



# Post-COVID recovery and green transition

An ecosystem view



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## INTRODUCTION

European corporates have been confronted with an unprecedented array of crises over a relatively short period of time. Just as the recovery from the COVID-19 pandemic seemed assured, a series of new turbulences added to the prevailing uncertainty and further disrupted the stability of supply chains. This cascade of crises can either weaken economic conditions and create divergence in EU countries, or instead it can be an opportunity to drive structural transformation. This will depend on the responses from all those involved in the various industrial ecosystems to the recent events.

Against the background of a difficult external environment, the need for investment in the twin transition remains crucial to ensure the viability of industrial ecosystems. Effective support from the European Union and its Member States will be instrumental at this critical juncture, with the design and implementation of new policy tools. At the same time, EU firms are called on to play a pivotal role. By innovating and investing in climate change mitigation and adaptation measures, businesses can protect themselves from the challenges lying ahead.

To assess to what extent industrial ecosystems are fostering new avenues for future growth and enhancing their resilience to external shocks, this report draws upon firm-level data collected for the EIB Investment Survey in all 27 EU countries. It first examines long-term investment impediments, thereby uncovering potential weaknesses across the European Union. But the report also explores investments in innovation and digitalisation, actions taken to mitigate supply chain disruptions and strategies to address physical and transition risks associated with climate change. Given the implications of the green transition and the recent energy crisis, the report takes a deep dive into two ecosystems, the Energy and Renewables ecosystem and the Energy-Intensive Industries ecosystem. These ecosystems are central to the greening of the EU economy and key levers to improve its strategic autonomy.

## THE ECOSYSTEM APPROACH TO ECONOMIC POLICY

In March 2020, the European Commission communication on a new industrial strategy for Europe announced an innovative approach to economic policy based on the concept of industrial ecosystems.

Ecosystems encompass all players involved in the achievement of a certain socioeconomic goal: the smallest startups and the largest companies cooperating to satisfy new market needs, the research activities supporting industrial innovation, the regulators steering economic activity through conducive policies, the service providers and suppliers. The ecosystem approach takes into account this richness and this heterogeneity.

The ecosystem approach is a methodology to analyse the EU economy. It extends and complements the analysis of value chains to highlight the network of complex interlinkages between economic operators across sectors and regions. The usual classifications of industrial activities, for example in sectors with different levels of the NACE classification of activities, do not consider inter-industry dependencies. The ecosystem lens can thus better describe and analyse the interlinkages and interdependencies occurring between the operators of a given ecosystem, but also between ecosystems.

It is when entrepreneurs, public institutions, researchers and communities join forces to achieve common objectives that they function as ecosystems: each element of the complex network has a role to play, and the importance of such role does not depend only on their economic size, but also on how central this role is in supporting all other roles.

Industrial ecosystems include economic activities in which the European Union excels, and hence contribute to the competitiveness of EU industry. They have a marked pan-European nature, but their composition is very mixed in terms of sectoral composition, size and scope. Industrial activities represent a significant share of course, but services play a fundamental role. Small and medium-sized enterprises (SMEs) represent a very significant share of these ecosystems.<sup>1</sup>

The COVID-19 pandemic, the recent energy crisis and the war in Ukraine shone a light on the increasing dependencies between goods and services, and between the European Union and external trading partners. Recent developments emphasised the fragility of some cross-border value chains. The impact of the COVID-19 crisis throughout the EU economy, and the disruptions experienced since 2020, clearly confirmed the need for an ecosystem approach, and accelerated its full adoption at the EU level.

The priority of the European Union is to support the green and digital twin transition in the context of the European Green Deal. Large investments and strong coordination are needed to increase digitalisation and implement effective measures to limit and address climate change. In particular, the European Union needs to mitigate the risks related to current and possible future strategic dependencies. The public sector can coordinate this transformation. Importantly, the design of supporting policies relies on a proper identification of economic linkages through the ecosystem approach.

The 14 industrial ecosystems, which represent more than 80% of the European Union's business economy in terms of value added and employment, are:

- **Aerospace and Defence**
- **Agrifood**
- **Construction**
- **Cultural and Creative Industries (CCI)**
- **Digital**

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<sup>1</sup> For more detailed information on which sectors are included in each ecosystem, please see pp. 69-72 of the [Annual Single Market Report 2022](#).



- **Electronics**
- **Energy-Intensive Industries (EI)**
- **Energy – Renewables**
- **Health**
- **Mobility, Transport, Automotive**
- **Proximity, Social Economy, Civil Society**
- **Retail**
- **Textiles**
- **Tourism.**

The ecosystems do not cover the whole economy. Notably, the financial sector and most of the public sector are not included. While the 14 ecosystems differ substantially in terms of their core activities, they all have four fundamental goals:

- **contribute to a fast and durable recovery;**
- **decarbonise all their activities and improve their resource efficiency;**
- **reinvent their business models and their technologies to reap the benefits of digitalisation;**
- **define the path to open strategic autonomy and resilience.**

The ecosystem approach is based on policy definitions but is implemented and proxied through existing statistics. The policy definition takes into account the economic and policy synergies of economic activities, as well as the role of public institutions. Official statistics do not directly provide an ecosystem view on the economy. The match between the policy and the statistical definitions is not perfect and several indicators cannot be easily built.

The classification of sectors in ecosystems is derived from national accounts, input-output tables, structural business statistics, firm-level microeconomic data, sector-specific studies and expertise. Each sector is attributed to an ecosystem according to its contribution to the activities of the ecosystem. Some sectors are attributed to more than one ecosystem, so that ecosystems overlap. There are also horizontal sectors such as rental and leasing activities, or some parts of manufacturing, that have been identified to be relevant for all the ecosystems.

Through the analysis of ecosystems, the implementation of EU economic policy can be monitored beyond a narrow definition of industry. This makes it possible to identify bottlenecks, investment needs, supply chain disruptions and strategic dependencies, and exploit synergies, which are priorities for policy and regulatory interventions.

## ECOSYSTEMS THROUGH THE LENS OF THE EIB INVESTMENT SURVEY

This report links the concept of ecosystems to the data of the EIB Investment Survey (EIBIS), an annual survey of firms in the European Union conducted with the aim of monitoring investment and investment finance activities and identifying potential barriers to investment.

The survey covers approximately 12 000 companies across the European Union and slightly more than 800 firms in the United States for the last three waves. The first wave of the survey took place in 2016 and the survey completed its seventh wave in 2022.

Using a stratified sampling methodology, the EIBIS General Module is representative of all 27 Member States of the European Union and the United States. It is representative of four firm size classes (micro, small, medium-sized and large) and four sector groupings (manufacturing, services, construction and infrastructure) within the individual countries.

The EIBIS complements existing information on investment activities in the European Union. It adds a firm-level dimension to the macroeconomic data available and thus facilitates a more fine-grained analysis of firm investment patterns. It also adds to existing firm-level surveys at a national level by providing full comparability of results across countries.

Linking the concept of ecosystems to survey data enables a deeper understanding of questions of great importance to policymakers, such as investment patterns of different ecosystems, their impediments and performance in terms of digitalisation, climate change and international trade.

The EIBIS targets firms operating in categories C to J of the NACE classification of activities: manufacturing, construction, services (wholesale and retail trade, accommodation and food services), and infrastructure (electricity and gas, water supply and waste management, transportation and storage, information and communication).

However, some of the 14 ecosystems consist of firms operating in other categories of the economy than those surveyed by the EIBIS. For example, the health ecosystem receives substantial contributions from human health services and social work activities (NACE category Q).

The EIBIS has an excellent coverage of ten ecosystems: Aerospace and Defence; Agrifood; Construction; Digital; Electronics; Energy-Intensive Industries (EII); Energy – Renewables; Mobility, Transport and Automotive; Retail; and Textiles. These ecosystems will be the focus of the analysis of this report.

Four ecosystems are not considered in the analysis because of the lack of good coverage with EIBIS data (less than 60% of the value added of the ecosystems): Cultural and Creative Industries; Health; Tourism; and Proximity (Proximity, Social Economy, Civil Security).

In order to link the ecosystems to the EIBIS, the firm-level survey results are first weighted by value added for each sector. In a second step, these sector-level results are reweighted by their respective ecosystem weight to gain insights at the ecosystem level.

