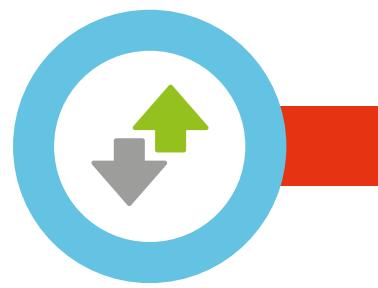


Green Economy Start-up Monitor 2017



Facts about the development and financing of green start-ups in Germany

About the Green Economy Start-up Monitor

The Green Economy Start-up Monitor (GEMO) of the Borderstep Institute and the University of Oldenburg examines developments regarding start-ups in the areas of renewable energy, energy efficiency, the circular economy, and other fields within the green economy in Germany. The survey methods employed build on the 'EGSS classification' of Eurostat, the European statistical office, and define 'green start-ups' as business start-ups that contribute to the environmental objectives of the green economy with their products, technologies, and services.

This issue of the monitor for the first time reports on the question of financing green start-ups (special pages 'Green Start-up Investment Monitor'). This special evaluation is funded by the German Federal Ministry for the Environment and the National Climate Protection Initiative as part of the 'Green Start-Up Investment Alliance – GreenUpInvest' project.

The most important information in brief

- The proportion of green start-ups in start-up activity in Germany is stagnating.
- In 2015 and 2016, 36,400 new businesses were founded in the field of the green economy in Germany.
- 40% of the green start-ups focus on energy efficient products and services.
- 17% respectively of the green start-ups focus on the circular economy and the areas of sustainable food and agriculture.
- Approximately half of the green start-ups are service companies focusing on the areas of trade, as well as building-related installations.
- The federal states Mecklenburg-Western Pomerania, Brandenburg, and Hamburg showed the highest start-up intensity with regards to the proportion of green start-ups from 2006 to 2016.
- Capital procurement is one of the biggest challenges for Cleantech start-ups, to a greater degree than in the case of other start-ups.
- In the context of the ten largest known financing rounds in Germany a total of over EUR 367.5 million was invested in only eight green start-ups in 2016 and 2017.



The Green Economy Start-up Monitor 2017 Investigation

The Green Economy Start-up Monitor 2017 builds on the Start-up Monitor 2015, which examined the long-term development of green business start-ups from 2006 to 2014. The investigation period has been extended to include the 2015 and 2016 start-up years. The Green Economy Start-up Monitor 2017 focuses both on the current development of green start-ups in Germany and on issues pertaining to the financing of green start-ups.

The survey: Focus on business start-ups of greater economic significance

In order to secure a representative sample, the Green Economy Start-up Monitor (GEMO) is based on a company database from Creditreform containing datasets on more than 1.3 million economically active companies in Germany and uses representative sampling techniques. GEMO examines business start-ups of 'greater economic significance' (cf. Statistisches Bundesamt 2017, p. 3). These are business start-ups by a legal entity or a natural person. In the case of a natural person, it is prerequisite that they are either entered in the commercial register, hold a craftsman's card or employ at least one employee. Where 'business start-ups' are mentioned in the following, these refer to business start-ups of greater economic significance.

