

NTT Data

2022

# ENERGY TRENDS

FUTURE  
AT HEART

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The UK government has set an ambitious target for the country to reach net zero by 2050. The energy sector is committed to leading the way and aims to reach its own net zero target ahead of the 2050 deadline. That's a challenge for all of us.

The aim is to transition away from an energy system based largely on traditional, large-scale generation towards an integrated system that embraces renewables and small-scale, diversified generation technologies. Smarter generation will in turn be supported by smarter, more-efficient energy storage and distribution networks. This increasingly complex new UK energy environment will rely on automation to help it balance the demands of efficiency, sustainability and energy security.

This calls for a complete overhaul of the way we do things.

We'll need to match innovation in new and emerging technologies with new ways of working – in both operating and business models.

This report gives an insight into how companies are already investing to help realise this vision. We consider which innovations are attracting investment from today's major energy sector players. We also review the start-ups that are bringing forward the next generation of exciting energy solutions.

2050 may seem a long way off, but I hope this report will help us all focus on what we need to achieve over the next decade if the UK energy sector aims to stay on track and achieve net zero ahead of the national deadline.

If you have any questions, please do not hesitate to contact me.

**Eduardo Fernández**  
Head Gas & Power - NTT DATA UK&I





Over recent years we have witnessed major social and industrial changes. Society is becoming increasingly aware of climate change and its effects. This is leading to a change in consumption patterns, with the resulting impact on companies' production processes. Due to this, a large number of corporations are looking at innovation as a fundamental cornerstone for growth and adaptation to these new trends.

The energy sector is no exception to these new trends. Ever since its inception, the sector has been committed to innovation, impacting the way of life of millions of citizens around the world. For this reason, adaptation to these new trends is being experienced as a growth process in the sector. The new energy models of the future are being applied, and these models must be efficient, socially responsible and environmentally friendly.

Similarly, the digital revolution experienced in recent years is spurring on companies in the energy sector to allow them to apply these new models. Over recent years we have observed that, thanks to the sector's technical know-how and talent, it has been possible to undertake the development of new infrastructure, operations and markets at great speed. The innovative nature of companies is being enhanced, companies that, along with their technological partners, have been and continue to be a driving force for structural change in the sector.

The innovative nature of the energy sector is being reflected in its commitment to electrification, decarbonisation and the decentralisation of energy as an industrial driving force. This is disrupting the sector itself, as well as other adjacent industries, such as the automotive industry, with the introduction of products such as electric vehicles which are boosting the use of renewable energies

**This commitment by the energy sector is blurring the differences between the Oil&Gas and Utilities, where a common purpose is emerging with a clear desire to enhance the value provided within this new energy paradigm. Offering all kinds of efficient storage, distributed energy, hydrogen, mobility and renewable energy solutions. Leveraging the use of new technologies such as Big Data, Artificial Intelligence, cybersecurity, VR/AR, and blockchain, among others.**

All of these give corporations greater agility when it comes to responding to the aforementioned changing trends both among consumers and in the sector itself.

This new energy model, as expected, is lowering the high barriers to entry that used to be in place. These new innovations are also allowing the entry of new players capable of taking on a significant role in the industry, in direct competition with traditional major companies. This is leading to the consolidation of an ecosystem where talent is distributed among its different component players, making collaboration between them essential in order to lead the change in model that the sector is experiencing.

Players in the sector have been working together for years with different strategic approaches, as represented in the same report. We can state that during the pre-COVID-19 period the sector's traditional corporations used venture capital funds as a strategic approach, above any other. The post-COVID-19 period is leading to the consolidation of new approach models, such as the Venture Client model which allows large corporations to access talent and continue to play a fundamental role in the ecosystem, but by investing as strategic clients rather than by putting up capital. In the coming years, we will see whether these new relationship models replace those that are currently established, or whether they will eventually co-exist with each other, enriching the ecosystem with new players.

In awareness of these trends, NTT DATA has drawn up this report, which analysed 258 investment events made between 2018 and 2020 by 32 corporate venture capital funds, in up to 148 startups in the energy sector. These investments represented a total volume of 6,414 billion dollars, injected directly into the aforementioned startups in support of their innovative technologies.

Based on the same report, one of the many conclusions that we were able to draw was that Oil&Gas startups account for 59% of total investment events while Utilities represent the other 41%. Even though investments are approximately equal in number, Oil&Gas, account for 77% of the total amount of money invested, with an average investment volume of 48 million dollars compared to an average of 18 million in Utilities startups.

In short, analysing these trends allows us to provide the innovation ecosystem with real information that can be used to generate discussions and extract investment patterns, thereby helping to redefine the strategies of the different players that make up the ecosystem. The above is a summary of qualitative and quantitative knowledge about the last few years in the sector.

**Héctor Pinar**  
Head Gas & Power - Partner Utilities & Energy

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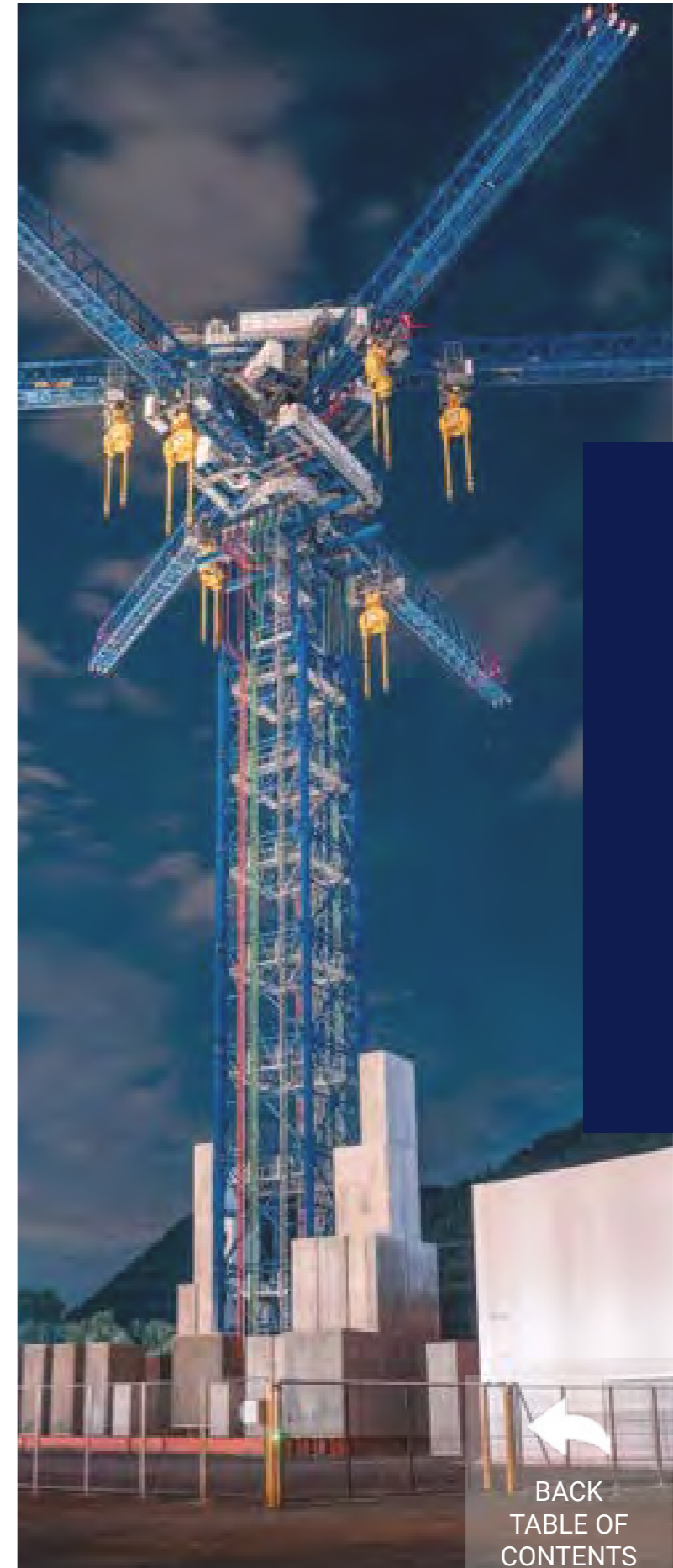
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# 01. Introduction



**The objective of this report is to provide an overview of current trends in the energy macro-sector, in terms of venture capital investments in technology startups and new business models, to allow us to anticipate potential changes in the sector in view of the investments that have been made.**

A paradigm shift in the energy sector can be observed in the same report, driven by different initiatives such as: the **Green New Deal**, which is being implemented by Joe Biden in the United States, which intends to invest 5 billion dollars to achieve a carbon-free economy with 0 emissions by 2050; the **European Climate Law**, which aims to make the European Union a global leader in the fight against climate change, achieving climate neutrality by 2050 through the **Next Generation bonds**, which are a reflection of a major commitment to change the energy paradigm, given that out of the 1.8 billion euros earmarked for economic recovery, 30% will be invested in plans that comply with the Paris Climate Agreement; and at the Spanish level, the **Spanish National Integrated Energy and Climate Plan** (SNIECP), which aims at a 23% reduction in

greenhouse gas emissions by 2030. As well as social preferences and trends that impact the market and drive the aforementioned paradigm shift.

Movements towards renewable energies can therefore be observed (exemplified by the 93.2% increase in photovoltaic energy), such as new models for sustainable mobility (with the emergence and growth of national and international startups), and the consolidation of *multi-utility* companies. All of these seek to achieve a duality between business efficiency and environmental efficiency. Supported, as anticipated above, by strategic state plans with aid packages for these new models.

In order to prepare this report, we analysed venture capital investments made by energy companies over the last three years, only including investments of a public nature.

This edition also includes a qualitative analysis based on interviews with startups and CVCs about the relationship between them and designed to help us understand the value proposition sought by startups, what corporations can contribute, and what barriers exist to a successful relationship.

## Scope of the report

This report covers investments made by companies in the energy sector. They have been analysed according to a sectoral criteria, based on their core business.

On the one hand, the field of this report includes oil and gas companies engaged in extracting, refining, distributing and transporting oil products and, on the other hand, all electricity and gas companies engaged in conventional

and renewable electricity generation, as well as companies engaged in the transport and distribution of electricity and/or gas.

Companies in surrounding sectors, such as suppliers of equipment for electricity generation and for oil activity, petrochemical companies with no relevant extraction or refining activities, state agencies, etc. fall outside the field of this report.

## Methodology

In order to prepare the report, a search for the largest companies in the sector was carried out, using the largest international stock market indices as a reference, as well as specialised lists such as the **Global Fortune 500**.

This search was carried out in media and websites specialising in the subject and all relevant information for the period 2018-2020, continuing from the previous report which covered the 2008-2017 period..

The aim of this report is to analyse startups funded by financial contributions from companies in the energy sector during the period. It should be remembered that there are different forms of partnerships with startups that do not necessarily involve funding. Partnerships that do not involve direct funding have not been taken into account for this report.

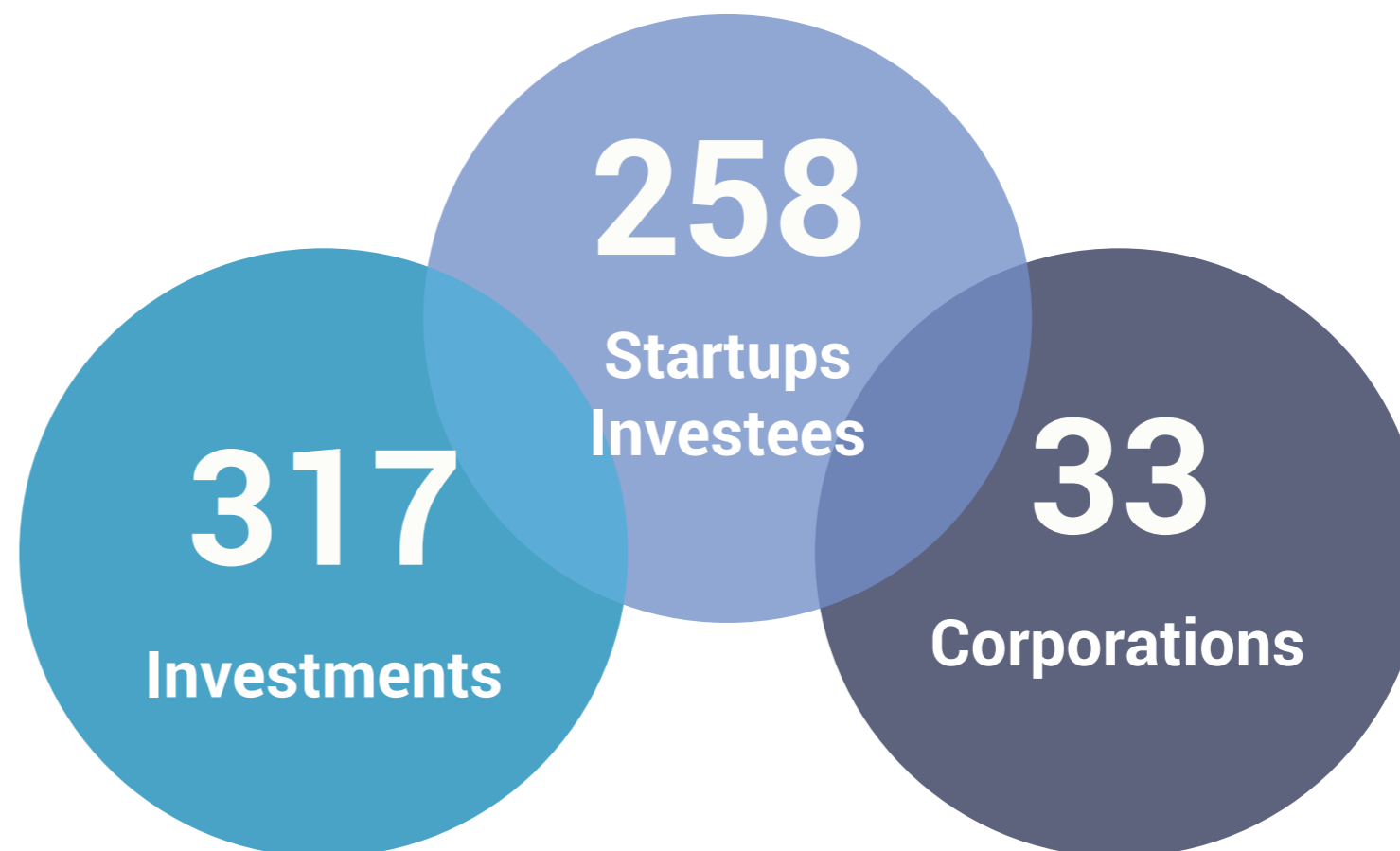
# Companies involved

**The investments of the 33 largest companies in the energy sector, by turnover, were tracked for the period 2018–2020. Over this period, 317 investments were made in 258 startups. To provide the most recent data, the 84 investment events that occurred in the first half of 2021 were also analysed.**

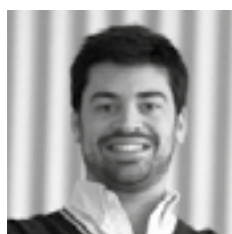
In addition, interviews were conducted with the main executives of these large corporations, mainly those in charge of the innovation and *corporate venturing* areas. These are players of great relevance and influence in the sector, as they decide on the strategic courses of action to be followed over the coming years. They also represent companies in leading positions on the aforementioned Global Fortune 500 list, of notable significance in the world's economy. Among the major corporations that were interviewed, emphasis should be placed on the participation of Saudi Aramco, the 4th largest company in the energy sector (14th largest corporation in the world), BP as the 5th largest company in the sector in terms of turnover (18th in the world), and Chevron as the 11th largest company in the sector (75th in the world).

In addition, in order to provide an overview of the sector, we interviewed the founders and main executives of the most relevant startups in the energy sector, which have managed to attract millions of dollars worth of investments in different investment stages and rounds.

These interviews have led us to understand the perceptions of investment and energy sector trends of both parties, as well as to delve into the complexities and success factors behind the investments themselves.



The heads of the innovation and corporate venturing areas of some of the largest companies in the energy sector were interviewed for this report. Founders and executives of the most prominent startups in the sector were also interviewed.



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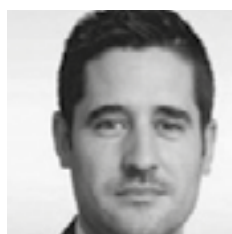
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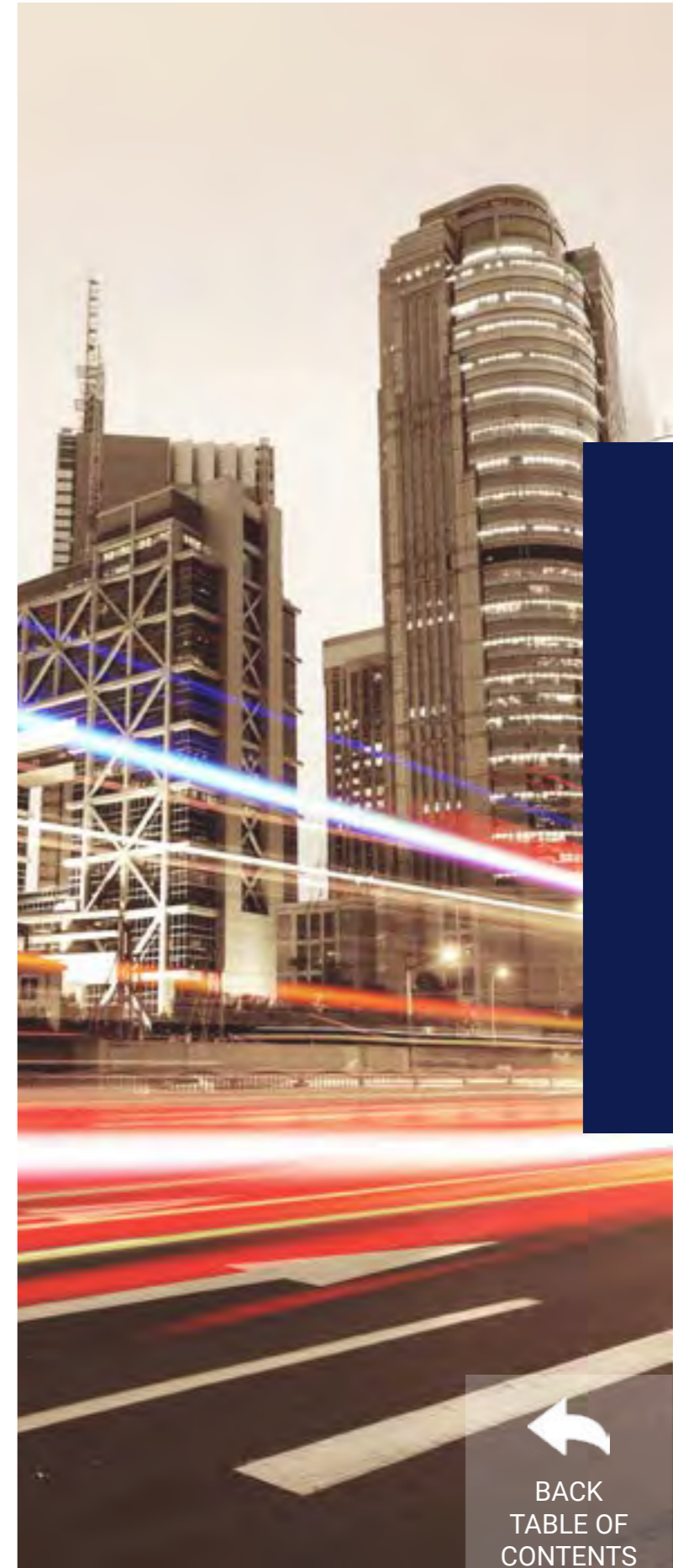
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# 02 • Venture capital investment trends in the energy sector



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**Venture capital investment by the largest companies in the energy sector continues to grow. An increasing number of corporations are investing in technology startups as a vehicle for open innovation through their venture capital funds (CVCs).**

The agility and low risk aversion of startups, together with the financial and industrial capacity of major corporations, is a winning combination to address the innovation challenges required by such a fast-changing sector as the energy sector.

## Investment volume

The number of investments has continued growing at rates of 17% year on year since 2008

As can be seen in **Figure 1 - Number of investments made by corporations**, investment numbers have continued to grow at +17% since 2008. However, the emergence of COVID-19 led to a significant drop in the number of *deals*. These deals, which the sector estimated could have reached 132 investments (a result of the upward trend in investments, in addition to planned investments), fell during 2020 to just 46 investment events. These results are one third of the investments forecast for the year, representing a -66% drop in expected investments.

The general uncertainty, together with a more defensive positioning by investment funds in terms of protecting their investees, meant that many of the investments planned for 2020 were postponed.

The liquidity situation in the markets, the gradual emergence from the pandemic and the backlog of postponed operations, suggest that we will see a significant volume of operations in the energy sector over the coming years.

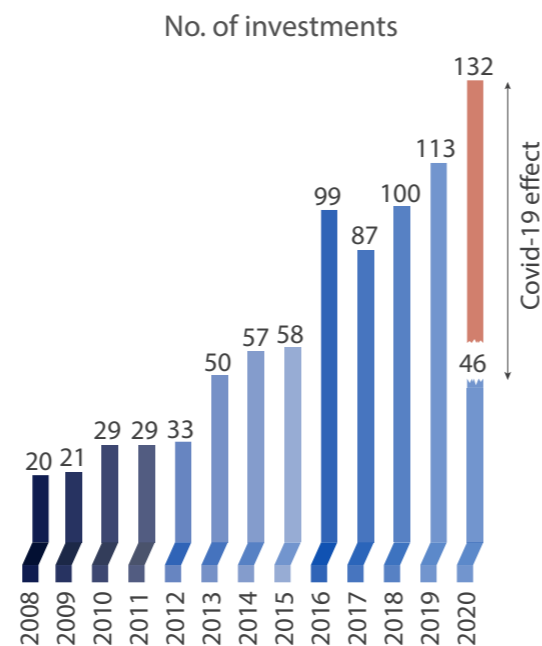


Figure 1 - Number of investments made by corporations

## Oil&Gas companies retake the lead in number of investments, lost between 2015-2017

Furthermore, the change in the trend in the number of investments by electricity and oil companies should be highlighted.

As shown in **Figure 2 - Number of investments made by corporations in the Oil&Gas and Utilities** sector, between 2015 and 2017, electricity companies were starting to show clear leadership in terms of the number of investments made during 2016. However, over the last 3 years, oil companies have taken the lead by participating in 20% more investment events than electricity companies.

This is a relevant fact because, although activity in the oil sector has been strongly affected by the pandemic with the price of oil falling to historic lows, these companies have maintained a significant number of investments in startups. They regained the lead in investments that had been lost between the years 2015 and 2017, when electricity companies greatly increased their total amount invested (+153% between 2014-2015 and +57% between 2015-2016).

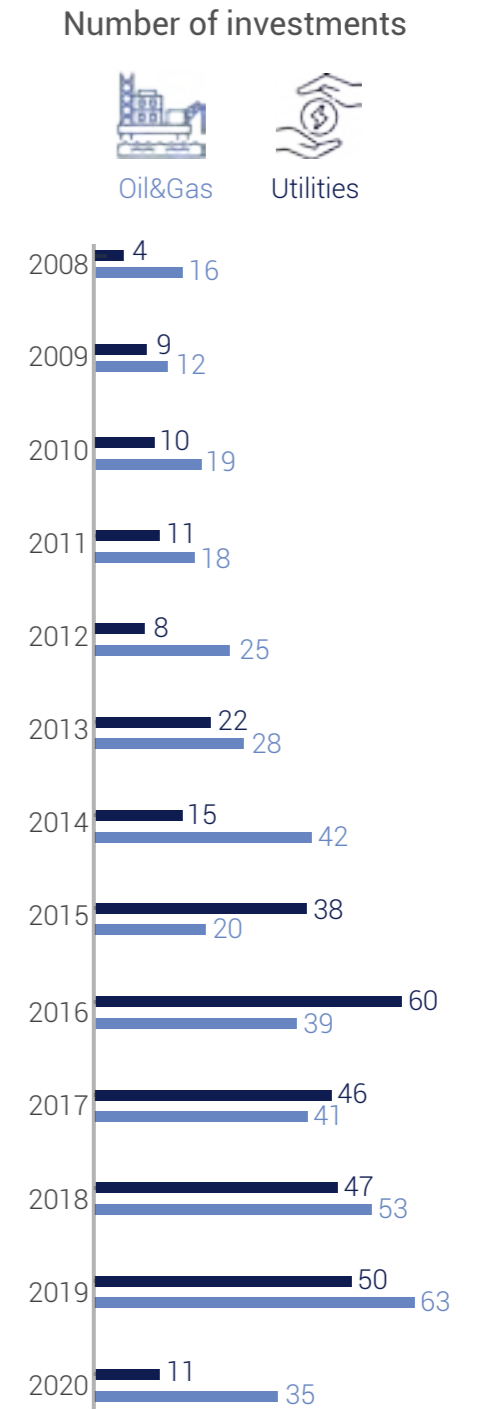


Figure 2 - Number of investments made by corporations in the Oil&Gas and Utilities sector, between 2008 and 2020

# Volume of investments by type: new investment or follow-on

The strategic nature of corporate venture capital investors result in these funds investing in startups of their portfolio in successive rounds.

This in general has followed an almost-perfect Pareto principle, with 80% of investments made by corporate funds being first investments in startups, whereas 20% of investment events are *follow-on* operations.

## Percentage of new investments and follow-ons, compared to total investments made by the CVCs

Figure 3 – Percentage of new investments and follow-ons, out of total investments by CVCs, shows the nature of CVC investment events, with new investments clearly taking priority over *follow-on* events. However, the exceptional situation experienced due to COVID-19 has changed this principle, which previously seemed stable, with *follow-on* investment increasing to 41% of the total.

many startups saw a significant reduction in income, meaning that they needed to boost liquidity by seeking capital. Similarly, due to this uncertain situation, corporate funds have opted to fund their investees and have subscribed to larger rounds in order to provide liquidity to these startups and ensure their survival, or the continuation of their objectives, during the months that the pandemic was ongoing.

