TECHBBQ
//IMPACT SERIES

Mapping the Danish Cleantech Startup Ecosystem

Understanding the economic potential of the Cleantech sector and challenges facing new Cleantech ventures

ERHVERVSSTYRELSEN

+impact by Danske Bank

TechBBQ is a non-profit organization that arranges Scandinavia's largest startup, innovation and tech summit. In 2019 we brought 8000+ attendees together, and in 2021 we are aiming to repeat the success during the 16th and 17th of September at Øksnehallen, located in the heart of Copenhagen. This includes Danish, Nordic and International Entrepreneurs, Investors, Innovators, Startups, Talents, Institutions, Associations, Journalists and Corporates, who use TechBBQ to explore new opportunities.

Suggested citation
Escalona, Christopher M. (2021) Mapping the Danish Cleantech Startup ecosystem: *Understanding the economic potential of the Cleantech sector and challenges facing new Cleantech ventures*. TechBBQ 2021.

Author
Christopher M. Escalona, Project Manager – Sustainability & Impact, TechBBQ

Research Assistant
Harry Justus, Research & Analysis Manager, TechBBQ

Content Advisors
TechBBQ Project Department:
Christopher M. Escalona, Harry Justus

Partners
Danish Business Authority
+impact

Project team
Project Manager & Research lead:
Christopher M. Escalona
Research Assistant & Editor:
Harry Justus
Brand identity:
Valeria Prada
Design, layout & illustrations:
Tobias S. Mikkelsen, WhatWeDo Copenhagen

Important notice

This report has been produced with the financial support from the Danish Business Authority, and forms part of a larger partnership that aims at promoting startups that create environmental solutions, as well as new innovative ideas for the creation of a more sustainable tomorrow. We would like to thank the Danish Business Authority for making this work possible.

Christopher M. Escalona has prepared the report from data and analysis based on publicly available data from Statistics Denmark, A TechBBQ partnership with the Danish Board of Business Development and desk-research with the aid of Harry Justus. No guarantee is given to the accuracy, reliability or completeness of the presented content, including any conclusions or inferred judgements by the involved parties. No acceptance of liability nor responsibility for the accuracy, omissions or errors in the content of this report is given. The views expressed are based on the author's judgement at the time of publication, and may be subject to change.

The contents of this publication are intended for informational and educational purposes, and are not constituted as legal, investment or policy advice. TechBBQ strongly encourages that acting upon the information contained herein is not taken without first obtaining professional advice.

Content

Executive summary

1.

The Danish Cleantech sector has a net positive impact on economic growth, with exports totalling 81 billion DKK and a higher aggregate productivity rate than the economy's baseline, with 18,000 DKK more in added value per worker per year (2018 data).

Cleantech is a diverse sector that includes manufacturing, construction, energy, agriculture, water supply and knowledge-based services contribute to a high export rate (6.7% of total exports), job-creation and innovation. The global increase in the demand for Cleantech, fostered by heightened political attention on climate change, signals a high chance for Denmark to maintain this positive trend. Elements that point to this include that investments in clean energies have remained stable and resilient (37% share of total global investments) despite the economic downturn caused by the COVID-19 pandemic.

Figure 6. Total exports of environmental products and services

Calculations: TechBBQ · Data source: Statistics Denmark.

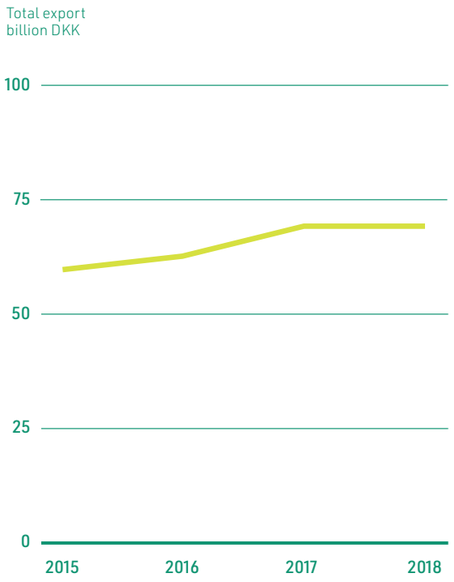
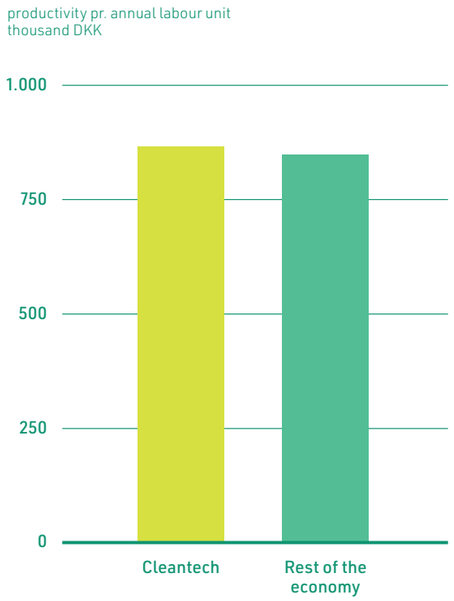


Figure 9. Productivity (2018)

Calculations: TechBBQ · Data source: Statistics Denmark.

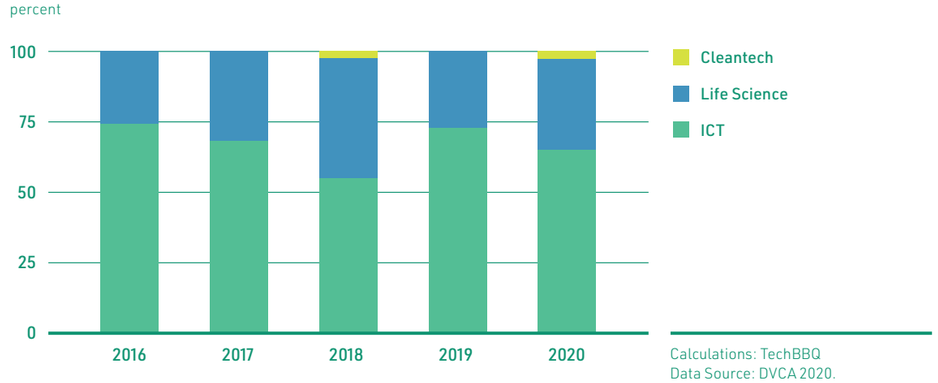


2.

Continued development of Cleantech is dependent on significantly increasing risk-willing capital, such as venture capital, and public support schemes which target early R&D processes and technological development.

The currently low degree of venture capital investments in Cleantech, combined with decreasing public funding, an incoherent technological pipeline, and a lacking overview of the Cleantech startup ecosystem all play a significant part in negatively impacting the potential for reaping Cleantech's economic benefits. Some of these challenges have less to do with the actual financial potential of Cleantech, and more with a lack of investment coherence between the Cleantech model and the traditional venture capital investment strategy, information lags, and an opaque overview of new and existing Cleantech startups.

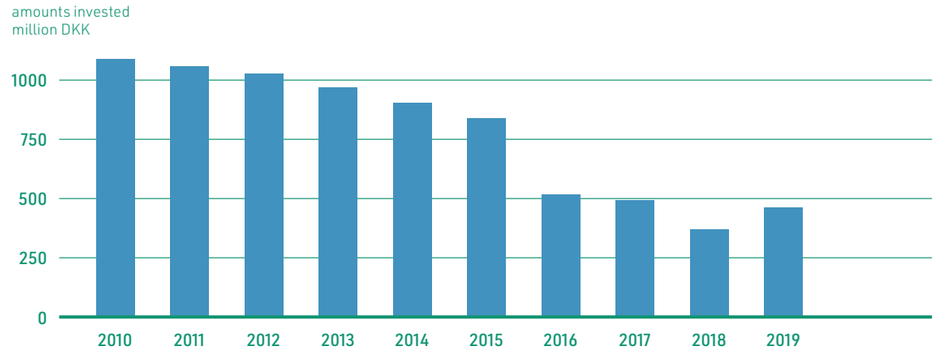
Figure 11. Distribution of venture capital investments in Denmark



Calculations: TechBBQ
Data Source: DVCA 2020.

Figure 16. Public investments in energy technologies

Adapted from Monitor Deloitte (2017); WWF (2017) & Energiforskning.dk.