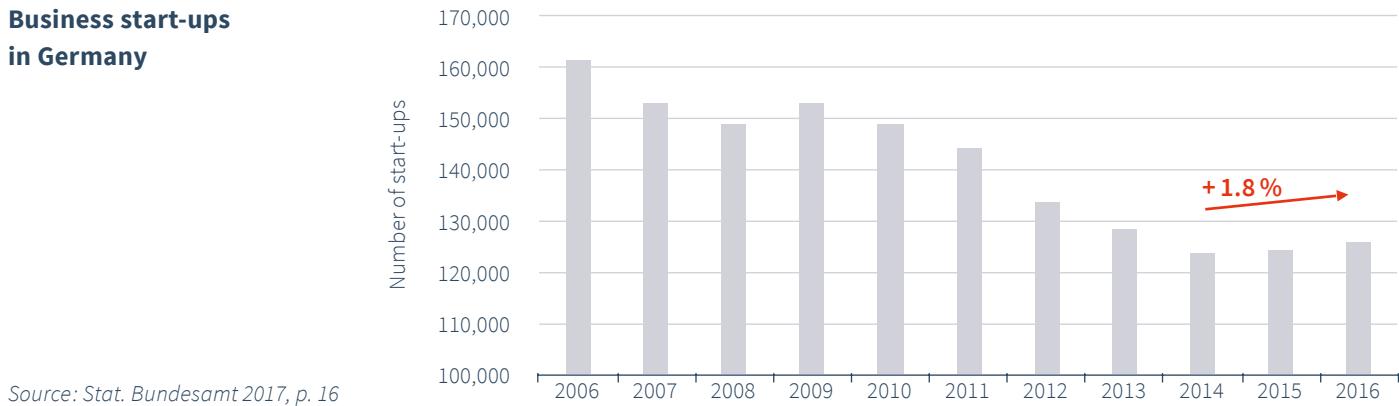
Per year investigated, 625 start-ups from the Creditreform database are evaluated. Datasets from a total of 6,875 business start-ups were used for the purpose of this monitor, which looks at the period from 2006 to 2016. They are classified according to different areas of the green economy, such as renewable energy, energy efficiency, or circular economy, based on EUROSTAT's Environmental Goods and Services Sector (EGSS) method (cf. Weiss & Fichter 2015).

Using the environmental classification of the EGSS method, the GEMO 2017 assigns the business start-ups to eight different target areas of the green economy. In contrast to the GEMO 2015, an additional area for 'Sustainable Food and Agriculture' has been included.

Decline in business start-ups in Germany

As regards business start-ups of greater economic significance, a reversal of trend is in sight. Since 2014, the number of these types of business start-ups has been increasing again, while general start-up activity in Germany continues to decline. While the figures reached a new low in 2014 at just 124,000 business start-ups, they had already improved slightly in 2015 and were at 126,000 start-ups in 2016. Comparing 2014 and 2016, this corresponds to an increase of 1.8%.

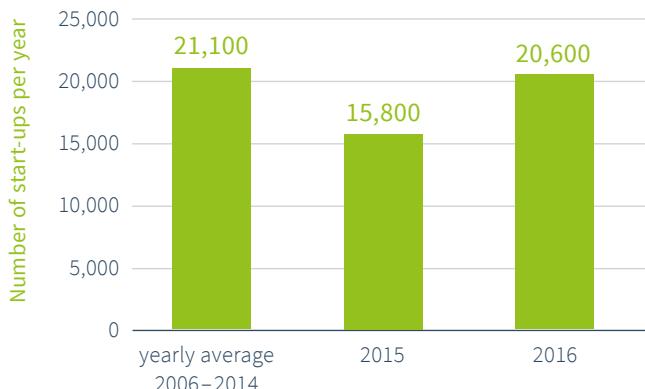
Business start-ups in Germany



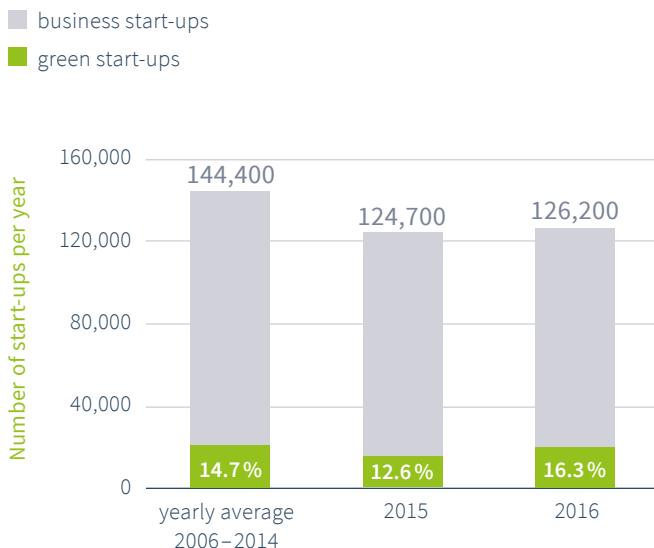
Green business start-ups in Germany

The long-term average number of start-ups during the period from 2006 to 2014 in the start-up fields of the green economy was 21,100 businesses per year. This corresponds to an average proportion of green start-ups of 14.7%. At 15,800 businesses, 2015 saw a decline in green start-ups. In 2016, however, the figure was again close to the average for the previous years at 20,600 businesses. The new long-term average (2006 to 2016) for the proportion of green start-ups is therefore at 14.5%. Green start-ups thus represent a significant proportion of the business start-ups in Germany, though the proportion is stagnating. Considering current environmental policy objectives, more committed and more focused start-up support is needed for green start-ups to be effectively used as a transformation engine for the green economy. This applies to the areas of climate protection and sustainable transport, for example.

