.” The solution, which can also be helpful for foreign-language patients, will improve patient services, save time and reduce communication barriers.

sovi.lu

Promoting online peer learning

Adapting to online education during the COVID-19 related lockdown was challenging for many students. CoCo World, a social start-up committed to promoting peer learning, studies students' online education experience during confinement and found that they missed a dedicated space to study with their peers. "Our Peer Square solution is an online study platform for secondary school students in Luxembourg, powered by AI to optimise the online learning experience," says founder Caroline Assaf. "It will allow them to learn from each other and with each other by engaging with a community of peers, finding peer tutors and arranging individual or group study sessions."

thecocoworld.com

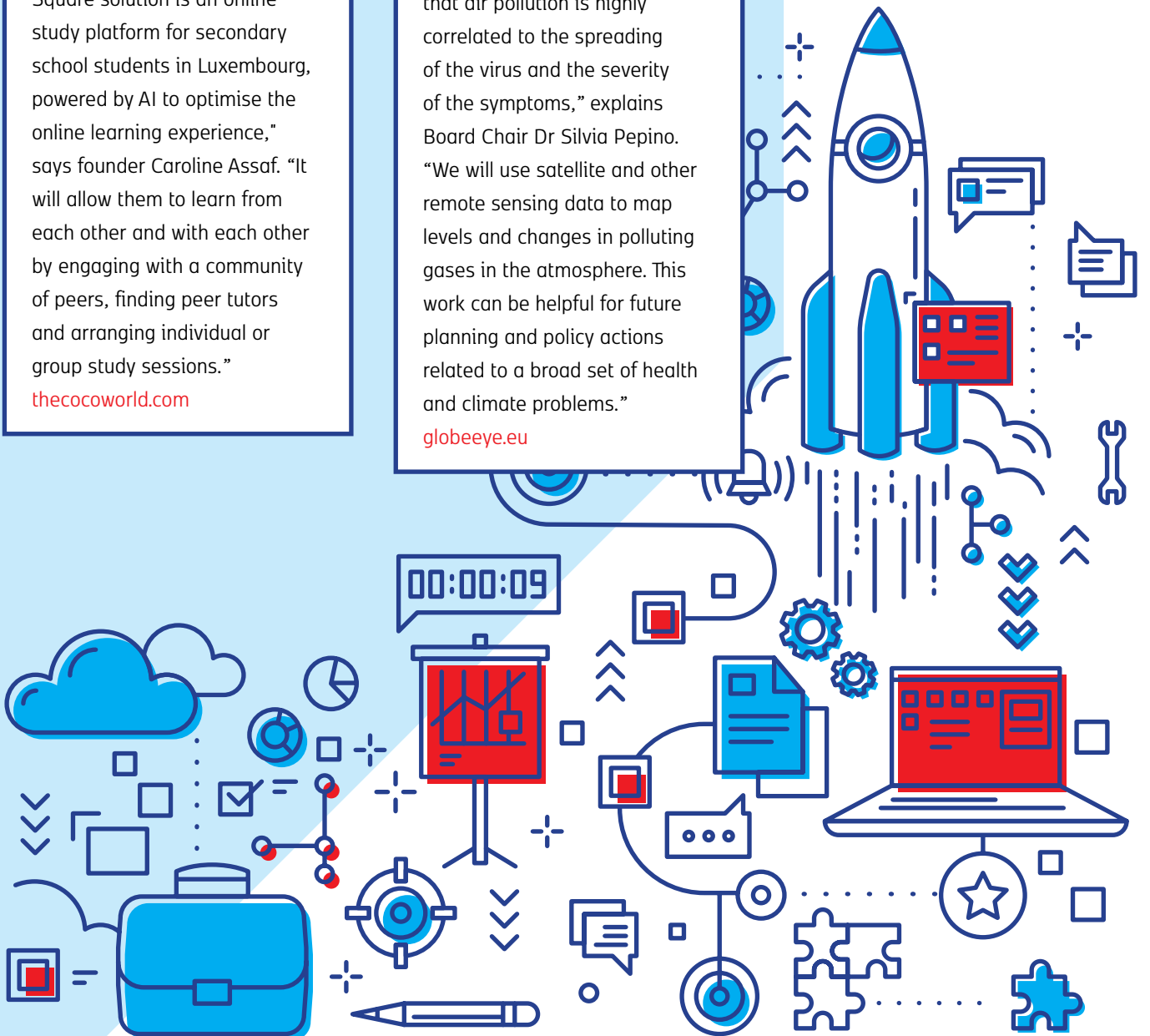
Coupling Earth observation and COVID-19

GlobeEye® uses Earth observation data to develop insights for the asset management industry. The start-up's project "Space-to-Breath" is aimed at identifying and tracing the distribution and sources of polluting gases believed to have an impact on the dissemination of COVID-19. "Research argues that air pollution is highly correlated to the spreading of the virus and the severity of the symptoms," explains Board Chair Dr Silvia Pepino. "We will use satellite and other remote sensing data to map levels and changes in polluting gases in the atmosphere. This work can be helpful for future planning and policy actions related to a broad set of health and climate problems."

globeeye.eu



Scan
to watch more
StartupsVsCovid19
stories





Calculating cyber risk

As companies' use of digital technologies increases, so do the associated risks. American start-up Cyberhedge came to Luxembourg to develop a method for calculating how cyber risk impacts business value, which it hopes will become an international standard.

During his over 20 years as an investor, Cyberhedge founder and CEO Ryan Dodd frequently encountered the inability of companies to report clearly on how they managed and protected data and software code. Nor could they express how their technology management influenced the company value. As a response, he set up Cyberhedge – the only company in the world able to instantly and accurately assess the impact of cyber risk on a company's equity value.

“In 2015, no one was talking about this, but now it is a big topic,” says Mr Dodd. He draws a parallel with environmental and social governance, which has gone from being a buzzword and niche investment topic to a mainstream issue and investment theme in global markets. “In the near future, there will be more requirements for companies to publicly disclose their cyber risk.”