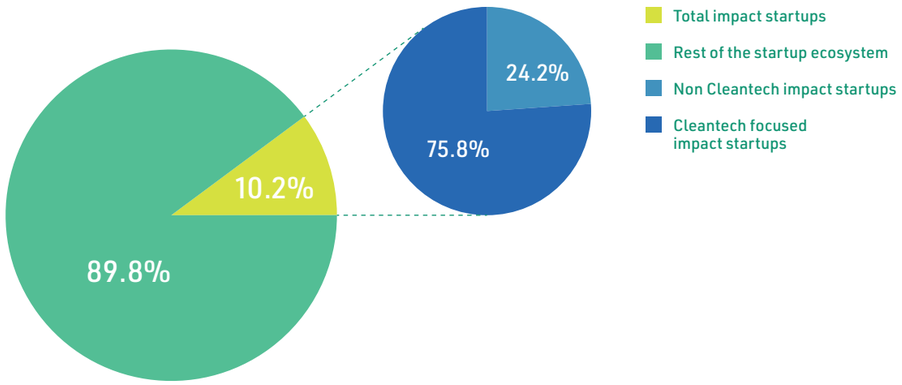


3.

Danish Cleantech startups target multiple and intersecting SDGs and showcase a higher degree of professionalism in relation to sustainability than traditional and non-Cleantech startups. Yet many are still in the seed stage of their growth journey.

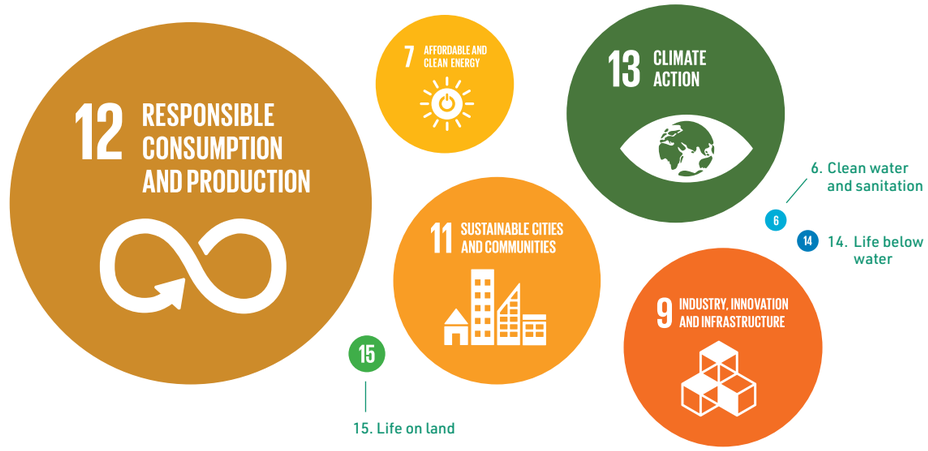
Our initial mapping of the Danish Cleantech startup ecosystem found that the most relevant Sustainable Development Goal (SDG) for startups is Responsible Consumption and Production (SDG 12), with Climate Action (SDG 13) being the most prevalent secondary SDG target. Most Cleantech startups also seem to exhibit a core-orientated approach to impact creation (70%), whereas non-Cleantech impact startups primarily have a side-orientated impact approach (74%). Cleantech startups have a tendency to embrace a manufacturing orientated business model (52%), followed by SaaS (27%), a finding that fits well with existing data. Our analysis also supports the finding that there is currently a lack of Cleantech focused investments. Most Cleantech startups still require early and risk-willing capital (59% in seed stage); as such,this finding indicates challenges to the continuous growth and support of necessary technological innovations.

Figure 18. Startup ecosystem · impact vs. non-impact



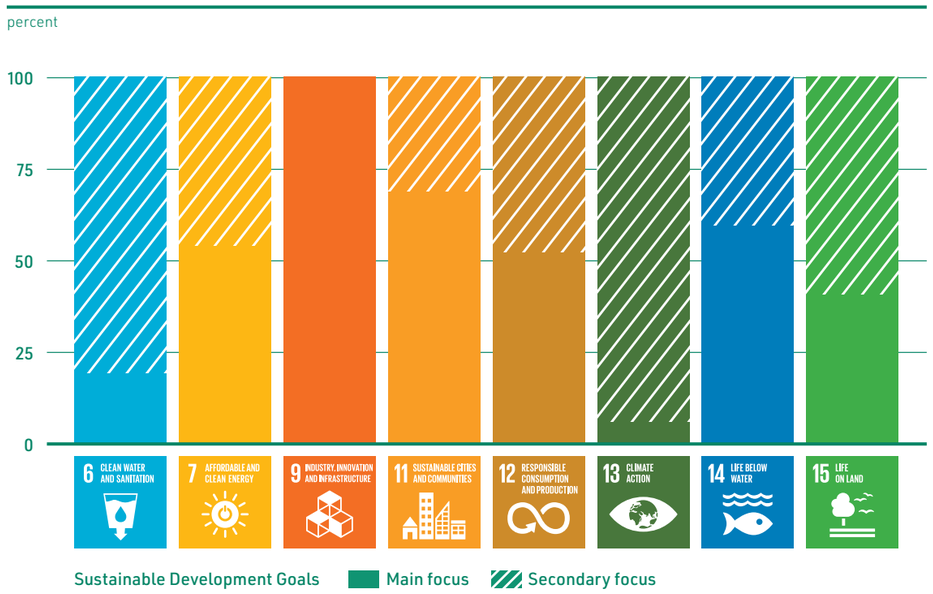
Calculations: TechBBQ · Data source: TechBBQ Startup Database Project.

Figure 19. Cleantech area



Calculations: TechBBQ · Data source: TechBBQ Startup Database Project.

Figure 20. Cleantech startups: main/secondary focus



Calculations: TechBBQ · Data source: TechBBQ Startup Database Project.

Introduction

2015 was a turning point in the pursuit of sustainability . With the unanimous adoption of the UN Sustainable Development Goals (SDGs), sustainable development took center stage on the global political scene. It cemented the urgency of taking swift and immediate action towards ensuring a brighter future for all life on Earth..

Today, it is abundantly clear that climate change – rapid change of ecosystems and rampant environmental degradation – are facts and consequences of modern life. For far too long, we have under-prioritised or ignored fixing the cracks and mitigating the negative environmental impacts driven by industrial production and the over-consumption of increasingly scarce natural resources.

However, times are changing. We are now learning that sustainable development is not only a social necessity, but an incredible economic opportunity. New business models and organisational structures, such as impact startups, and investment strategies that place sustainability at the center are quickly emerging. These trends are no different for the tech ecosystem, which for the past decade has witnessed technological innovations within the field of clean energy and water technologies, resource optimisation, waste management and circular economy. Such trends, normatively known as Cleantech,[1] hold promise for mitigating negative environmental impacts while promoting sensible and balanced economic development.

This report seeks to investigate how such economic benefits can be harnessed, by understanding the larger context that the Cleantech sector currently plays in the Danish economy. We will explore the challenges the sector faces, as well as how the greater startup ecosystem is interwoven in these considerations and developments. TechBBQ actively works towards fostering support for the

> **Sustainable development is not only a social necessity, but an incredible economic opportunity.**

Nordic startup ecosystem; uncovering the power, composition and sustainability considerations of Cleantech startups is one way we aim to contribute to the sustainability agenda.

By providing industry insights into the fabric of Cleantech as a whole, we seek to clarify and elevate the discussion regarding the potential that this sector holds for continued economic development. Secondly, we seek to frame the potential for Cleantech in a larger context by investigating the challenges

[1] Cleantech and Greentech tend to refer to the same industries, and in many cases they are used interchangeably. For this report we use the phrasing Cleantech, as it refers more clearly to technological improvements and effects for a clean future. That is, "clean" more clearly signals environmental impacts, such as 'clean water, clean air' whereas green is, in our opinion, more vague and lacks conceptual clarity, along with being prone to so-called "greenwashing".

that currently exist and inhibit progress. Here, we examine data on investments made in Cleantech as well as questioning whether the traditional investment paradigm is an adequate fit for organisations that seek to create hybrid and sustainable value. Lastly, the report provides a refined look at the intricacies and characteristics of Cleantech startups. Our intention herein is to create transparency and support Cleantech startups to reach their full potential.