Construction	Retail	Agrifood	Aerospace	CCI*
Digital	<b>Industrial Ecosystems</b>			Health
EII*				Proximity*
Electronics	Energy – Renewables	Mobility	Textiles	Tourism

■ Covered in the EIBIS    ■ Not covered in the EIBIS

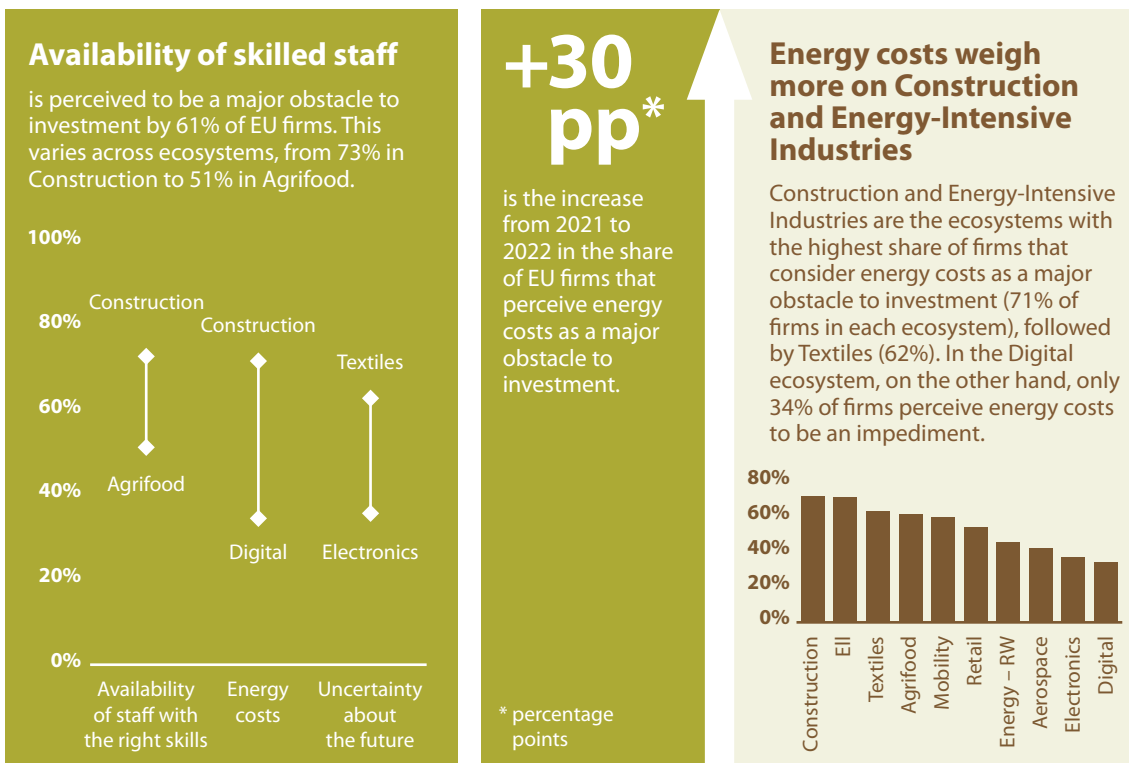
\* CCI: Cultural and Creative Industries / Proximity: Proximity, Social Economy, Civil Security / EII: Energy-Intensive Industries

# LONG-TERM BARRIERS TO INVESTMENT DIFFER SIGNIFICANTLY ACROSS ECOSYSTEMS

In an era of rapidly changing economic conditions, it is critical to understand the different obstacles to investment activities. The three major obstacles reported by EU ecosystems in 2022 are the availability of staff with the right skills (61% of firms, on average), energy costs (54%) and uncertainty about the future (45%).

The Construction and Digital ecosystems are most affected by the lack of skilled staff, with 73% and 71% of firms, respectively. Compared to 2021, this represents an increase of almost 30 percentage points for these two ecosystems. While Agrifood is the ecosystem that reports to be the least affected by the availability of staff with the right skills (51%), firms in this ecosystem have also reported an increase of almost 30 percentage points compared to the previous year.

Firms in Energy-Intensive Industries are inherently hindered by energy costs, together with firms in Construction. Digital and Electronics are the ecosystems with the lowest share of firms reporting energy costs as a major obstacle to investment, and with Aerospace, they also witnessed the smallest increase from 2021. Uncertainty weighs particularly on the investment decisions of Textiles and Energy-Intensive Industries, with 63% and 52% of firms, respectively.



### Uncertainty about the future

is the third most often mentioned major barrier to investment. The differences across ecosystems are large and Textiles is the ecosystem most affected by uncertainty, followed by Energy - Intensive Industries.

### Large firms and SMEs are equally affected

On average, the share of medium-sized and large firms (with more than 50 employees) that are concerned about energy costs is similar to that of smaller businesses.

## 71%

of firms in Energy-Intensive Industries report energy costs as a major barrier to investment. This weighs on their ability to compete.

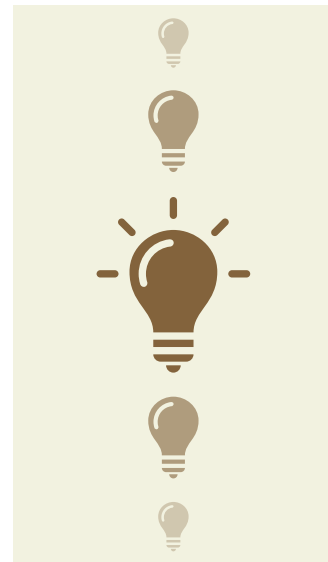
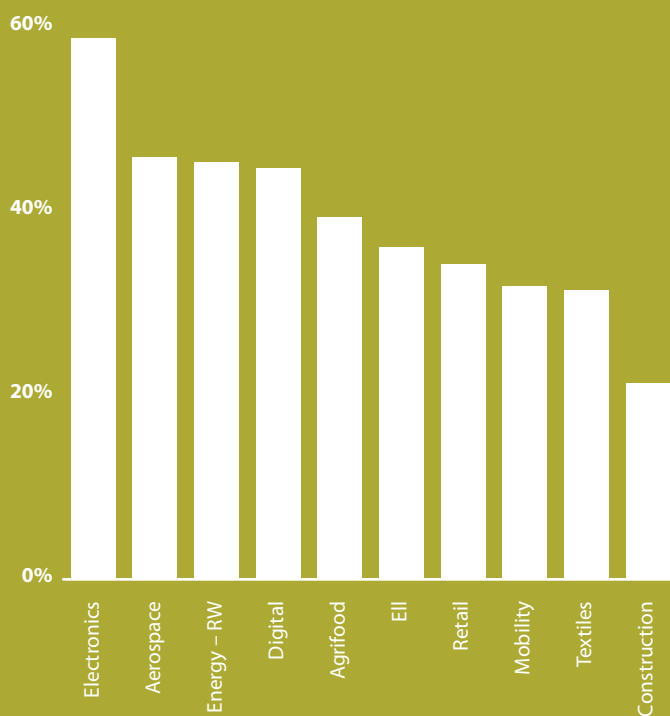
## THE ELECTRONICS AND DIGITAL ECOSYSTEMS INVEST MORE IN INNOVATION

Investment in innovation opens new avenues for sustainable economic growth and can enhance resilience to external shocks. The Electronics and Digital ecosystems have a strong focus on innovation, as reflected in their past investments and future investment priorities. 59% of firms in Electronics and 45% in Digital have invested to introduce or develop new products, processes or services in the previous year.

Compared to other ecosystems, Electronics and Digital are also more likely to consider innovation as their investment priority in the next three years. Firms in Textiles (35%), Energy-Intensive Industries (33%) and Aerospace (30%) also consider investment in innovation over the next three years as a priority. The ecosystem that is the least likely to consider innovation as an investment priority over the next three years is Construction (14% of firms).

# 59%

of firms in Electronics introduced or developed new products, processes or services, compared to 46% in Aerospace, and 45% in Energy – Renewables and in Digital. This is well above the share of firms in Construction that invested in innovation (21%).



### About one in three

firms report innovation as an investment priority in the coming three years. This share varies across ecosystems: 48% of firms in Electronics and 43% in Digital mention innovation as their priority, compared to only 14% of firms in Construction, where firms instead prioritise capacity replacement.

### Electronics is the biggest investor in R&D

with a share of R&D expenditure out of total investment of 28%.