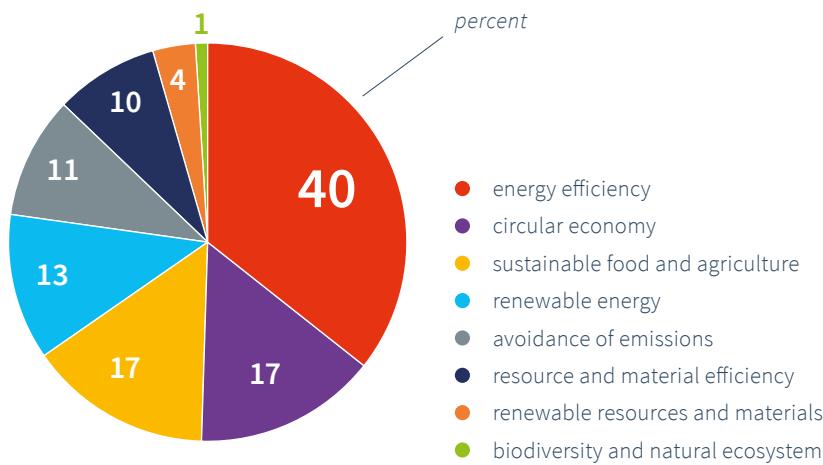
Green business start-ups in Germany



Proportion of green business start-ups in Germany



Proportion of different green economy areas accounted for by all green start-ups in Germany 2015 and 2016



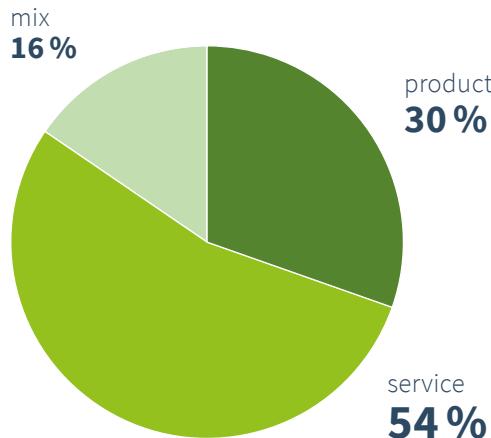
There is an increasing proportion of green start-ups in the areas of the circular economy as well as sustainable food and agriculture

Of the 36,400 green start-ups founded in Germany in 2015 and 2016, 40% focus on the area of energy efficiency and 17% respectively on the circular economy as well as sustainable food and agriculture. In comparison to previous years (approximately 36%), the proportion of start-ups that focus on renewable energy with their products or services has decreased considerably at 13%.

Product and service range of green start-ups

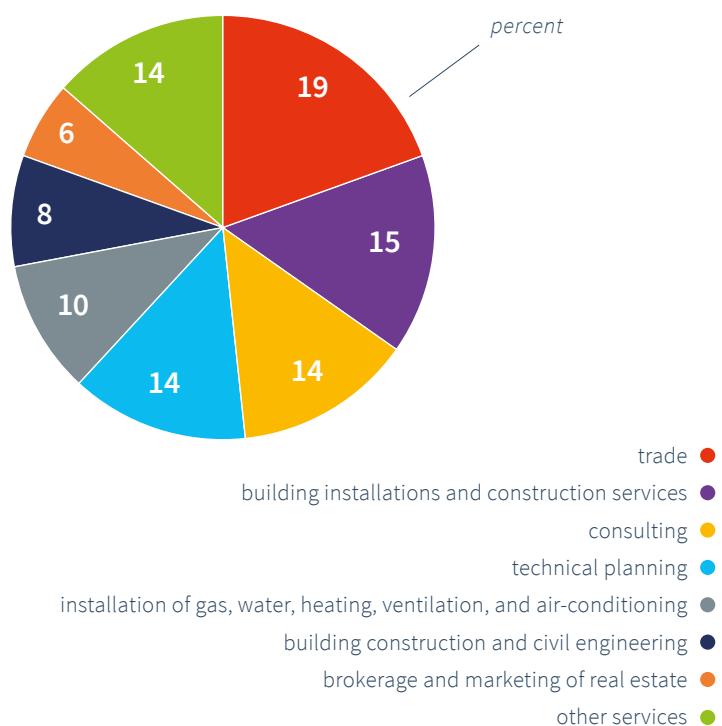
What do green start-ups offer? The range of products and services offered by a green start-up may focus on **products** (material goods), **services**, or a **mix** of both (product-service systems). More than half (54%) of the green start-ups founded in 2015 and 2016 are represented on the market by a service. 30% offer a product, while 16% rely on a product-service mix. Common services include manufacturing or consultancy services, for example for systems based on renewable energy sources. Product-service systems include, for example, applications in the area of Smart Homes, which are specially designed, installed, and regularly maintained.