Cyberhedge combines standard economic modelling with machine learning and artificial intelligence to calculate cyber risk in financial terms. The instant calculations are done through a software as a service (SAAS) dashboard used by corporates and the investment community. The company is working with global ratings agencies to license its technology to rollout the risk management product and get it adopted by corporates as a standard for measuring cyber risk.

European centre of financial regulation

Locating the company in Luxembourg was quite logical. “Europe is the global leader in the field of environmental and cyber issues and their influence on the economy of the future. Luxembourg is at the heart of the European financial system and regulation, and for us, it is crucial to be where the conversation is really taking place.” The Luxembourg Stock Exchange, which Mr Dodd calls fairly unique in its willingness to try new things, was also

interesting. One of Cyberhedge's plans for the future is to create financial instruments that help corporations hedge or transfer risk – hence the company name – and the stock exchange could be an attractive partner for testing ideas such as a futures index for cyber risk.

Cybersecurity commitment

The contact with Luxembourg initially came through Cyberhedge's lead investor, VC firm Paladin Capital, which connected the start-up with the Luxembourg Future Fund. Cyberhedge now counts both the fund and the Luxembourg state-owned bank SNCI among its shareholders.

Mr Dodd is impressed by the Luxembourg government's commitment to cybersecurity. “For people thinking about opening an office or setting up a European HQ here, I tell them the truth: if you are willing to commit, the government provides an enormous help.”

Cyberhedge currently has a staff of 12, a number that it expects to double in the next 9-12 months. The Luxembourg staff is hosted at the Luxembourg House of Financial Technology, where the company has found an effective professional network. “Our clients are international, but our national network is very useful for recruiting leading data engineers and scientists,” Mr Dodd explains.

In spite of the COVID-19 pandemic, the CEO is confident about the future. “This period has emphasised companies' reliance on digital technology, while cyberattacks have increased. This will create more awareness about cyber risk and the need to deal with it as a core risk to business operations. I'm convinced that our offering will be part of the solution.”

Text: Lena Mårtensson

Photo: Olga Antonova



Text: Lena Mårtensson

Photo: Laurent Antonelli



MushRooming eco home

Luxembourg



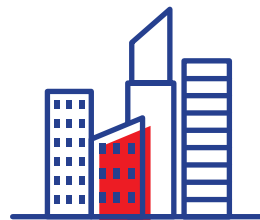
1st country in the world to make all public transport free

As of 29 February 2020, residents and visitors can travel by public transport everywhere in the country free of charge.