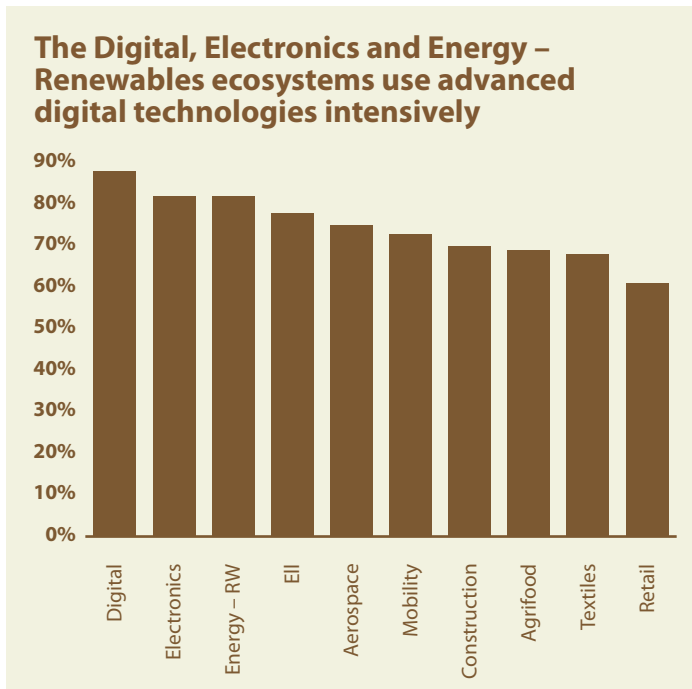
This is followed by Textiles (with a share of 19%), Digital (18%) and Aerospace (15%). The other ecosystems devote less than 10% of total investment to R&D.



## COVID-19 PUSHED FIRMS TO INVEST IN DIGITALISATION

Energy – Renewables and Digital are the ecosystems with the highest use of advanced digital technologies, whereas the Retail ecosystem reports the lowest use of advanced digital technologies. A firm is identified as digital if at least one advanced digital technology (such as big data analytics and artificial intelligence, 3D printing, advanced robotics, drones, the internet of things, digital platform technologies and augmented or virtual reality) was implemented in parts of the business.

COVID-19 was an accelerator of digitalisation. Firms in Electronics, Energy-Intensive Industries and Energy – Renewables in particular reacted to COVID-19 by investing in digitalisation (69%, 62% and 60% of firms, respectively). The ecosystems that transformed the least were Agrifood (40%) and Textiles (40%).

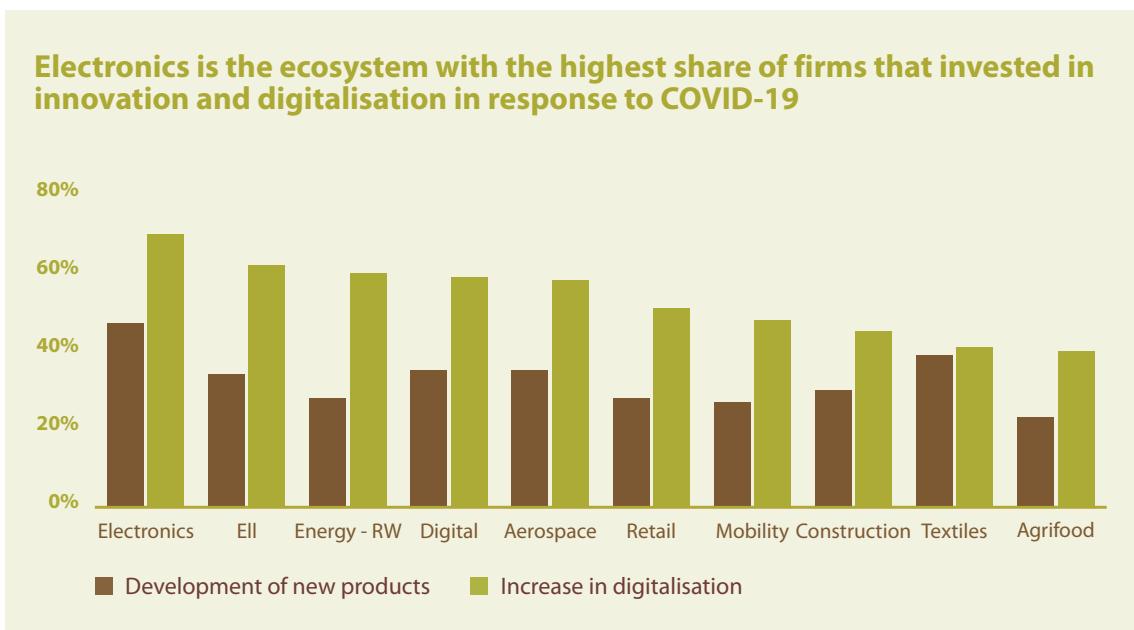


The gap between the most digital and the least digital ecosystem amounts to

**27 pp\***

\* percentage points

**Between 8% and 29%** of total investment activities was devoted to software, data, IT networks and website activities. This share varies across ecosystems: from 29% in Digital, to only 8% in Energy-Intensive Industries.



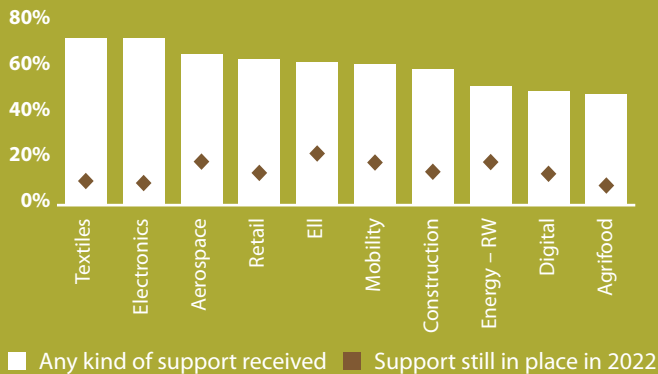
## WIDESPREAD AND EFFECTIVE POLICY SUPPORT RECEIVED DURING THE COVID-19 CRISIS

Support measures were vital during COVID-19, and continued to play a non-negligible role after the pandemic. The ecosystems that received the most support were Textiles and Electronics (73% of firms each), while the ones that received the least support were Energy – Renewables, Digital and Agrifood (52%, 50% and 48% of firms, respectively). The support measures included subsidies (on average 41% of firms), subsidised or guaranteed credit (18%), deferral of payments (18%) and other measures (7%). The Textiles ecosystem had the highest share of firms that received subsidies and subsidised or guaranteed credit, while deferral of payments was particularly important for Electronics, with 25% of firms using it.

Policy support helped firms weather the drop in sales and turnover during COVID-19. Initially the sales balance, that is, the difference between the share of firms that reported an increase in sales and the share of firms that reported a decrease, was negative from 2019 to 2020 for all ecosystems, except for Agrifood, Retail and Digital. The sales balance from 2020 to 2021, instead, was positive for all ecosystems, witnessing a strong recovery after the pandemic.

### All ecosystems received support measures during the COVID-19 crisis,

mostly in the form of subsidies. Energy-Intensive Industries is the ecosystem with the highest share of firms (22%) still receiving support in 2022.



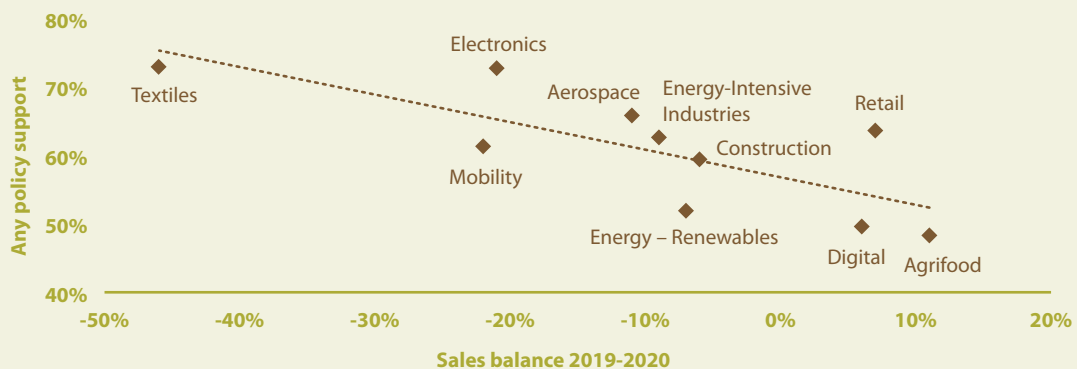
### Energy-Intensive Industries and Energy – Renewables experienced the strongest recovery

Their sales increased by 76% and 72%, respectively, from 2020 to 2021. The other ecosystems also witnessed a strong recovery in turnover after COVID-19.



### Policy support reached the most affected ecosystems

Ecosystems that experienced a negative sales balance from 2019 to 2020 received more policy support during 2021 and 2022.




# FIRMS TOOK ACTION TO MITIGATE GLOBAL VALUE CHAIN DISRUPTIONS

Firms suffered from several forms of international trade disruptions in 2022: disruptions to global logistics, disrupted or reduced access to inputs, and new trade restrictions, customs and tariffs. The main factors affecting international trade were the production decline during the COVID-19 crisis with the subsequent bottlenecks during the reopening and the Russia-Ukraine conflict. Following the squeeze in the distribution of semiconductors, the Electronics ecosystem was the most affected by the COVID-19 crisis, while the Construction ecosystem was the most directly affected by the war in Ukraine. Digital is the ecosystem that was least affected by trade disruptions due to COVID-19 or the war in Ukraine, with only 23% of firms reporting to be impacted.