This more recent trend was a direct consequence of the effect of the uncertainty caused by the pandemic, which meant that

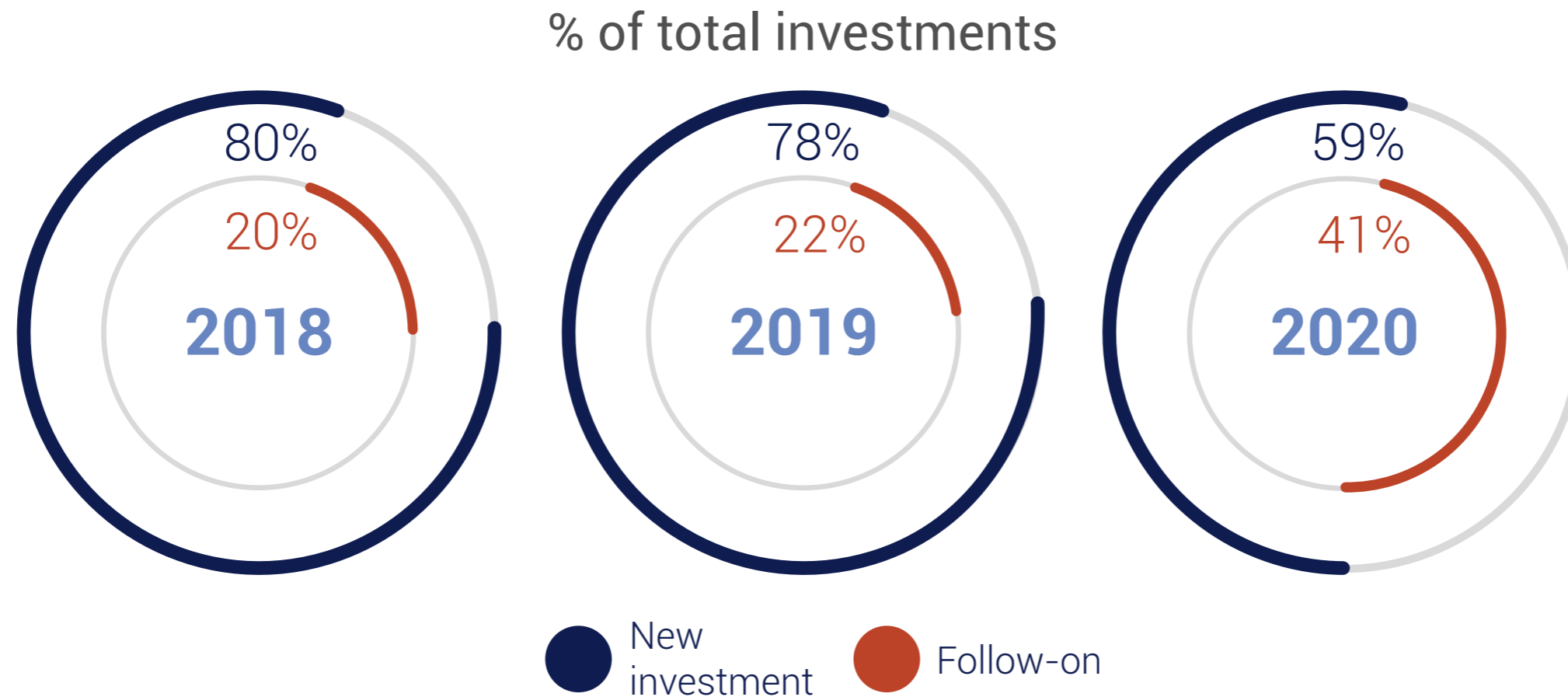


Figure 3 – Percentage of new investments and follow-ons, out of total investments by CVCs

### TOP 5 new investments, 2018-2020 period

As can be seen in **Figure 4 – TOP 5 new investments, 2018-2020 period**, the maximum investment during the period was made by Total in 2018, which put 320M dollars into the G7 startup. This emerging Asian company previously managed to raise 190M dollars from different investment rounds, increasing its *ticket* in each round since 2015 and conducting one round per

year. It can also be seen that the average amount of the TOP 5 new investments was \$200M, mostly in advanced rounds (Series E, Series H and Private Rounds), mainly invested by Oil&Gas companies. We only found one co-investment, a model that will be discussed in the following pages.

### TOP 5 investments in follow-ons, 2018-2020 period

Similarly, as shown in **Figure 5 - TOP 5 investments in follow-ons, 2018-2020 period**, these investments were mainly made over the last year due to the aforementioned impact of COVID-19. The average *ticket* of these is lower than new investments, standing at 125 million dollars, almost half that of the previous case (200 million). By taking into account

the 10 largest investments of each type, the same difference can be seen in the average *ticket*, with an average of 84 million dollars for *follow-ons* and 141 million dollars on average for new investments. From these figures it can therefore be concluded that CVCs invest on average twice the amount in first investments.

Out of these rankings of major investments, the case of the **ChargePoint** startup stands out above all others, as it features in both the **TOP 5 new investments** and the **TOP 5 follow-ons**, showing the major commitment made by the CVCs of **American Electric Power** and **Chevron**, which co-invested in it. In 2020 they decided to inject approximately 50% of the first investment ticket, meaning that the startup obtained a total invested volume of 367 million dollars over the period.

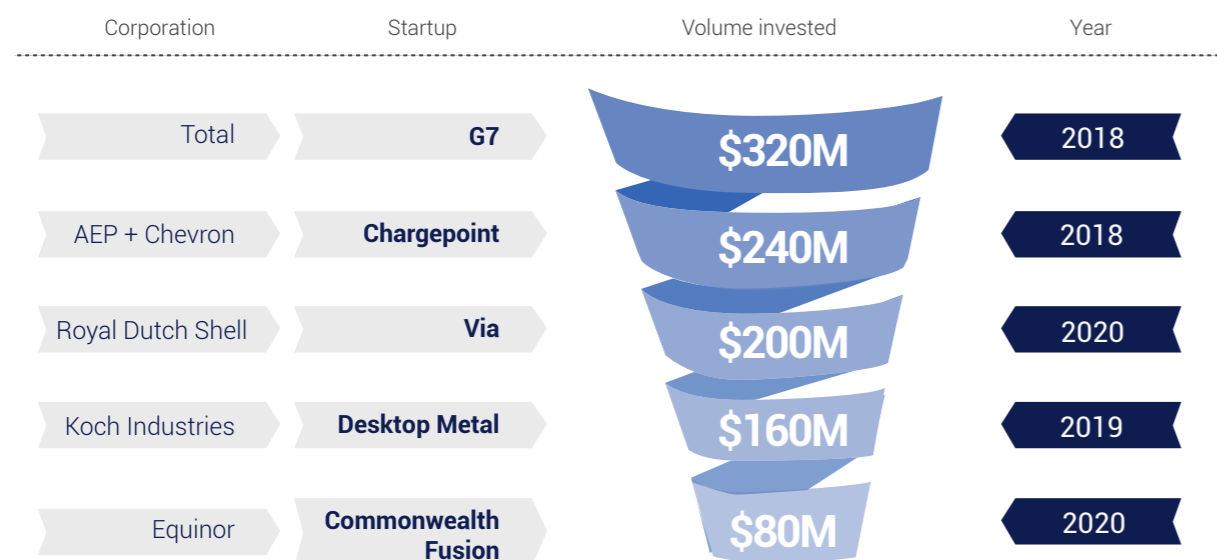


Figure 4 – TOP 5 new investments, 2018-2020 period

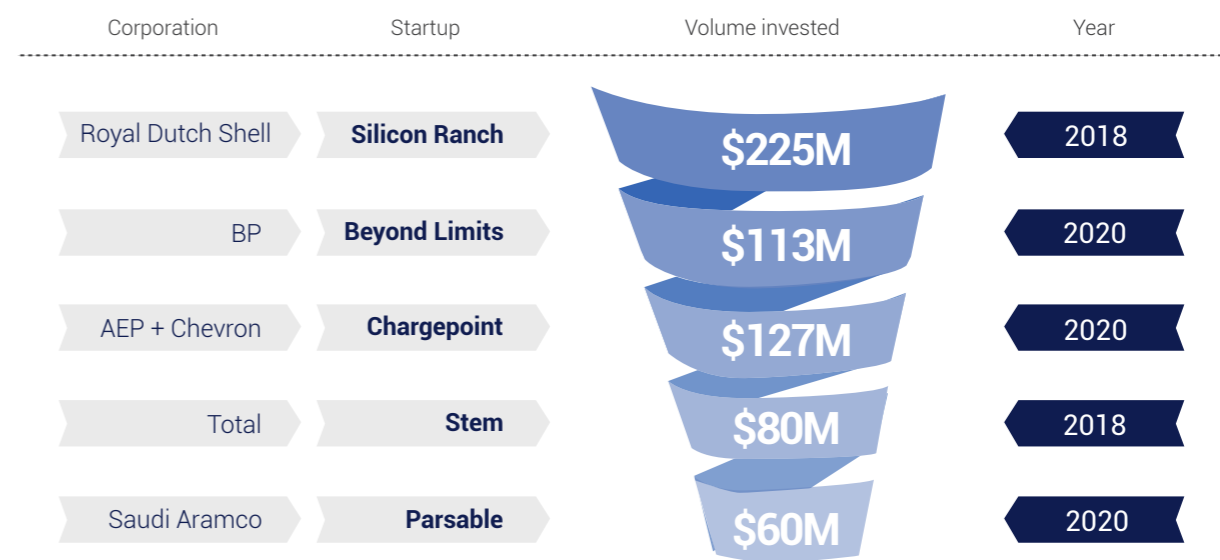


Figure 5 – TOP 5 investments in follow-ons, 2018-2020 period

# CVCs leading investment

## TOP 5 Oil&Gas CVCs with the greatest number of investments between 2018-2020

The main companies investing in the energy sector are European, with companies in the Oil&Gas sector accounting for the largest number of investments over the period.

Figure 6 – TOP 5 corporations in the Oil&Gas with the largest number of investments, between 2018-2020, shows the five companies in the sector that participated in the largest number of

investment events. These companies were: **Shell, BP, Chevron, Saudi Aramco and Total.**

Out of these, the Anglo-Dutch oil company Shell is one of the most active investors, both in terms of investments and acquisitions, on the investment scene. It has accumulated 38 investments and 5 acquisitions, with a highlight being the acquisition of the smart home battery company **Sonnen**, one year after investing 69 million dollars in it.

The number of investments grew by 89% compared to 2020, due to post-COVID-19 effect

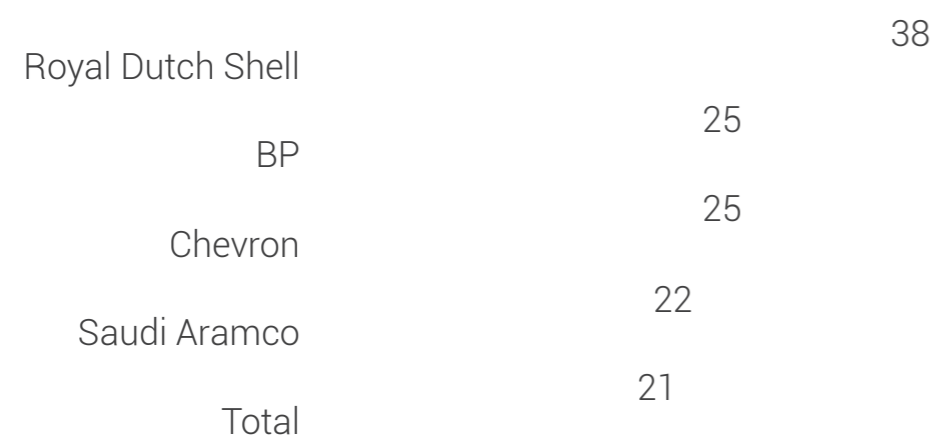


Figure 6 – TOP 5 corporations in the Oil&Gas sector with the largest number of investments

## Largest investments made by Oil&Gas corporations, 2018-2020 period

Emphasis should also be placed on the data shown in **Figure 7 – Largest investments made by the TOP 5 Oil&Gas CVCs, 2018-20 period.** These data show a summary of the ten largest investments made in this period, by the aforementioned CVCs.

Therefore, the following conclusions can be drawn from these data: **Total**, despite being the corporation with the fewest investments (out of the TOP 5), is the corporation that invests the largest average amounts. It is also the CVC on the above list that

subscribed the largest amount in a single investment (320 million dollars in 2018 to the G7 startup).

It is also significant that these five CVCs subscribed their largest investments at the start of the period, before the emergence of COVID-19. We analysed the 50 largest investments made by them over the same period, and found that only 22% were executed in 2020, 38% were executed in 2018 and 40% in 2019. This is influenced by the period of uncertainty that COVID-19 caused in the world economy.

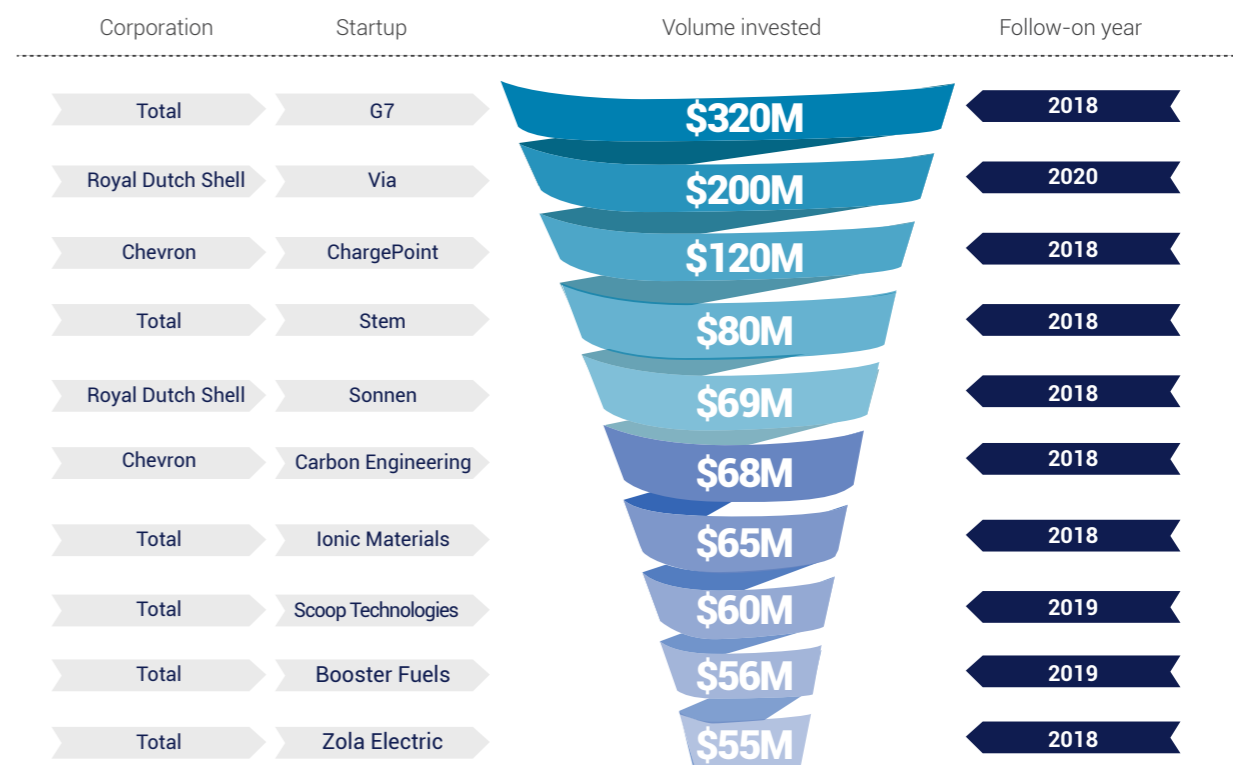


Figure 7 – Largest investments made by the TOP 5 Oil&Gas CVCs, 2018-20 period

## TOP 5 Utility CVCs with the largest number of investments between 2018-2020

In the utilities field, Germany's **E.On** leads investment following the incorporation of **Innogy** and the subsequent creation of **Future Energy Ventures**, an outsourced corporate fund with a more *venture capital* focused approach. This model, increasingly common in the world of corporate investment, has allowed E.On to position itself as the second most important player by number of operations in Europe, even ahead of large funds such as that of Portugal's EDP.

Along the same lines described above, Figure 8 – TOP 5 Utility CVCs with the largest number of investments, between 2018-2020, shows the five companies with the largest number of investment events made over the period. These companies are the aforementioned E.On and EDP, as well

as Statkraft, EnBW and Engie. Therefore, it can be seen that the average number of participations in investment events, among these TOP 5 companies, was approximately half that of the previous case of Oil&Gas companies.

## The post-COVID-19 effect has led to an 85% increase in the number of investments compared to 2020



Figure 8 – Top 5 Utility CVCs with the largest number of investments, between 2018-2020

## Largest investments made by Utilities, 2018-2020 period

Similarly, **Figure 9 – Largest investments made by the TOP 5 Utilities CVCs, 2018-20 period**, shows clear differences when compared to the Oil&Gas CVCs. What is most striking is the fact that the average *ticket* of their ten largest investments was 27 million dollars, in contrast with the average of 109 million dollars invested by Oil&Gas companies.

Unlike the previous case, the CVC with the largest number of investments, E.On, is the same as the one that invests the highest average amount - 26 million dollars on average. Even so, emphasis should be placed on **Engie**, which comes last in the TOP 5 of the largest investments, but 40% of

the investments that it made are among the largest in the field of Utilities. Therefore it is the CVC that made the largest investment, 50 million dollars in **BBOX** in 2019.

The final piece of data to highlight is the effect that COVID-19 had on the Utility CVCs. As in the case of Oil&Gas, out of the 50 largest investments made by Utility CVCs, the lowest percentage is seen in 2020. It stood at 6% during that year, in contrast to 44% of investments made in 2019 and 50% made in 2018. A downward trend can be seen in the average *ticket* of these TOP 5 Utility CVCs. Those who invest the most are investing less and less.

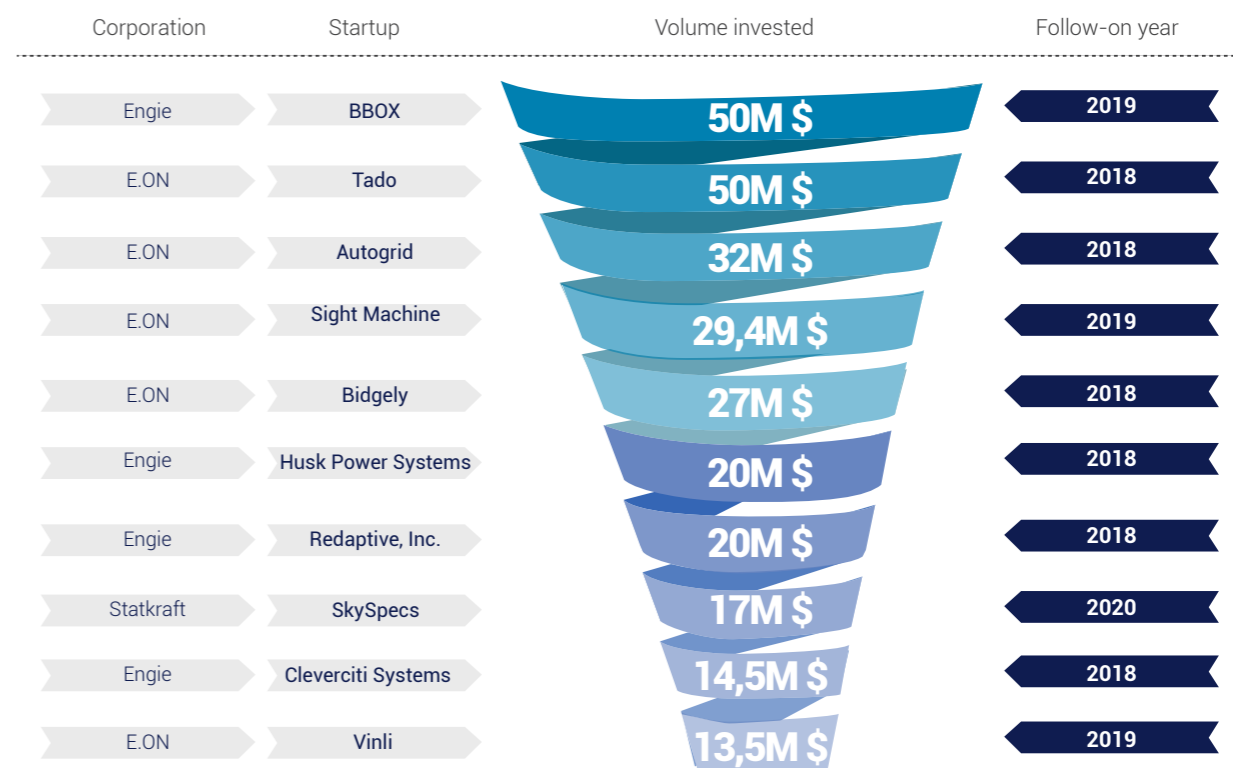


Figure 9 – Largest investments made by the TOP 5 Utility CVCs, 2018-20 period

# How are energy CVC investments evolving?

**The number of equity investments in energy sector startups by CVCs owned by major energy companies has been on an upward trend over the last decade. This trend has gone from 20 investments in 2008 to 113 investment events in 2019, with an annual compound growth rate of 17%.**

Year after year, more *players* have launched *venturing firms* to benefit from this open innovation mechanism. This has led to an increase in the number of agreements and partnerships with startups. Out of the aforementioned investment events made annually, eight out of ten have been new investments, as opposed to two out of ten investments accounted for by follow-ons, which is resulting in an exponential growth of the ecosystem, where new relationships between corporations and startups are established every year.

However, this trend has suffered from the effect of COVID-19, drastically reducing the number of transactions during 2020 from 113 investments in 2019 to 46 investment events in 2020, which is a 59% decrease compared to the previous period. This drop increases to 65% if the number of investments planned for 2020 is taken into account (132 investment events were forecast and only 46 were completed). In the first quarter of the year, companies have adopted a position of *"Hold & See"* with regard to equity investments, protecting their portfolios rather than closing new agreements.

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Lots of deals were planned however due to COVID they have been put on hold, and as such the volume of investments has been skewed to another quarter. The investments expected for 2020 will be accounted for in 2021. Overall in the period of 24 months it should even out, and the trend of increasing investment should maintain.

**David Cuesta**  
Business Director  
NTT DATA



The pandemic has caused a cash problem in many corporations, which has radically slowed investment levels. Downward protection rather than opening up to new *greenfield* investments has literally put many investments on hold. Most of them have already been recommenced, and it can be stated that the CVCs are once again up to date.

Due to this effect, we expect that most of the delayed agreements that were not accounted for in 2020 will be accounted for in 2021. Therefore, we expect to recover the original upward trend, in terms of transaction volumes. It is however the case that the uncertainty caused by the pandemic makes it difficult to achieve the total volume of investments seen in 2019 in the short term. Even so, a major boost is expected over the coming periods.

One of the main driving forces that suggests an ongoing increase in the number of investments is the entry of new players. It should be noted that it is not only energy corporations that are closing agreements with startups. Venture capital companies and technology giants are actively entering the scene, investing in energy and sustainability startups around the world.

Financial VCs tend to present a more opportunistic and finance-driven thesis, as opposed to the more strategic approach of corporate investors. However, capital inflows during later stages have a positive effect on negotiation flow levels, as they literally energise the market. This will have a positive effect, as there is sometimes a lack of investment opportunities in the startup ecosystem.

Another positive effect is the digitisation of the energy sector, which is paving the way for the entry of technology giants. These digital native giants, such as Google and Amazon, are actively investing in energy

startups with unique value propositions. Providing access to enhanced digital capabilities as a complement to equity is key to boosting the growth of startups, and a perfect complement to co-investing alongside energy companies.

In addition to this, the diversification of the energy sector will play a major role in the upsurge of new agreements. The energy business is experiencing remarkable diversification, opening the door to the new technologies needed to upgrade existing businesses and expand into new markets and geographical areas. *Fintech*, *Ledger Technologies* and *Cyber Security* are some of the sought-after emerging fields that could drive increased transaction levels over the coming years.

However, it should be taken into account that equity investments are not the only way to deal with start-ups. In the search for innovation, new mechanisms are flourishing with non-capital formulas designed for establishing partnerships with startups. One of these mechanisms is the Venture Client, the main promoter of which has been the German company BMW. For this major corporation, this model means becoming the startup's first customer, thus changing the corporation-start-up relationship, and reducing the risk taken on by CVCs; furthermore, this model also serves strategic purposes for the start-up, as its shares are not affected and it is given access to the sort of *expertise* and turnover that are difficult to obtain during the early stages. As a result, these partnership or open innovation mechanisms may cause a negative effect by reducing the number of transactions over the following years.

What is clear is that energy companies are reasserting their commitment to *Corporate Venture Capital*, suggesting that an increasing number of investments will be seen over the next 3 to 5 years.

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We are going through a time of so much liquidity that the competition is between funds to find teams and ideas to invest in.

In addition, new players are entering the venture market such as the Tech Giants (Google and Amazon) with large funds from outside the sector with a big focus on the energy market.

**Luis Santos**  
Innovation Team  
EDP Ventures

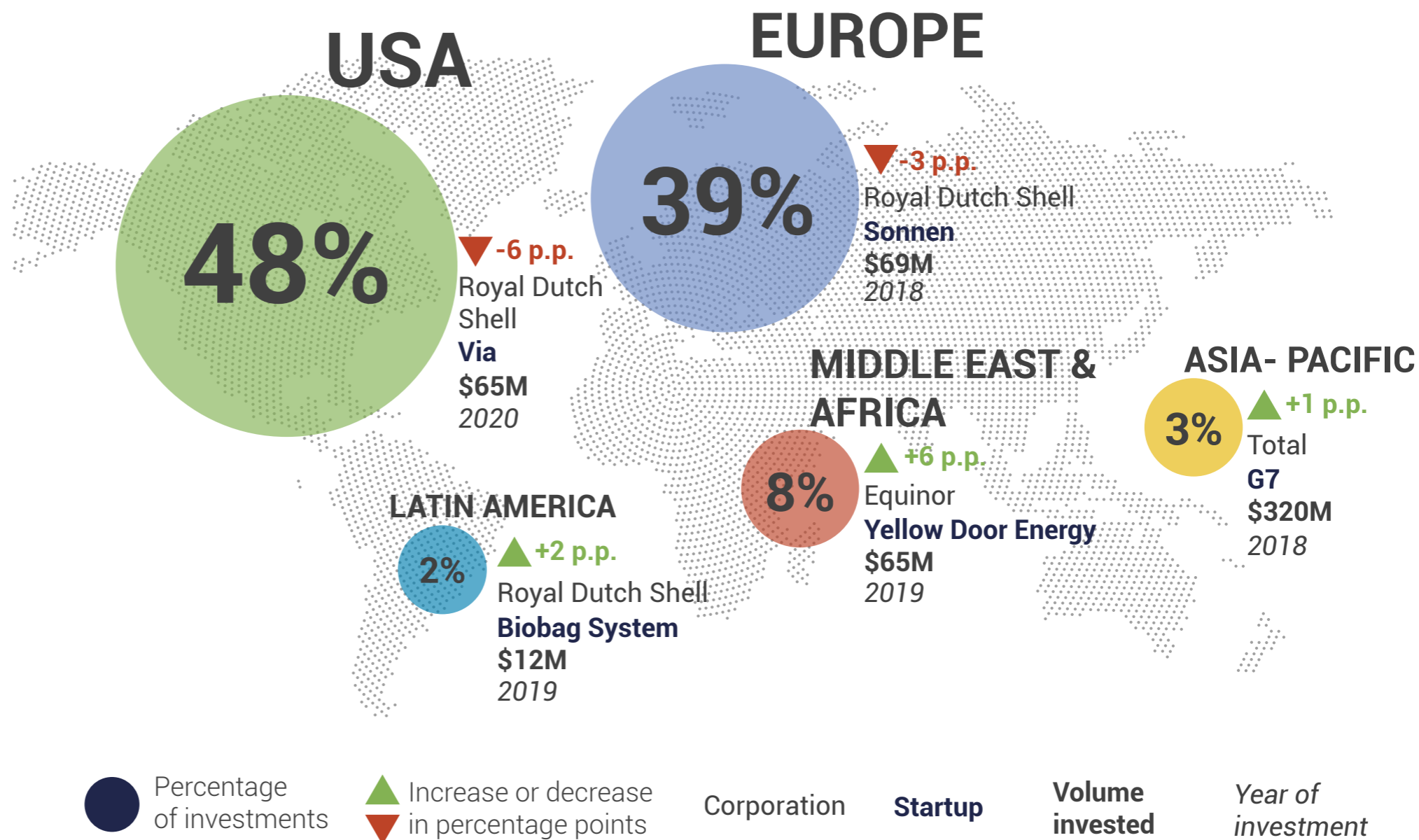




# Geographical areas and venture capital investment hubs in the energy sector

The main investment hubs, based on the head offices of investee startups, are located in the USA and Europe, with California and Germany being the main investment hubs.