Methodological considerations

Data for this first part of the analysis has been collected through Statistics Denmark's[2] datasets on national accounts and government finances and environmental-economic accounts. Analyses are therefore dependent on the available data.

Data for the last part of the report is provided by our 'Startup Database' project, which is being developed by TechBBQ with support from the Danish Board of Business Development. The Database project is focused on establishing a database of the Danish startup ecosystem through sourcing publicly available data. As this is TechBBQ's first mapping of its kind, our methodological approach is still in its infancy. We've approached data with a critical mind-set and as such are aware that information in relation to the characteristics of startups quickly shifts, entailing that not all data-points used for this mapping process might be a hundred percent accurate. Moreover, our encapsulation of data takes all currently existing startups and scaleups into consideration, regardless how long they have existed. For some, this might signal methodological inadequacy, in relation to their conceptualisation of what a startup is. Lastly, our mapping allows us to evaluate the current state, focal point and composition of the Cleantech startup sector. However, it does not say anything specific about the potential nor actual impact that Cleantech startups create. From this we infer that the sector has a high possibility for the potential creation of environmental impacts.

Who would benefit from reading this report?

We envision that this report will be beneficial for stakeholders that work in the investment landscape, such as business angels and other investors who are potentially interested in Cleantech. Moreover, the insights herein could also prove useful for NGOs and non-profit organisations that work with promoting, developing and supporting Cleantech ventures. Lastly, government bodies that work with promoting businesses, providing financial aid, and supporting development and implementation of business policy will also find the results interesting.

[2] Statistics Denmark is the main institution responsible for creating statistics on the Danish society, for example employment statistics, trade balance and demographics - Statistics Denmark (2020).

What is Cleantech?

Cleantech refers to a conglomeration of industries, sectors, verticals and companies/organisations that strategically focus on developing and producing goods and services that significantly reduce negative environmental impacts (Jensen et. al. 2020). This is achieved through different technological processes and procedures that focus on either protecting the environment or minimising the usage of scarce resources, such as materials and energy (IDA 2018). Some of the areas where said technological processes are constituted e.g. include the promotion and development of energy efficiency technologies, circular production processes,[3] and reusable products. The Cleantech umbrella also covers the adoption and implementation of renewable energy sources such as wind and solar power, bioenergy and smart grid systems, often taking a particular focus on systems integration[4] and supply chains (Cleantech Cluster 2019).

For obvious reasons, this broad conceptualisation makes Cleantech extremely difficult to pin down to one singular entity. Cleantech should therefore be understood as an umbrella term that accounts for multiple intersecting approaches and technologies that work together to support and promote sustainable development, with emphasis on reducing negative environmental impacts. However, this broad conceptualisation still poses some challenges in terms of compartmentalising and promoting Cleantech as a whole.

Industries that play a major role in Cleantech[5]

- Information and communication technologies (ICT)
- Machinery, manufacturing and chemicals
- Transportation and logistics
- Agriculture and food
- Energy and power

Without a clear idea of what Cleantech actually is, it can be difficult to direct financial and research resources to the right areas, as well as hindering the development of policies conducive to the sector. Moreover, a lack of clarity can inhibit effective communication and knowledge transfer, simply because a difference in understanding and associations with Cleantech will vary across different actors (Onen 2016). Creating a clearer conceptualisation of what Cleantech is – and is not – could therefore increase a targeted focus on supporting the right technologies and promoting the necessary industries and sectors.

[3] A regenerative model for production, which seeks to optimise resource usage and minimise waste creation by extending the life cycle of their products or use 'wasted' resources as production inputs.
[4] Refers to the process of combining and planning the operation and delivery of energy across multiple energy sources and geographical positions. The goal is to create and deliver reliable and effective energy services with minimal to non negative environmental impacts.
[5] Defined by Cleantech Group.

The formation of Danish Cleantech

In Denmark, Cleantech did not become a strategic and professional cluster before the 1990's (Ministry of Climate and Energy 2016). The process started through multiple cross-sector partnerships that combined efforts across entrepreneurial, industrial and educational institutions, leading to the formation of regional cluster organisations throughout the country. While Cleantech was becoming professionalised, it was rather fragmented in its early stages. Cleantech Cluster was formalised in 2014, and strategic development across all regions became consolidated under the leadership of this one organisation (Cleantech Cluster 2019).

Throughout 2016 and continuing through the present, Cleantech Cluster has been one of the key organisations supporting the development of Cleantech ventures and technologies, and has worked towards supporting business promotion, innovation, job creation and internationalisation.

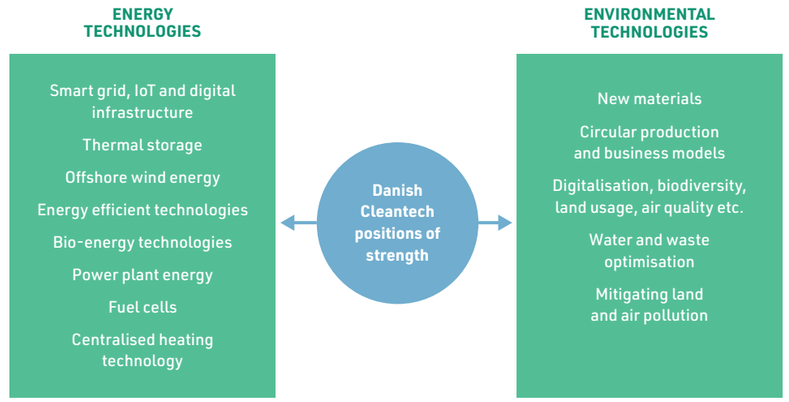
Today, Cleantech is heavily focused on so-called "Triple-Helix" partnerships, which involve collaboration across research and higher educational institutions, private organisations and public institutions (Razak & White 2015). This specific combination of forces has been said to increase the transferability of technological capabilities and knowledge across sectors. This is primarily possible thanks to the Helix model's blurring of the traditional boundaries between each sector. For instance, Triple Helix approaches have greatly increased the role of universities and research laboratories in commercial activities, while businesses engage more with the academic research and development processes.

Along the way, several other activities have also been established that contribute to strengthening the collaborative efforts between important actors within Cleantech. On a national level, these include conferences, networking activities, fundraising, establishing and managing partnerships, as well as supporting both startups and more mature ventures with business development and export strategies (Cleantech Cluster 2019, State of Green 2020).

Danish positions of strength within Cleantech

With the increased focus on promoting Cleantech as a whole, two main features appear to be the economic driving force for Danish Cleantech. Several reports[6] highlight that our position of strength is to be found in two main areas: 1) Energy technologies and 2) Environmental technologies, the specifics of which are outlined in more detail in Figure 2.

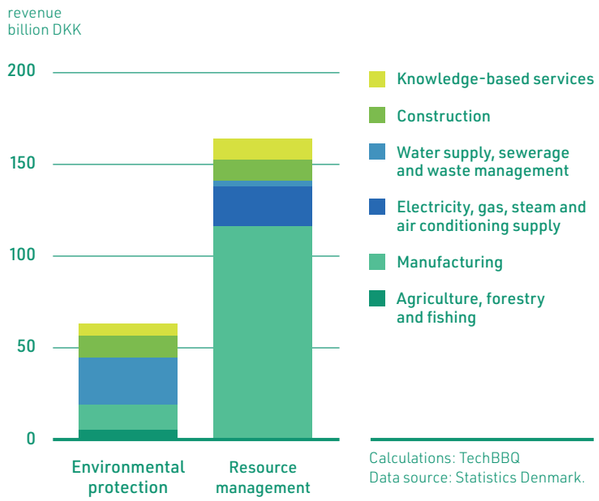
Figure 2. Danish Cleantech positions of strength



Cleantech Cluster - Clean 2019 & Monitor Deloitte (2017).

[6] IDA (2018); Monitor Deloitte (2017); Ministry of Climate and Energy (2016).