The measures to tackle trade disruptions included diversification strategies or actions to focus more on domestic suppliers and markets. Electronics was the most active ecosystem, with 72% of firms putting in place some kind of countermeasures, and with the highest share of firms deciding to source and sell more domestically. The Energy-Intensive Industries ecosystem was also reactive and showed the highest share of firms opting for diversification.

### All ecosystems faced disruptions to international trade

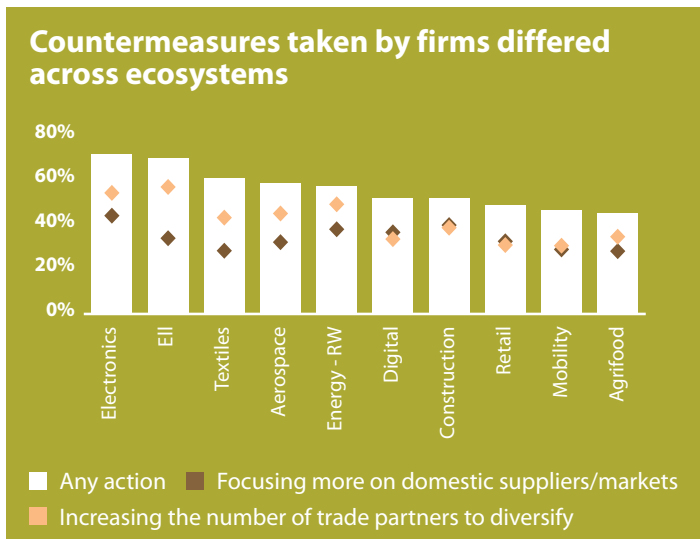
About **84%** of firms faced at least one form of trade disruption.



The Aerospace ecosystem was hit the hardest, with 93% of firms affected. Around 90% of firms were affected in Electronics, Textiles, Energy-Intensive Industries and Energy – Renewables.

### Different types of trade disruptions affected the ecosystems

- More than 80% of firms in Energy-Intensive Industries, Electronics, Textiles and Aerospace faced disruptions to global logistics.
- More than 80% of firms in Aerospace and Energy-Intensive Industries faced disrupted or reduced access to inputs.
- More than 50% of firms in Textiles and Energy-Intensive Industries faced new trade restrictions, customs and tariffs.



**57%** of firms in Energy-Intensive Industries increased their number of trade partners to diversify.

**44%** of firms in Electronics focused more on domestic suppliers or markets.

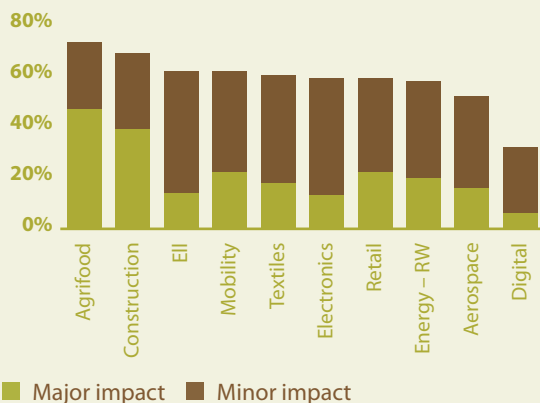
## FIRMS INCREASED INVESTMENTS TO REDUCE CLIMATE-RELATED RISKS AND GREENHOUSE GAS EMISSIONS

The risks of climate change include physical risk, due to losses caused by extreme climate events, and transition risk, resulting from the enforcement of climate change policies. The ecosystem most affected by physical risk is Agrifood, with almost half of firms reporting to be highly impacted. Conversely, in the Digital ecosystem, only 6% of firms report physical risk to have a major impact on their business activities. Energy-Intensive Industries is the ecosystem with the most firms concerned about transition risk. Smaller firms report being less impacted by both physical and transition risks. Across ecosystems, small firms in Agrifood are the most affected, while for large firms, Construction is most impacted by physical risk.

Firms react to climate-related risks by implementing investments to tackle the impacts of weather events and to help reduce carbon emissions. As of 2022, the average share of firms that had already made such investments was 52%, with the lowest share observed in Digital. 51% is also the average share of firms that were planning such investments, which is higher than the average over the period 2020-2021 (45%).

### All ecosystems report to be impacted by physical risk,

but Digital to a lesser extent.



### Transition risk has the largest impact on Energy – Renewables and Energy-Intensive Industries,

while more than 50% of firms in Digital, Textiles and Agrifood are not impacted by the transition to stricter climate standards and regulation.

### Small firms are less impacted

About 52% of small firms report that they are affected by transition risk, compared to 61% for large firms. For physical risk, the average difference between small and large firms is nine percentage points (49% against 58%).

# 6 pp\*

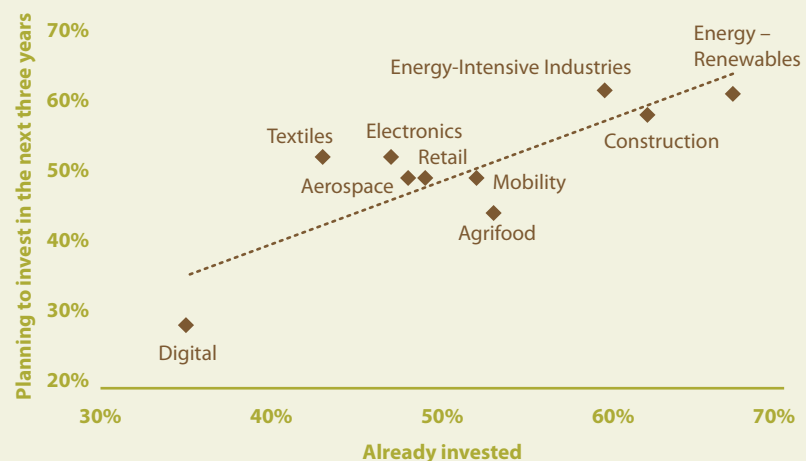
is the increase between 2021 and 2022 in the share of firms that were planning green investment. Agrifood is the only ecosystem that showed a decrease.



\* percentage points

### There is a positive correlation

between green investment already made and green investment planned in the next three years.

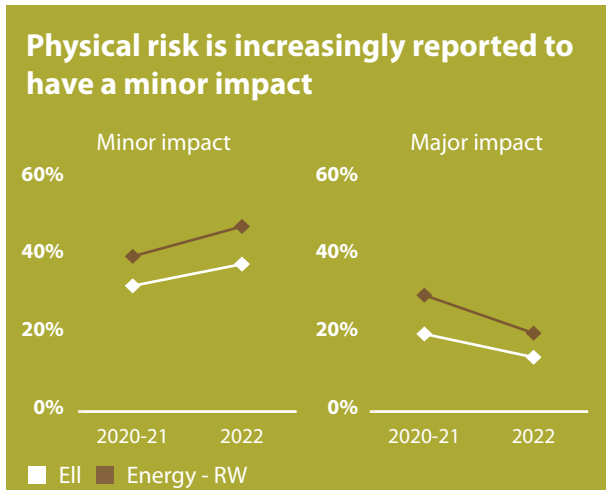
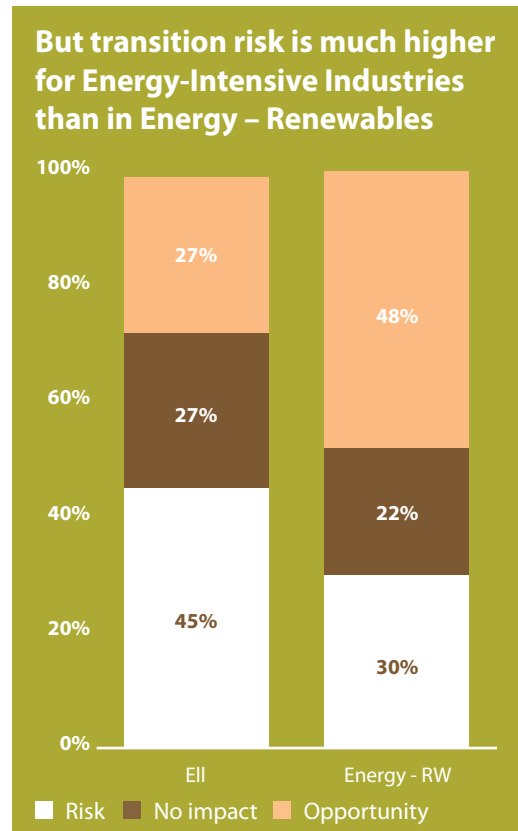
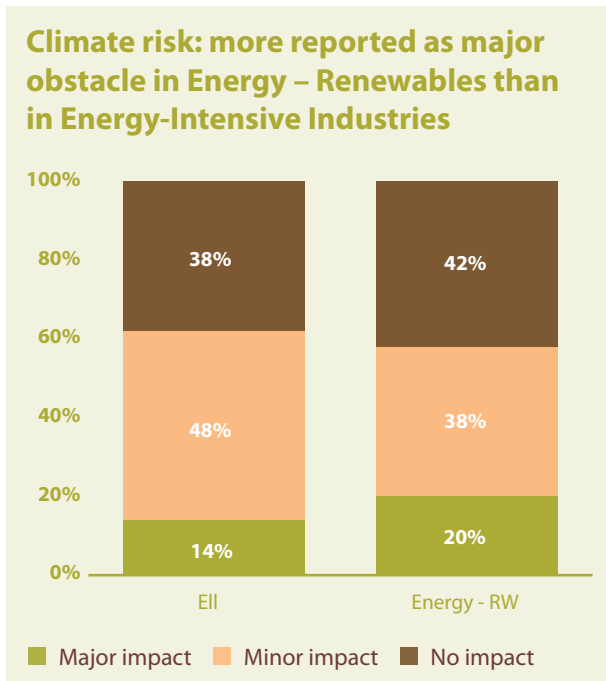