2nd most sustainable country in the world

Source: *2020 Environmental Performance Index (EPI)*, which ranks 180 countries on environmental health and ecosystem vitality.



3rd best city for expats

Source: *AIRINC's 2020 Global 150 Cities Index*, which lists cities that offer an attractive combination of high salaries, low taxes and costs, and an attractive quality of life.

2020 has been the year of the “staycation” and, for many, the opportunity to enjoy unexpected adventures and beautiful spots. Luxembourg is blessed with a unique landscape and diverse scenery, and offers a wide variety of accommodation ranging from glamping to castles and boutique hotels. Why not try out the MushRooms of hotel Pétiche Lauer in the central Eastern part of the country? Located a mere stone throw away from the feudal castle ruins in Useldange, these eco lodges on the edge of the river give you direct access to cycling and hiking trails.

peitchelauer.lu



A place for innovation

Ekaterina Bereziy

CEO of ExoAtlet

From Russia

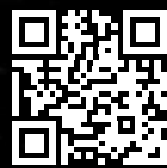
Living in Luxembourg since 2019

Ekaterina Bereziy came to Luxembourg to look for the ideal location for the European headquarters of ExoAtlet, a start-up specialised in wearable exoskeletons helping patients recover their locomotive functions. Her first visit to Belval, a former steelworks site transformed into an innovation hotspot, was a surprise. “It was like being inside a museum hosting innovation. At first, I could not image having an office here – today Belval is the place where I both live and work.”

She enjoys both life and business in Luxembourg. “It is a very safe and pleasant country. People are very nice and speak both English and other languages. The people we collaborate with are open to help our start-up on its journey.”

The greatest advantage?

“I don't feel like a foreigner here. I feel at home.”



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to watch
more

Text: Lena Mårtensson
Photo: Laurent Antonelli

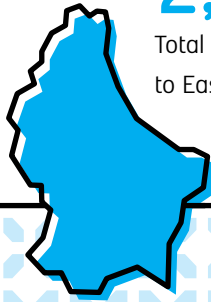




Luxembourg in figures

2,586 km²

Total area of the country (57 km from West to East and 82 km from North to South)



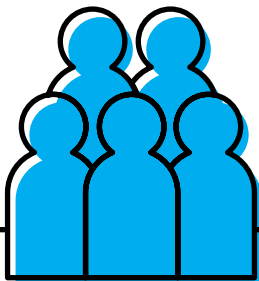
+2.3%

GDP growth 2019

254

GDP/inhabitant 2018

(in Purchasing Power Standards; Index 100 = EU-28)



626,100

inhabitants

Population (01/20) including 329,600 Luxembourgers and 296,500 non-Luxembourgers representing more than 170 nationalities

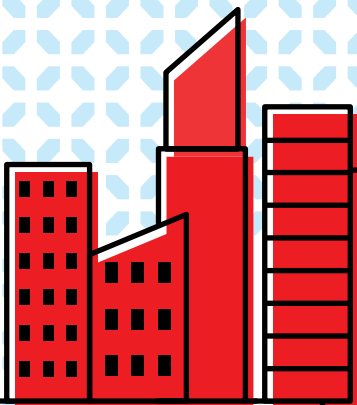
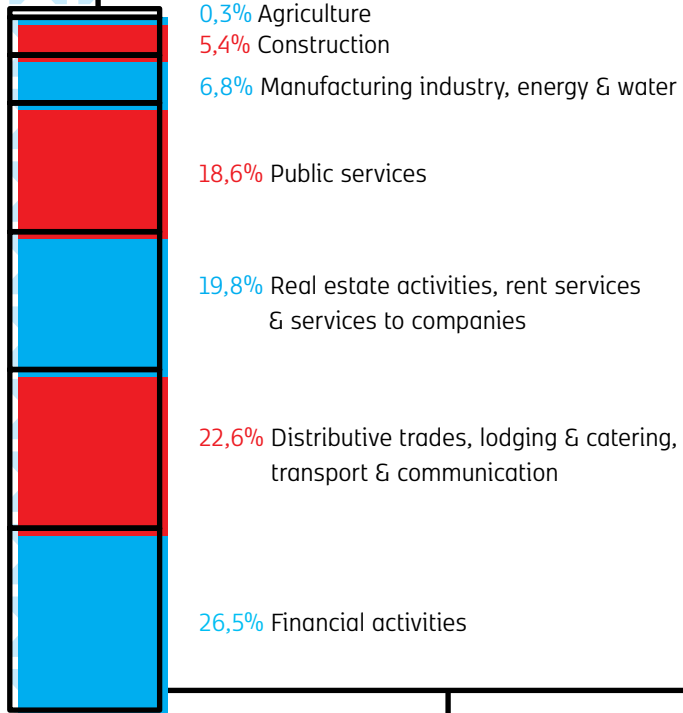