Figure 3. Cleantech total revenue (2018)



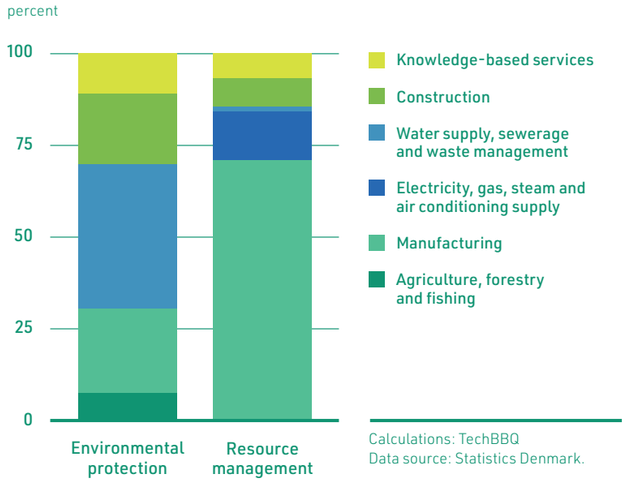
What constitutes our 'positions of strength'?

As Cleantech is cross-disciplinary and cross-sectoral in nature, identifying specific positions of strength can be a difficult endeavour. The above mentioned areas have, according to Cleantech Cluster, been identified through a sample of several macro-economic indicators that are deemed important for socio-economic development. These include, but are not limited to, data regarding job creation, total revenue, growth and productivity rates, exports and contribution to GDP.

By looking at Cleantech's total revenue for 2018, as an example, it becomes clear that the largest area of economic activity lies within the field of resource management, with a total of 164 billion DKK. In contrast, endeavours that target environmental protection only account for 64 billion DKK (see figure 3).

Manufacturing is by far the single largest contributor to economic activity across Cleantech as

Figure 4. Cleantech total revenue distribution (2018)



a whole with an total revenue of 130 billion DKK. Next follows water supply, sewerage, and waste management with 27 billion DKK; construction with 24 billion DKK; and electricity, gas, steam, and air conditioning supply with 21 billion DKK. At the bottom we find knowledge-based services with 17 billion DKK, and agriculture, forestry and fishing with 5 billion DKK.

However, if we instead look at the proportional size of each industry across both Cleantech fields the picture is a bit different. As illustrated in Figure 4, manufacturing is still the predominant contributor within the field of resource management, whereas the distribution seems more balanced and diverse within the field of environmental protection.

The largest contributor for the latter is water supply, sewerage and waste management (39%). A significant difference from the industry's contribution within Resource management (2%). The only industry that appears to have a comparable and somewhat balanced contribution across both Cleantech fields is knowledge-based services, with a differentiation of 5% between environmental protection (11%) and resource management (6%).

Even though resource management as a field accounts for the largest total revenue, mostly associated with manufacturing ventures, it is prone to higher risks and negative impacts due to the lack of diversification. On the other hand, the field of environmental protection appears more resilient and would adapt better to potential negative developments in the future.

In the next segment, we will delve into some particular aspects of the Cleantech sector and their impact on Danish economic development. Some of the factors that we will look into include Cleantech exports, GDP, employment and productivity data, as well as value added.

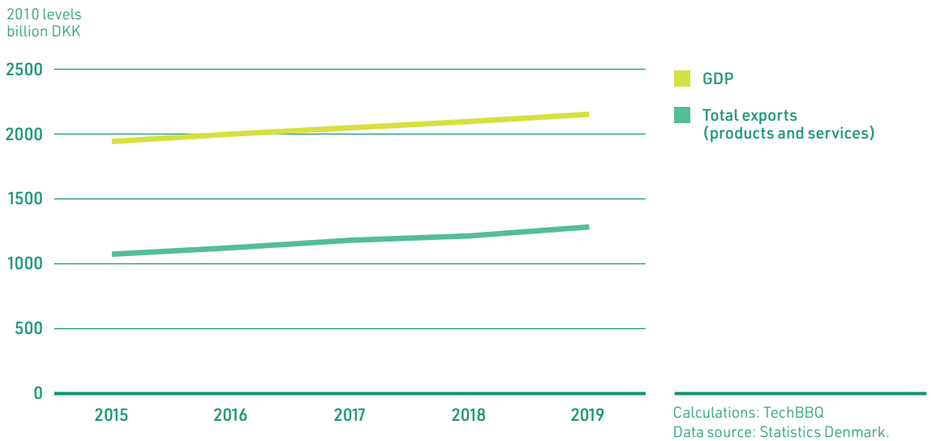
The economic performance of Cleantech in Denmark

As Denmark is an open economy, its economic growth is highly dependent on external developments in the global market and their effects on the ability of Danish companies to engage in international trade of goods and services. As such, export data serves as a good indicator for diagnosing the development of Danish businesses and their ability to contribute to prosperity through trade and employment. For this reason, it is interesting to look at the total share of exports in relation to GDP, and secondly to investigate the proportional size of Cleantech in relation to those total exports. By understanding these data, it becomes easier to understand the propensity and importance of Cleantech as an economic driver.

GDP and exports

As shown in Figure 5, Denmark's GDP and total exports have been steadily increasing since 2015, indicating strong economic performance. In 2019, Denmark's GDP totaled 2.15 trillion DKK, whereas total exports accounted for 1.27 trillion DKK. With a total share of 59% of GDP, exports play a significant role in maintaining and developing economic activity through trade and employment, highlighting that Denmark's growth in the global economy is dependent on external factors. A continued strategic focus on supporting the internationalisation of Danish business therefore seems to have significant empirical backing.

Figure 5. Inflation corrected prices



Calculations: TechBBQ
Data source: Statistics Denmark.

With a total share of 59% of GDP, exports play a significant role in maintaining and developing economic activity through trade and employment

Figure 6. Total exports of environmental products and services

Calculations: TechBBQ · Data source: Statistics Denmark.

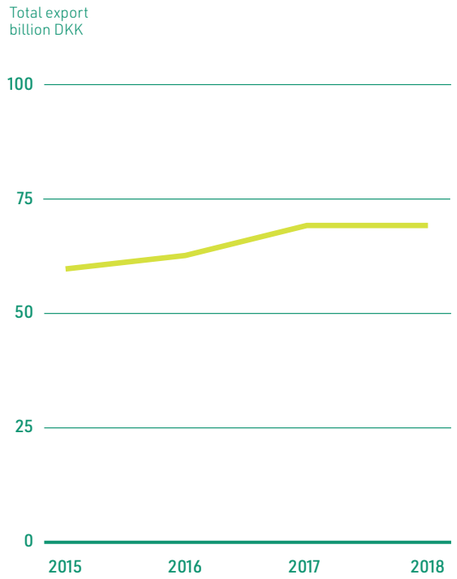
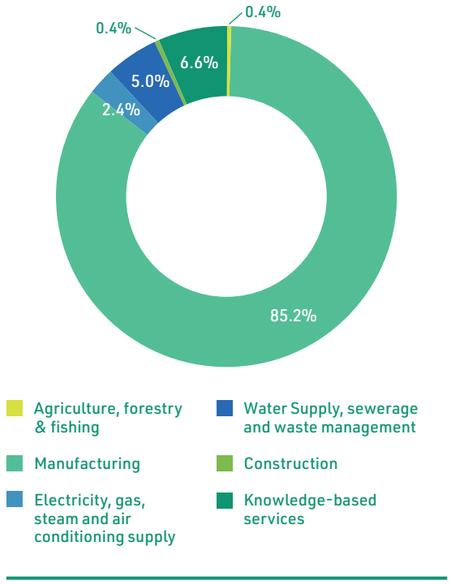


Figure 7. Sectoral breakdown of Cleantech orientated exports (2018)

Calculations: TechBBQ · Data source: Statistics Denmark.



Cleantech orientated exports

Figure 6 showcases that exports within environmental products and services have steadily been increasing since 2015, although this trend has leveled off slightly between 2017 and 2018. Danish export-focused Cleantech ventures therefore appear to have managed to follow suit with the general trend of export increases, and as such contributed to increased prosperity and economic activity. However, there is still room for improvement, as the increase in growth rate from 2017-2018 was lower (0.3% increase) than the average for the rest of the Danish export market (5% increase).[7]

Denmark's total export market is worth 1.27 trillion DKK, close to 7% of which can be directly attributed to Cleantech ventures, with an estimated value of 81.3 billion DKK. On a sectoral level, most of that 81.3 billion DKK can be attributed to industrial manufacturing ventures that make up 69.3 billion DKK in exports (Figure 7). This is equivalent to 85% of total Cleantech orientated exports, making manufacturing one of the most important industries in the Danish Cleantech market.