# DEEP DIVE ON ENERGY – RENEWABLES AND ENERGY-INTENSIVE INDUSTRIES: CLIMATE CHANGE CHALLENGES AND OPPORTUNITIES

Energy – Renewables and Energy-Intensive Industries are the ecosystems that witnessed the strongest recovery from COVID-19: compared to 2020, sales and turnover in 2021 increased for 72% of firms in Energy – Renewables and 76% of firms in Energy-Intensive Industries. After the energy crisis, these ecosystems can now refocus on the opportunities or challenges resulting from climate change.

These two ecosystems are the most impacted by transition risk, although in opposite ways: the Energy-Intensive Industries ecosystem sees it as an actual risk (45% of firms), while the Energy – Renewables ecosystem perceives it more as an opportunity (48% of firms). Smaller firms are less likely to report that they are impacted by transition risks. Physical risk from climate change is reported to have a major impact on business activities by 20% of firms in Energy – Renewables, and 14% of firms in Energy-Intensive Industries. While less reported as a major impact over time, this physical risk is increasingly reported to have a minor impact for these ecosystems.



### Large and small firms in Energy – Renewables

see the transition to stricter climate standards and regulation as an opportunity: 49% of large firms and 42% of small firms, respectively. At the same time, only 36% of large firms and 28% of small firms in Energy-Intensive Industries perceive the transition risk as an opportunity.

## DEEP DIVE ON ENERGY – RENEWABLES AND ENERGY-INTENSIVE INDUSTRIES: STRATEGIES TO ADDRESS CLIMATE CHANGE

Different measures are implemented to build resilience to climate change. The Energy – Renewables and Energy-Intensive Industries ecosystems are very active in this respect:

- **adaptation strategy, that is, a strategy that involves changing operations to increase firm resilience;**
- **technological and engineering solutions or nature-based solutions to avoid or reduce exposure to climate risks;**
- **insurance products to offset climate-related losses.**

Firms also implement measures to reduce greenhouse gas emissions, with the most common measures adopted by the Energy – Renewables and Energy-Intensive Industries ecosystems being investments in energy efficiency, waste minimisation and recycling. More than half of firms in the Energy – Renewables and Energy-Intensive Industries ecosystems have targets in place for own greenhouse gas emissions.

### Different measures to build resilience

More firms in Energy – Renewables than in Energy-Intensive Industries have implemented an adaptation strategy (29% against 18%), while more firms in Energy-Intensive Industries have opted for solutions to reduce exposure (34%, against 31% in Energy – Renewables). Insurance products are used by 19% of firms in Energy-Intensive Industries and 10% of firms in Energy – Renewables.



Adaptation strategy



Solutions to reduce exposure



Insurance products

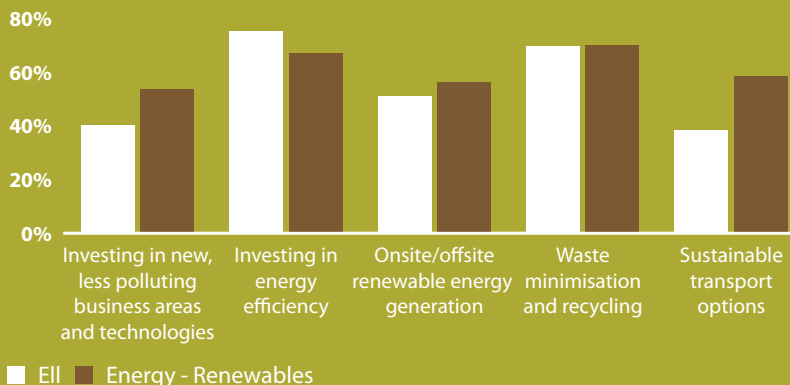
# 48%

of firms in Energy – Renewables and Energy-Intensive Industries have introduced at least one measure to build resilience to the physical risk of climate change.



### Different measures to reduce greenhouse gas emissions

The most common measures adopted by Energy – Renewables and Energy-Intensive Industries are energy efficiency, and waste minimisation and recycling, with more than 65% of firms in each of the two ecosystems developing each of them.



# 65%

of firms in each of the two ecosystems have targets in place for their own greenhouse gas emissions. This is the highest share among all ecosystems.



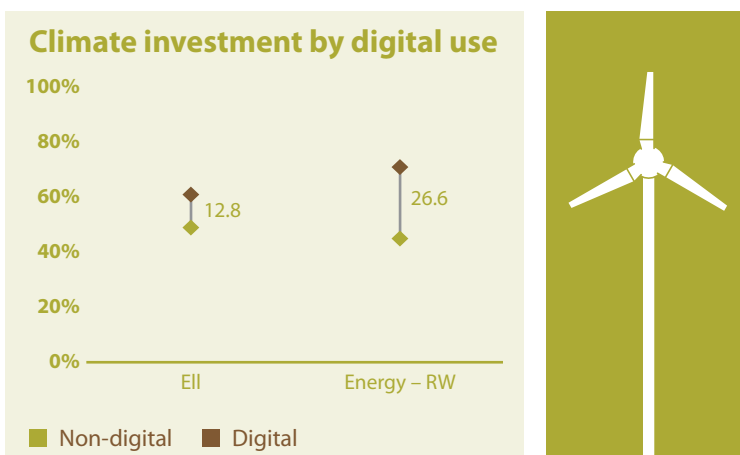
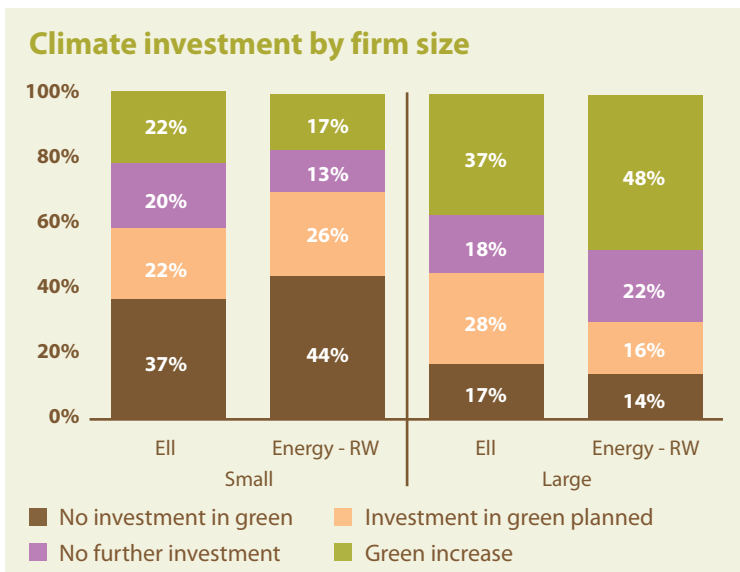
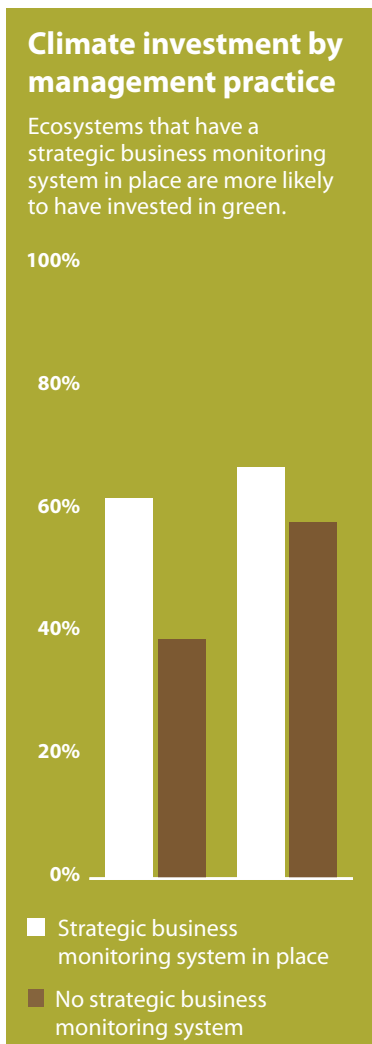
# DEEP DIVE ON ENERGY – RENEWABLES AND ENERGY-INTENSIVE INDUSTRIES: CLIMATE INVESTMENT

Energy – Renewables and Energy-Intensive Industries show the highest share of firms — 62% for both — planning to make investments to tackle the impacts of weather events and help reduce carbon emissions in the next three years. Energy – Renewables also shows the highest share of firms that have already made such investments (67% of firms). It is followed by Construction (62%) and Energy-Intensive Industries (60%).