As can be seen in Figure 10 – Percentage of total investments in startups, by country, with increases or decreases compared to previous years, investments are concentrated in areas with stronger entrepreneurial traditions, where innovation hubs have been established and where legislation is favourable for the creation of startups. It can also be seen how the main investment hotspots (the US and Europe) are giving way to the emergence of new hubs, with the Middle East standing out above the rest, where in recent years efforts have been made to promote its own startup-friendly ecosystem.



Our scouting is global and we notice that the deals are going down as a percentage in the EU and the US, although the total volume is growing. What is happening is that it is growing in other regions where we were not finding these potential investments until now.

**Emilio Martinez Gavira**  
 Head of Open Innovation & Corporate Venturing  
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Figure 10 – Percentage of total investments in startups, by country, with increases or decreases compared to previous years

As can be seen in the above figure, the United Kingdom, Germany and Norway stand out as the main innovation hubs in the energy sector. This is partly reinforced by the local and global combination of the most active funds that are all based in these geographical areas.

The search for startups that are local but have international projection allows corporate funds to maximise the strategic impact of venture capital investments, in a *win-win* situation for both the startup, which is able to access industrial capacities, *expertise* and new service channels, and for the corporation, which gains a better understanding of market dynamics thanks to contact with the local ecosystem.

to diversify into technologies that are increasingly relevant for the operation of highly digitalised and distributed energy businesses.

Therefore the Middle East has a high potential as a market in its own right. However, investment companies are still shy about investment activities in this geographical area. Market dynamics, regulation and the complexity of exporting

technologies to other markets mean that investment in companies based in countries such as China will not be of any significance over the next few years. However, companies such as BP from the UK have made a \$10M investment in the Chinese fund NIO capital to explore mobility solutions in the Asian giant. This shows how interested some companies in the sector are in entering this market through venture capital.

”

Although we have not ruled out certain regions, our priority is on those where we are active because it makes more sense and greatly accelerates partnerships with investee startups.

**Oscar Cantalejo**  
Investment Analyst  
Iberdrola



The United States continues to be the leading geographical area for innovation in terms of number of investments, as shown in **Figure 6 – Percentage of total investments in startups** by country, with increases or decreases when compared to previous years.

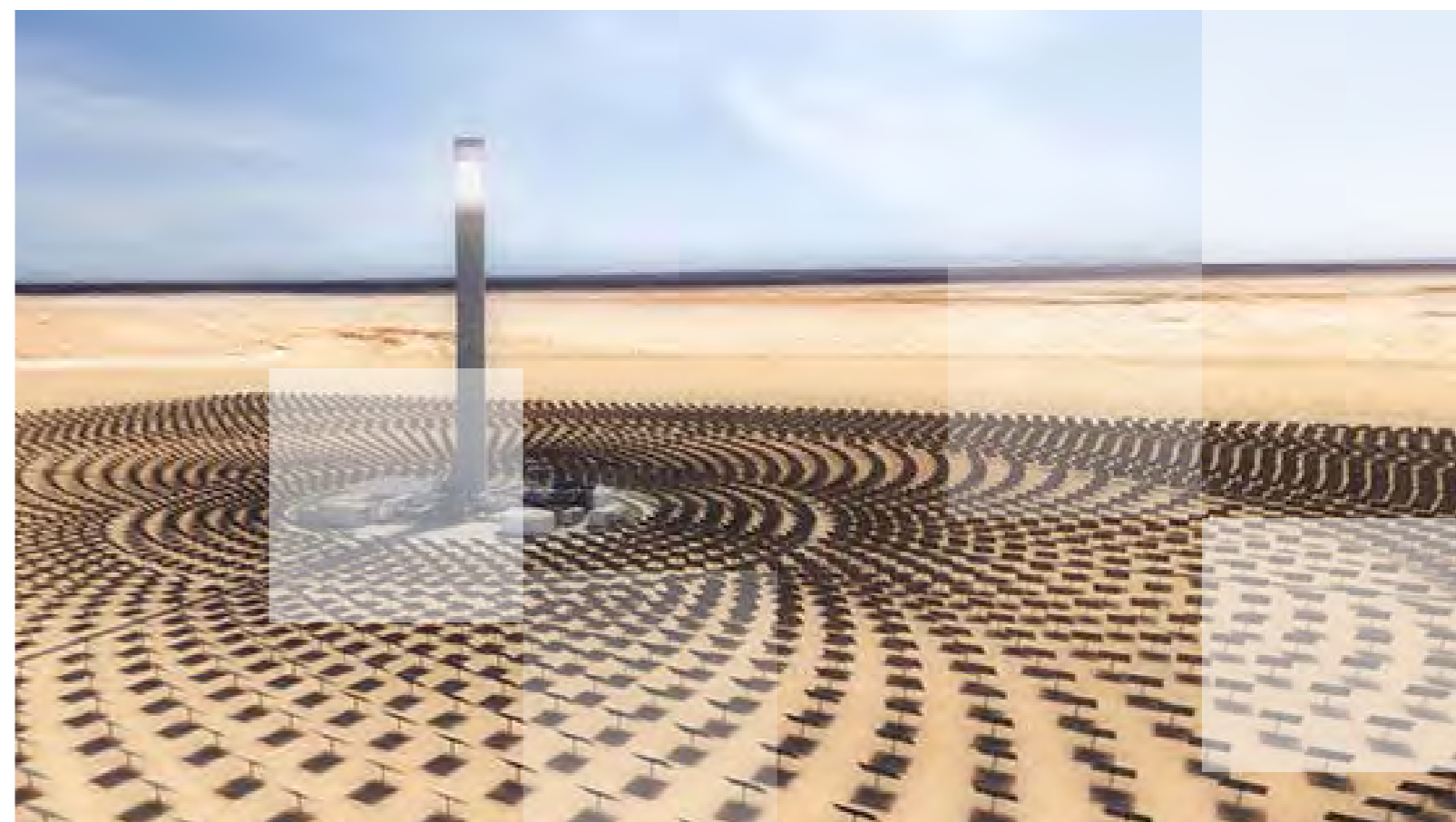
With 48% of the total investee startups lying within its borders, the region of California remains the most relevant innovation hub on the energy scene.

During the analysed period, an increase in investment activity has been detected in other geographical areas outside Europe and the USA. LATAM, the Middle East and Asia are becoming areas of interest for corporate funds in the energy sector.

Latin America is beginning to show significant potential in the creation of technology-based startups, as a reflection of

the innovative currents in North America and Southern Europe, and total investments in this territory have increased by 2 percentage points. This is significant given the presence in this geographical area of companies such as EDP, Iberdrola and Repsol, which are very accustomed to investing in startups.

The Middle East is one of the most significant emerging hubs for the energy sector, with Israel being the main focus. The rise of, and increasing interest in Artificial Intelligence, Cybersecurity and Fintech solutions by companies in the energy sector has led to an increase in the number of investment events in Israel-based startups, reaching 8% of total investments in the sector, representing an increase of 6 percentage points. A clear example is the launch of an innovation lab focused on Fintech-Cybersecurity by **Enel X** and **Mastercard** in Tel Aviv. This fact suggests a clear commitment by the energy sector



# Co-investment with other CVCs

Within the total investments made in startups, co-investment models between CVCs themselves can be found. This type of investment allows large corporations to reduce risks by sharing them among themselves, thus reducing the amount of own capital that they inject.

Furthermore, this investment model is beneficial for startups as well as for CVCs,

as they are provided with early stability generated by the confidence in their business idea of more than one major corporation. This ultimately puts them in an advantageous position in subsequent investment rounds.

Emphasis should be placed on several startups that have received co-investment from more than one CVC in the period between 2018 and 2020, as shown in **Figure 11 – TOP 5 largest co-investments in the 2018-2020 period:**

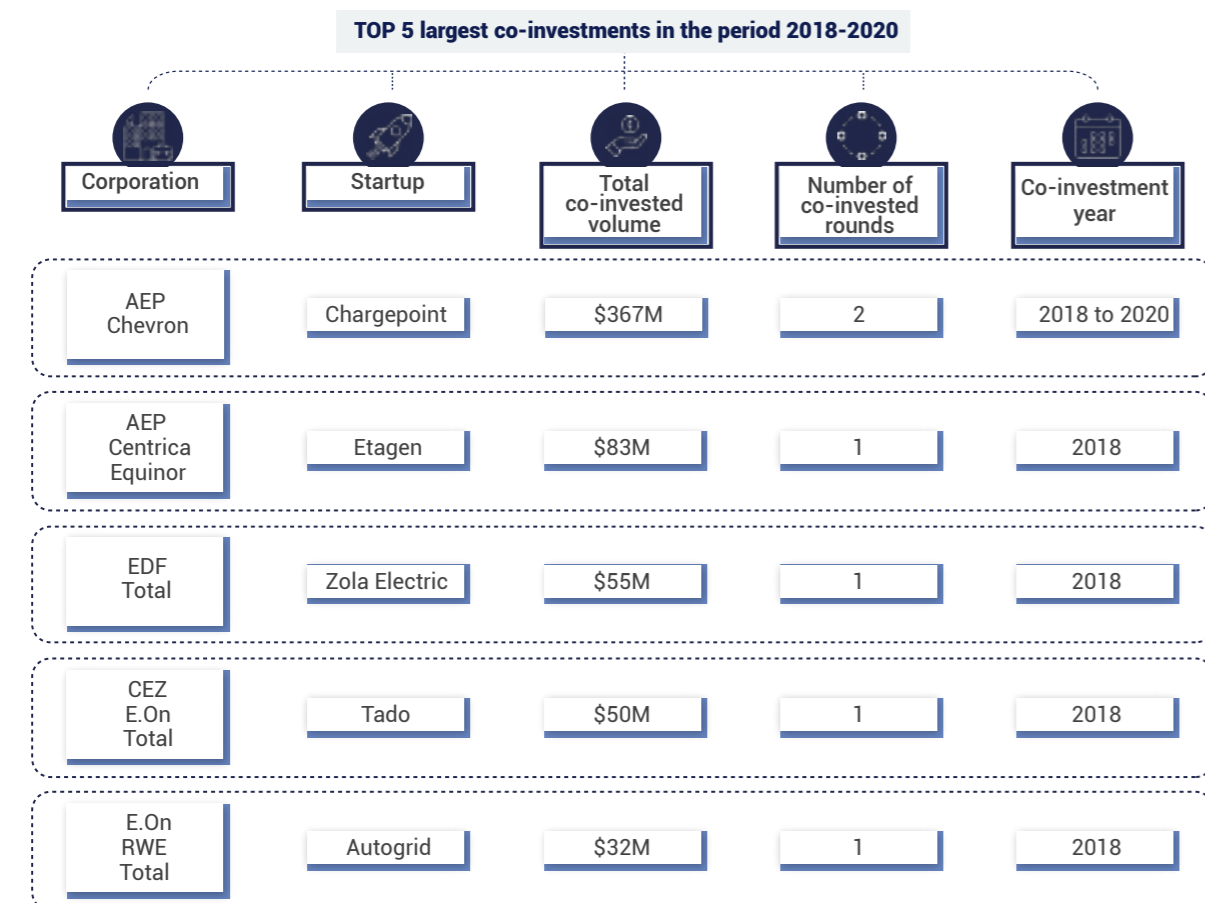


Figure 11 – TOP 5 largest co-investments in the 2018-2020 period

It is worth highlighting the case of **ChargePoint**, in which **American Electric Power** and **Chevron** have co-invested on two occasions. The sum of both rounds is 367 million dollars, but a closer look at the two rounds show that they both individually hold spots one and two in the TOP 5. The first was held in 2018 with a volume of 240 million dollars, and the second, held in 2020, had a volume of 127 million dollars. Therefore, the American electric vehicle startup can boast that it is the only company to appear in the TOP 5 largest investments, TOP 5 largest follow-ons and TOP 5 largest co-investments, in the 2018-2020 period.

Also worthy of note is the case of **Autogrid**, which has received investments from up to 4 CVCs. In the preliminary Series D stage in 2018, the following CVCs co-invested in the startup: **E.On, RWE** and **Total**. The following year, in a new Series D, another major corporation entered the scene, in this case: **Royal Dutch Shell**, as the sole agent in this round. This startup has shown its ability to generate great confidence among the largest main corporations in the sector, providing itself with notable long-term stability.

## TOP 5 CVCs with the largest number of co-investments

In terms of the CVCs, emphasis should be placed on Total, which participated in 3 out of the 5 largest co-investments in the period, followed by E.On and American Electric Power, which participated in 2 of the largest co-investments. As shown in **Figure 12 – Top 5 corporations with the largest number of co-investments**, the corporations that participated in the most co-investment rounds with other CVCs are, in descending order: **Chevron** (10 co-investment rounds),

**CEZ** (6 co-investment rounds), **Total** (6 co-investment rounds), **Saudi Aramco** (5 co-investment rounds) and **Royal Dutch Shell** (4 co-investment rounds).

Chevron, in addition to being one of the two corporations that participated in the largest co-investment, is the CVC that has taken part in the largest number of co-investment rounds.



Figure 12 – Top 5 corporations with the largest number of co-investments

# CVC investment thesis

**Corporate Venture Capital is noted for a strong Series A and B investment thesis. This period is characterised by startups with metrics that show traction and validate a business or technology model (Series A) and moments of growth or expansion of pre-validated models (Series B).**

Taking into account the objective of corporate funds with a strategic investor profile, Series A and B are the most appropriate moment to reach a good compromise between financial and strategic returns.

As shown in **Figure 13 – Number and percentage of the total of investments made by CVCs in startups, by stage**, 42% of investments by venture capital funds are made in these stages of investment, in startups with an average maturity of 5-7 years since their foundation.

However, the strategic redefinition of some corporate funds towards a more financial model independent of corporations, in combination with rapid software solution development cycles encourages investment in early-stage startups, accounting for 15% of investments made during the period 2018 to 2020. The so-called *seed* stage generates higher risks due to the lack of proven metrics and large customer volumes, but offers a higher return on investment. As well as an interesting strategic positioning.

Without leaving behind expected strategic impact of corporate funds, this new approach allows an adjustment to be made to the investment thesis to pre-Series A entries, where financial return is maximised without sacrificing the strategic return.

However, there is a trend towards more opportunistic investments in early stage startups. A clearly financial approach, but which, on certain occasions, given the short development cycles of software-based solutions, also allows corporations to obtain a strategic return.

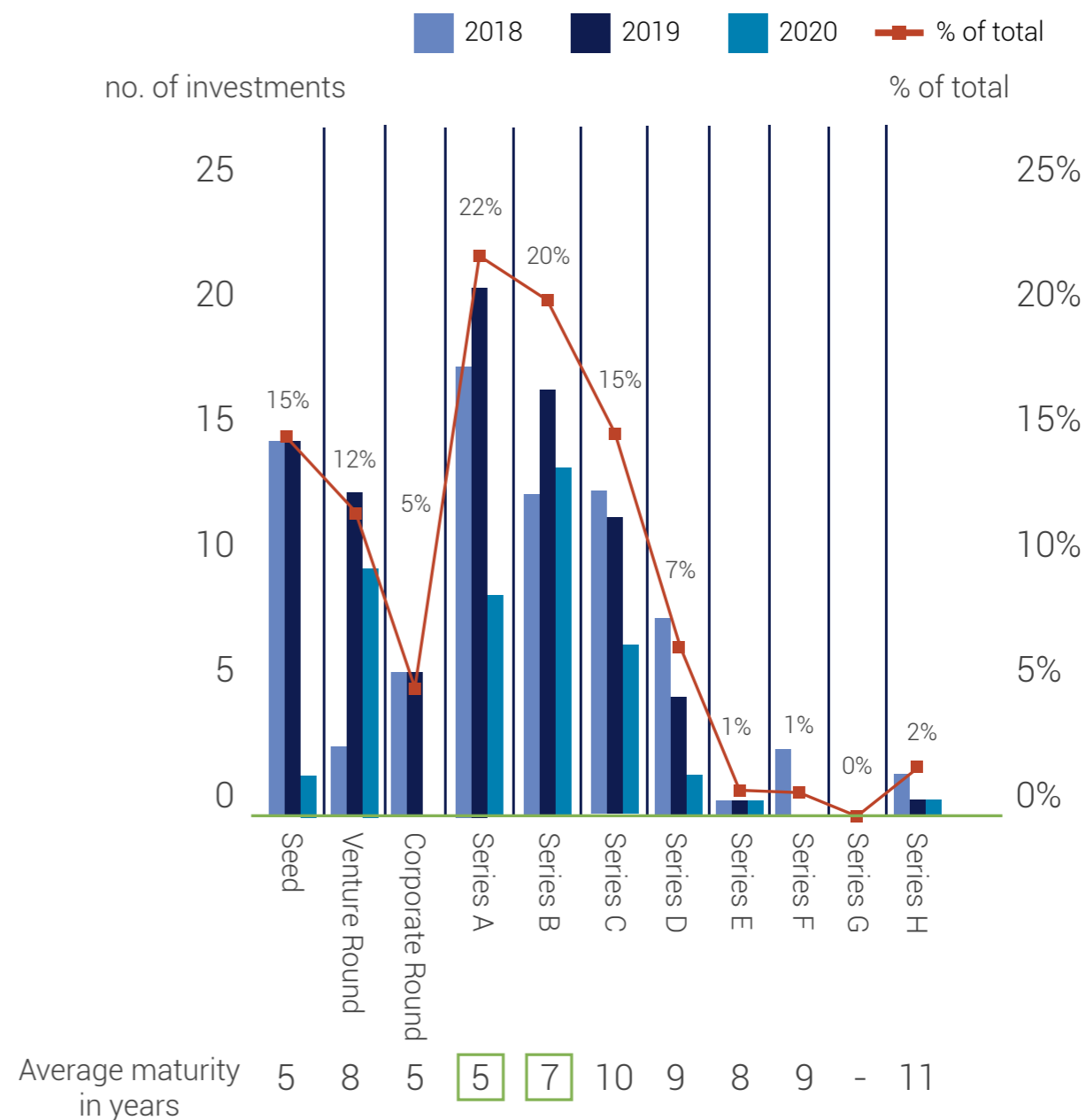


Figure 13 – Number and percentage of the total of investments made by CVCs in startups, by stage



**We invest mainly in Series A, at a point of maturity where the main hypotheses are solved, but with a margin for piloting the technology and generating new use cases.**

**Elena de Benavides**  
 Head of Corporate Venturing & Innovation Ecosystems  
 Elewit



# Investment volume according to the field of application of the startup

Based on the data analysed for the report, it was possible to draw conclusions on the relevance of each field of application of startups (electricity, Oil&Gas, mobility and digital technology), according to the number of investment operations received. Therefore, as can be seen in **Figure 14 – Total investments made by CVCs, according to the field of application of the startup**, electrification is the main area of

investment in the 2018-2020 period, with a total investment volume of 113 (44% of the total). A significant decrease in investments in the sector can be seen in 2020, as a result of the situation caused by COVID-19, which led to a drop of -74% compared to the previous year. Within the electrification sector, distributed energy, demand management and energy storage are some of the main technology fields.



Consumers and also large corporations are increasingly investing in electrification because of their desire to use clean and renewable energy, to reduce its cost.

**Fabio Tentori**  
CEO  
Enel Innovation Hubs

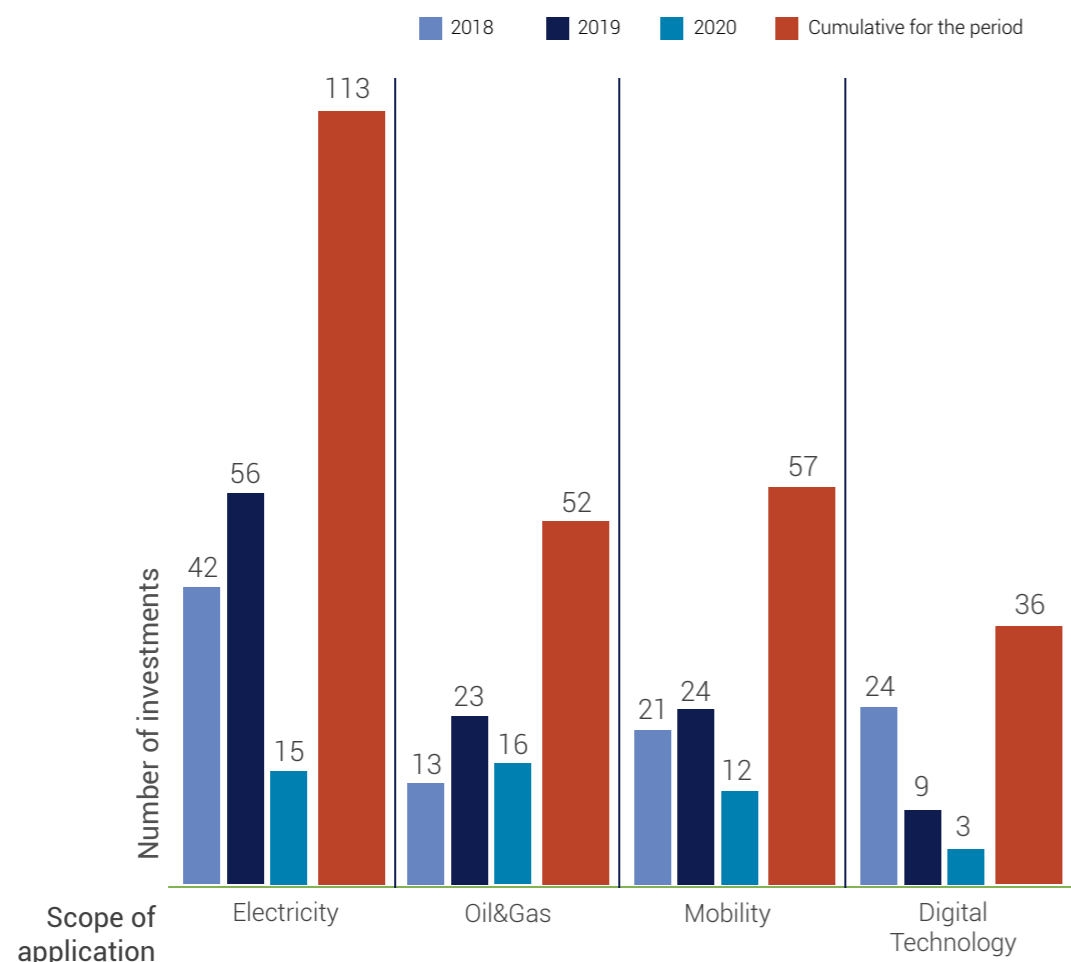


Figure 14 – Total investments made by CVCs, according to the field of application of the startup

However, during the last few years, mobility has experienced significant growth, becoming the second largest field in terms of number of investments. Electric mobility is a key field in the corporate investment landscape, although there are many fields of mobility, including conventional mobility focused on improving existing combustion engines or making our transport more efficient. This offers competitive advantages based on the expertise of both Oil&Gas companies and Utilities companies.

On the one hand, Oil&Gas companies have unique knowledge in terms of fleet management, services and vehicle

refuelling. This stems from their experience of managing millions of service stations around the world. This makes the new mobility field a natural step for these companies, where they can also contribute all of their acquired knowledge.

On the other hand, electric mobility opens up an opportunity for the integration of utility companies into the mobility sector. Knowledge of the roll-out and management of electric infrastructure, such as charging stations, combined with energy management and storage make new mobility a natural field for these companies.

## Investment volume of Oil&Gas CVCs

**Oil&Gas companies make 34% of their investments in technologies related to exploration and refining production, thereby boosting the growth of their sector.**

The search for efficiency, operational excellence and new fuels are some of the fields that account for 34% of the investments made by companies in the Oil&Gas sector. However electricity, with 30% of investments, is the field with the second highest number of investments, followed by mobility with 25%.

As can be seen in **Figure 15 – Investments by CVCs (Oil&Gas) according to the startup’s field of application**, it was only in 2018 that Oil&Gas CVCs participated in a larger number of investment events in startups with a field of application different to their own. This shows their clear preference and an upward trend in promoting technologies with a direct

application in their core business, ahead of others. Even so, emphasis should be placed on the role of electricity in their investments, which in 2018 exceeded those made in Oil&Gas, but decreased year on year in terms of total investments made.



The main area where we are looking for projects are technologies and new businesses related to the electrification of the economy. The evolution of technology is allowing electricity to reach more and more energy uses: transport, buildings and industry. Entrepreneurs are key to unlocking new business models in this area.

**Diego Díaz**  
Global Head of Ventures & Technology  
Iberdrola

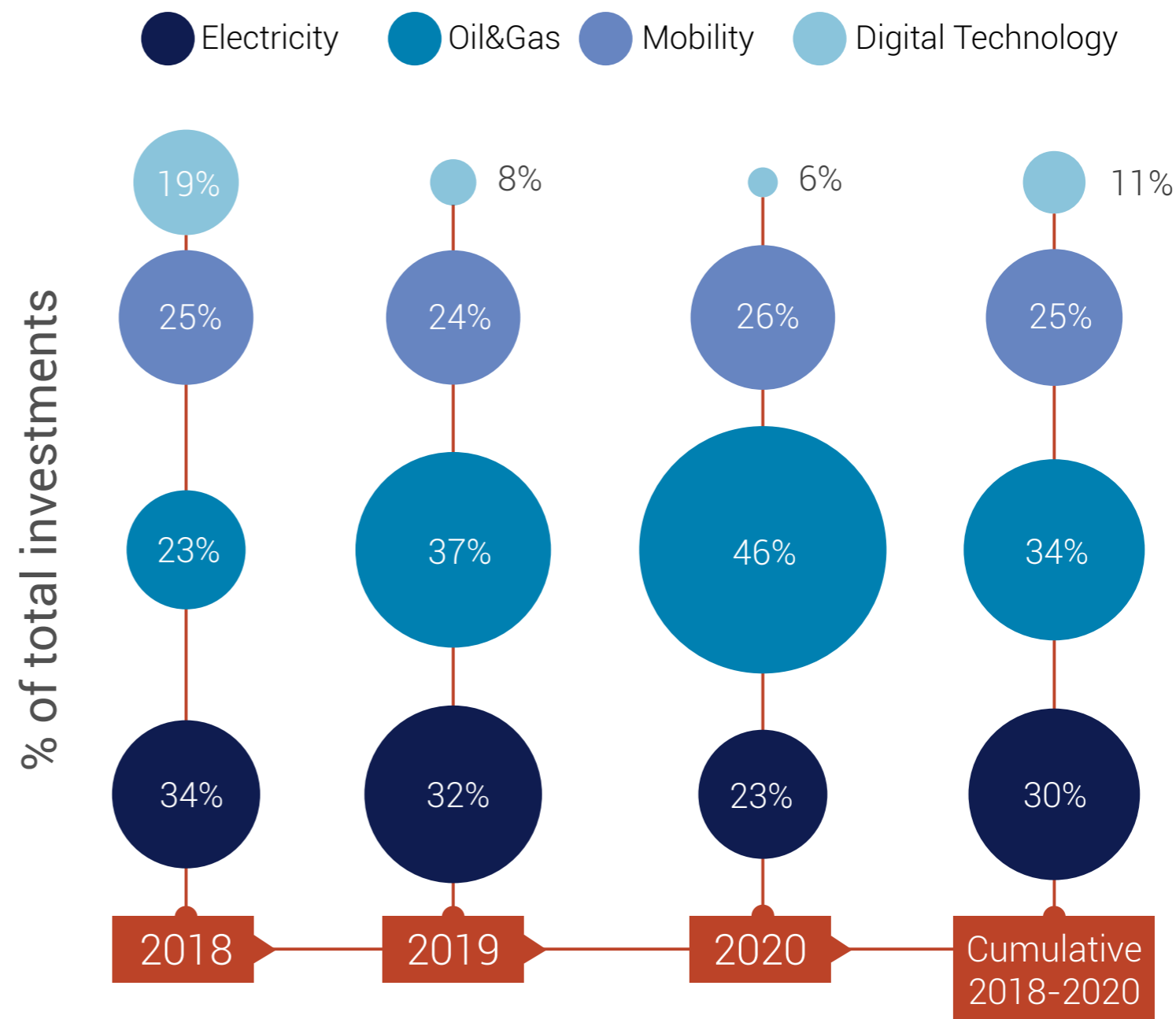


Figure 15 – Investments by CVCs (Oil&Gas), according to the field of application of the startup

## Investment volume of Utilities

**In contrast, utility companies make 63% of their investments in technologies related to the generation, distribution and trading of electricity, thereby boosting the growth of their sector.**

Electricity companies seek to include new technologies and business models that complement their core business by injecting two thirds of their total investment into them. Following these investments, 19% of investments made by these companies are in startups dedicated to mobility, showing a clear commitment to the growth of this sector.