The second and third largest export areas are to be found in knowledge-based services with a total of 5 billion DKK and water supply, sewerage and waste management with a total of 4 billion DKK (Figure 7). This is rather interesting when considering that knowledge-based services rank fifth on total revenue.

We can therefore conclude that a higher proportion of total revenue for knowledge-based services appears to be more export-oriented than other Cleantech industries such as agriculture, forestry, and fishing. Electricity, gas, steam and air conditioning supply also lag behind knowledge-based services in this area. From a policy perspective, this could indicate that heightened focus should be placed on further strengthening knowledge-based services' role within export markets, as it would require fewer resources to develop than other Cleantech industries.

The sectoral breakdown therefore points to the fact that even though manufacturing is Denmark's largest export area in Cleantech, opportunities to develop diversification should be taken, as these could produce increased growth. In particular, knowledge-based services could have positive economic impacts in the future, as the development of new technologies and the popularity of digitalisation continue to rise.

[7] Calculations:TechBBQ. Data source: Statistics Denmark.

Cleantech: value added

This segment investigates the actual added value of Cleantech for the economy. Examining exports yields important information in relation to the value of Cleantech; however, it does not quantify or take into account the actual added value. Exports only account for the amount of sold goods/services to other countries, and not the expenses and costs attributed with the production of said goods/services. Therefore, by subtracting expenses accrued in relation to production, we arrive at a more realistic and nuanced understanding of the actual addition of value produced by Cleantech ventures.

Figure 8 illustrates the share of Cleantech jobs, calculated as annual labour units, in relation to the rest of the Danish economy.

With 74,886 annual labour units, Cleantech accounts for 3.5% of the economy's roughly 2 million annual labour units. In 2018, the sector's added value was an estimated 64,8 billion DKK. This is the equivalent of 3.6% of the economy's total added value of 1.8 trillion DKK. From this data, we can deduce that the sector's productivity is higher than its proportional share of the labour market, and therefore has a net positive impact on economic development.

Figure 9 illustrates in more detail the specifics of this impact by looking at the sector's productivity per annual labour unit and comparing it to the economy's baseline productivity per annual labour unit.

With an estimated added value of 865,000 DKK pr. annual labour unit, Cleantech appears to be slightly more productive than the economy's baseline, which accounts for 847.000 DKK pr. annual labour unit. In other words, each worker employed in Cleantech, on average, produces roughly 18,000 DKK more in value per year than the aggregated worker baseline. If the labour market had the equivalent added value per worker as Cleantech, Danish economy's value addition would be 2% higher.

Figure 8. Employment (2018)

Calculations: TechBBQ · Data source: Statistics Denmark.

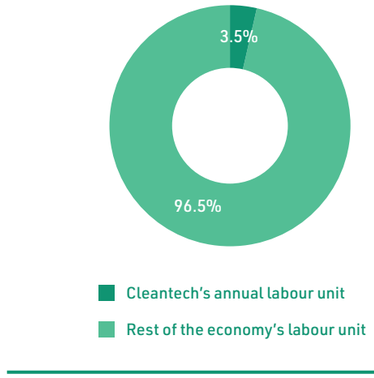


Figure 9. Productivity (2018)

Calculations: TechBBQ · Data source: Statistics Denmark.

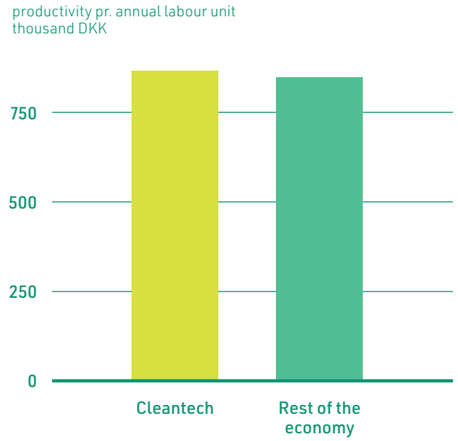
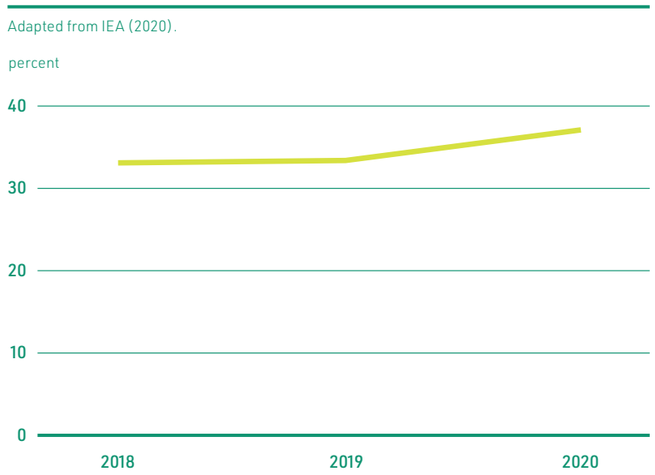


Figure 10. Share of investments in clean and energy efficient technologies in relation to global investments



Cleantech: a strong economic driver

By being a somewhat diversified, productive and growing business sector as shown in the above data, the Danish Cleantech sector is evidently an important economic driver within the realm of sustainability, as it contributes to increased prosperity while simultaneously promoting and securing environmental action on a global scale. Moreover, there are several arguments and evidence for why Danish leadership must be maintained, which are covered in this part of the report.

On a larger scale, there is a strong case for continuing to support the development of Danish Cleantech ventures, as the focus on climate change mitigation becomes a centerpoint of global policy with increased demand for and investment in cleaner technologies following suit. Recent data from the International Energy Agency (IEA) shows that investments in clean and energy efficient technologies accounted for 37% of total global investments in 2020 (Figure 10), signalling that investments in these areas have remained resilient, even during the COVID-19 pandemic and its consequent economic recession.

Such developments seem to be growing in popularity. Heightened global attention on climate change and its negative impacts on social and economic prosperity have led to efforts to enact new regulatory and policy frameworks. A significant number of countries have already taken action towards decoupling greenhouse gas emissions from growth (OECD 2015) through public sector planning, carbon-pricing and taxation, as well as the development of new climate policies aimed at implementing and mandating climate adaptive and mitigative measures.

> **focus on climate mitigation, resource optimisation and demand for cleaner technologies are on the rise**

Several empirical studies indicate support for the progression discussed above. The number and degree of policies designed to regulate or mitigate climate change, GHG emissions, and environmental degradation have increased sharply in recent years. Examples at the national and international levels include a total of 1,600 successfully enforced policy interventions (by 2015) (Mundaca et. al. 2019) and the adaptation of the European New Green Deal, which mandates climate neutrality for the EU by 2050 (Climate Action - European Commission 2020).

At the city level, The Global Covenant of Mayors for Climate and Energy had by 2017 registered policy commitments from 7,500 cities, governing a total population of 681 million people (Mundaca et. al. 2019). Moreover, data reported to CDP-worldwide, a non-profit that runs a global disclosure system enabling cities, regions, companies and investors to manage environmental impacts, highlighted increases in implemented emission reduction activities across various cities, with 60% of such activities taking place in the realm of technology and infrastructure investments (Ibid).

Lastly, in 2019 we witnessed commitments, from 882 European companies that collectively emit 2.3GtCO_2e, towards low-carbon investments for an estimated value of 923 billion DKK in the areas of energy, transportation and materials/manufacturing (CDP-worldwide 2020).

All of these examples highlight two important developments. The first is that focus on climate mitigation, resource optimisation and demand for cleaner technologies are on the rise. The second is that if the right policies and support mechanisms are set in motion, there is a strong empirical case for maintaining Danish leadership within Cleantech, which by extension would contribute positively to economic growth through increased trade, investment, and job creation in the years to come.

The challenge Danish Cleantech faces in the future therefore appears not to be a sudden political circumvention in relation to the importance of mitigating climate change and environmental degradation, which would cause a decrease in demand for cleaner technologies. Rather, the challenge lies in not meeting the potential of Denmark's already leading role in Cleantech through a lack of investments, policies and strategic market incentives that would otherwise ensure its competitive advantage.

Known policy instruments for supporting climate change mitigation and environmental degradation

Mundaca et. al. (2019).