6.6%

Unemployment rate (mid-2020)

Structure of the gross value added

at basic prices



European institutions

Luxembourg is home to no less than 12 European institutions and bodies.

Text: Jean-Michel Gaudron

Illustrations: Quattro Creative

Source: STATEC



Text: Lena Mårtensson



Business info Luxembourg

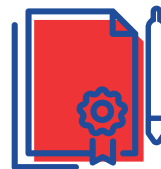
Setting up a business in Luxembourg

Creating a company in Luxembourg involves several steps. This practical guide walks you through the process.



1. Apply for your business permit

All businesses established in Luxembourg must acquire the necessary governmental permits. Commercial, skilled craft and industrial activities as well as certain liberal professions are subject to a business permit.



2. Define your company's legal form

Whatever the size and nature of their business, it is crucial for entrepreneurs to choose a legal form that suits their activity (sole proprietorship or company).

For more detailed information, please visit:
tradeandinvest.lu/discover-why-luxembourg

Contact our international network



The Luxembourg Trade and Investment Offices (LTIOs) around the world are fully committed to assisting you with the expansion of your business to Luxembourg and your entrance into the European markets.

LTIO Abu Dhabi investinluxembourg.ae

LTIO Casablanca tradeinvestluxembourg.ma

LTIO New York new-york.investinluxembourg.us

LTIO San Francisco san-francisco.investinluxembourg.us

LTIO Seoul investinluxembourg.kr

LTIO Shanghai investinluxembourg-china.com

LTIO Taipei investinluxembourg.tw

LTIO Tel Aviv investinluxembourg.co.il

LTIO Tokyo investinluxembourg.jp

Find more information about the support available for international companies considering coming to Luxembourg at tradeandinvest.lu/how-we-help



3. Handle immigration issues

Any third-country national (a person who is not an EEA or a Swiss Confederation national) planning to stay in Luxembourg for a period exceeding three months (90 days) must apply for a residence permit before entering the country.



5. Learn about taxation

Companies in Luxembourg are subject to corporate tax and have to apply value added tax (VAT) to their products and services. Individuals are taxed based on their personal situation.



4. Explore financing and support measures

Companies that establish a sustainable presence in Luxembourg can draw on several financing and support measures that help them expand their activities, develop innovative concepts and products and strengthen their competitiveness.



6. Affiliate to the social security system

All companies need to fill in an operating declaration and a declaration of start of employment to the Joint Social Security Centre, which handles the data, registration of affiliations and collection of contributions for the different insurance funds.



Business support in pandemic times



Yuriko Matsuno, LTIO Tokyo
© Masaya Abe

***Crossroads Magazine* asked Yuriko Matsuno, Executive Director of LTIO Tokyo, how she and her team support Japanese companies interested in exploring Luxembourg as a business location during the COVID-19 pandemic.**

“We are organising a series of webinars featuring different sectors – logistics, clean technologies, ICT, and so on – in order to keep Japanese companies informed about opportunities in Luxembourg, and this has been very successful. The Japanese community in Luxembourg is also an essential network for us, and we organised an online discussion about how its members have fared during the pandemic.

In addition, we are encouraging Japanese business people to participate online in Luxembourg events. For example, three Japanese start-ups had virtual booths at ICT Spring 2020,

a major event where start-ups can meet both investors and potential clients. We also increasingly translate brochures and videos into Japanese and publish them online to compensate for the networking opportunities that we used to have during the pre-corona period.”

Looking forward to when we will be able to travel again, what do you like most when coming to Luxembourg?

“I love the weekly markets that are being held in the centre of the capital. Whenever I see stands and people on Place Guillaume or Place de la Constitution, I make sure to join for a beer and a typically Luxembourgish potato cake – a Gromperekichelcher.”

Impressum



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