It should be noted that 18% of investments made by Utilities are in startups classified in this report as "Digital Technology". Under this classification we find fields such as Cybersecurity, Artificial Intelligence and Machine Learning, which are of growing interest to Utilities. The digitalisation of energy means that solutions focused on ensuring cybersecurity or harnessing the vast amounts of data extracted from electricity grids to generate business intelligence, developing new business models or ensuring operational excellence, are becoming of great interest to these companies.

Finally, as can be seen in **Figure 16 – Investments by CVCs (Utilities) according to the startup's field of application**, the Oil&Gas field lacks strategic and financial interest for the sector and an investment was only made on one occasion, in 2018, in the whole period.

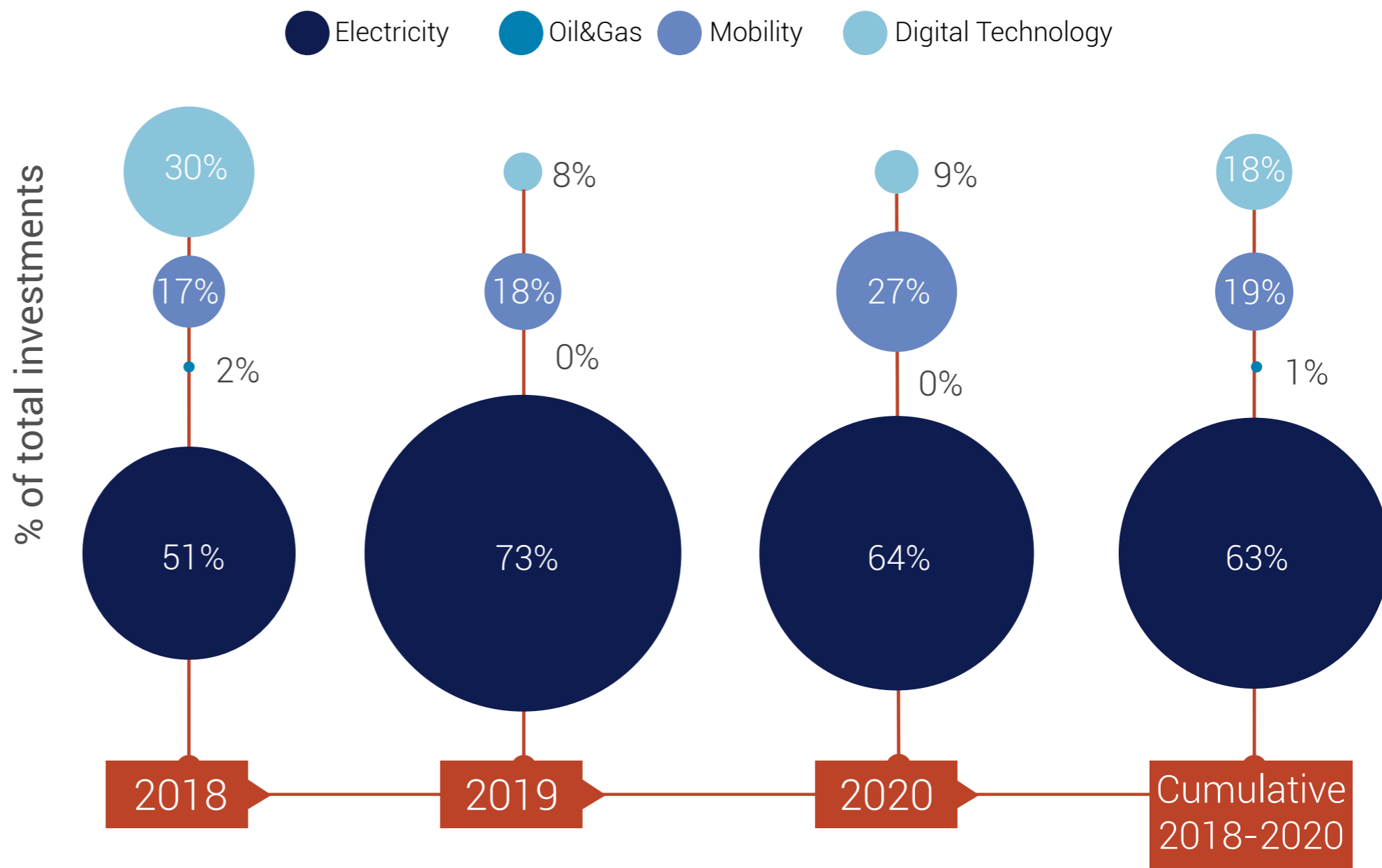


Figure 16 – Investments by CVCs (Utilities) according to the field of application of the startup

## Investments according to the value approach of the startups

The fields of application of electricity, Oil&Gas, mobility and digital technologies have been taken into account throughout this report. All of these have been chosen because of their relevance within the sector, accounting for the largest number and volume of total investments.

The aim of this section is to take a more in-depth look at each of these fields and to analyse the number of investments in the 2018-2020 period, the corporations investing in them, as well as the solutions offered by the investee startups.

In this section, the generic field of application known as "Digital Technology" is not examined in detail, due to the large variety of solutions offered by the investee startups and the fact that there is no specific field of application that is relevant.





# 1 Investment in startups in the field of electricity

**Investments in the field of electricity are leaders in the investor landscape ahead of those made in Oil&Gas, mobility and digital technologies, with 143 investment events registered during the 2018-2020 period.**

Within this field, decentralised energy is the most relevant field of investment, accounting for 42% of these investments, led by the Anglo-Dutch oil company **Shell**, which has participated in up to 15 investment events - almost double that of the second most committed corporation in this field, the French oil company **Total**. To refer to a few examples, there is the investment in distributed storage in the startup **Sonnen**, which is considered a world leader in its market and which is producing batteries for homes and small businesses that allow energy from photovoltaic installations to be stored in a smart storage system that guarantees that solar energy

can be used 24 hours a day. After this investment, the startup was acquired by **Shell**. The **Solstice** solar communities are another example. This startup - invested in by **Total** - promotes the use of solar energy produced by community facilities that can be accessed by nearby residents. This avoids having to install photovoltaic systems in all the homes that consume their energy. Both are examples of a trend of investment in start-ups with models based on the distribution of energy resources.

However, large-scale renewables continue to be an area to be taken into account for venture capital investors. Led once again by **Shell** and **Total**, and by investments such as those made by **Eolfi**, (promoting new wind facilities with a major emphasis on offshore facilities, although without neglecting onshore ones), **Level 10 energy** (a digital platform focusing on connecting the different players making up the renewable energy ecosystem: sellers,

buyers, advisers and financiers to allow time savings) and **SiliconRanch** (also focused on the development and management of community solar facilities), which make this a key investment field to supplement the renewable businesses of energy groups.

Data analytics, accounting for 26% of investments, is an area experiencing continuous growth, which is much needed given the growing trend of energy decentralisation. Funds managed by **RWE** and **EnBW** lead this field with investments such as those of **eSmart Systems**, which focuses on improving infrastructure inspections through data analytics, and **Gridscale** which enables the creation of SaaS solutions to improve the user experience.

With only 2 registered investments, grid-scale energy storage is the field with the lowest amount of registered investment. Only **Shell** and **Engie** have supported startups dedicated to this field.

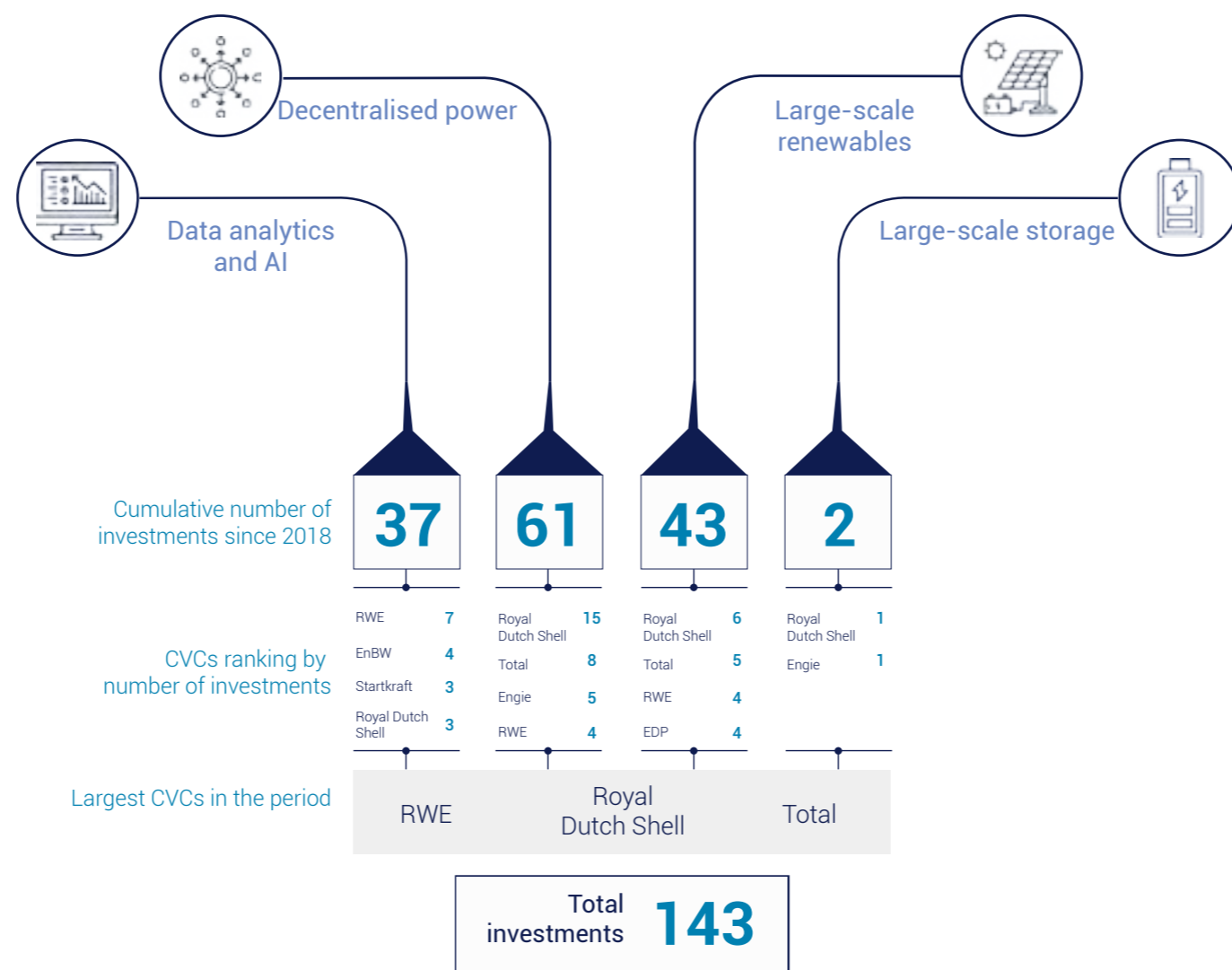


Figure 18 – Total investments made in electricity, by area and CVC



Regarding to decentralised energy, we must take into account that there is the home, where there is no end to what is going to happen; with a clear trend towards consolidating innovative solutions with cross-sector offerings or bundling of services, where digital capabilities and solutions are essential.

**Erika Escolar**  
Venture Capital Director  
Capital Energy



# 2 Investment in startups in the Oil&Gas

The major companies in the Oil&Gas sector are leading investment commitments in this field, accumulating a total of 58 investment events in the period 2018/2020.

The UAE company **Saudi Aramco** and the American company **Chevron** are the main drivers behind this investment, accounting for 31% and 27.5% respectively of total investments.

The fields of exploration and production are leading the way, in a clear search for efficiency in crude oil extraction processes which is key to increasing cost competitiveness and reducing the carbon footprint. As previously mentioned, the **Saudi Aramco** corporation leads the group of investors, with investees such as **Modumetal**, which, by producing metal nano-sheets that are stronger and

more efficient than conventional ones, reduces the impact on the planet of a large number of industries, or **Inventys Thermal Technologies**, which, through a process of intensified adsorption due to temperature changes, makes it possible to limit the CO2 emitted by the Oil&Gas industry, using an adsorbent material (when the combustion gases pass through the material, the CO2 is trapped and allows other gases, such as nitrogen, to pass through unhindered).

The so-called *downstream* activities are the second most attractive field for CVCs, accounting for 43% of operations, once again led by **Saudi Aramco** and **Chevron**. Some investee startups in this field are **Seeq**, which provides advanced analytics for improving refining processes, and **UnitX**, which provides supercomputing capabilities in the *cloud* for the deployment of artificial intelligence capabilities at scale.

In pursuit of efficiency in refining processes Biofuels are the area with the lowest accumulated investment during the period, although **Shell** is making a clear commitment with investments in companies such as the refinery developer **BioLNG Nordsol**, which has developed LNG technology and a decentralised biogas treatment and liquefaction production plan that makes small-scale production profitable.

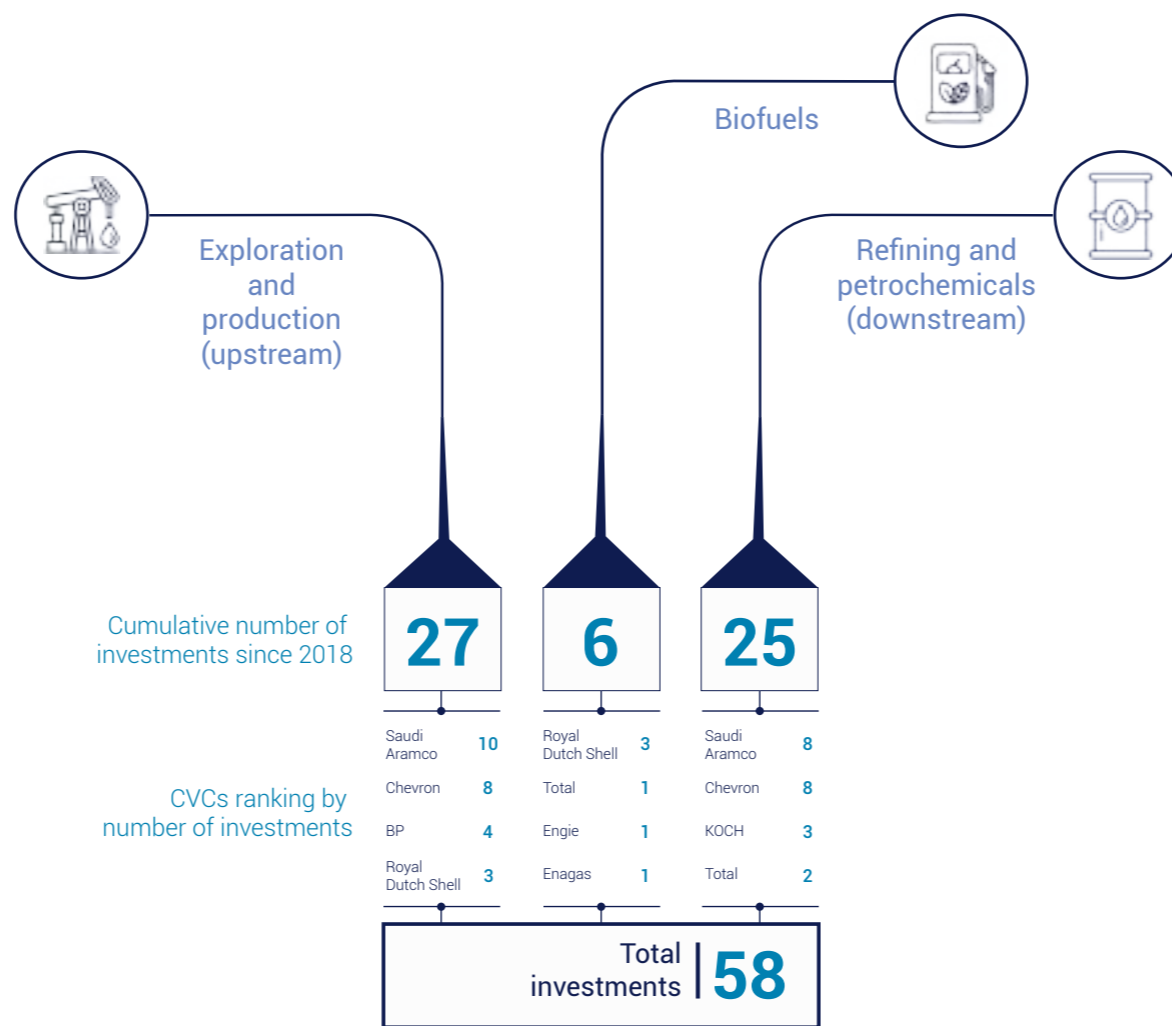


Figure 19 – Total investments made in Oil&Gas by area and CVC



Despite the short-term volatility in the price of crude oil, the drop in investments in Oil&Gas technologies will be brutal in the coming years. We will not reach the point of consuming all the oil reserves, there will be a transition before we reach that point.

**Marc Sabas**  
Investment Director  
Ship2B Ventures



# 3 Investment in startups in the field of mobility

**Mobility has experienced significant growth in recent years in terms of the number of investments. An upward investment trend, clearly led by Oil&Gas companies, which have accumulated key expertise in this field.**

In the period between 2018 and 2020, the field of mobility has accumulated a total of 60 investment events, distributed across a significant number of CVCs, with the British company **BP** leading the way in up to three different fields of application.

With 28% of investments, electric mobility is the area with the highest number of registered investments, followed by fleet management and mobility infrastructure. Although fragmented in terms of the number of investors, the British company

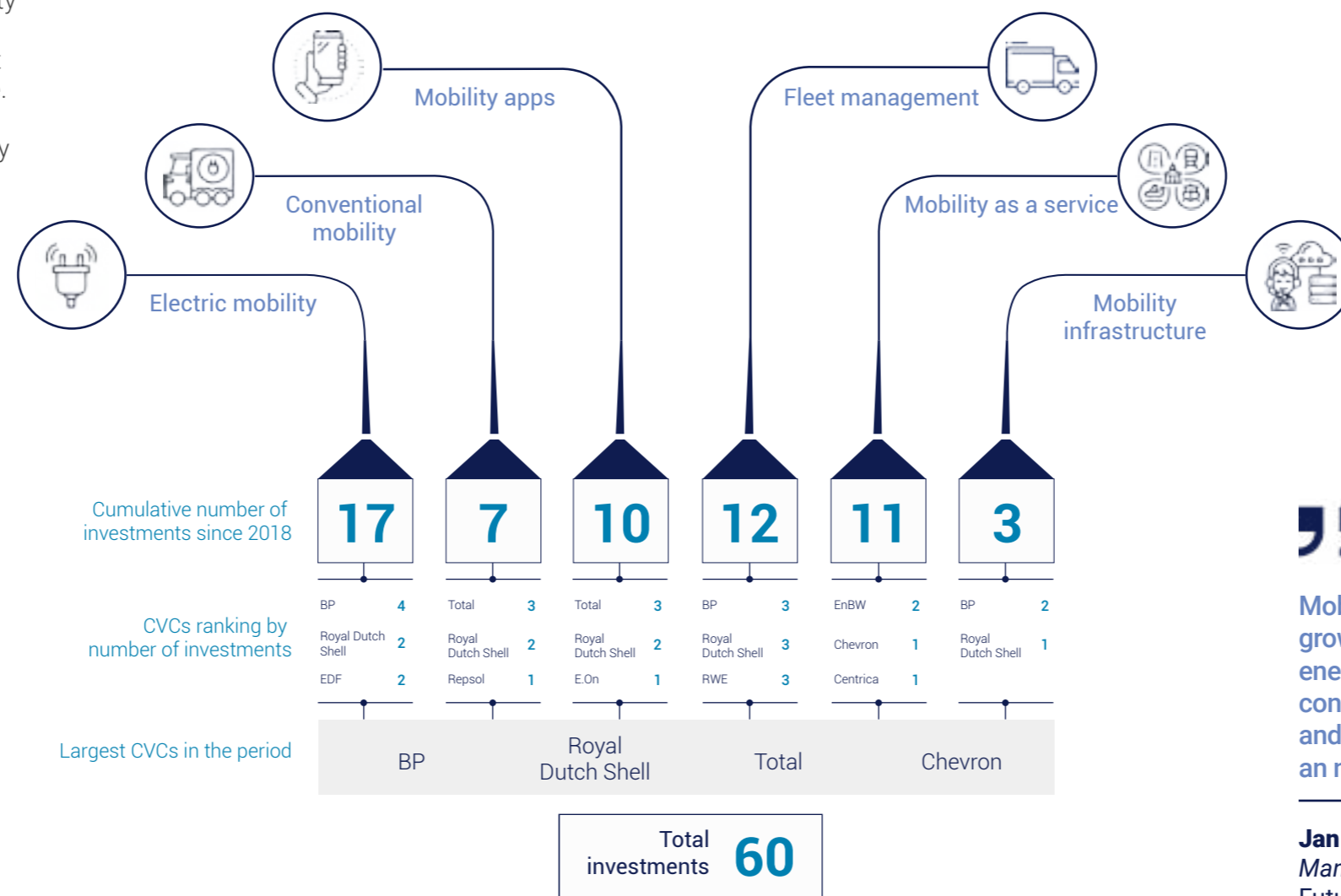
**BP** leads the field with investments such as the one made in the startup **Lightning eMotors**, which focuses on the development of large electric vehicles (buses, vans, trucks, etc.), B2B, a market niche little exploited by the competition, which tends to focus on utility or sports vehicles, B2C.

Fleet management and mobility infrastructure are two areas of interest for venture capital investors. Major Oil&Gas companies such as **Shell** and **Chevron** have invested in startups like **ChargePoint**, which develops charging solutions for electric vehicles and as seen throughout the report, leads a number of investment rankings

However, in the field of mobility, Utilities take on significance in terms of the

number of investment events, with participation in startups such as **Vialitics**, which provides an artificial intelligence-based solution for road maintenance management.

Mobility applications are a key area for obtaining basic information when it comes to focusing investment in infrastructure and new businesses. For this reason companies such as **Total** and **Shell** have invested heavily in *ride-hailing* and *ride sharing* startups such as **Grab**, a digital platform in mobile app format, based in Singapore, which offers its users services such as transportation with a driver (VTC), or the *delivery* of products such as shopping, food or parcels.



**Mobility is the field where we expect strongest growth, along with smart cities and distributed energy. We will generate, distribute, trade and consume energy in many ways, and smarter cities and mobility will be instrumental to arrive earlier in a net-zero economy**

**Jan Lozek**  
 Managing Partner  
 Future Energy Ventures - E.ON



Figure 20 – Total investments made in mobility by area and CVC

# Investments according to the value approach of the startups

Startups can take one of four major value approaches. There are those that develop hardware or software technology, or a mix between hardware and software and those in which added value is agnostic to the technological solution, thereby developing an innovative business model.

Corporate venture capital funds have traditionally been known for strategic long-term investments with higher capital

requirements and investment theses different to those of financial funds, in terms of development horizons.

This meant that the investments that best fit the CVCs' investment criteria were hardware solutions with longer development horizons and time-scales. However, the digitalisation of the energy sector has given way to startups with longer development horizons, forcing corporate funds to adjust their theses to these digital models.

As shown in **Figure 17 – Percentage of investment by CVCs, according to**

**the value focus of the startup**, 47% of the investments made by corporate funds are in startups that are developing software technology, compared to 16% invested in startups that are developing hardware technology. Investment in software solutions, which are generally less capital-intensive than hardware, allows the compromise between a financial and strategic return to be better adjusted, which is why CVCs have a preference for the former.

The startups that receive the second most investments are those that offer an

innovative business model. These business models represent a double economic benefit for corporate funds: on the one hand, business models that present an adequate scalability factor can offer interesting financial returns within the typical investment cycle of CVCs; on the other hand, these business models can represent new market access routes or unique channels for corporations, and can even allow them to reach segments that would otherwise be difficult to reach. This can result in a high strategic return for corporations.

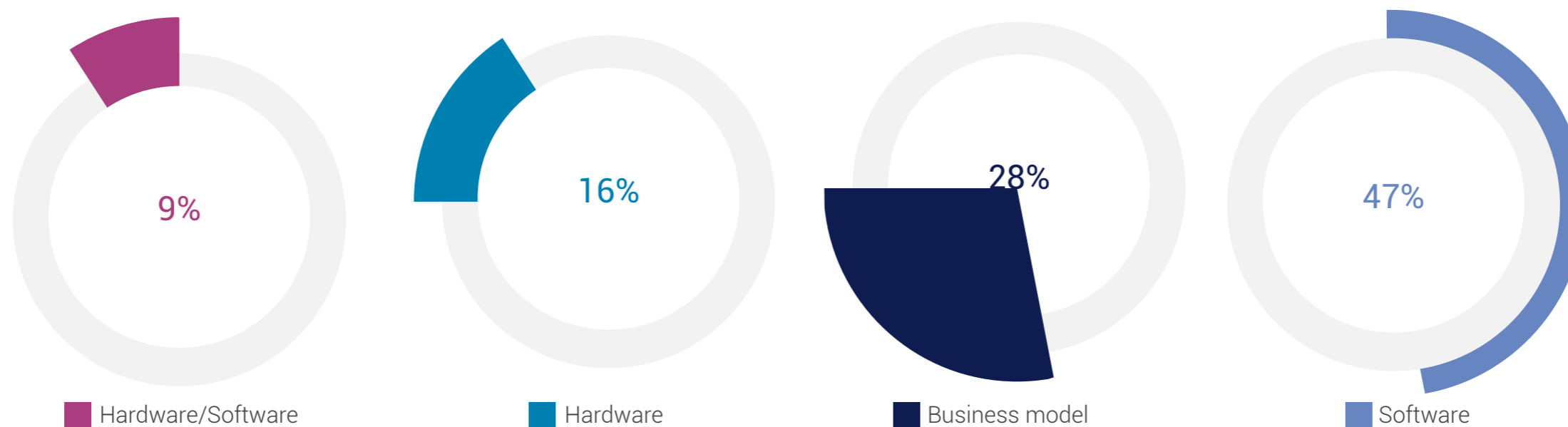


Figure 17 – Percentage of investment by CVCs, according to the value focus of the startup

# In what areas of the energy sector will CVCs invest in the future?

One of the great challenges of this era is the fight against climate change. The citizens of the 21st century want a better world for those who come after us, a world without pollution (air and water), a fairer and more sustainable world with fewer health risks, extreme weather events, rising sea levels, etc.