Economic
- Subsidies
- Public grants and loans
- Rebates
- Carbon tax and pricing
- Emission trading schemes
- Tradable green certificates

Regulatory
- Emission standards
- Performance and industry standards
- Auditing
- Binding legislation
- Quotas

Information-based
- Campaigns
- Education
- Labelling schemes
- Awareness raising
- Certifications

Voluntary
- Voluntary agreements
- Emission reduction targets
- Energy saving programmes
- Corporate governance
- Meeting sectoral targets

Challenges facing Cleantech

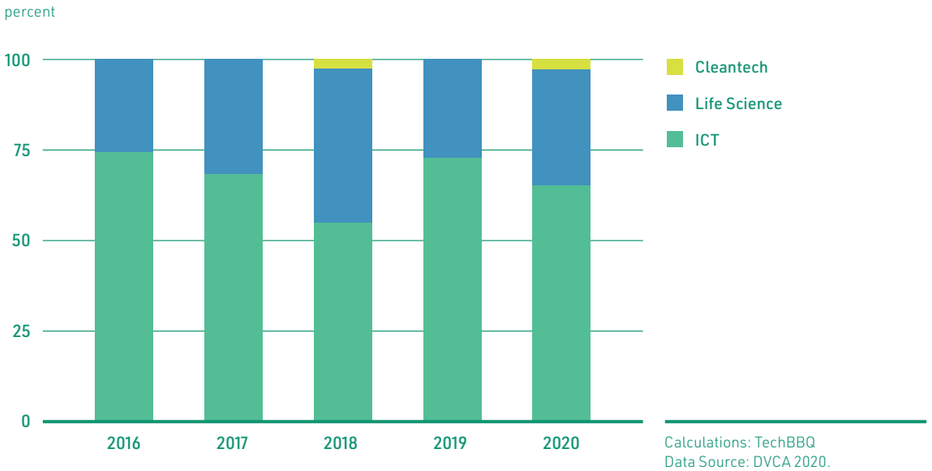
Current available data indicates that there are significant challenges inhibiting the full realisation of Danish Cleantech ventures. These challenges include a lower degree of investments by Venture capital foundations (VC's), declining public support schemes, and a lack of a broader overview and understanding of new investments opportunities, such as impact-orientated startups. The next segment of the report will provide a brief look at some of the most urgent challenges, namely:

Low degree of venture capital investments in new/early-stage Cleantech ventures

Venture capital investments target late stages of pre-commercialisation

Lack of conceptual clarity within Cleantech

Figure 11. Distribution of venture capital investments in Denmark



Calculations: TechBBQ
Data Source: DVCA 2020.

Low degree of venture capital investments in Cleantech

Data on investments[8] made by Danish VC's highlight that between 2016-2020, Cleantech-targeted investments have accounted for only 21 out of the 276 total investments that have been made. This is equivalent to a 7% share of total investments, which is significantly lower than Life Sciences with a 18%, or ICT with a 62% share of total investments.

Figure 11 showcases the financial distribution of venture investments across Cleantech, Life Science and ICT for the past five years. It clearly shows that the two most dominant investment areas are ICT with an aggregate value of 6 billion DKK, and Life Sciences, with an aggregate value of 3 billion DKK.

In both 'amounts invested' and 'times an investment was made', new Cleantech ventures appear to be less popular and therefore less targeted, which signifies a potential risk to supporting the future development of the Danish Cleantech sector. Without enough capital input, the development of new technological innovations will simply slow down, leading to a potential decrease in aggregate productivity, employment, and exports, thus negatively impacting Denmark's competitive advantage.

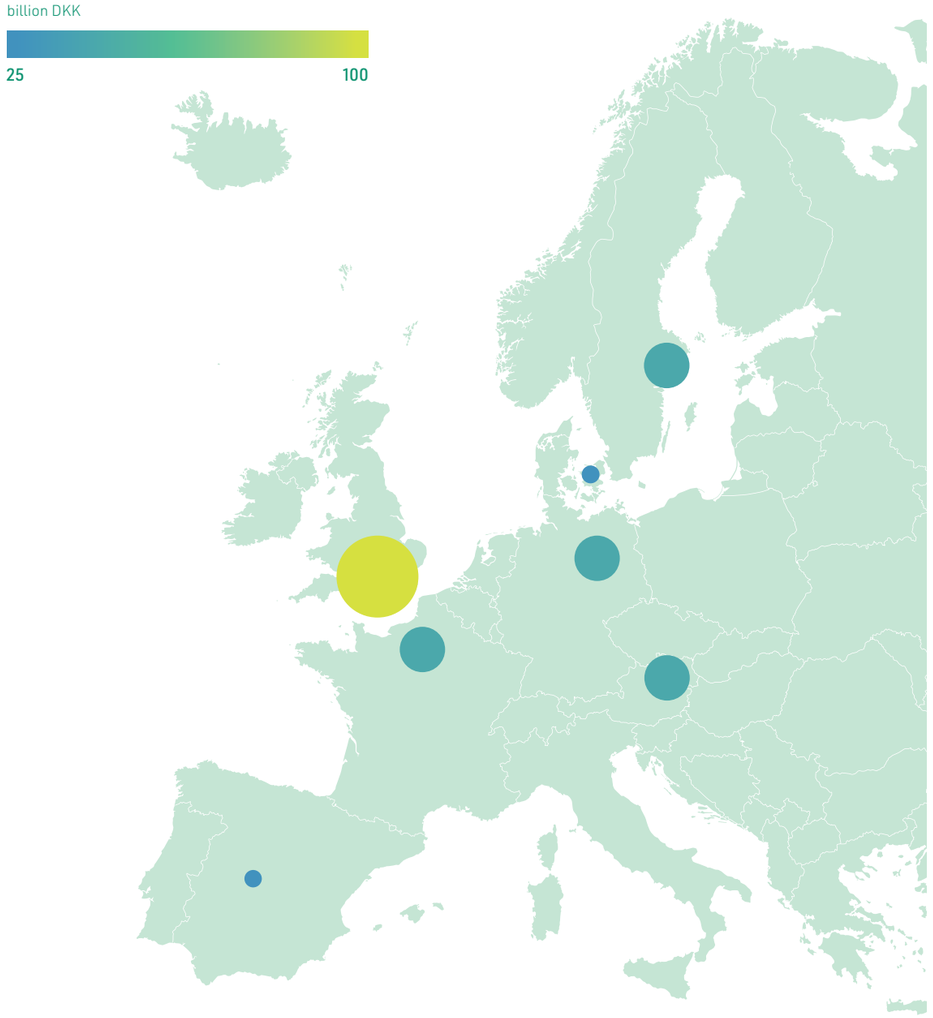
However, it is important to take into account that the Danish VC industry is smaller than both in the U.K. and Sweden. In 2019, investments ranged between 37-143 billion DKK for London, and 7-37 billion DKK for Stockholm (EY 2020), dwarfing the Danish level of 4 billion DKK for the same year (Vækstfonden 2020).

A smaller VC market correlates with the level of investment compartmentalisation, entailing that the low level of investments within Cleantech are not solely dependent on the interest from investors. They also could be impacted by the size of the VC industry itself. With the Danish VC industry growing (Ibid), the propensity for ICT or Life Science investments might take a step back, as more industry-specific VC's are formed, competition rises, and screening processes become even more professionalised, leading to better decision-making.

Moreover, Life Sciences and ICT might have a higher probability of acquiring VC investments simply because the ROI is higher for these industries, than it is assumed it would be for new Cleantech ventures. Research carried out by MIT seems to support this hypothesis. In a study that specifically targeted venture capital and Cleantech, researchers found that between 2006 and 2011, investors accrued high costs and low returns in comparison to other industries (Gaddy et. al. 2016).

[8] Danish Venture Capital and Private Equity Association - There is discrepancy in the available data as A) Not all investments made are publicly accessible, and B) The classification used for ICT sometimes covers investments made in Healthtech (which is a Life Science industry) or environmental SaaS solutions (which is a Cleantech industry). ICT investments are therefore, to some extent, inflated.

Figure 12. Top European cities for venture capital investments



Data source: EY 2020.

SOLUTION

Growing focus on impact and realigning investment purposes

A potential solution to combat this asymmetry would be to acknowledge that the venture capital business model is not the best fit for Cleantech orientated investments, as risks, rate of returns and temporal frames between them are at odds with each other.