The combination of realised investments and investment plans for the next three years gives rise to four categories:

- no investment in green (neither made nor planned);
- investment in green planned (not yet made, but planned for the future);
- no further investment (already made, but not planned for the future);
- green increase (already made and also planned).

Climate investment is more likely to be implemented by large firms, firms that have a strategic monitoring system in place and firms that use advanced digital technologies.



## APPENDIX

### Definitions and abbreviations

**Large firms:** Firms with 50 employees or more

**Small firms:** Firms with fewer than 50 employees

**Aes:** Aerospace ecosystem

**Agr:** Agrifood ecosystem

**Con:** Construction ecosystem

**Dig:** Digital ecosystem

**EII:** Energy-Intensive Industries ecosystem

**ERW:** Energy – Renewables ecosystem

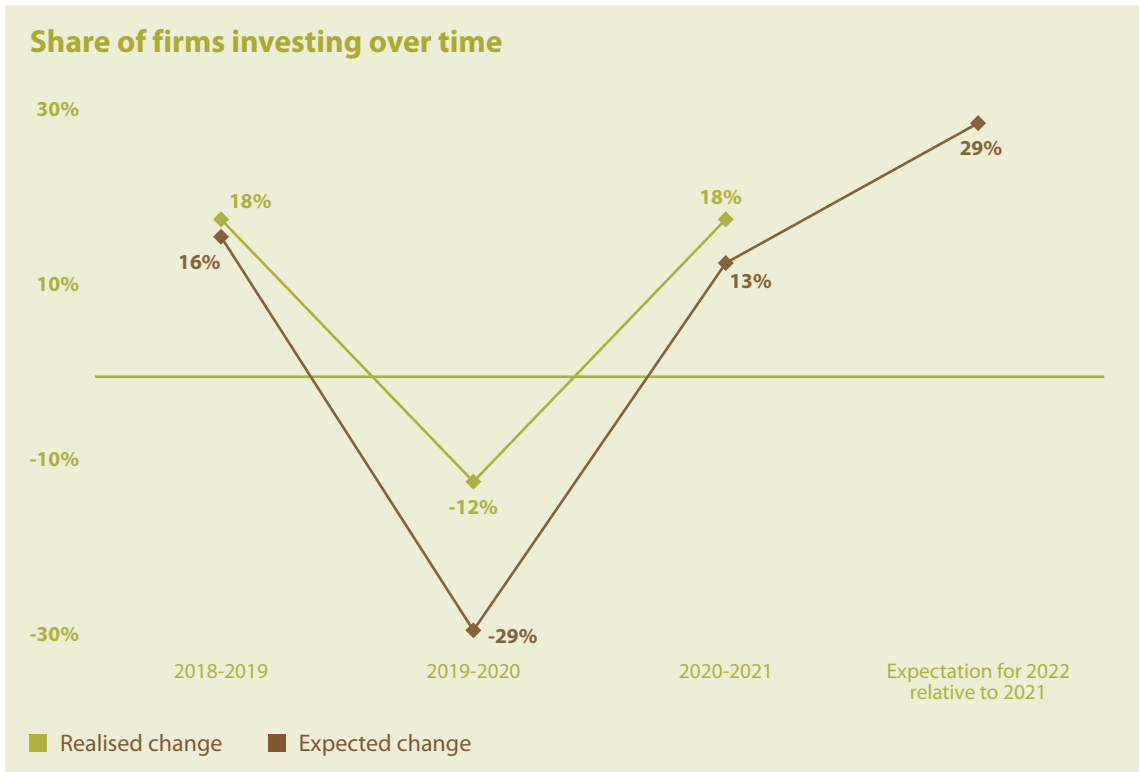
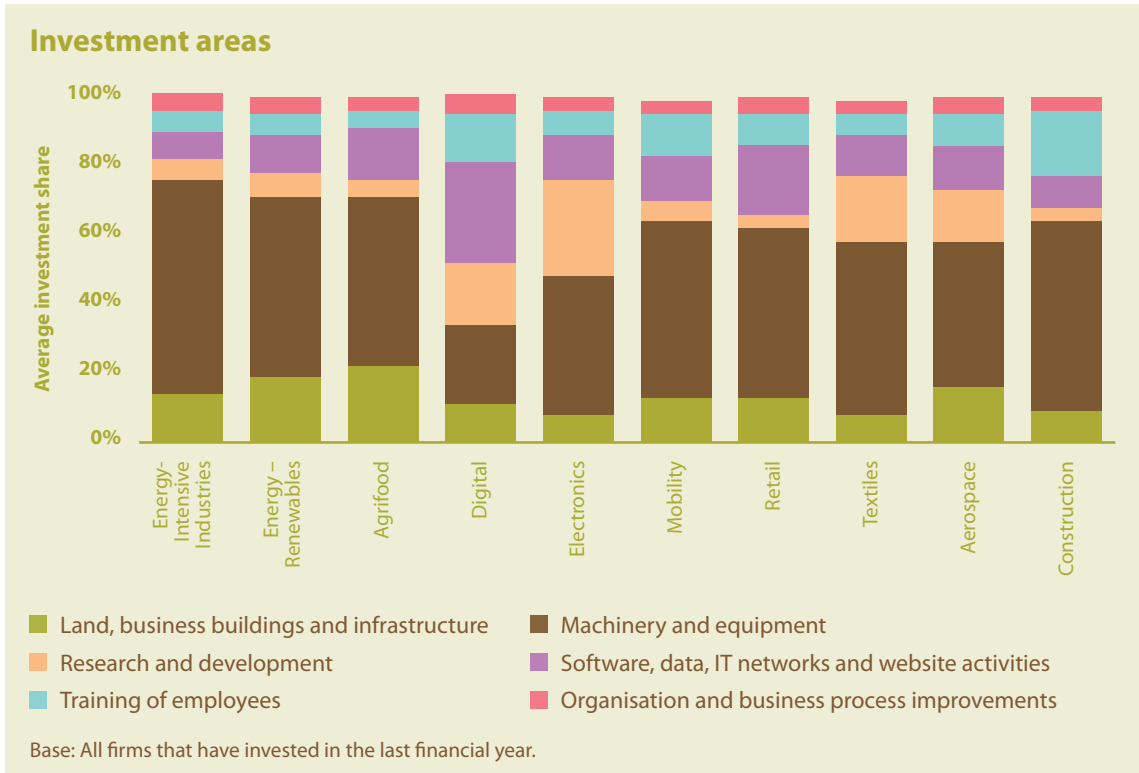
**Elec:** Electronics ecosystem