The Paris agreement was a milestone in addressing climate change and its negative effects, in that it was the first universal and binding agreement with the objective of reducing global greenhouse gas (GHG) emissions and keeping the global temperature increase to 1.5°C. Since this trigger, the energy transition has become an unstoppable movement worldwide, affecting all sectors and companies across the economy (energy, transport, banking, telecommunications, industry, etc.)

But for the energy transition to be possible, a paradigm shift is required in which the system has to change to a different model through 4 fundamental levers: decarbonisation, digitalisation, decentralisation and the circular economy. Therefore, investment trends will be aligned with these levers, which will also be enhanced by the participation of all companies in the economy, which will have to develop sustainability strategies:

## 1 Decarbonisation

According to goal 7 of the SDGs (Sustainable Development Goals) the world must ensure access to *affordable, reliable, sustainable and modern* energy. This path to achieving the goals is laid out on a roadmap towards zero emissions, along with the electrification of the economy. In the area of decarbonisation, the main trends of investments due to be made in the energy sector over the coming years by CVCs will be channelled into 3 main areas:

**1. Hydrogen**, where more than 20 countries worldwide have published hydrogen strategies for 2050, or are preparing such strategies, which include goals to decarbonise different sectors of the economy (production, storage, transportation and industrialisation) with investments in companies and startups related to electrolysers and *fuel cells*, among others. Hydrogen implementation will be accelerated in generation alongside renewables, through green hydrogen, where investments may be seen in new production models utilising hydrogen, such as hybridisation, floating photovoltaics or offshore *wind*. In transport, the use of synthetic fuels could be another development path for hydrogen.

**2. Mobility**, where some countries already have strategies to ban fossil fuels by 2030, which means that investments will therefore be seen in larger volumes in the short term than in the previous case. Investments in decarbonisation will fundamentally come in 2 waves: electrification, through electric vehicles, batteries and charging stations, and other biofuels (bioethanol, renewable methanol, or others).

**3. Carbon capture** is another area where investments are envisaged, with implementation in the medium to long term to cover the final stage of decarbonisation.

## 2 Digitalisation

A large part of the investments will be decided upon as a result of the roll-out of *smart grids* and the modernisation of generation plants (i.e. *digital twins*). IoT for use in electricity infrastructure, EMS (Energy Management Systems), remote operation and cyber security will play a key role. This will lead to new business models based on Big Data, information traceability (*blockchain*), *analytics* and artificial intelligence.

## 3 Decentralisation

Investments will be made as a result of the roll-out of *smart cities*, smart buildings and business models based on BTM (Behind The Meter) and *smart appliances*, where the customer will be firmly at the centre.

Investments will be made in companies related to self-consumption, batteries and energy management systems for homes, businesses and industry. One of the major fields of investment that brings together these investments mentioned above, and which is also linked to the leveraging of digitalisation related to the roll-out of *smart grids*, will be the flexibility of both generation and demand, through VPP (*virtual power plants*) and the aforementioned elements, to which will be added electric vehicles, which will also be able to provide services to the grid (*V2X applications*).

## 4 Circular economy

Finally, in addition to the well-known 3Ds, there is a new investment lever that will have a major impact in the coming years, derived from the trend of zero waste related to circular economy models, such as second life batteries, or other models.

”

The next big investment fields will be hydrogen, Carbon Capture and digital data analytics

**Cayetano Hernández**  
Business Director  
NTT DATA



# Preliminary analysis of post-COVID-19 investments

**During the first period of 2021, it has been observed how the previously forecast investment trend has become a reality. A clear upturn in investment events has been seen following the drop in 2020 due to COVID-19, with the best forecasts increasing in some cases (more rounds and higher amounts).**

In order to provide the most up-to-date analysis possible of trends in the sector, in the following section we will analyse the data generated in the first half of 2021. Although data for the calendar year are not yet available, it was considered relevant to give an overview of the period that is as most up-to-date as possible. By looking at the data in this way, it is possible to tell whether the trends seen in recent years are at the forecast levels, or whether there are any notable variations. We will also be able to show which players are the most significant and have the greatest presence in the different investment events that we have analysed.

## Investment volume and type

As predicted in the previous pages, the year 2021 is seeing growth in the number of deals closed, many of which had been postponed as a result of COVID-19. Thus, in the first half of the year, a total of 84 investment events have already been closed, almost double the total for 2020, reaching the 2017 totals in just half a year, but not yet reaching the forecasts for 2020. As can be

seen in **Figure 21 – Number of investments made by corporations**, data for the 2021 period has been added, showing an increase of 89% when compared to the previous year. Taking into account the annual percentage growth of recent years, a total of 153 investment events can be expected by the end of the year.

The number of investments grew by 89% compared to 2020, due to post-COVID-19 effect

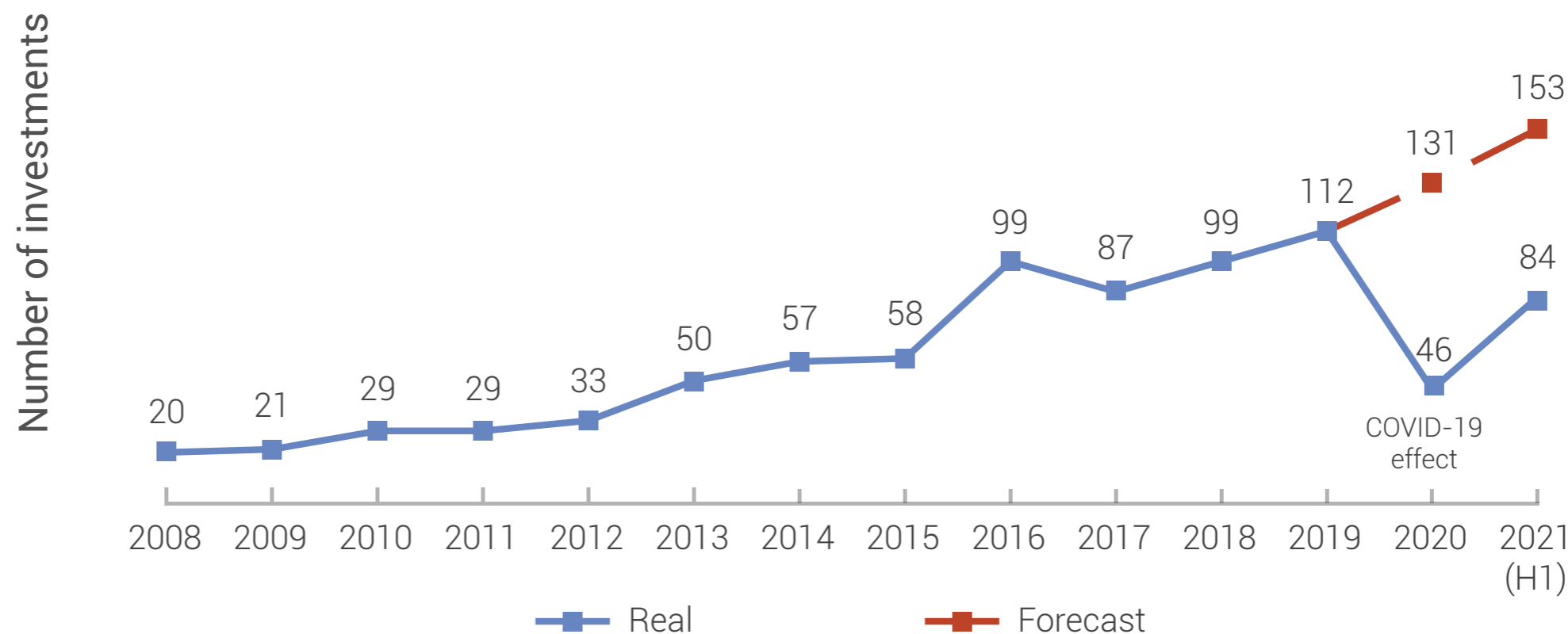


Figure 21 – Number of investments made by corporations

It is worth observing that the trend in investments by Oil&Gas companies is growing steadily. In the first period of 2021, they have already achieved a peak in investment event participation that comes close to breaking the post-2008 highs, participating in just one investment event less than in 2019, the record year of the period.

The need to face up to new social trends is leading Oil&Gas companies to significantly double down on their commitment to innovative and technological solutions, accounting for 74% of total investments in the first half of 2021. The total number of investment events is expected to increase during the rest of the year, so it remains to be seen what role Utilities will play in the investment landscape in the final period of 2021, and whether they will be able to increase their presence and close the gap with Oil&Gas

Oil&Gas companies increase their investment leadership to triple that of Utilities

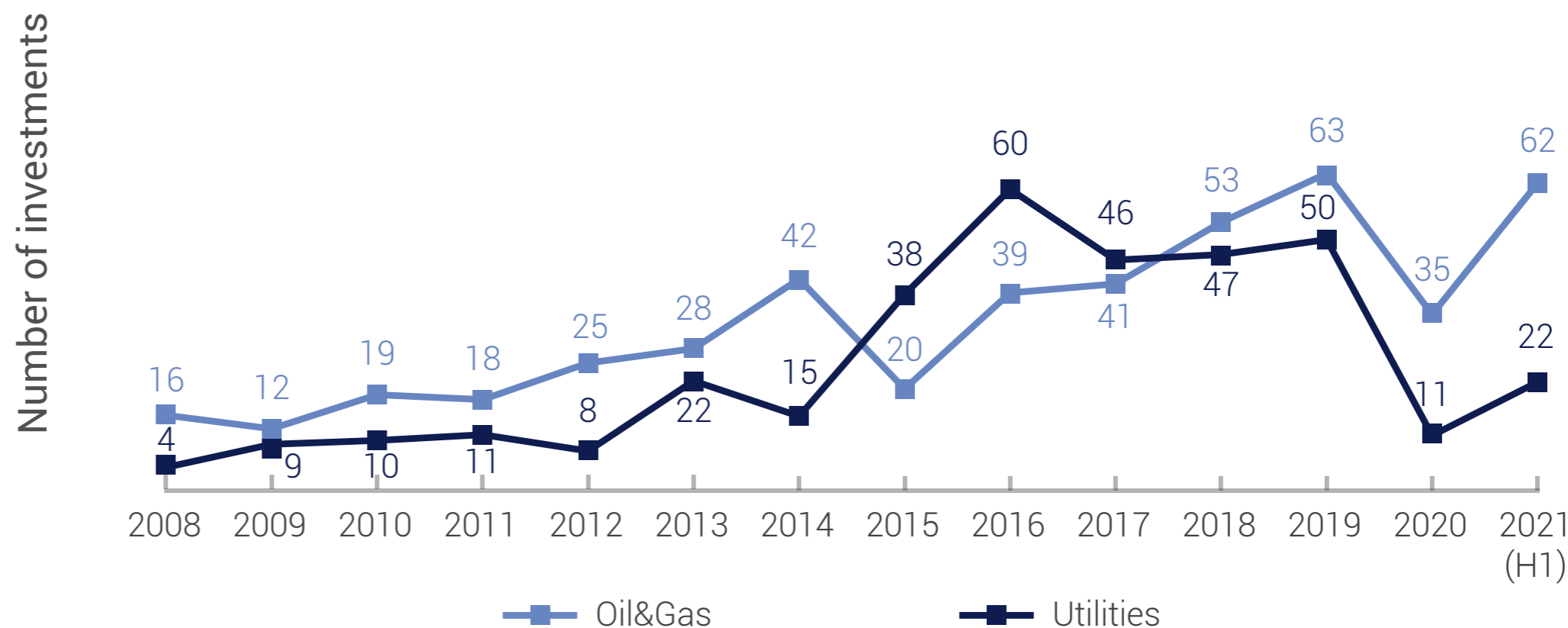


Figure 22 – Number of investments made by corporations in the Oil&Gas and Utilities sector, until H1 of 2021



A closer look at the details of these operations, as can be seen in **Figure 23 – TOP 10 largest investments, period H1 2021**, shows that the number of investment events so far this year is notably high (124 million dollars on average in the 10 largest investments in the period), with the level of years prior to COVID-19 being maintained. This fact is reinforced if the 10 largest investments from 2020 and 2021 are taken into account, 70% of which were made in 2021, and just 30% in 2020. These shows that CVCs are once again increasing the amounts of their investments.

Similarly, 40% of the largest investments in the period are *follow-ons*, compared to 2020, when this percentage figure reached highs of 41 points. It can therefore be concluded that this trend is remaining stable. If we take into account previous periods, with highs of 20-22% in this type of investment, it can be seen that CVCs are giving greater priority to reinvestments in startups in their portfolios in order to give them greater liquidity, than during the pre-COVID-19 era. This can be explained by the extended period of uncertainty generated by the pandemic.

Finally, it should be noted that during the first half of 2021, co-investments between several CVCs have reached the total number made in the whole of 2020 (6 co-investments) and are just two co-investment events away from surpassing the 2019 data. This suggests that, in the remainder of the year, co-investment figures will return to levels similar to those seen in 2015-2018, when the average was 11 co-investment events per year.

The American company Chevron is currently the leader in co-investments, participating in up to 4 events. In other words, it participated in 33% of its investment events during the first half of 2021 in conjunction with another CVC: **BP** in its investment in **Eavor**, **Caterpillar Ventures** in **Infinitum Electric**, **American Electric Power** and **Equinor** in **Mainspring Energy** and **Saudi Aramco** in **Seeq** (third consecutive year of joint investment in this startup)

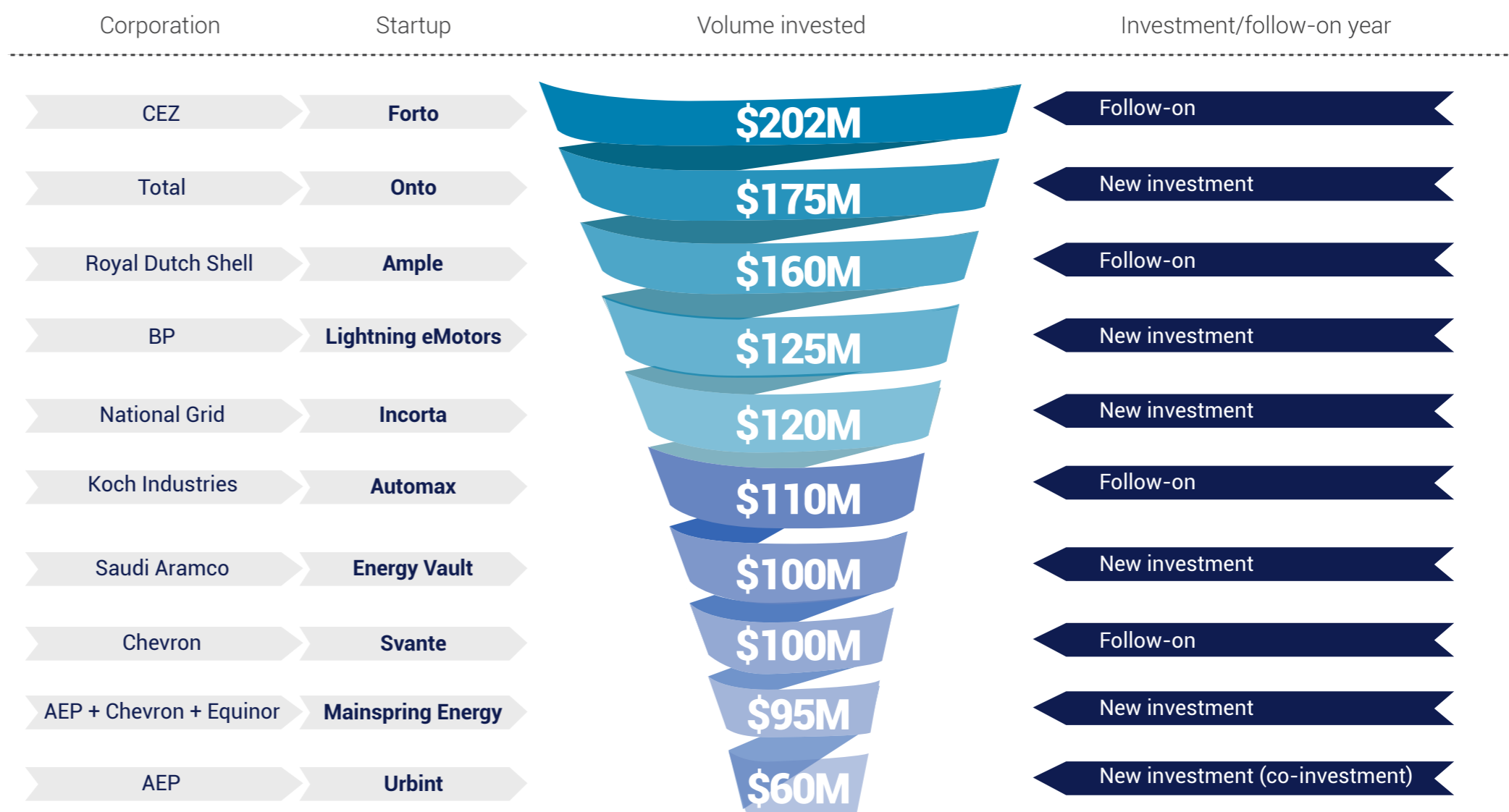


Figure 23 – TOP 10 largest investments, period H1 2021

## Investment hubs

The main and most notable growth has taken place in the Middle East and Africa, with Saudi Arabia being the country with the highest growth in investment events.

As we forecast based on the data analysed above, Europe and the US are continuing to lose their presence on the global investment landscape in percentage terms, due to the growth of other geographical areas, as can be seen in Figure 24 – Percentage of total investments in startups, by country, with increases or decreases compared to previous years. The two main global investment benchmarks again dropped by 2 points and 1 percentage point when compared to the previous period 2018-2020, where they had already suffered a significant drop. Despite being somewhat negative as far as these hubs are concerned, it is positive for the innovative ecosystem of the sector at a global level, as the fact that these powers are seeing a drop in their percentage share is nothing more than a synonym for the growth of geographical zones that are as yet little exploited.

In the first half of 2021 there have been up to 4 investment events, all led by UAE's Saudi Aramco, in startups such as: **FalconViz, Hazen.ai, Ir4lab** and **Postage**. This is a highly relevant fact, considering that only 2 investment events took place in the entire period 2018-2020. In other words, in just half a year, the number of investment events made in this geographical area has doubled, boosting the growth and presence of the Middle East on the investment scene in the energy sector.

Largest investments made in startups by geographical area, post-pandemic period (H1 2021)

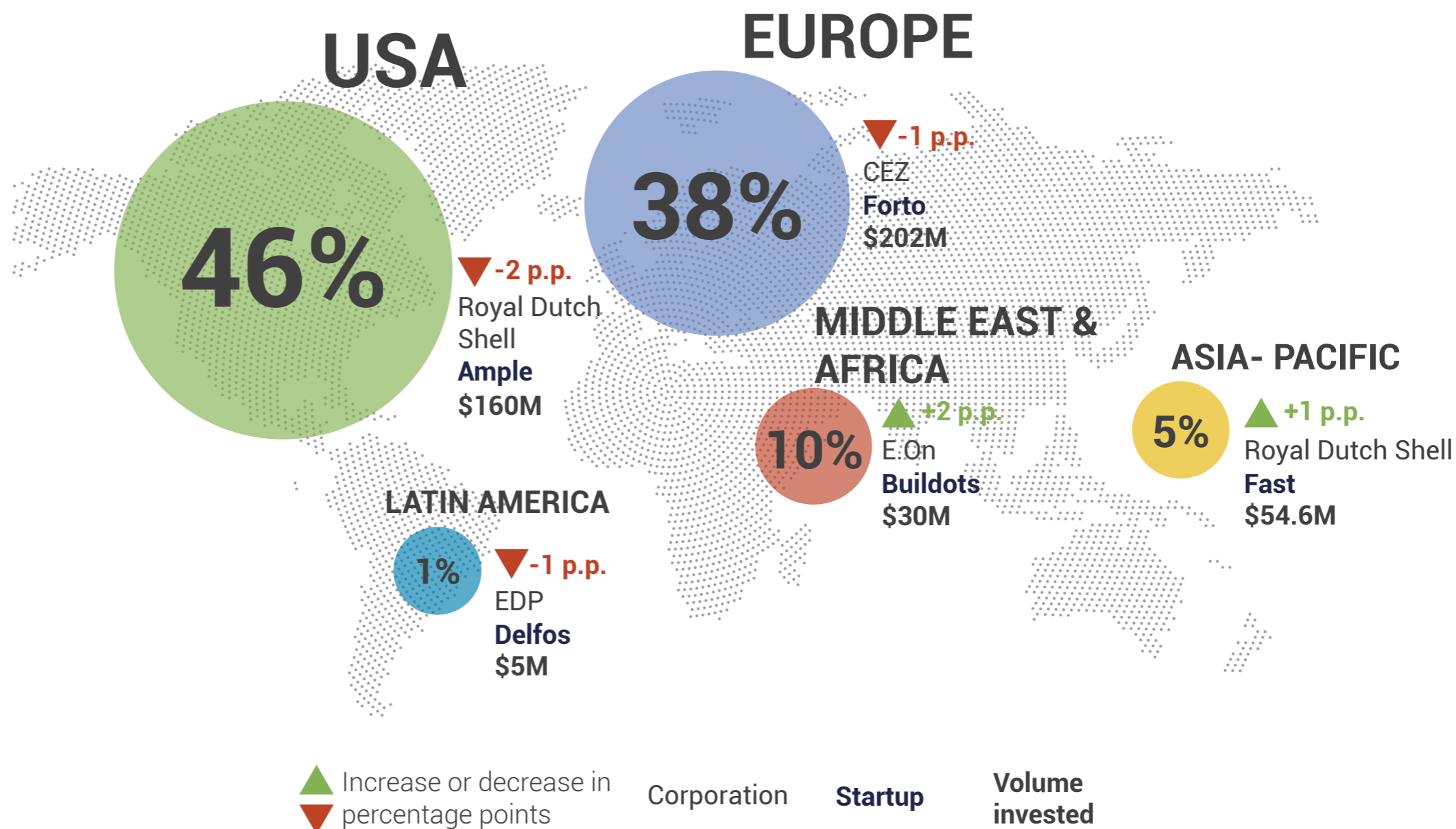


Figure 24 – Percentage of total investments in startups, by country, with increases or decreases compared to previous years

## Investment volume according to the field of application of the startup

Emphasis should be placed on the percentage drop in areas such as electricity, Oil&Gas and mobility, in favour, above all, of areas such as Digital Technology, as well as other areas that have been emerging in recent years, such as hydrogen and decarbonisation.

Figure 25 – Total percentage of investments made by CVCs, by field of application of the startup, shows the percentage weight of each field of application (electricity, Oil&Gas, mobility and digital technology) in the 2018-2020 period and first half of 2021. In addition, two new scopes of application have been added, which are beginning to be more widely represented on the market (decarbonisation and hydrogen), as foreseen in the different articles of this report.

In the case of Digital Technology, the main fields in which these investee startups operate are: data analysis (Big Data), artificial intelligence (AI), 3D printing of all types of industrial solutions, robotics and the internet of things (IoT). The most notable investments were in the startups **Forto** (USD 202 million), **Incorta** (USD 120 million) and **Automox** (USD 110 million), by the CVCs **CEZ**, **National Grid** and **Koch Industries**, respectively.



Oil&Gas CVCs are transitioning to non-traditional upstream-downstream investments as well as more tech based investments that can still be used in the company but are more VC centric.

**Michael Lawrie**  
Business Engagement Manager  
NTT DATA

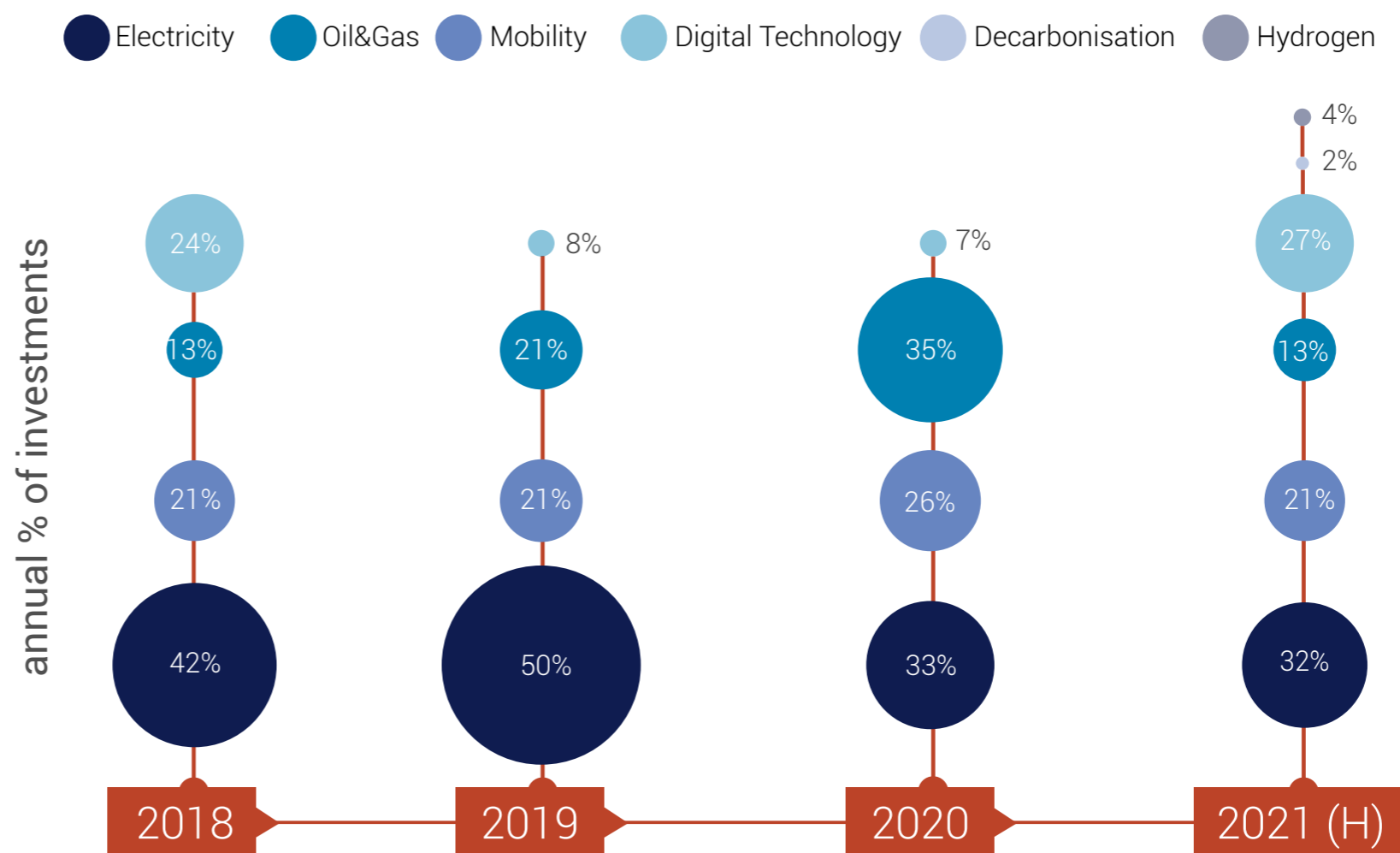


Figure 25 – Total percentage of investments made by CVCs, by field of application of the startup

To provide this new insight and deep data analysis, we have relied on Inttrend, an AI & data-driven market intelligence platform by NTT DATA. Inttrend helps corporates to make better growth strategies and business development decisions. Inttrend gathers and processes the most relevant public and private data-sources to offer a comprehensive view of innovation and business ecosystems. This tool has allowed us to draw a series of valuable conclusions to better understand the trends and the main changes in the field of the energy sector.