Product and service range of green start-ups (2015–2016)



In the context of this investigation, the green service start-ups were analyzed in greater depth and assigned to different service categories. Start-ups that provide services in the trade sector represent a major share of the service range at 19%. In particular, companies in the wholesale trade are represented in this group. A quarter of the green start-ups offer building-related installations. On the one hand, these refer to building installations and construction services (15%) and, on the other hand, to installation, maintenance, and repair services in the areas of gas, water, heating, ventilation, and air-conditioning (10%). Consulting services and services focusing on technical planning are strongly represented at 14% each, followed by start-ups in building construction and civil engineering. Brokerage and marketing of real estate is also a significant start-up field. The remaining 14% of the services are scattered over a large number of different service categories. This includes, for example, start-ups providing green services in the area of gardening and landscaping services or in the cleaning industry.

Categories of green start-up services 2015 and 2016



Green economy start-up intensity

The indicator of business start-up intensity relates the number of business start-ups to the number of employees. This makes it possible to draw comparisons between federal states and regions of different sizes.

The current evaluations show that general business start-up intensity has been declining since 2006. Whereas the national average for business start-ups registered per 10,000 employees was 38.9 in 2006, in 2016 it was only 29.3. In contrast, the green start-up intensity of 4.8 in 2016 corresponds to the long-term average since 2006. Consequently, and in contrast to the general business start-up intensity, no general decline was reported nationwide regarding green start-up intensity.

When comparing the average values from 2006 to 2014 to the average values from 2006 to 2016, i.e. including 2015 and 2016, the results for the individual federal states were as follows:

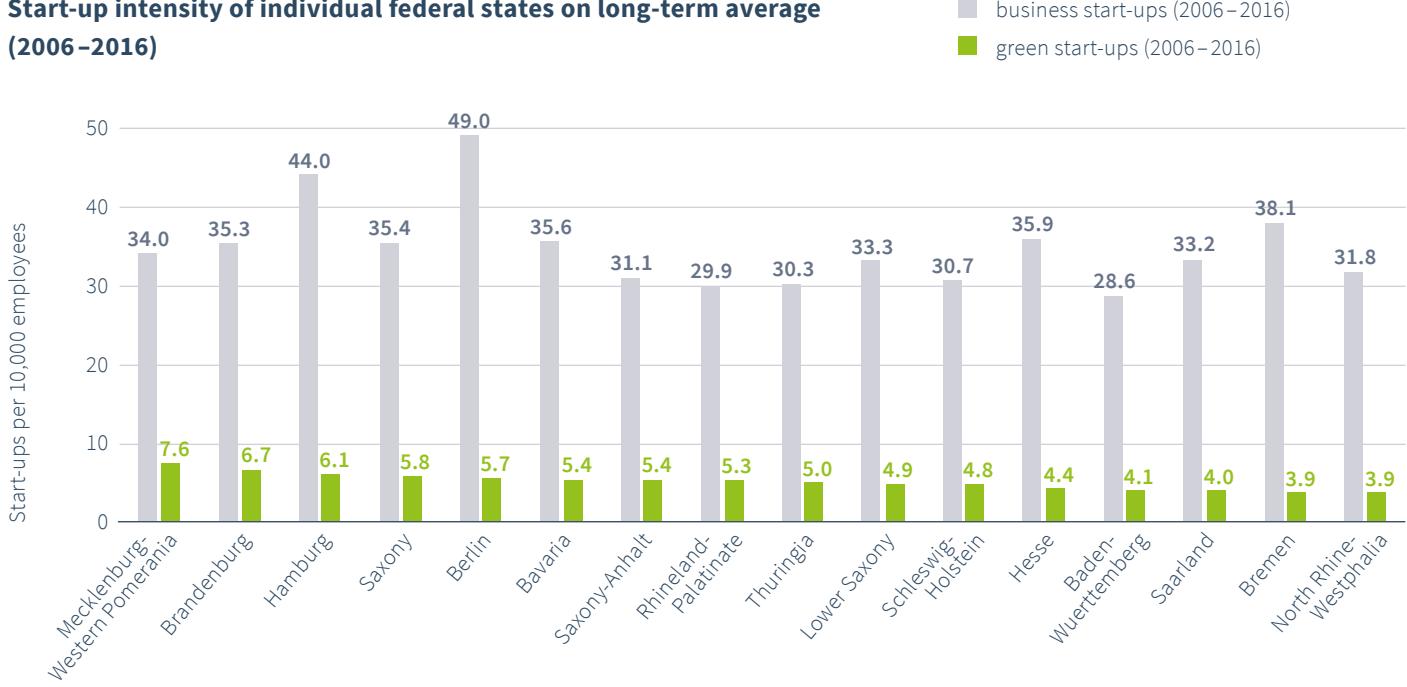
In terms of overall start-up intensity, all federal states recorded a declining trend in terms of start-ups. The strongest declines in start-ups per 10,000 employees were recorded in Bremen (-2.3) and Brandenburg (-1.6), whereas Berlin (-0.3) and North Rhine-Westphalia (-0.5) only recorded slight declines. On average, the decline was at -1.1 business start-ups per 10,000 employees.

But what is the significance of the green economy in the start-up activity of the individual federal states compared

to general business start-up intensity? From 2006 to 2016, Mecklenburg-Western Pomerania, with an average of 7.6 green start-ups per 10,000 employees, recorded the highest green start-up intensity, followed by Brandenburg (6.7) and Hamburg (6.1). The lowest green start-up intensity was found in Bremen (3.9) and in North Rhine-Westphalia (3.9). In comparison to the average values from 2006 to 2014 from the Green Economy Start-up Monitor 2015, Bremen (+0.9%), Mecklenburg-Western Pomerania (+0.4), and Berlin (+0.4) increased the most in terms of green start-up intensity, while figures in Saarland (-0.6), Saxony (-0.5), and Hesse (-0.5) decreased the most.

State-specific factors of influence for green start-ups include the respective economic and science infrastructure, funding conditions, and local conditions of relevance to the energy transition.

Start-up intensity of individual federal states on long-term average (2006–2016)



Green Start-up Investment Monitor



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Financing conditions and challenges for Cleantech start-ups

Data on financing conditions and challenges facing Cleantech and non-green start-ups have been evaluated in collaboration with the Deutsche Startup Monitor 2017 (DSM – German Start-up Monitor) of the Bundesverband Deutsche Startups (BVDS – German Startups Association). This evaluation was carried out in the context of the ‘Green Start-up Investment Alliance (GreenUpInvest)’ project funded by the German Federal Ministry for the Environment and the National Climate Protection Initiative. The Cleantech start-ups include all start-ups that indicated they were active in the ‘green technology’ field in the context of the DSM survey. The results show that the future financing needs of Cleantech start-ups (on average EUR 200,000) are greater than those of non-green

The GreenUpInvest Project

What funding does green entrepreneurship need? How can green start-ups procure money more easily? How can support for entrepreneurs bring about more environmental and climate protection? The Green Start-up Investment Alliance (GreenUpInvest) looks for practical solutions. The Green Start-up Investment Alliance funded by the National Climate Protection Initiative aims to strengthen and promote the financing of green start-ups in Germany. The project is coordinated by the Borderstep Institute for Innovation and Sustainability. Other project partners include Bundesverband Deutsche Startups e.V., Business Angels Netzwerk Deutschland e.V., and Forum Nachhaltige Geldanlagen e.V.