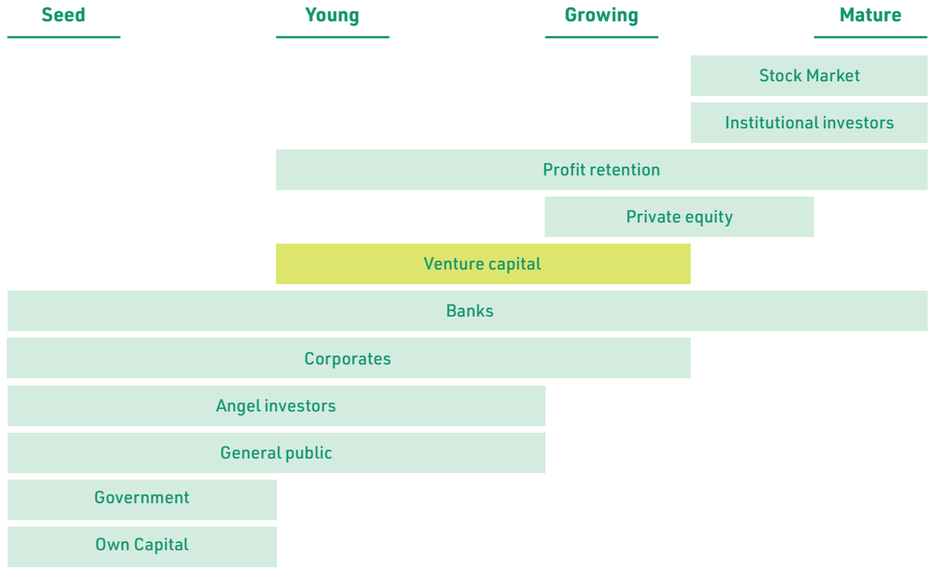
As such, this calls for a divergence in the investment landscape, by e.g giving rise to A) more 'patient capital' and B) more industry-specific investors, i.e 'smart capital', demarcated by the increased popularity of impact investing, which by 2019 had an estimated market worth of $2.1 trillion in the U.S. alone (USSIF 2020). In other words, impact investment yields financial and non-financial value; as such, Cleantech ventures make good impact investment cases, as they typically produce environmental benefits as well as financial gains. Figure 13 gives an overview of the impact investing spectrum.

Figure 14. Impact investing spectrum

Traditional Investing	Responsible Impact Investing	Sustainable Impact Investing	Thematic Impact Investing	Impact First Investing	Philanthropy
COMPETITIVE RETURNS	ESG RISK MANAGEMENT	ESG OPPORTUNITIES	MAXIMUM-IMPACT SOLUTIONS		
Seeks financial returns of Environmental, Social or Governance (ESG) factors	Investments are screened out based on ESG risk	Sustainability factors and financial returns drive investment selection	Targeted themes and financial returns drive investment selection	Social and environmental considerations take precedence over financial returns	Financial returns disregarded in favour of social and environmental solutions
	NEGATIVE SCREENS Tobacco Alcohol Weapons Gambling Pornography Nuclear Energy	**FACTORS CONSIDERED** Carbon fooprint Resource use Waste reduction Compensation Product safety Gender equality	**SOLUTIONS FOR** Climate change Polpulation growth Ubanization Water scarcity Food systems	**SUPPORT FOR** Innovation and Risk Taking Proof of Concept/Pilots Enabling Environments Commercial Capital Leverage	

Adapted from Pierce (2020).

Figure 14. Investment ecosystem



Adapted from Bocken (2015). The stages visualised in this model refer to specific research. However, they can be vaguely associated with the traditional, PreSeed and Seed (Seed), Series-A,B,C (Young & Growing) and IPO (Mature).

Venture capital investments target late stages of pre-commercialisation

A separate, yet related problem to the previously mentioned challenge is that most VC investors, besides having a short timespan and high requirements for returns, primarily operate in the young and growing stages. These lie typically after the R&D and prototyping phases (Monitor Deloitte 2017), which indicates that VC's tend to invest in the late stages of pre-commercialisation.

This poses problems for new Cleantech ventures for several reasons. The fact that Cleantech ventures tend to be very capital-intensive and have a long commercialisation pipeline with a predominant focus on technological development, manifests two main challenges. Firstly, Cleantech ventures are heavily reliant on pre-commercialisation funding to support R&D processes. This leads into the second problem, which is that reliance on pre-commercial funding makes Cleantech ventures difficult, expensive and time-consuming to scale (ibid).

Both reasons therefore contribute to positioning Cleantech outside the archetypical VC investment. Moreover, Cleantech ventures tend to operate on the production side of the economy, making risk and market growth assessments difficult, significantly adding to the difficulty of adapting Cleantech to VC funding strategies (Cummings & Henrique 2014).

Some argue that the very foundation of Cleantech's double-sided production of value (i.e. delivering a social good, such as clean air/CO_2 neutral energy, through market operations) stipulates low investment incentives, as the consumption of the social benefits produced by Cleantech solutions are non-rival. If company/investor A can benefit from the social and environmental benefit produced by company/investor B, there is no incentive for the latter to pay the accrued costs in securing equivalent environmental benefits through capital investments. Such a scenario would thus lead to a general tendency of undersupply of Cleantech investments (McNutt 2002), which fits well with available data.

SOLUTION

Clearer development pipeline and increases in public funding

One solution that could support a higher adaptation of VC investments in Cleantech would therefore be a clearer and more structured development pipeline across the whole ecosystem.

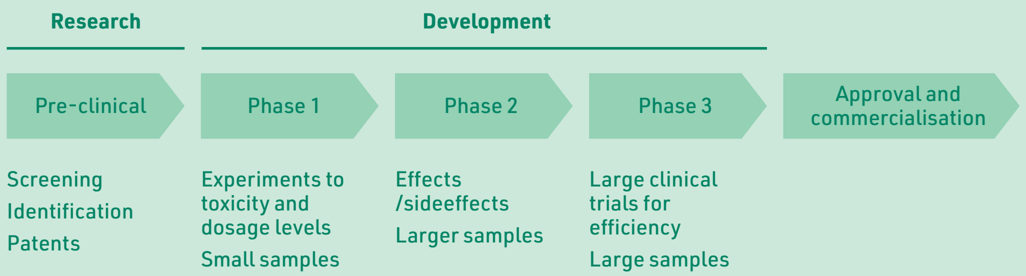
In comparison, the Life Science development pipeline is well-known and well regulated, which significantly reduces the negative impact of unknown factors. Figure 15 details the pharmaceutical industry's development model.

The creation and adoption of a similar pipeline scheme for Cleantech should place emphasis on two key processes. One is the institutionalisation of pre-seed funding schemes that would support crucial prototyping and R&D processes.The other is unearthing, mapping and structuring the whole technological development process into distinct phases. By nurturing and demystifying the technological development of new Cleantech ventures, their potential for landing future VC investments would increase as the technology pipeline becomes more transparent. This would in turn significantly increase the market potential of new and radical innovations through the strategic expertise of commercialisation, expansion and growth approaches, which are at the heart of the VC business model.

However, with decreasing public investments and support schemes in e.g. energy technologies, which accounts for a big part of the Cleantech sector, for the past years, a scenario as the above mentioned seems unlikely to materialise soon, despite a small increase between 2018-2019. The level of public investments in energy technologies have been declining between 2010-2015 by an annual rate of 3-5% (Figure 16). The largest fall took place between 2015-2016 with a total decrease of 38%. 2018 was clearly the year with the least amount of activity. 2019 saw a slight increase, yet investment in this sector is still less than it was in 2016.

Early, capital-heavy, high risk investments are of great importance for the continued development of Cleantech ventures. Without the proper support mechanisms in place to target the long-term and capital- and tech- intensive parts of the Cleantech pipeline, future prospects for enabling the commercialisation and growth of new Cleantech ventures through a higher degree of sustainable VC investments, economic growth and prosperity will be hard to attain.