*Scan the QR code to view an interactive map showing the geographical concentration of startups and investors.*

*You can also access it [by clicking here](#).*

# 03

The partnership between  
startup and corporation



  
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In order to understand the dynamics between startups and CVCs, a series of interviews is conducted with some of the most prominent players on both sides (founders of startups with the largest investments, people responsible for the innovation areas of large corporations, and the senior executives of both institutions), to review what both parties value most about these relationships, as well as the main difficulties they encounter when working with each other.

## Journey of the startup during its growth

In their early stages, startups value the contribution of capital from Grants and Angel Investors, but they consider partnerships with CVCs to be key in the more mature stages where they can combine capabilities to achieve mutual benefit and promote growth (international experience, growth towards new segments, etc).

The interviewed startups have all gone through their own particular journeys before reaching a CVC investor, passing through different funding rounds and entering development and accelerator programmes. All of these journeys have brought different values to startups, with a distinction being drawn between financial value and added value.



Startups are forward-looking, they think about how the market should work. We are pulling corporations into this future, and that's what they like about working with us.

**Christian Feisst**  
CEO  
Greencom

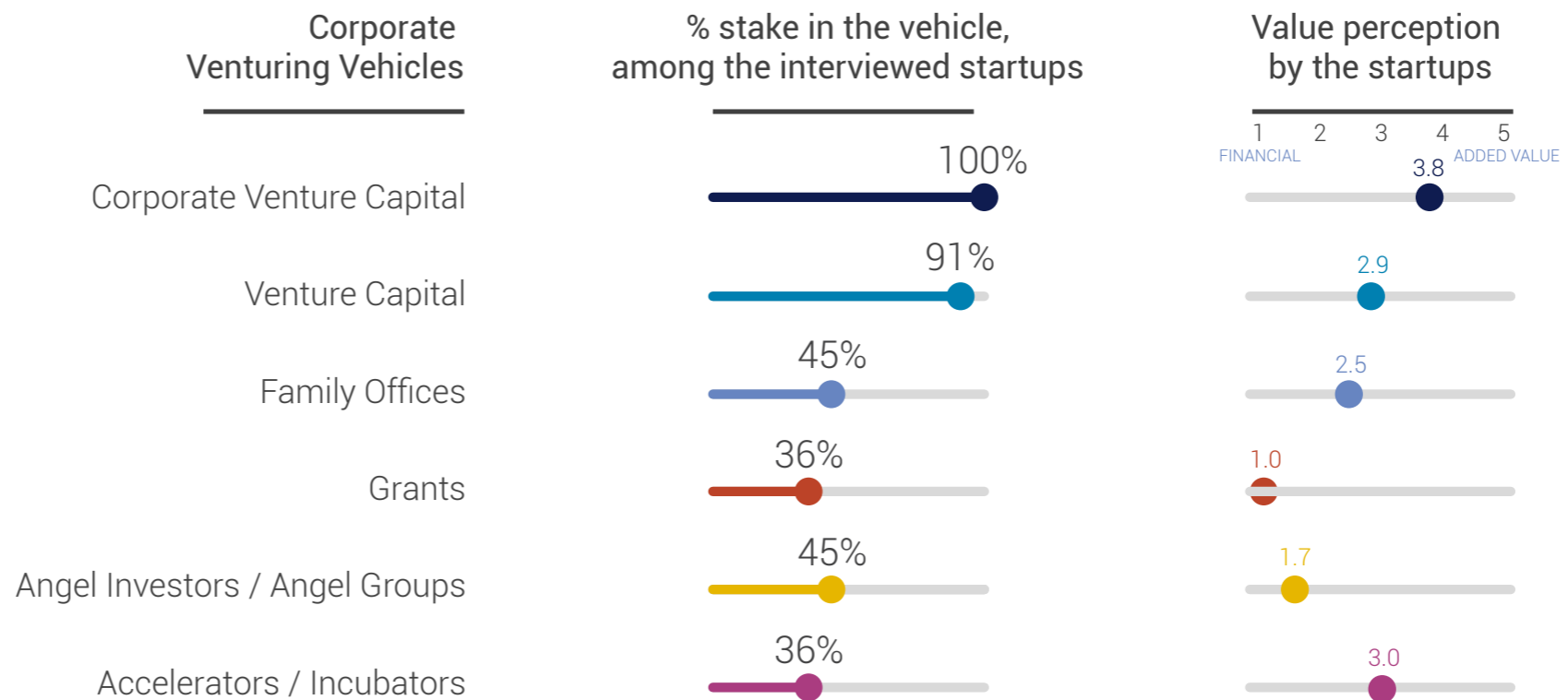
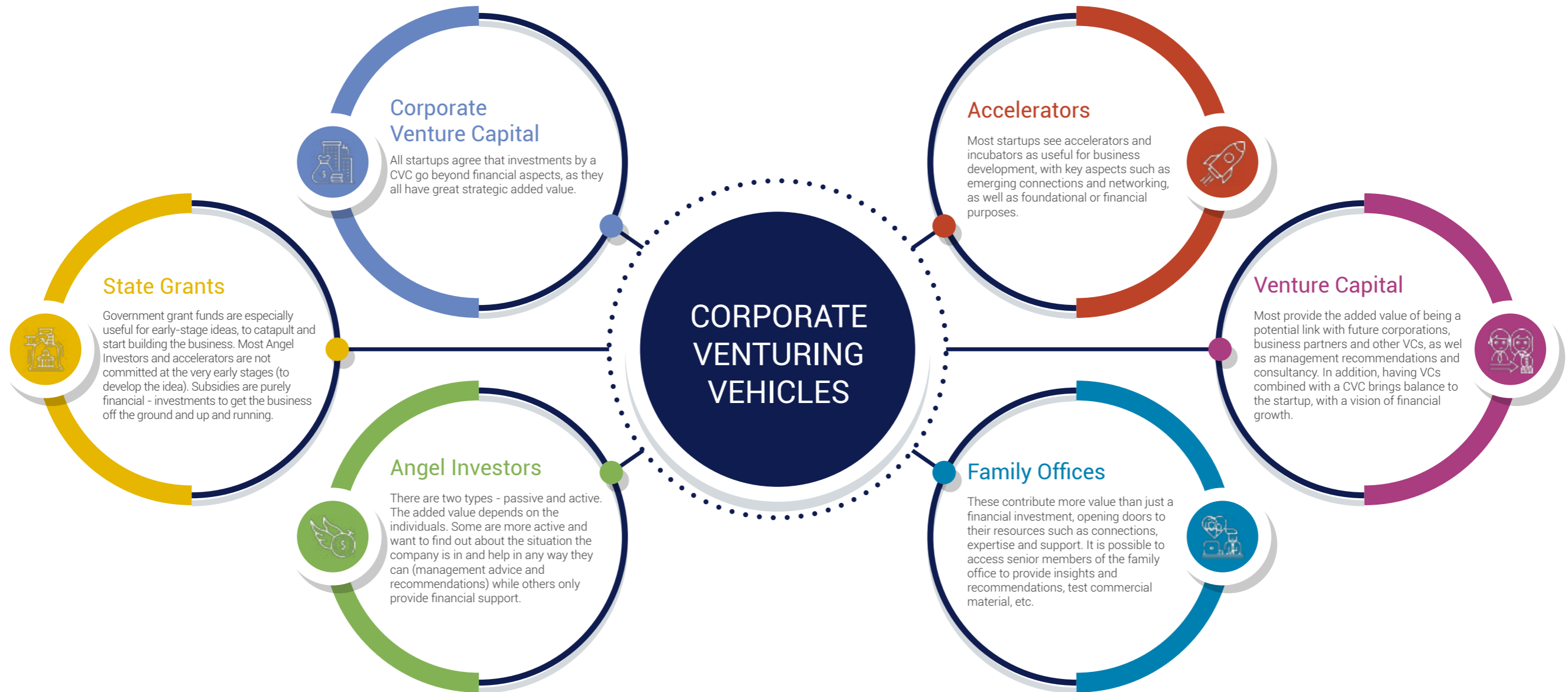


Figure 26 – Value perceived by the startups, by type of investor



Startups are looking for investors with a long-term vision, who are willing to take the risks involved in new businesses, especially if the market has not yet been created. A purely financial investor who is only interested in the results is not the best partner.

**Borja de Paz**  
 Business Consultant  
 NTT DATA



A problem that energy startups can have with accelerator programs that are over short periods, is getting data for a PoC. There can often be legal processes and internal stakeholders to convince to make progress. If a PoC is the outcome of a program, these issues can result in consuming most of the time of the program and rushing at the end. A startup should enter the program with the data available. We'd recommend taking care of data needs before the program begins.

**Daniel White**  
 CEO & Founder  
 Signal



# What do CVCs look for in a startup and what are the barriers to investment?

The main reasons behind CVC investments can be seen in **Figure 27 – Main reasons why CVCs invest in startups**, by percentage of responses. The main reason being the, namely the exploration of new technologies/ business models that could offer a strategic

advantage or *insight*, closely followed by the objective of solving business problems. All the interviewed stakeholders agree that these are the primary objectives, however the secondary objective of a financial return should never be neglected.

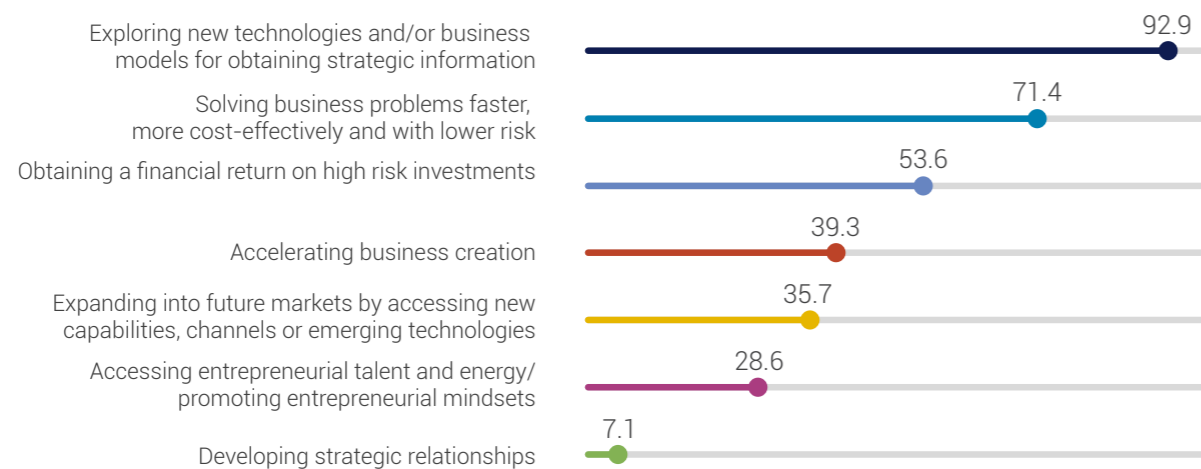


Figure 27 – Main reasons why CVCs invest in startups, by percentage of responses

”

It is important that the company investing is not the only one with the problem, having a larger market to expand to, less dependencies and loss of decision making power, to not become an in-house solution, ensuring it is an early stage of a broader market.

**Mat Podskarbi**  
Vice President Americas  
Akselos



## Factors taken into account by CVCs when investing in startups

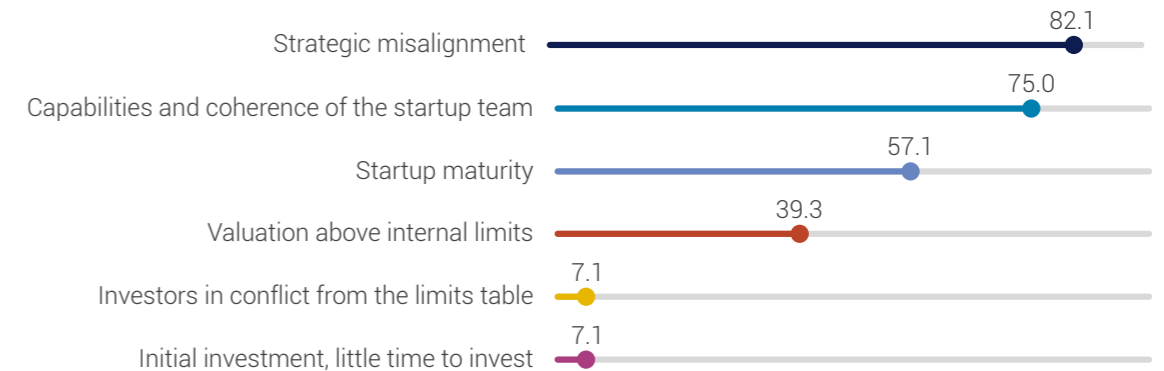


Figure 28 – Factors taken into account by CVCs when investing in startups, by percentage of responses

In relation to the results shown in **Figure 28 – Factors taken into account by CVCs when investing in startups, by percentage**

**of responses**, the main factors that CVCs consider when making an investment and that influence the Go/No Go decision are:

### 1 Strategic alignment

Ensuring that the startup's product or service has the potential to meet the objective behind the investment.

### 2 The team

It is fundamental to have confidence that the startup will meet the objective and has the potential to grow.

### 3 Maturity

An important factor to be taken into account in terms of objectives and the timeframe for delivering results.



# Main value provided by corporations to startups

While the benefit that a CVC can provide to a start-up varies depending on the CVC or the characteristics and maturity levels of the start-up, there is a general consensus on the main benefits. Both startups and CVCs agree that the main benefit provided by the corporation is access to customers, which allows the startup to gain traction and roll out its product or solution.

Startups, on the other hand, have a more varied view of the value that a CVC can contribute, and the different attributes they look for in an investment are more widely distributed, as shown in **Figure 29 – Benefits for CVCs of investing in a startup, and benefits for startups of being invested in by a CVC.** Meanwhile, CVCs have a much more aligned view, with the value provided having two clear attributes



CVCs are more patient with startups than VCs because their investments tend to be strategic and long-term, giving them a longer grace period.

**Borja de Paz**  
Business Consultant  
NTT DATA



A key part of the thinking behind incorporating CVCs was to overcome the market entry barrier, where people need to know who you are and your technology, where having names big Corporate names associated, opens a lot of doors.

**Asam Rafi**  
Vice President of Global Sales  
Carbon Clean

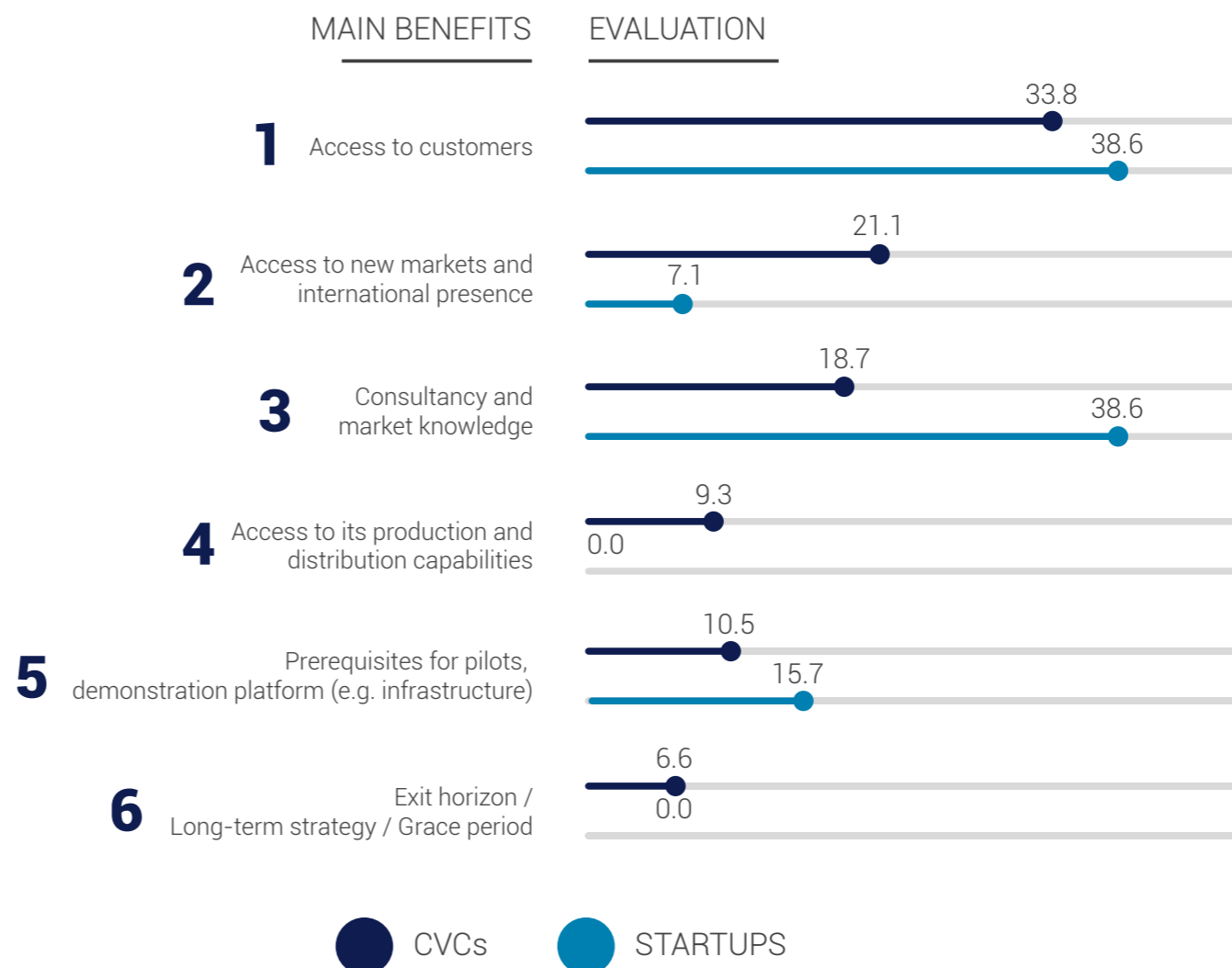


Figure 29 – Benefits for CVCs of investing in a startup, and benefits for startups of being invested in by a CVC

## 1 Access to customers

The most important factor for startups seeking to gain traction is access to customers, taking advantage of the corporation's commercial distribution channels. Having access to customers is highly beneficial for startups looking for a product-market fit in the early stages. In many situations, the corporation also becomes a major customer of the startup.

## 2 Access to new markets and international presence

The international presence of the CVC is key for many startups, both to provide key *insights* into the markets, as well as for the internationalisation of the company (acting as their eyes and ears, for future markets and becoming pioneers).

## 3 Consultancy and market knowledge

Providing a strategic point of view, helping startups to focus on the market, understanding customer needs. From this perspective, a CVC is a great partner (through the charter methodology), as it helps to establish what elements the startup is going to add and where they should go next or how the solution should evolve.

## 4 Access to production and distribution capabilities

For some startups it is important to access corporate scaling capabilities rather than building the capabilities themselves, which is a costly alternative. Having access to internal resources helps in many situations to reduce the cost of their products/service.

## 5 Prerequisites for pilots

Companies can be an ideal demonstration platform (for technologies and business models) due to their existing infrastructure or assets, allowing the startup to roll out the solution to obtain references and reach new milestones.

## 6 Exit horizon / Long-term strategy / Grace period

Long-term strategy is also key in dealing with corporations, as they are very patient, with long-term investment views. CVCs are more patient with startups, as they are a more strategic investment with a longer-term perspective than for VCFs, which are more financial results-oriented (shorter grace period). Most startups require investors with a long-term vision, willing to expose themselves to the risks of the business they are in, where the market may still be non-existent or where there may be major questions about how it will evolve.

”

Most startups seek CVC investment when they already have a proven technology, where their goal is to scale and access customers.

**Cayetano Hernández**  
Business Director  
NTT DATA



## Main barriers in the startup-corporation relationship

**The biggest difficulty in a startup-corporation relationship is the different working cultures, where different speeds are immediately noticeable, where the agility and decision-making process of the companies can change the startup's objectives.**

CVCs agree that the main difficulties come from their side, stemming from inadequate internal processes to deal with startups, as well as from maintaining the *engagement* of the business units, which makes it impossible to meet the startup's expectations, leading to frustration.

In this regard, both startups and CVCs recognise these barriers, with CVCs expressing a greater concern about the backing and the commitment of the business unit, than startups.

”

One of the main difficulties is the corporate agility and decision making, big corporations do not understand what a Startup is and what innovation is, one cannot apply the same corporate process when working with a startup.

**Santiago Oriol**  
Business Consultant  
NTT DATA



”

It is important to understand the needs of the business units, to speak in the same language, stakeholders in the Corporate do not necessarily share the passion of the solution of the Startup.

**David Cuesta**  
Business Director  
NTT DATA



Some of the main difficulties perceived by both parties in their relationship, as shown in **Figure 32 – Main difficulties**

**in the startup-corporation relationship,** are agility and decision-making times, although they are not the only ones:

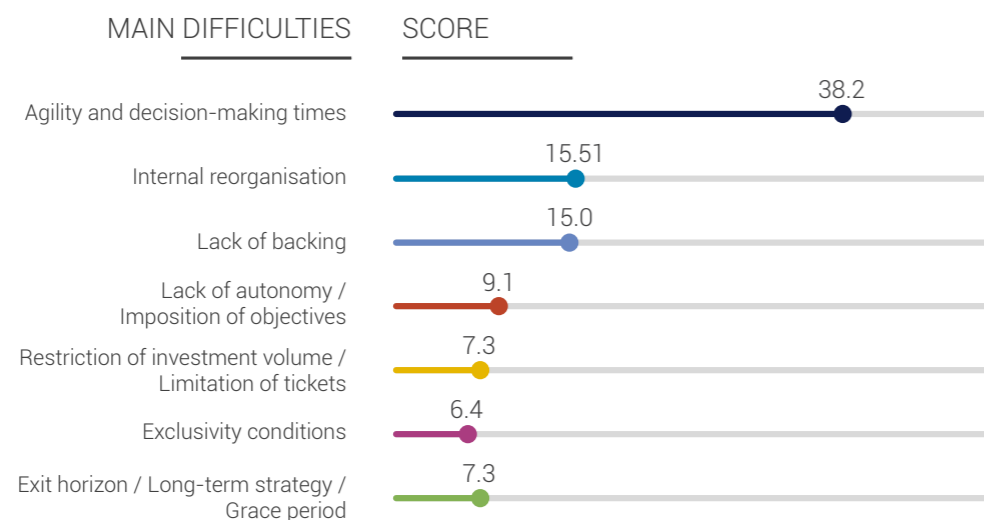


Figure 30 – Main difficulties in the startup-corporation relationship

### Decision-making agility and times

The time taken by CVCs to make decisions (business flow time) is much longer than VCFs, as they have to coordinate and get internal approval from different business units. For urgent funding, the agility of CVCs can be a barrier. The investor must be attuned to the time scales of startups. Everything takes 6 times longer in the company due to internal approval processes. Major corporations do not understand what a startup is, they are not organised to work with startups; none of the corporate processes can be applied to the startup in the traditional way.

### Internal reorganisation

Internal reorganisation of a corporation can be challenging, as it can affect the objectives and vision of the business unit and the connection must be reset. If you have someone who is motivated to work with the startup and they leave, this can lead to an agreement not being closed, or the loss of the promoter within the company. It is necessary to have suitable promoters able to convince the rest. Part of the impact could be mitigated by resolving the agreement flow time, reducing the likelihood of a reorganisation occurring during the agreement.



**Maintaining engagement with the business unit is the biggest difficulty that corporations face when working with startups.**

**Michael Lawrie**  
Business Engagement Manager  
NTT DATA



### Restriction of investment volume / Limitation of tickets

Startups believe that CVC funds have stricter requirements about where they can invest than VCFs, but this has a low impact in general.

### Lack of autonomy / Imposition of objectives

In most cases, startups report that they have a conflict of interest, mainly due to the intensive work done initially to select the right investor and to secure voting rights. However, the greater the dependence of the start-up on the company, the greater its influence on the roadmap and strategic decision-making, which can lead to a conflict of interests.

### Lack of backing

In terms of lack of backing, sometimes the startup may have no one in the business unit but only in the investment unit, with communication failures between the two units leading to the lack of a promoter. A lack of exclusivity sometimes leads to a limited exchange of data between the company and the startup, with the company being concerned that the startup will do deals with other competitors or be purchased by somebody else. As a result, some departments limit the information provided to the start-up, limiting synergies.

### Exclusivity conditions

Most startups believe that investment from a CVC should not be a barrier to selling the solution to the competition, having negotiated from the outset to ensure that there is no exclusivity. In some cases, startups feel that there may come a time when the CVC wants to influence the startup's decision on who to do business with, wanting exclusive rights. There may be a certain amount of perceived exclusivity on the market, where competitors are interested, but being linked to other companies is a barrier to be overcome when doing business.

# What is the value proposition for a successful partnership?

**Having interviewed both sides of the startup-CVC relationship, we have gained a holistic perspective of the values that startups look for in their investors, as well as what CVCs believe they can offer startups.**

To begin with, when a startup seeks investment from a CVC, it is looking beyond financial support. Companies agree that, for purely financial support, there are plenty of players and VCFs that are more specialised and have greater capabilities to meet that need. So, what value does a corporation provide to a startup?

Before covering what corporations can provide to a startup, it is important to understand what stage the startup is at. While there are different theories, the general rule is that startups seek CVC investment once they have developed a solution that is ready to be implemented and gain traction, with proven technology, and once they have a product beyond the POC level, which is starting to sell and gain customers.

This is vital, as it is in line with the main objectives that corporations have when investing in startups: they should solve the business problems as quickly and profitably as possible, with low risk, while exploring new technologies and/or business models to obtain strategic insights.

For the early stages and implementation of POCs, there are other venturing tools that do not require the risk associated with the

investment. Furthermore, it is difficult for the CVC to obtain corporate backing - a critical factor for a successful relationship when dealing with less mature startups - as a failure to obtain the short-term impacts that businesses tend to look for can lead to tensions in the relationship.

As such, the main added value that the CVC provides to startups is access to customers. Not only do startups value this, but CVCs also believe that this is where they can offer the most value to a startup.

It is important to place emphasis on the startup's concept of a customer, as it is highly dependent on the market and business model. Sometimes the customer, especially in Oil&Gas, and Power&Gas transmission/distribution, is the corporate infrastructure itself. In this sense we are not only talking about access to customers, but also to other business partners. Being able to talk to the business partner, together with the corporation, multiplies your chances, as it helps to attract the attention of these stakeholder groups at a higher level, such as branding and market recognition.

In contrast to aspects valued by startups, the second most important added value offered by CVCs is consultancy and market knowledge. This aspect is more important than startups think, as there is a whole set of elements surrounding the solution and the business model, legal, supply chain, etc. with which the CVC has extensive experience and professionals who can provide the startup with great ideas.

In terms of access to new markets, although this is the second most valued aspect, it is also the most complex to implement, requiring a great deal of effort and coordination with international divisions to obtain approval and acceptance.

Finally, to be successful and have a fruitful relationship that provides the added value sought by the startup and the results expected by the CVC, there are 5 critical factors to consider:

”

**If an investor is not aligned with your business it won't work. Make current investors and future investors sit down together and observe the atmosphere to ensure good feeling/vibe on the board**

**Doron Frenkel**  
ICEO  
Driivz



## Transparency

From the outset it is essential that both parties understand each other. Both parties must be fully transparent about their goals and expectations, and the startup must be especially transparent about its current status and roadmap. This allows for a shared understanding of vision and values. In the end, the search for the right investor comes down to people, relationships and honesty. **It is vital to have a good relationship with investors.**

## Ensuring the backing of business units

Acceptance by business units is vital for the success of the partnership, but this collaboration cannot be forced on them. For this to happen, the Business Units must understand the value of the innovation and have a vision beyond their usual business. An interesting perspective on this is for middle management business units to participate in the CVC to give them an insight into the world of innovation, allow them to understand how startups work and then take that mindset back to the business unit.