**Mob:** Mobility ecosystem

**Ret:** Retail ecosystem

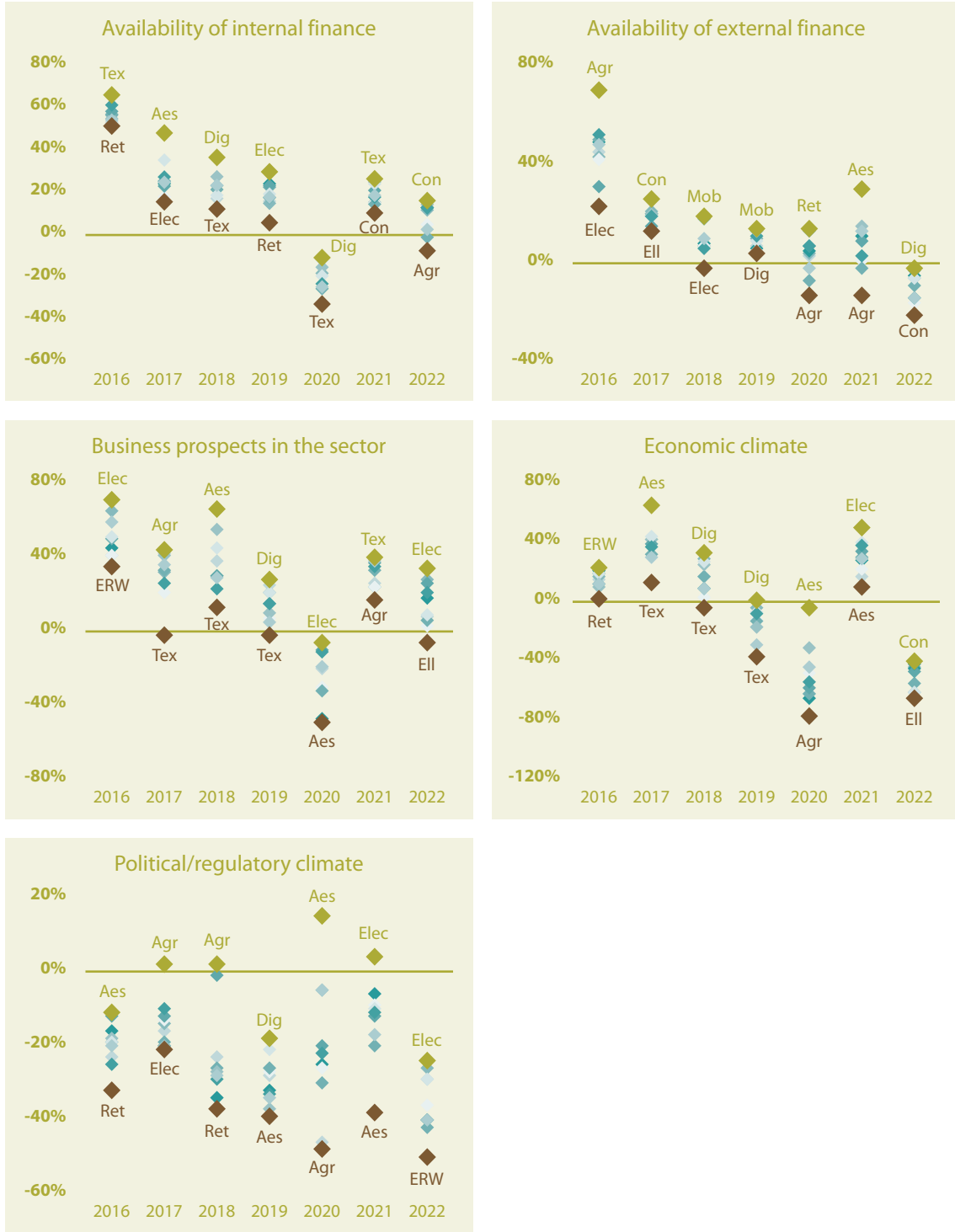
**Tex:** Textiles ecosystem

# INVESTMENT AREAS



# DRIVERS AND CONSTRAINTS

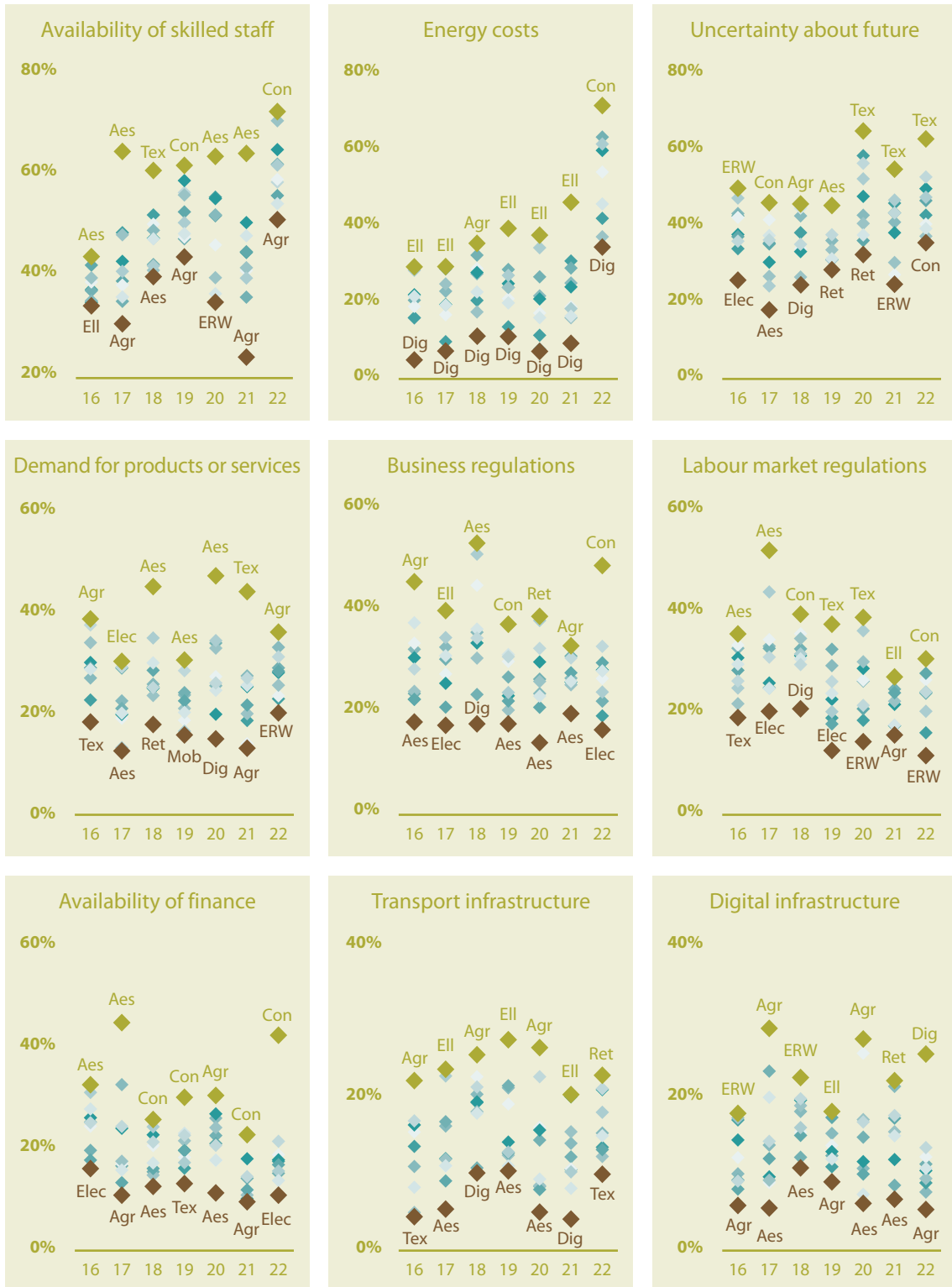
Short-term firm outlook (net balance\* in %)



\* Net balance is the share of firms seeing an improvement minus the share of firms seeing a deterioration.