www.greenupinvest.de

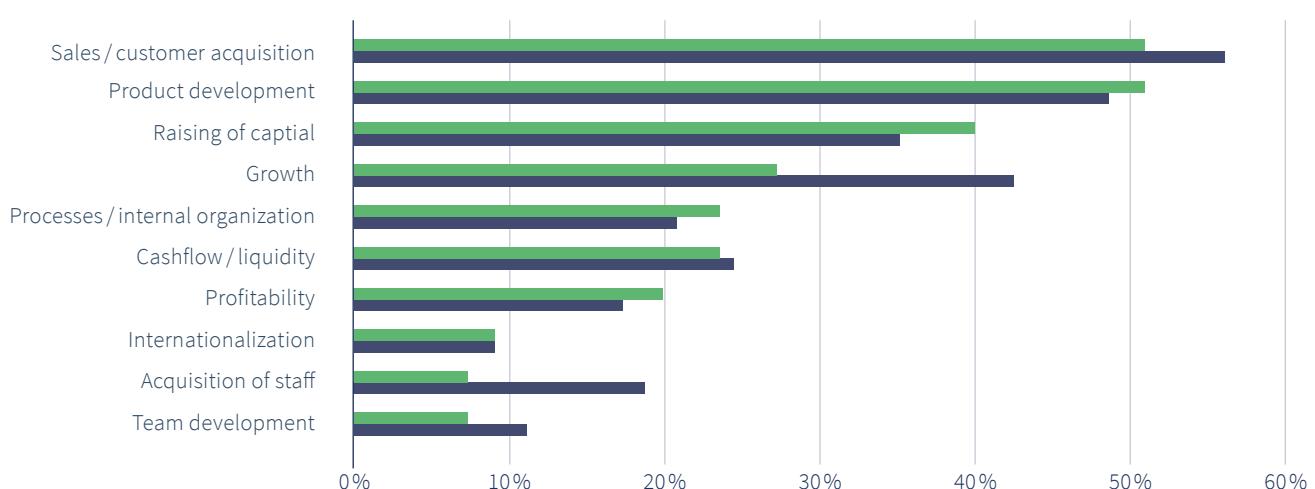
start-ups (on average EUR 35,000) (see figure on the next page). This also explains why Cleantech start-ups consider the procuring of funds to be a bigger challenge than non-green start-ups do.

Against this background, it is not surprising that the Cleantech start-up respondents hope for greater support in the procurement of funds from policy and the public sector. In contrast, the other start-ups hope to see the removal of regulatory and bureaucratic obstacles above all else. Furthermore, what becomes apparent is that the Cleantech start-ups wish to improve the exchange with politicians much more than other start-ups do.