## Startup: corporate mentor / intermediary

In relation to the previous point, the startup-corporation partnership can be highly beneficial to both parties, but they must however **be aligned and have a mutual understanding**. A good practice for this is to have a figure **acting as an intermediary to help promote the startup within the company and to help the company in its relationship with the startup**- a mentor to guide both parties. Mention should be made of a special case related to this, where the startup recruited the CVC's Investment Director who had worked for the company for 15 years with the aim of getting maximum leverage from the Global Corporation. He was given the responsibility of being the liaison between the startup and the corporation, to ascertain how to "milk" the company in the best and most efficient way.

## Maintaining the core values and independence of the startup

Startups need to maintain their core values (essence and agility) to keep innovating at high speed. It should be borne in mind that it is beneficial for both the startup and the corporation not to have exclusivity. Exclusivity means that the two are bound to one another. Allowing the startup to have a broader vision and access to a larger market allows for new information, greater development and understanding, which leads to more business and profits later on.

## Increasing corporate agility

The corporation must be attuned to the way startups operate and **should adapt internal processes to cope with startups** and make dealing with them easier and more streamlined. It is not feasible to apply all corporate processes in the traditional way.

”

Startups need to maintain their core values (the essence and agility) and how they work, be very responsive, not adapt to the corporates pace, that's what sets them apart and what is valued by the Corporate. However, they need to accept that the corporate has processes that need to be met.

**George Ayres**  
Executive Vice President Partnerships  
Vinli



# What are the new startup partnership models?

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In a world of constant change and market disruption, innovation has become a key factor for any corporation that wants to gain some kind of competitive advantage in its market. **Business as usual is no longer enough.** There is an urgent need to accelerate the creation of disruptive products, services or business models to achieve profitable growth, which means that **the speed of innovation** becomes essential today. In these extraordinary times we are living in, where digitalisation and new technologies are disrupting industries in unexpected ways, partnering with startups is the best approach to avoid being left behind. Companies have been trying to **shorten innovation cycles** for many years now, and the result is a set of strategies and tools that demonstrate the existence of a solid framework that is available for partnerships between corporations and startups.

Corporate **incubators** have traditionally been very common. Companies supported startups through value-added services, *mentoring* and specialised support, and even *co-working* spaces where entrepreneurs could build their MVPs, validate prototypes or ideas for bringing them to the market, **all in exchange for capital.** Today, specialised incubators and accelerators are flourishing in major startup ecosystems globally, meaning that corporations no longer are and no longer seek to be an edge in this area.

The **Venture Client** model is gaining traction as a non-participatory agreement model where corporations aim to develop strategic partnerships with startups at an early stage, to secure a partnership agreement and **become their first customer.**

In the process, corporations provide support to startups with the validation of their prototypes, an understanding of the needs of specific industries, and business development actions which connect them to key market players. Venture Clients do not seek to acquire, or take control of, any *equity* or IP of the startup. What they do is commit to becoming the startup's first customer on its market launch roadmap, nothing more and nothing less. Startups need customers, particularly in their early stages of commercialisation, and Venture Clients not only secure them a place, but also help them understand the specific needs of the market, to allow them to develop a competitive product/service.

Compared to Incubators, **the Venture Client model offers significant added value to startups:** it allows them to work in close collaboration with their future customer and to change and adapt their product to its needs, clearly resulting in a *win-win situation*. For corporations, this tool offers the opportunity to accelerate innovation and to work alongside startups, with a MVP close to the market. This results in a greater chance of disruption when compared to the competition and, more importantly, it allows them to work with the latest innovations, helping startups succeed on their way to becoming global leaders with highly successful products and services.

# 04. Vision 2030





**As set out on the previous pages, the future of the energy sector is shifting towards greater environmental awareness (clean energy, more energy efficiency, hydrogen, non-polluting mobility models), driven by government regulations and social trends.**

This is leading to the need for major corporations to incorporate an increasingly rapid and streamlined capacity for adaptation, both to new technologies and innovations, and to new ways of building relationships with start-ups that are driving and creating these new changes in the sector.

”

**A general field that is going to be very significant is Energy Efficiency and the Circular Economy. Companies are under pressure to become more economically and energy efficient, as well as more sustainable.**

**Jaime González-Puelles**  
Senior Venture Manager  
7r Ventures



For this reason, corporations have increased their investments in startups, both in terms of the number of events and investment volume. Taking on board the need to apply a culture of innovation and change in their organisations as the only way to continue leading the future of the sector.

It is expected that these figures (volume of each investment, number of events, CVCs, investee startups) will continue to increase year by year, due to the boost offered by governmental aid and measures launched in favour of these new models. Direct investment in renewable energies, through Next Generation bonds, or the commitment of the United States and Asia to less polluting production, storage and mobility models, lead us to foresee exponential growth in innovation in the sector over the next 30 years, with the application of disruptive models that increase the value of the energy sector and its possible applications.

This growth will also be driven by the consolidation of new models for partnership between corporations and startups, as described in Article 4 of this report. These models are extremely attractive to both parties, offer less risk and more independence for startups without limiting their growth or agility.

Similarly, the analysis of the main investment hubs has provided an insight into the growth of geographical areas with as-yet less developed innovative ecosystems.

LATAM, Asia, the Middle East and Africa are starting to grow their innovative ecosystems, thanks to the boost given by their major corporations to start-ups in their own geographical areas, with a commitment to their own talent. Over the coming years this will lead to the emergence of significant *hubs* that will increase the appearance of new start-ups and innovative solutions for the sector, in turn fostering greater interest among investors in establishing head offices close to these geographical areas.

Therefore, the challenge will be for the governments in these geographical areas, which will have to make their bureaucracy and legislation more flexible in relation to the emergence of startups and significant investors, as these aspects have limited their growth to date.

In percentage terms, Europe and the US are expected to see their leadership reduced vis-à-vis these new geographical areas, not because of a decrease in their *deals*, which are expected to continue to increase, but because of an exponential growth of these new hubs. Israel will continue to lead the growth in innovation away from the West. As one of the countries with the most startups per capita, it is expected to lead the change in the energy sector, thanks in part to the proximity of major Oil&Gas corporations founded in the Persian Gulf, such as the UAE's Saudi Aramco and Qatar Petroleum.

Similarly, the analysis of investments in 2021 has forced us to focus on Saudi Arabia, which is expected to establish itself as one of the benchmark areas for innovation in the Middle East.

As regards the fields of application that have attracted the most investment, as set out in Article 2, greater growth is expected in fields such as hydrogen, mobility and carbon capture. All of these fields are expected to lead future investment, as their application has the potential to significantly reduce emissions, with hydrogen being one of the energy cornerstones of the future.



# Energy storage challenges and opportunities

The growth of renewable generation together with the digitalisation of the electricity system is accelerating the roll-out of storage, mainly in countries such as India, Italy, Australia, the USA, Japan, Chile, Germany, Japan and the UK.

The **national policies** of many of these countries are turning to storage to reduce dependence on energy imports, improve the resilience of their electricity grids and make progress towards meeting the **decarbonisation goals set for their economies**. However, **Europe** has been much **slower** to adopt storage than its North American and Asia-Pacific counterparts, mainly due to excess capacity in conventional generation, greater interconnection between countries, more modern grids and a more restrictive regulatory environment.

According to Wärtsilä's report entitled "*Atlas of 100% Renewable Energy*", it is estimated that by 2030 the G20 countries will need to have a capacity of 3,526 GW of flexible generation assets, in the form of energy storage and flexible gas, in order for their energy systems to operate on 100% renewable electricity.

Through **energy transition policies**, countries such as the US are incentivising investment in storage, with a \$1.75 billion tax credit policy that includes \$555 billion for renewable energies. In 2020, the **European Commission** launched the **Next Generation EU** funds stimulus package, worth €800B. The European Commission is making a **commitment** to develop complete value chains on European soil around **electrochemical energy storage**, avoiding dependence on third countries for elements that could impact the development of electric vehicles or the transition to a system with greater penetration by renewables.

One example of stimulus policies is a €305 million loan from the **European Investment Bank (EIB)** to **Northvolt** to finance Europe's first lithium-ion cell gigafactory.

The costs of storage technologies are falling rapidly thanks to economies of scale in battery manufacturing, the use of new materials, as well as advances in digital technologies that enable the development of new use cases such as artificial intelligence, blockchain and predictive analytics. Such is the case of **Storedot** which is developing graphene-based energy storage devices that reduce charging times and increase cell life.

Similarly, the Australian startup **MGA Thermal** is exploring new alternative technologies to lithium-ion batteries by developing small blocks of miscibility-gap alloys that store energy in the form of heat and allow existing coal-fired power station steam turbines to operate without producing emissions.



Along the same lines of exploring new storage systems, **Breakthrough Energy Ventures**, the fund backed by Bill Gates, has made long-term storage one of its top priorities through investments in startups such as **Form Energy**, **Quidnet** and **Malta**.

From the perspective of electricity grid modernisation, the growth of storage goes hand in hand with efforts to make the transition to smart grids. If in 2017 most storage was pumped hydroelectricity, by 2030 it will be necessary to incorporate more flexible energy storage technologies with faster response times.

In recent years, startups such as **Stem**, **AmpereHour Energy** and **Doorastha** have demonstrated how the combination of smart grids and energy storage systems can meet the need to store excess energy from renewable generation on windy days or during peak sunshine hours, and supply energy to instantly smooth out fluctuations caused by demand peaks.

For grid operators, smart grids lead to better integration of variable renewable energy systems, which in turn lead to lower operating costs and a more resilient grid.

Finally, while energy storage is becoming a key element in the energy transition, incumbent companies and new entrants are getting ready to experiment with and develop new business models. In this field, startups such as **Voltus**, **Bamboo Energy** and **Autogrid**, among others, are developing digital solutions to support new flexible business models.

**In 2020, Sunrun, the largest solar self-consumption installation company in the US, achieved a total of 13,000 home storage systems and incorporated Autogrid's cloud-based Virtual Power Plant solution for the management of its decentralised solar self-consumption and storage assets.**



# Business models around electric mobility

According to current trends, electric mobility will continue to be one of the main niches for innovation. The main sources of innovation are the different business models, as well as the ecosystem that is being generated around electric mobility, in which a wide variety of players participate.

Five main business areas can be seen in this whole ecosystem, as shown in Figure 1:

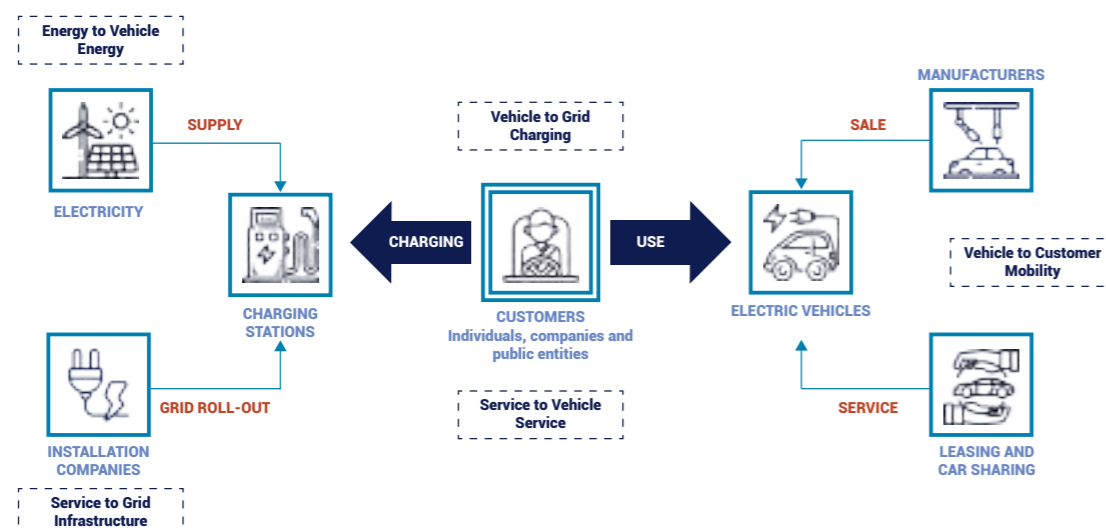


Figure 1 – Ecosystem of electric mobility business models.

## Vehicle to Customer

Development of business models that bring electric mobility to all kinds of audiences, beyond traditional private ownership:

- Car Sharing and MaaS
- Electrification of the private vehicle market and business fleets.
- Leasing subscriptions for shared private or business use.
- Short- and medium-distance urban mobility with B2C intermodal transport alternatives.

**Steer**, an all-inclusive electric car subscription platform (insurance, maintenance and concierge service) was created to challenge the traditional car buying and ownership model and accelerate the general public's shift towards ecological transportation through a vehicle subscription service.

## Energy to Vehicle

Addresses the challenges related to the supply of green, renewable energy for charging stations:

- Charging planning with competitive green energy tariffs
- Self-consumption for energy autonomy with a 100% renewable energy guarantee in a subscription format
- PPAs for reducing the aggregate cost of networks of charging stations, with a green origin guarantee through PPAs.

The GoStations of **Gogoro**, the Taiwanese urban electric scooter *battery swapping* platform, uses solar energy from the solar panels installed on the station to recharge electric scooter batteries.

## Service to Grid

The roll-out of different charging models seeking to optimise the choice and location of charging stations:

- Retention by bundling power in charging linked to homes and private parking.
- Customer acquisition and customer loyalty for other businesses, relating to charging opportunities in car parks and shopping centres.
- Fast charging service and cross-selling of other VAPS (Value-added Products and Services) during convenience charging at city and motorway service stations.

Any business model **requires technology partners who can install, operate and maintain the required charging** stations.

**Ubricity** offers a network of charging stations through public infrastructure such as lampposts and electricity poles.

## Vehicle to Grid

Seeks to maximise the use of charging assets, as well as the distributed resources of EVs, and to provide a flexible service to the grid. The trend here points towards smart charging of EVs with dynamic actions to meet grid requirements:

- Location, booking and availability of charging stations to maximise their use.
- Interconnection and compatibility of different charging networks.
- Enabling and managing the use of the vehicle as a flexible energy-source.

**GreenFlux** offers a cloud-based smart charging platform to facilitate charging network management, leveraging open protocols and systems.

## Service to Vehicle

Improving the customer experience during charging, promoting digital channels and processes along with value products and services, leveraging mobile apps to make the customer participate in the ecosystem:

- Design and differentiation of the charging experience from the driver's perspective.
- Loyalty and cross-selling strategies through internal VAPSs or through partnerships.
- Streamlined and digital charging service for electric vehicle fleets.

**CrowdCharge**, combines its electric vehicle charging optimisation platform with a mobile app to allow the customer to interact with the smart charging system, e.g. view their charging session and request high priority, prioritising their current session over others.

Looking ahead, for these business models to thrive in the future, innovation in **V2G technologies, AI platforms** and smart charging **algorithms** will play a key role. In turn, there is the challenge of overcoming the existing barriers to electric car adoption. A key issue here, and a major concern for drivers, is the roll-out of charging infrastructure.



# Synthetic fuels

The first thing that comes to mind when thinking about the decarbonisation of transport is electric vehicles powered by batteries or fuel cells. e-Fuels are still little known, but they are expected to play a major role in supplementing electric mobility, or even as the main alternative when electrification is not feasible. In Europe and other advanced economies, light land transport is moving towards electric vehicles. However, decarbonisation in all other modes of transport (heavy land transport, shipping and aviation) and geographical areas will require solutions such as e-Fuels.

Fuels produced using hydrogen generated from renewable electricity and incorporating either carbon to produce hydrocarbons, or methanol or nitrogen to synthesise an alternative fuel such as ammonia, are known as **e-Fuels**. **Liquid hydrocarbons** such as diesel, petrol or paraffin are widely used in all modes of transport. However methanol and ammonia, traditionally used in the chemical industry, also have characteristics that make them suitable for use as fuels, and in fact they are already starting to be used. The unique feature of **hydrocarbons** and **methanol** is that they have **zero net CO2 emissions**

throughout their life cycle if they use CO2 from biogenic sources or captured directly from the atmosphere. On the other hand, ammonia does not emit CO2 during combustion, so it can have zero CO2 emissions if produced with renewable hydrogen. The **main advantages of synthetic fuels** include:

- **In contrast to batteries or hydrogen**, investments in infrastructure or engine modifications are much lower when using hydrocarbons and alcohols, which minimises the investment in their distribution and usage.
- **Energy density** is a key factor **in transport**, as more energy can be contained with less weight and volume. In this regard, hydrocarbons such as methanol or ammonia are superior to batteries, allowing them to be used in heavy transport, aviation or shipping.
- **In contrast to biofuels**, synthetic fuels do not have the problem of being a limited raw material, as waste alone does not cover the entire demand, and no land is used to obtain raw materials that compete with foodstuffs or the preservation of ecosystems.

Despite these advantages, there are still challenges to overcome. At a **technological level**, the **high production costs have to be brought down**. At a **regulatory level**, there is currently no legislation that considers the particular features of these technologies and promotes them, unlike electric vehicles. At a **political and social level**, these **solutions** are **little known**, although they can open paths towards decarbonisation in the short term.



**Maturity** is currently at a **medium-high level** and is moving from pilot projects to plants at a commercial scale, such as the ones run by **Repsol** in Bilbao (from 2kt/a initially to 500 kt/a of e-kerosene and e-diesel), **Carbon Recycling International** (currently 4 kt/a of e-methanol at its Iceland plant and plants under development in China of 100 kt/a) and **Porsche** and **Siemens Energy** in Chile (pilot of 750,000 litres/year of e-methanol to be used to produce e-gasoline, scaling up to 550 million litres/year of e-gasoline by 2026).

In the **airline industry**, companies such as **KLM** are already using synthetic fuels, and others such as **SAS** are involved in major projects for large-scale production. In shipping, engine manufacturers such as **MAN** and **Wärtsilä** are already developing engines powered by ammonia, and their catalogues include engines that run on methanol.

**Shipping companies** such as **Maersk** are already exploring e-Fuels in their fleets, while **Stena** has recently used e-methanol in a demonstration pilot.

At the technological level, players such as **Lanzatech**, **Synhelion**, **Prometheus**, **Sunfire**, **Carbon Engineering**, etc. have attracted hundreds of millions of euros in investment in recent years, demonstrating the industry's clear commitment to this technology.

It is for this reason that, although many barriers still need to be overcome, **synthetic fuels** can play a significant role in **decarbonisation**, mainly in heavy land transport, shipping and air transport, as they have unique characteristics that make them the most suitable solution in many cases.



# What role will hydrogen play in the future?

One of the most talked-about technologies today is low-emission hydrogen, including green hydrogen, produced from renewable sources, and blue hydrogen, produced from fossil-fuel sources with CO2 capture and storage.

”

Hydrogen as an energy carrier will become more important in the medium term. We will see increased investments in technologies and business models based on electrolysis, fuel cells or storage technologies...”

**Nacho Gimenez**  
Managing Partner  
BP Ventures



The hydrogen boom is due to two main factors:

## 1 **Goal of carbon-neutrality by 2050**

The world's major economies have committed to achieving climate neutrality in the long term. For this purpose, different geographical areas have drawn up decarbonisation strategies, including specific roadmaps for hydrogen.

## 2 **Decarbonisation of sectors where reduction is difficult**

In line with decarbonisation strategies, hydrogen is emerging as a key component in heavy transport, long distance transport, high temperature industrial heating and industries that consume hydrogen as a raw material. In addition, its re-conversion to by-products such as ammonia or synthetic fuels allows for emission reductions across a wide range of applications.

However, a significant part of hydrogen technology is still under development, with most projects still in the development and demonstration phase. This represents an opportunity for all types of companies, as a new value chain needs to be developed over the coming years. Green hydrogen **is expected to mobilise investments worth EUR 2.2 trillion by 2050 in Europe**, and as much as EUR 10 trillion if we consider the global market.

This opportunity has been spotted by multiple startups that are developing hydrogen technology. However, innovation in the hydrogen field often requires the development of hardware that involves large investments. Furthermore, these technologies tend to require long testing and piloting cycles, for which significant capital and infrastructure are essential.

The above reasons have led to hydrogen becoming an emerging CVC element at different stages of the value chain (see the following figure).



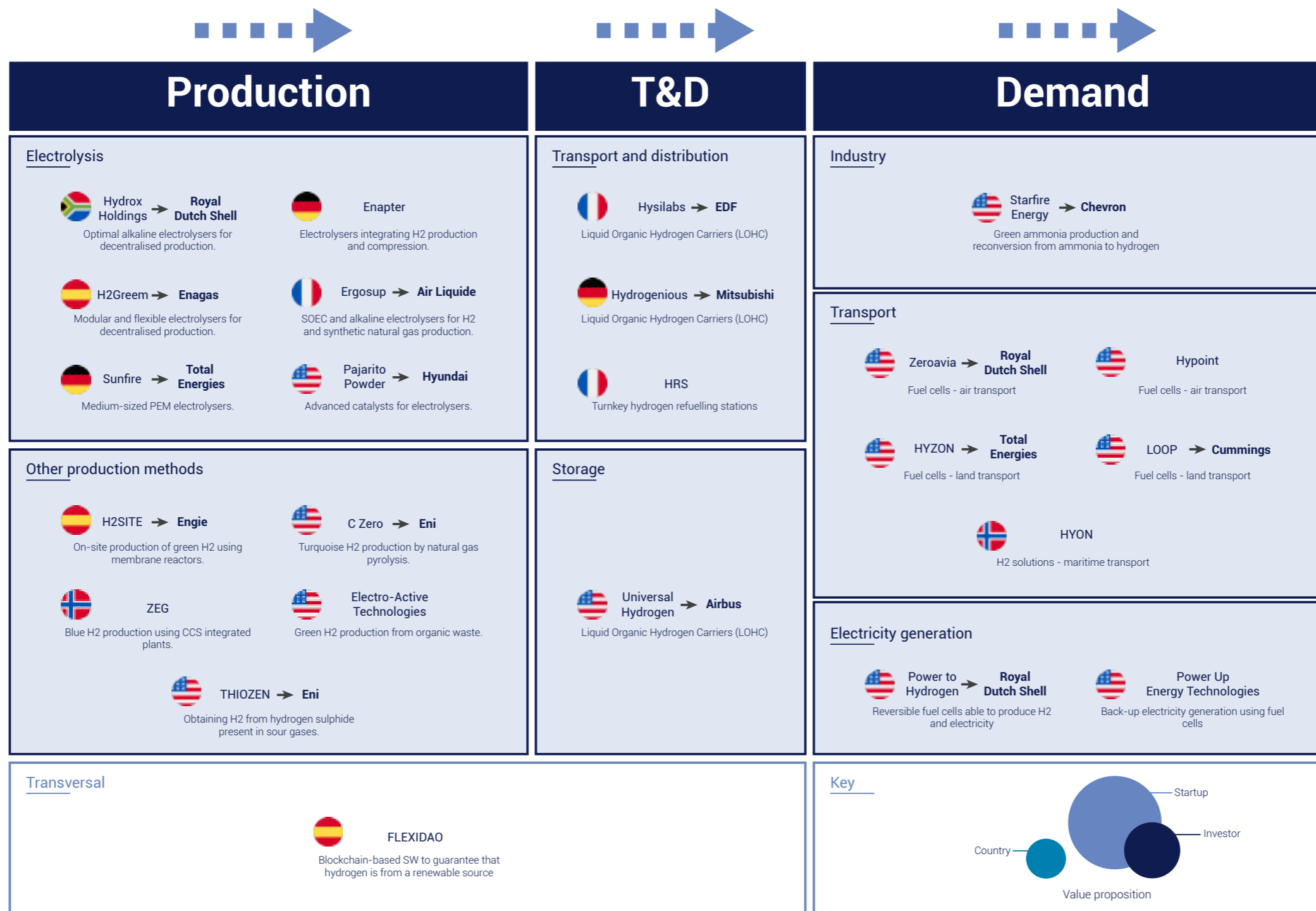


Figure 2 – Corporate Venture Capital and startups in the low-emission hydrogen value chain

As can be seen in the figure, hydrogen offers opportunities throughout the value chain, with an emphasis on:

## Production

Focused on companies working with electrolyzers and other less conventional production methods (membrane technology, hydrogen production from waste or fossil-fuel sources, etc.)

## Transport and distribution

An emphasis should be placed on liquid organic hydrogen carrier (LOHC) companies, which facilitate hydrogen transport and storage.

## Demand

Mainly distributed over heavy land transport and air transport, but also with a presence in the industrial and power generation sectors.

## Multidisciplinary technologies

Focused on traceability technologies using technology such as *blockchain*

It should be highlighted that other lines of funding are emerging, in addition to CVCs:

## Production

There are specialised hydrogen funds, such as **AP Ventures**, with a portfolio of 18 hydrogen startups, including 6 in the above figure. Furthermore, other funds such as **Breakthrough Energy** include in their portfolio hydrogen startups such as **C-Zero**, **H2Pro**, **ZeroAvia** and **Electric Hydrogen**

## Accelerators and incubators

Some of the programmes that have already started are: **H2 Refuel Accelerator**, which is supported by **Shell** and **Toyota**; and **Berkeley SkyDeck** in California, which has funded **UP Power Technologies** to improve its back-up generator technology. Recent programmes include the **H2 Challenge** led by **Hyundai** and the **H2V Green Hydrogen Accelerator** in Chile

## Public support

Cases are also being seen of public subsidies for start-ups, as hydrogen is considered a strategic element at a national level. Examples can be found at **Enapter**, which received €10M from the German Ministry of Economics, Innovation and Digitalisation to scale up its electrolysis technology, and **ZeroAvia**, which received \$16M from the UK Government to advance its hydrogen powertrain technology for aviation.

**In short, it is clear that hydrogen is coming to the boil and can be expected to be one of the sectors with the greatest investment movements over the coming years, in line with the Hydrogen Roadmaps and projects currently being developed worldwide.**



# The main objectives of the circular economy

One of the new niches that is currently in a growth phase, and where an increase in investment volume will be seen, is the circular economy. Startups and corporations are already developing solutions at all stages of the energy value chain and are adopting different courses of action.

We believe that there are four **main objectives** with their corresponding courses of action:

## 1 Minimise the impact of activities

1. Minimisation of impacts on ecosystem biodiversity as a result of productive activity.
2. Reduction of greenhouse gas emissions into the atmosphere (SF<sub>6</sub>).
3. Incorporation of recyclable and/or highly biodegradable materials to minimise waste.
4. Establishment of waste management practices to obtain raw material, or waste-to-power.

**Heliatek**, the world's first company to mass produce organic solar films.

**Iberdrola Distribución** has carried out a Pilot Project to Change **Stork Nesting Habits**: installation of **alternative platforms instead of nests on electricity lines and pylons**. 90% of adult storks adapt easily to these alternative homes.

**Nanocomp Technologies** produces **carbon nanotubes that can be used for power transmission and distribution**. Compared to copper, they are estimated to be 5 times more electrically conductive and can carry 1,000 times more current capacity.

**Modvion** has developed a new **modular design, made of renewable engineered wood to simplify and improve the logistics of wind turbine tower construction**.