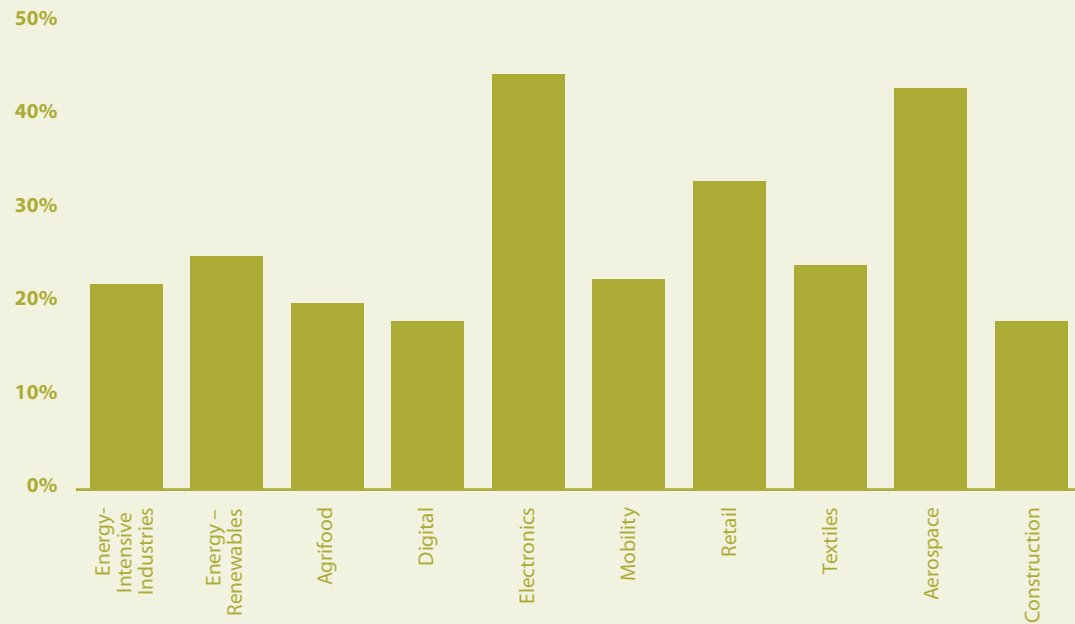
# INVESTMENT IMPEDIMENTS

## Major long-term barriers to investment



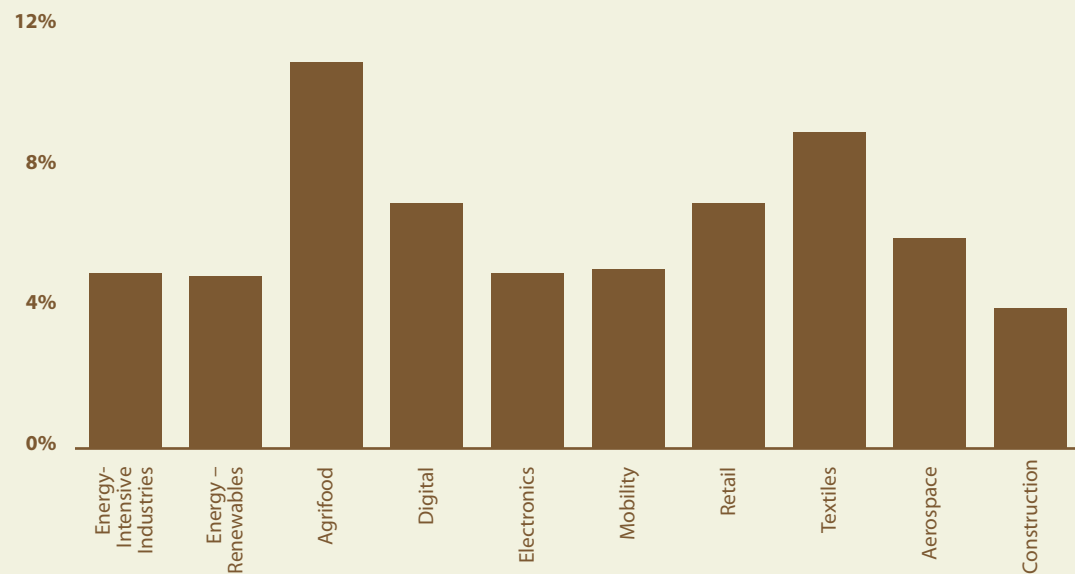
## ACCESS TO FINANCE

### Share of firms with finance from grants



Base: All firms using external finance.

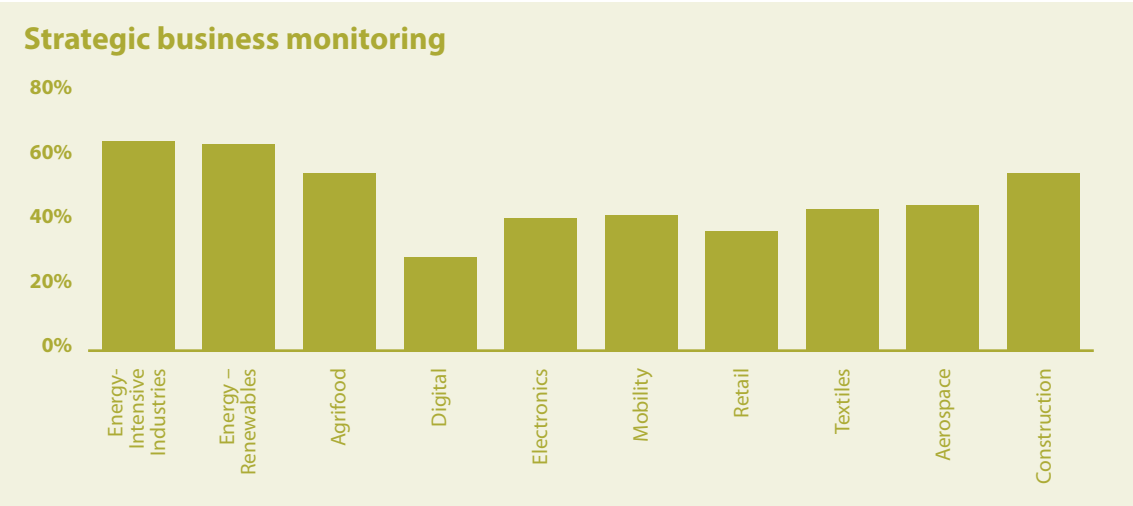
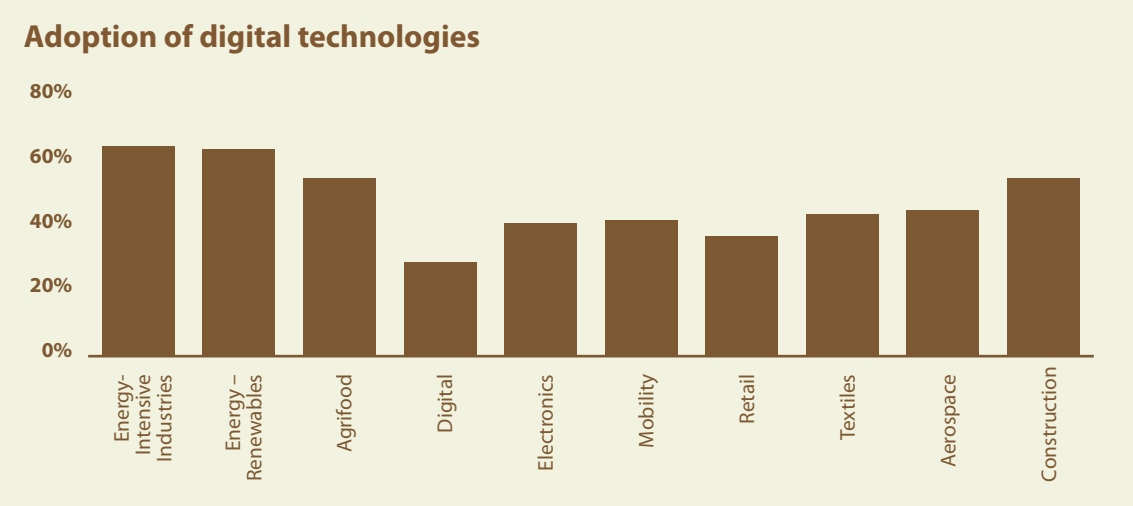
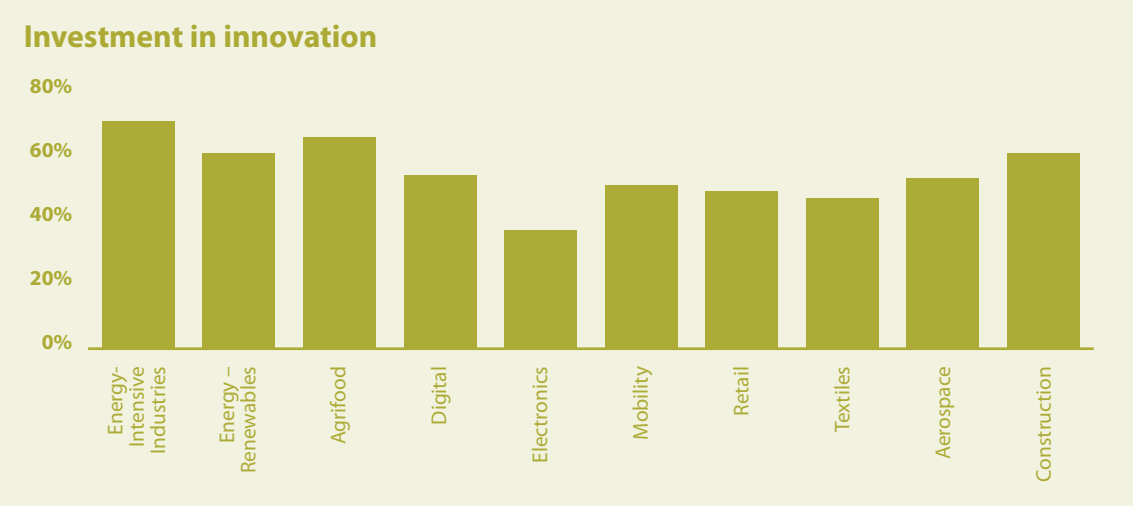
### Share of finance-constrained firms



Finance-constrained firms include those dissatisfied with the amount of finance obtained (received less), firms that sought external finance but did not receive it (rejected) and those that did not seek external finance because they thought borrowing costs would be too high (too expensive) or they would be turned down (discouraged).



# INNOVATION AND MANAGEMENT PRACTICES







# Post-COVID recovery and green transition

An ecosystem view