Current challenges German start-ups are facing

% Cleantech start-ups

% other start-ups

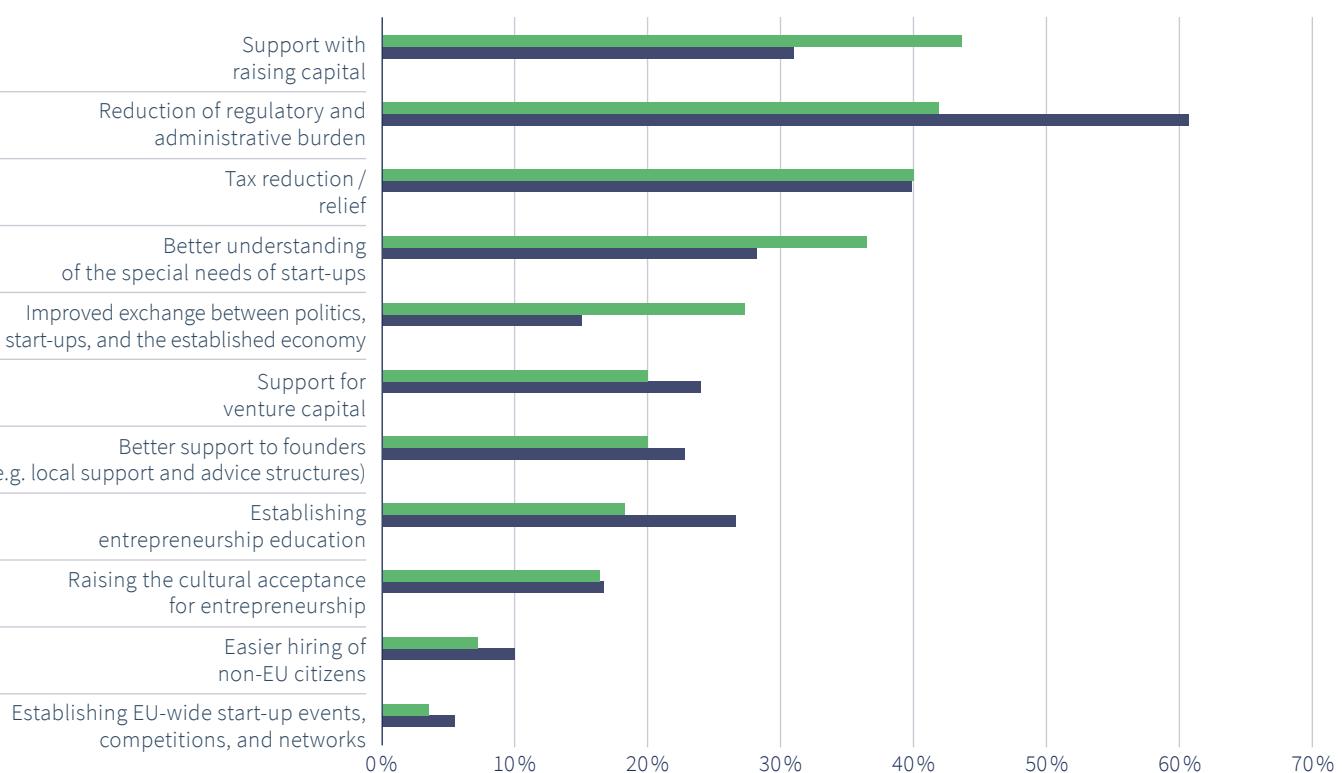


Based on a sample of 1251 non-green start-ups and 55 Cleantech start-ups

Start-ups' policy expectations

% Cleantech start-ups

% other start-ups



Based on a sample of 1224 non-green start-ups and 55 Cleantech start-ups

Top 10 Green Deals for 2016 and 2017

Investments in the form of financing rounds (so-called deals) in green start-ups and young enterprises are an important indicator of the market situation and trends in the green economy. To date, however, there has been no systematic recording of either national or international green deals. An analysis carried out in the context of the GreenUpInvest project closes this gap and systematically records all publicly known green deals in Germany from 2016 to 2017 for the first time. The ten largest deals are shown in the following overview.

#	Green Start-up	Deal sum (in EUR million)	Investment phase	Investors	Number of investors	Date
1	Sonnen GmbH	85	Growth	eCAPITAL Entrepreneurial Partners AG, Thomas Putter, SET Ventures, Munich Venture Partners, Inven Capital, GE Ventures, Envision Energy	7	10/2016
2	Heliatek	80	Growth	AQTON SE, BASF Ventures, eCAPITAL Entrepreneurial Partners AG, High-Tech Gründerfonds, Innogy Venture Capital, TUDAG, Wellington Partners, innogy SE, ENGIE, BNP-Paribas, CEE Group, EFRE-Mittel, EIB	12	09/2016
3	Lilium GmbH	76	Start-up	Tencent, LGT, Obvious Ventures, Frank Thelen, Atomico	5	09/2017
4	Volocopter GmbH	25	Start-up	Daimler AG, Lukasz Gadowski	2	08/2017
5	Thermondo GmbH	23.5	Growth	Global Founders Capital, Rocket Internet, E.on, Holtzbrinck Ventures, Investitionsbank Berlin, Picus Capital	6	05/2016
6	EcoIntense GmbH	22	Growth	One Peak Partners, Morgan Stanley Expansion Capital	2	05/2017
7	Thermondo GmbH	21	Growth	Vorwerk Ventures, Eneco, Holtzbrinck Ventures, Investitionsbank Berlin	3	11/2017
8	tado° GmbH	20	Growth	Inven Capital, Target Partners, BayBG, Siemens AG, Shortcut Ventures GmbH, Statkraft Ventures	5	04/2016
9	Heliatek	15	Growth	eCAPITAL Entrepreneurial Partners AG, innogy SE, Engie, BASF, BNP-Paribas, AQTON, Innogy Venture Capital, Wellington Partners, Asian family business, German family holding	10	10/2017
10	Kiwigrid GmbH	8-digit EUR amount	Growth	AQTON SE, innogy SE, LG Electronics	3	02/2017

Note: Due to the limited availability of publicly accessible information, this overview does not claim to be exhaustive.