## 2 Maximise asset value

1. Extending the useful life of assets through repair, refurbishment and maintenance practices.
2. Maximising the use of assets by combining different productive elements.
3. Reuse of assets to give them a second life.

The **Finnish Technical Research Centre** has used artificial intelligence and 3D printing to develop a highly durable **material that hardens** when exposed to **mechanical stress** to minimise erosion in the wind energy sector.

The combination of wind, photovoltaics and storage in **hybrid farms** allows energy complementarity, providing more efficient **use of the grid infrastructure**, leading to less pronounced peaks and reducing the overall time without production.

**Connected Energy** has developed a technology solution that gives the batteries of electric vehicles (EV) a second life by installing them in commercial-scale energy storage systems.

### **3** **Generate a sustainable value chain**

1. Minimisation of the carbon footprint of internal logistics by promoting local suppliers.
2. Minimisation of the **carbon footprint of field services**.
3. Extrapolation of environmental and social requirements to all external *stakeholders* in the value chain.
4. Inclusion of **contractors and suppliers in the programmes** to achieve the objectives set by the company.

Walmart's **Gigaton Project** aims to reduce greenhouse gas emissions by one gigaton, through its **value chain**. As part of this project, **Schneider Electric** will train Walmart's **suppliers** on how to **purchase renewable energies** through long-term Power Purchase Agreements (PPA.)

### **4** **Promote local symbiosis**

1. Introduction of mechanisms for the **coordination of grid modernisation with society**.
2. **Promotion of local economic activity** where assets are located.
3. Promotion of local talent through worker education and retraining.

**Solmatch**, the first large **solar community in Spain**, which allows the sharing of local, renewable energy generated on rooftops (**roofers**) with homes located within a radius of 500 metres (**matchers**).

**Canopy** provides **microgrids** as an **electricity service** in areas that cannot be accessed by the grid. This startup designs independent, fully bespoke **clean energy microgrid systems** that guarantee low-cost energy and address the complex logistics challenges of the energy transition.

Driven by new regulations and social demands, the circular economy questions the foundations of the current production model. However, at the same time as it poses major challenges, new market opportunities are opening up in which *win-win-win* situations for consumers, business and the environment can be obtained.



# The key role to be played by carbon capture

**Achieving the Paris Agreement target of limiting the rise in global temperatures to 1.5°C by the end of the century requires not only measures aimed at reducing and managing current CO2 emissions, but also the implementation of technologies to remove large amounts of CO2 from the atmosphere.**

Direct atmospheric CO2 capture, known as **DAC** (*Direct Air Capture*), extracts CO2 accumulated in the atmosphere and removes it permanently by storing it in geological formations or converting it into carbonate minerals, thus achieving negative emissions.

The most mature technologies for separating CO2 from the air involve the use of liquid absorbents, in which CO2 is either soluble or reacts reversibly, or solid adsorbents, which reversibly retain CO2 by adhering it to their surface. In both cases the air, after circulating through a fan, comes into contact with the absorbent or adsorbent, which capture the CO2 molecules before releasing them in a regeneration process for re-use. There are other technologies based on CO2 recovery, involving redox reactions or changes in humidity conditions, but they are at an early stage of development.

The ecosystem is currently led by three companies that have already developed projects and established important commercial agreements.

The Swiss company **Climeworks** is one of the most prolific companies in this sector, with 15 plants in operation across Europe, including the recently opened Orca. Its technology separates CO2 from the air using a selective filter material placed inside large fans. **Orca**, located in Iceland, has the capacity to capture 4,000 tonnes of CO2 per year, which is stored in the form of minerals through a partnership with **Carbfix**.

In the United States, **Global Thermostat** has implemented several pilot projects and is supported by **ExxonMobil**, with whom it signed a partnership agreement in 2019 to develop and scale its technology, which separates CO2 from the air using amine-based adsorbents.

Finally, **Carbon Engineering** is a Canadian company which, unlike its competitors, uses a potassium hydroxide solution as a liquid absorbent. Its technology is being implemented in two large-scale atmospheric CO2 capture projects, one in Texas (USA) run by **1PointFive** (an initiative to promote the roll-out of the **DAC** industry, created by **Oxy Low Carbon Ventures**) and another in Scotland, in partnership with **Storegga**. Both plants aim to capture around 1 million tonnes of CO2 per year. **Carbon Engineering** has received funding from companies such as **BHP**, **Chevron** and **Oxy Low Carbon Ventures**.

Business opportunities associated with the direct capture of atmospheric CO2 include emission offset models, where different entities pay a fixed amount for each tonne of CO2 that is removed on their behalf. Companies such as **Shopify**, **Stripe** and **Microsoft** have already committed to offset thousands of tonnes of CO2 by purchasing CO2 elimination credits from companies such as **Climeworks** and **Carbon Engineering**. Similarly, airlines such as **United Airlines** and **Virgin Atlantic** are showing increased interest in negative emissions technologies and have announced that they will offset their emissions by investing in projects being developed by **Carbon Engineering**.

In short, the direct capture of CO2 from the air is a promising solution in terms of achieving the removal of sufficient amounts of CO2 from the atmosphere to meet climate targets, particularly if the goal of limiting emissions to the threshold that would lead to a temperature increase of 1.5°C is not met. The main barrier to the roll-out of this technology is the high operating cost due to the high energy demand of the process, although based on the latest developments this is expected to reduce significantly over the coming years.

# The Next Generation EU programme drives the energy transition

The European Next Generation programme is more than a recovery and resilience plan. It is conceived as an opportunity to emerge stronger from the COVID-19 pandemic, transforming our economy by incentivising private investment through subsidies and creating opportunities for implementing innovative projects that develop new technologies and promote the ecological transition, digital transformation, social and territorial cohesion and equality.

€750 billion has been made available for the stimulus plan for the European economy, of which €390 billion will be subsidies and €360 billion will be loans. Around 90% (€672.5 billion) of the NextGEN funds will be earmarked for the **recovery and resilience plans** proposed by each country and approved by the EU, while 10% will go to participating in other funding programmes such as the Just Transition Fund (Transition to climate neutrality), Horizon Europe (R&D projects) and REACT-EU (ecological, digital and resilient economic recovery).

This economic injection is expected to bring investment levels back to pre-financial crisis levels, which will have positive effects at a macroeconomic level. Based on available information on loan utilisation, NextGEN investment accounts for approximately 4% of EU GDP. According to the European Commission, for a "fast spending" scenario (four years), with spending evenly distributed between 2021

and 2024, it can be seen that the actual GDP level among the EU-27 may be around **1.5% higher** in 2024 than forecast in a baseline scenario without the funds. In the scenario in which the NGEU plan is assumed to last six years (2021 to 2026), **GDP grows by 1.2%** more by 2026 than in the scenario without funds. This positive impact on GDP will not only be reflected during the implementation and development of the subsidised projects, but will also have an **ongoing effect over time**. This growth will be driven by the **creation of new companies, new departments and new skilled jobs**, which will be developed around these new technologies.

Funds have been distributed according to the countries most affected by the pandemic. As mentioned above, the funds will be split between subsidies and loans, with the main beneficiaries of subsidies being Spain (€69.5M), Italy (€68.9M), France (€39.4M) and Germany (€25.6M).

Distribution of subsidies by country for recovery and resilience plans

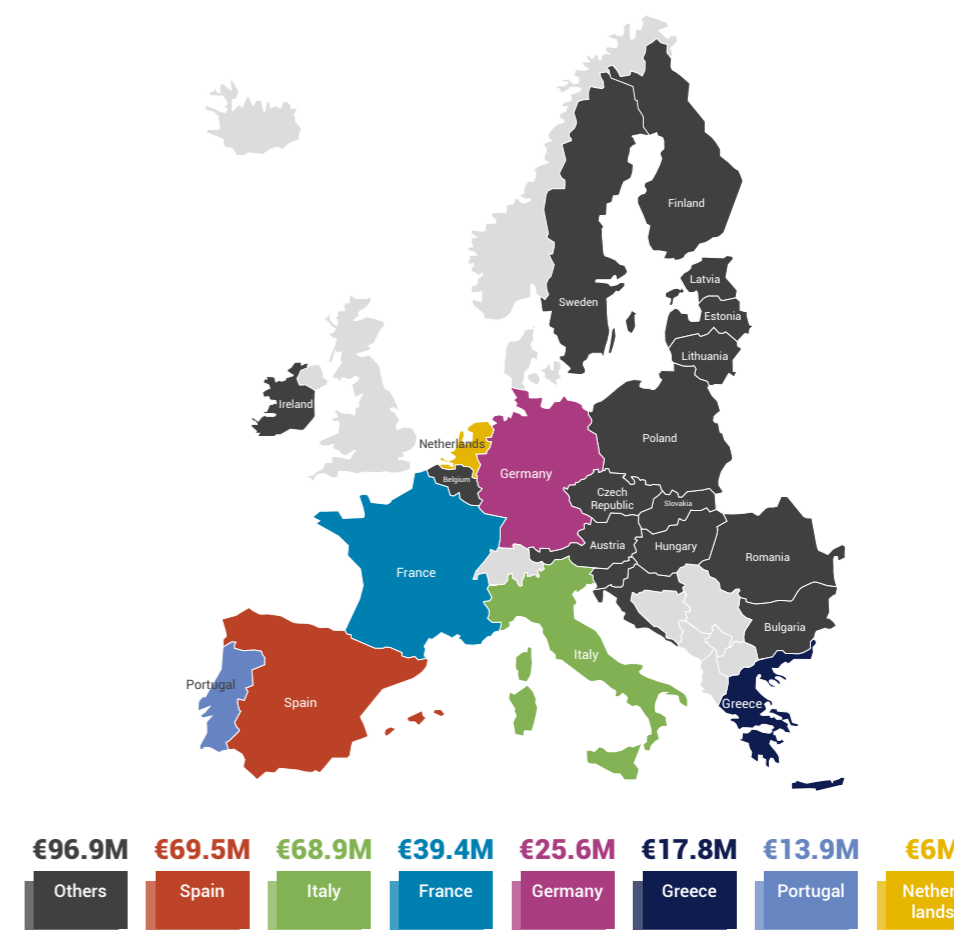


Figure 3. Source: European Commission, RaboResearch.

As the ecological transition, and hence the energy transition, is one of the EU's goals, particular focus has been placed on promoting the development of certain enabling **technologies such as sustainable mobility, smart grids, biofuels, large-scale renewables, large-scale energy storage, etc.** Due to reasons related to maturity and profitability, these areas require an economic boost. A clear example of this is the generation of green hydrogen, which currently costs around €5/kg to produce, whereas grey hydrogen costs €2/kg, making its production economically non-feasible without the help of subsidies. An example in the area of technology maturity is energy storage. If the efficiency of electricity-hydrogen conversion were improved and the cost of hydrogen production reduced, large-scale and long-term storage would be possible.

With regard to the generation of business opportunities associated with the development of these new technologies, if we follow the example of renewable hydrogen, we open up a range of possibilities throughout the hydrogen value chain. Major companies on the energy market are already positioning themselves to obtain these subsidies, by generating major partnerships and creating new lines of business. In addition, many SMEs are consolidating their position at different stages of the value chain, encompassing areas such as hydrogen generation, transport and distribution, or the adaptation of hydrogen consumption equipment, among other areas. Clear examples of this are SMEs such as Sunrgyze (Spain), Elestor (Netherlands) and Ferroamp (Sweden), Wallbox (Spain) and Flexidao (Spain), which are developing their businesses around hydrogen production, hydrogen energy storage, Smart Grids, electric vehicle charging and the traceability of renewables, respectively.

All this creates a **unique growth opportunity for companies**, as it enables them to develop into emerging markets and to stay at the cutting edge of technology. Access to funds depends on each call for tender, as each one is focused on promoting the development of a specific type of project and therefore has specific requirements. However, all calls for tender seek to ensure that the funded projects have a broad **socio-economic** impact, where new jobs are created and wealth is created beyond the boundaries of the project, thus seeking a recovery from the economic crisis caused by the pandemic. That **they reduce or neutralise the environmental impact** through emissions reductions, either by replacing fossil fuels, through CCUS, the use of renewable energies, etc. Similarly, **technical and economic feasibility** must be demonstrated in the long-term through solid economic models and business models that demonstrate the profitability of the project and the possibility of its implementation.

In turn, the projects must be disruptive and innovative in terms of their **industrial roll-out** or have an **R&D** component. Lastly, projects should seek to favour the largest number of companies, which is why it is very useful to form **consortia** or to seek relationships with **different partners** for their development.



# Future opportunities radar

The business opportunities radar explores the current status of the different business fields within the energy transition, considering three key factors:

## 1 Current demand

The perspective regarding the state of current market demand, by answering the question: Is there a need for the asset or solution and/or can it be applied en masse? Conversely, is it a incipient market where the foundations such as the regulatory framework have yet to be established before it can be adopted?

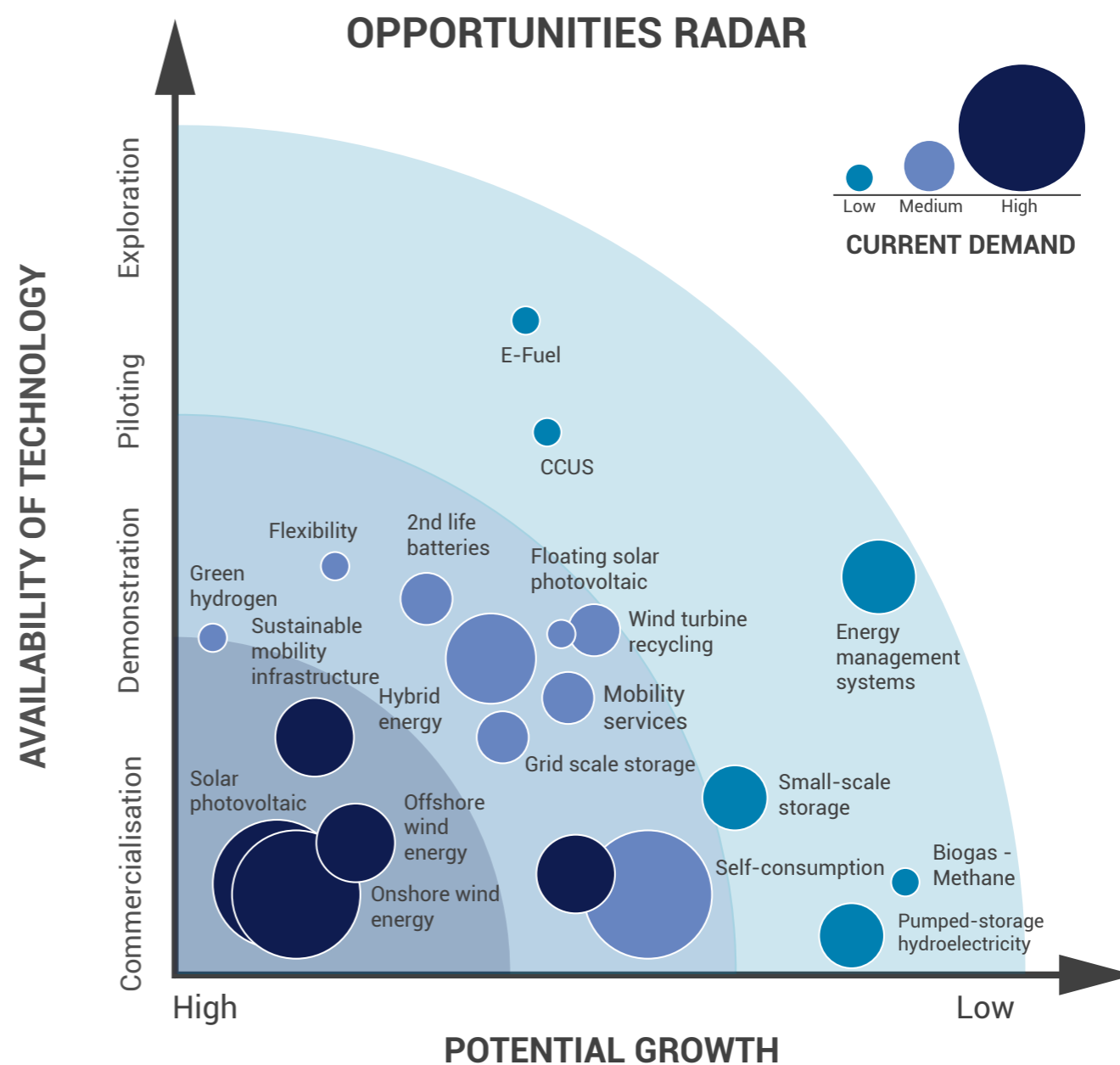
## 2 Demand growth

The perspective regarding how demand will evolve in the short/medium term: Will this market need and application be generated en masse? Will the regulatory market evolve to encourage adoption?

## 3 Technology Maturity

The current status of the technology corresponding to the business area: Is it a proven technology that is ready for adoption? Is there a need for further development, piloting or even exploring potential solutions so that the market needs can be met?

This provides a clear view of current opportunities, where the technology is already proven, where there is demand, and where growth is high, as well as an overview of what is to come, both more in the short to medium term and in the longer term, and what needs to be monitored and leveraged to ensure that it is ready and that capabilities are in place to take it to market.





There are four regions on the opportunity radar:

### ZONE 1 - Existing high growth opportunities

Markets that are already technologically enabled and with high growth potential, such as onshore wind energy or photovoltaic solar energy, among others. All of these have considerably high maturity, growth potential and current demand.

### ZONE 2 - Incipient opportunities with high growth potential

High potential markets that are not yet in commercial phases, requiring technological development before the solution can be adopted on a mass scale. The most prominent among these are green hydrogen (which should play a major role in the coming years), hybrid energy and energy storage systems, and second-life batteries.

### ZONE 3 - Complementary Opportunities

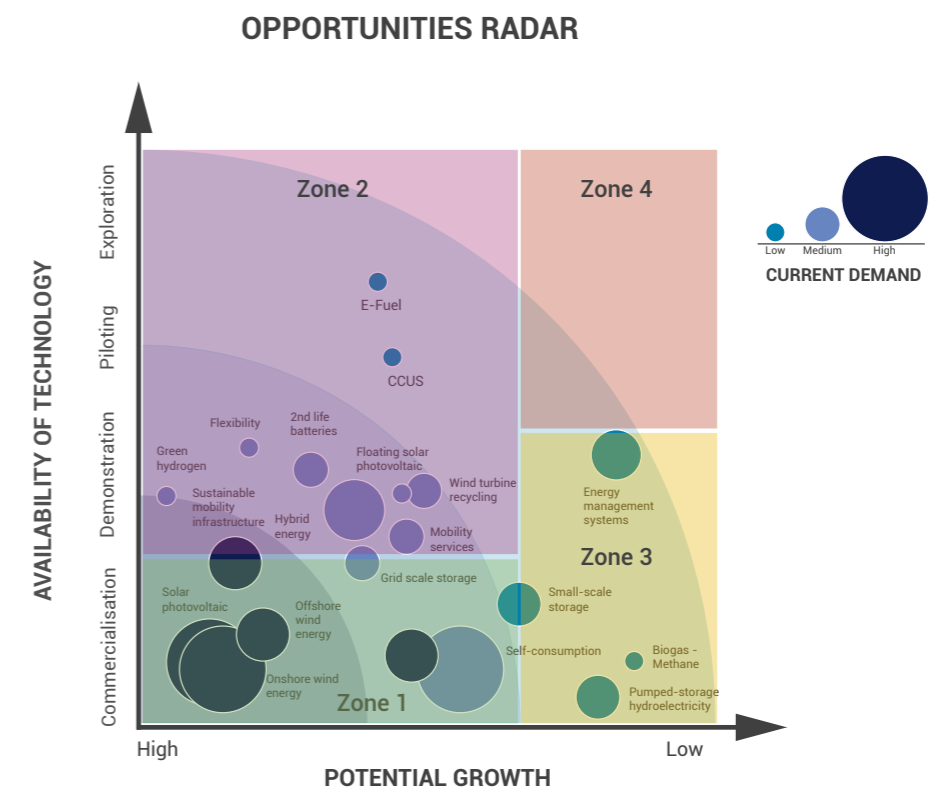
Markets that are less attractive for development on an individual basis due to their low growth potential, despite their technological maturity, which may be supplementary to other higher growth markets. This zone also includes markets that are mature but have little potential for growth.

Examples of high demand and low growth potential are energy management systems, pumped hydrogen and large-scale energy storage.

### ZONE 4 - Low return opportunities

Markets where there is little incentive to develop the technology due to its low growth potential, where the technology will remain undeveloped until changes in the market make it more attractive and its growth potential increases.

The opportunities detected in this zone were not sufficiently relevant to highlight any of them in the Report.



**We can infer where the main opportunities lie by analysing the radar and considering the characteristics and needs of the three main stakeholders of the energy market innovation ecosystem.**

## Corporate Business Units

The main objective of the business areas is to be able to implement new technologies or business activities that can be monetised right now, i.e. that have a fast *time to market*. This is why the main opportunities are those where technological maturity already exists. ZONE 1 opportunities stand out for their growth potential:

- Self-consumption.
- Mobility.
- Renewable farms, large-scale storage and their hybridisation to maximise their performance.

Similarly, and with multidisciplinary application to all opportunities, there are the needs for digitalisation and evolution towards a *data driven company*.

## Corporate Venture Capital

Considering the CVC investment thesis, the main feature of which is to invest in series A and B, i.e. startups where the technology or business model is already proven in order to solve business needs, the opportunities lie mainly in startups “powered by AI” and digitalisation startups, in alignment with the need to introduce efficiency into management and operations.

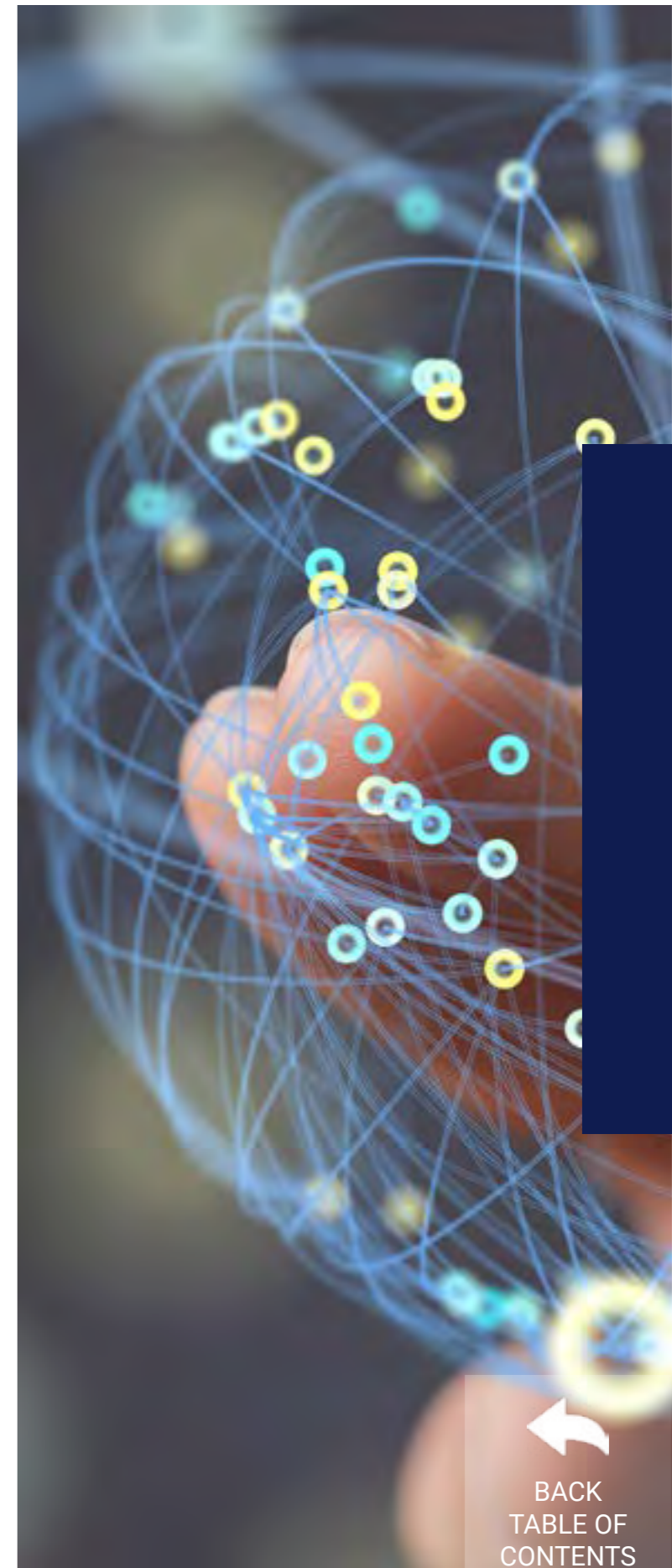
Similarly, there is a need to achieve a broad and diversified portfolio that also explores less mature and higher risk (and return) areas (zone 2 on the radar), where many CVCs are seeking the best way (*venturing tool*) to establish relationships with startups in earlier rounds (*seed rounds*). In this context, the highlighted opportunities form part of the circular economy, such as *2nd life batteries*, as well as opportunities for CCUS and flexibility (where new V2G mobility solutions are also considered).

## Startup

The opportunities radar for the development of new start-ups follows the same pattern as the CVCs, with 2 areas of application being highlighted:

- Meeting the current needs of corporations, i.e. capabilities applied to existing opportunities (ZONE 1) or of their core business, with digitalisation or artificial intelligence solutions.
- Development of new business areas of the future (ZONE 2), the most prominent of which are opportunities in green hydrogen, mobility and flexibility.

# 05. Annexes



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# Methodology

In order to prepare the report, we began searching for companies, using the largest international stock market indices as a reference, as well as specialised lists such as the Global Fortune 500.

The search was carried out in media and websites specialising in the subject and all relevant information from the 2018-2021 period was gathered, as this period was deemed sufficient to detect and analyse the evolution of the sector as a whole.

The aim of this report is to analyse startups funded by financial contributions from companies in the energy sector, within the perimeter. Please remember that there are many different ways of forming partnerships with startups that do not necessarily involve funding: those types of partnerships that do not involve direct funding have not been taken into account in this report.

- [Crunchbase](#)
- [Factiva](#)
- [SABI](#)
- [Zephyr](#)
- **Alte**
- **Allied Market Research**
- **BIS Research**
- **Bureau Van Dijk**
- **DBK Informa**
- **EMIS**
- **Euromonitor International**
- **Everest Group Research**
- **Fitch Ratings**
- **Forrester**
- **Gartner**
- **GlobalData**
- **HFS**
- **IDC**
- **KLAS**
- **Market Line**
- **Mordor Intelligence**
- **NelsonHall**
- **OMDIA**
- **Oxford Academycs**
- **Sitsi**
- **Statista**
- **TBR**
- **Tech Market View**



# Team

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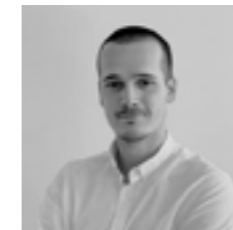
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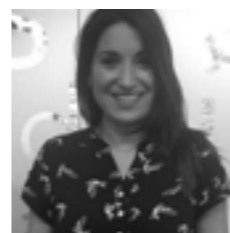
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Brand & Communications  
Leader  
NTT DATA

An aerial view of a city at dusk or dawn, with a blue color palette. Overlaid on the city are several glowing white lines that represent data connections or network paths. A large, thick blue wave graphic curves across the top and right sides of the image. In the center-right, there is a small graphic consisting of a grid of squares in various shades of blue and white.

**NTT Data**

**FUTURE  
AT HEART**

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