In 2016 and 2017, a total of over EUR 367.5 million was invested in only eight green start-ups as part of the ten largest known German deals. Most of the companies were in the growth phase. Most investment took place in the green economy fields of energy efficiency and renewable energy. It is remarkable that the only two companies in the start-up phase are active in the area of sustainable mobility and deal with e-micrcopters or air taxis. This indicates a high degree of innovation but also an increased risk potential. Investors are predominantly (corporate) venture capital companies, followed by private equity investors and corporations. These are often investors whose portfolios focus on investments in the areas of Cleantech and energy (for example ECapital, innogy SE). However, conventional investors such as Rocket Internet or Daimler are also involved. The number of capital providers varies from two to twelve investors per deal.

In addition to deals concluded in Germany, international deals were recorded. The three largest identified green deals include an investment of over USD 1 billion in the e-vehicle manufacturer NIO from Shanghai. Ayla Networks, a provider of an Internet of Things platform from California, received a further USD 60 million. USD 50 million was invested in the Israeli e-mobility company Phinergy.

Information about all past and future deals concluded in Germany and internationally is published on the StartGreen start-up platform (www.start-green.net). This aims to improve market transparency for start-up teams and investors. Information on the methodology of the survey as well as sources of information will also be available there.

Conclusions and Recommendations

Start-up projects and start-ups that develop and offer products and services **with a high level of environmental benefits** have to be **supported in a more systematic and targeted manner**. It is only in this way that the pattern of stagnation regarding green start-ups in Germany can be broken and the potential of green start-ups for a transformation to a green economy can be fully utilized.

The **provision of capital** geared to target groups represents an important lever, which should be used to a greater extent by politics and business.

Between start-up sponsors, investors, and start-up teams, **there is a lack of transparency or a recognized basis for the assessment of sustainability**. This is shown by the results of the GreenUpInvest project.

The **manual for the sustainability assessment of start-ups** provides a new basis for such assessment. The manual was developed by the Borderstep Institute in cooperation with Forum Nachhaltige Geldanlagen (FNG) in the context of the GreenUpInvest project. The tool is accompanied by the analyses of the Top 10 green deals in Germany, which are to be published on a regular basis on the StartGreen start-up platform in future.

At the same time, **greater networking of green start-ups with politics and business must be achieved**. Green start-ups do a lot for Germany as a business location and for its environment, climate, and sustainability policy objectives. It is only through the increased visibility of these contributions that the full potential of young innovative enterprises can be realized. The **establishment of a new green start-ups working group at the Bundesverband Deutsche Startups (BVDS - German Startups Association)** in 2017 was an important milestone in this respect.

For 2019 and 2020, the Borderstep Institute and the German Startups Association are planning to organize a dialogue series with the support of Deutsche Bundesstiftung Umwelt (DBU - German Federal Environmental Foundation). Under the title 'Grüne Gründungen als Transformationsmotor stärken' ('Bolstering green start-ups as a transformation engine'), this series of events is intended to strengthen awareness among start-up funding players, as well as those responsible for economic and environmental policy with regard to green start-ups.

Green start-ups are an indispensable **transformation engine for Germany as a business location**. Tapping the environmental and economic potential of green start-ups should therefore be a key objective of future start-up support.

Further links

The platform for the green start-up scene:

www.start-green.net

Borderstep Institute for Innovation and Sustainability:

www.borderstep.org

German Startups Association:

www.deutschestartups.org

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With the support of Marianne Lotz

Citation note

Reference to this paper should be made as follows:

Trautwein, C., Fichter, K. & Bergset, L. (2018).

Green Economy Start-up Monitor 2017. Berlin, Oldenburg: Borderstep Institute and University of Oldenburg.

Imprint

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Gefördert durch:



aufgrund eines Beschlusses
des Deutschen Bundestages