Figure 15. Development model of the pharmaceutical industry

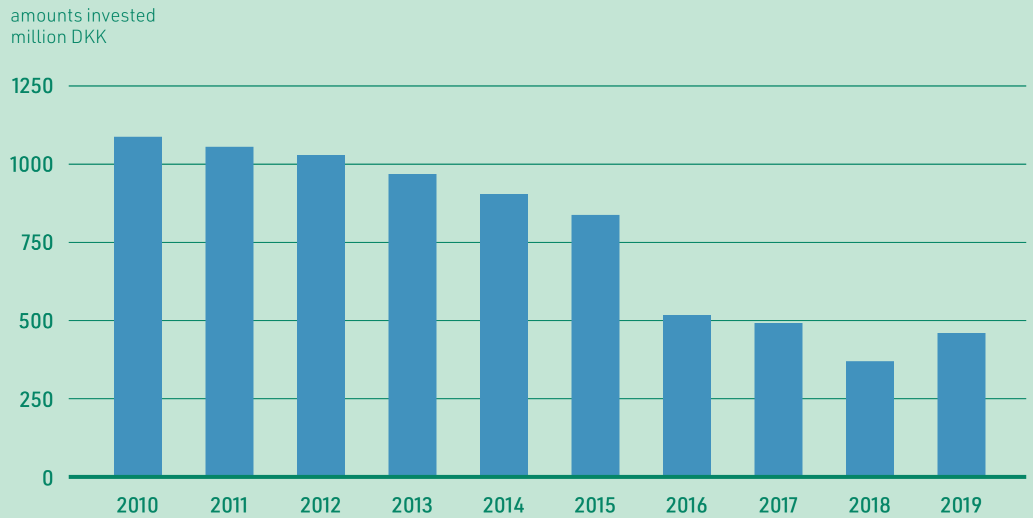


Adapted from Monitor Deloitte (2017).

SOLUTION

Figure 16. Public investments in energy technologies

Adapted from Monitor Deloitte (2017); WWF (2017) & Energiforskning.dk.

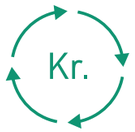


Lack of conceptual clarity within Cleantech

One of the biggest challenges facing Cleantech as a sector is that it is hard to quantify and conceptualise. Questions such as, "what exactly is Cleantech?" often lead to clarification errors and reaffirmation of biases against new technologies that fall outside the normative understanding of Cleantech, which tends to be wind and solar energy.
We are in need of a holistic and formalised understanding of the diverse landscape of solutions, startups and technologies that in combination constitute Cleantech. Without this, private and public investors, the market, and the general public will have a hard time understanding and supporting the necessary and varied innovations that are needed to combat climate change and environmental degradation. At present, we lack a clear and structured overview of the Danish startup ecosystem's landscape in relation to Cleantech startups, signalling a somewhat scattered and fragmented image.

Data and research on the specific factors and attributes that make up new Cleantech ventures (such as impact startups) is hard to come by. This adds to the problem by distorting the purposes, motivations and professional composition of these ventures. This makes judging their business models, innovation capacities, speed-to-market potential, and their ability to strategically utilize networks and form co-competitive collaborations difficult (Bocken 2015).

Figure 17. Cleantech startup characteristics



Business model factors

Are hybrid in nature, as they focus on the 'triple-bottom line'

Focus on 'doing good by doing well'

Are capital and technologically intensive

Human capital factors

Are diverse and non-normative

Founders tend to have scientific and technical degrees, such as engineering, physics etc.

Often lack necessary commercial and business acumen

Are driven by ethical principles, disagreement with the status quo and /or systems-thinking

Organisational factors

Have a higher degree of innovation capabilities than non-Cleantech ventures, as they tend to focus more on ongoing R&D and patents

Broader focus on radical than incremental innovations

Tend to introduce market novelties

> **We are in need of a holistic and formalised understanding of the diverse landscape of solutions, startups and technologies that in combination constitute Cleantech**

Since profitability and sizable returns are at the center of the current investment paradigm, ample focus is laid on the market potential of the business model, as this is an important indicator for assessing the potential of new ventures. For this reason, attaining a better understanding of the Cleantech startup business model, how they produce and conceptualise hybrid value creation (economic as well as environmental/social goods), how they implement and measure their sustainable effects and most importantly, how they commercialise their solutions are necessary clarifications for supporting and driving investments towards Cleantech ventures. Figure 17 provides a short overview of some of the known characteristics of Cleantech startups.

SOLUTION

Establish a structured overview of Cleantech startups

A way of combating this information asymmetry would be to establish a Cleantech-specific database to which venture capital, corporates, public and industrial investors would have access. Such a database would be able to provide compartmentalised information on the various types of new Cleantech ventures including their target market, industry/business sector, technological focus and more. The availability of such information would positively feed into better decision-making processes as the industry becomes demystified, producing positive economic benefits for society as a whole.

As it happens, TechBBQ is currently working on a larger database of the Danish startup ecosystem in collaboration with the Danish Board of Business Development. The aim of this project is to provide data-driven insights which would ascertain the various nuances, differences and diversity of the Danish startup ecosystem. Information from this project that is relevant to the Cleantech sector is provided in the next part of the report in order to support the continued development of the startup ecosystem.

Quick summary of challenges and solutions

Cleantech investments are less popular than Life Science and ICT investments

- Low degree of investments is driven by presumed low returns and high costs
- Danish VC industry is significantly smaller than in other European hotspots, leading to uniform investment strategies

Solution: Create a more diverse investment landscape, in order to attract 'smart capital' and impact investors

Support for the continuous development of Cleantech is at risk

- VC's tend to focus on the late stages of pre-commercialisation, which lowers available capital for Cleantech, as these ventures tend to require seed and risk-willing capital for R&D
- Decreasing public Cleantech focused support schemes, such as energy which target early stages of the technological development, have been declining since 2011

Solution: Increase public support schemes for the early development of clean technologies and establish a more transparent investments and technological development pipeline.

Cleantech startup ecosystem is unstructured and lacks overview

- Makes the establishment of a coherent support strategy difficult
- Risks in relation to supporting the necessary innovations become prevalent
- Communication errors are intensified

Solution: Establish a better and data-driven overview/database on the startup ecosystem, herein assessing Cleantech startups

Mapping new Cleantech opportunities

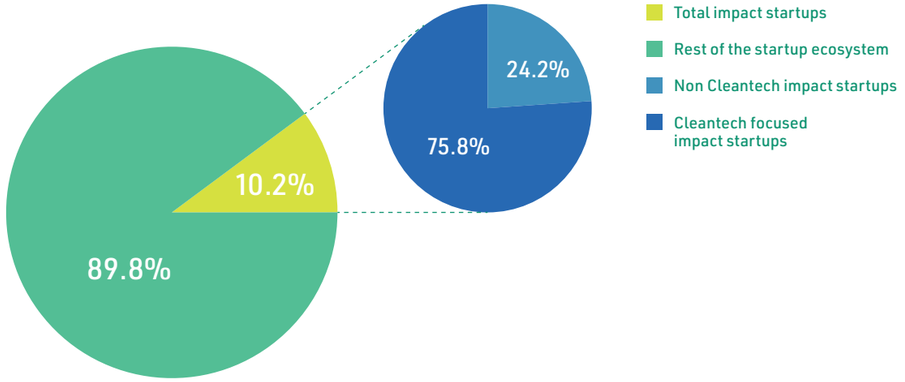
The last part of this report will take a deep dive into the makeup of Cleantech startups in order to provide a nuanced and transparent perspective for the various parties involved in the funding and continuous development of the Danish Cleantech sector. If we are to take sustainability seriously in a business context, we must first start by understanding the various intricacies which constitute organisations that have integrated novel and responsible business models that aim to produce shared value.

Data overview

In order to build our mapping process, we rely on data provided by a partnership between TechBBQ and the Danish Board of Business Development, which currently speaking includes unique data points on roughly 4000 startups and scaleups. Content wise we cover startups and scaleups that are involved in innovation, technology and operate in the field of environmental sustainability, such as clean energy, transportation, manufacturing and more. Moreover we also use the term 'impact startup' to refer to startups that have sustainability embedded in their fabric, counting both social and environmental aspects. For the sake of clarity, it is important to understand that impact startups are an umbrella term for all sustainability related startups, thus housing Cleantech startups.

By comparing the amount of startups/scaleups that have an environmental focus, we can better understand the proportional size that Cleantech accounts for, for the whole startup and scaleup ecosystem, as well as for impact-startups. In connection with this, we also examine various distributable breakdowns, such as their business sector, sustainability focus, growth stages and more.

Figure 18. Startup ecosystem · impact vs. non-impact



Calculations: TechBBQ · Data source: TechBBQ Startup Database Project.

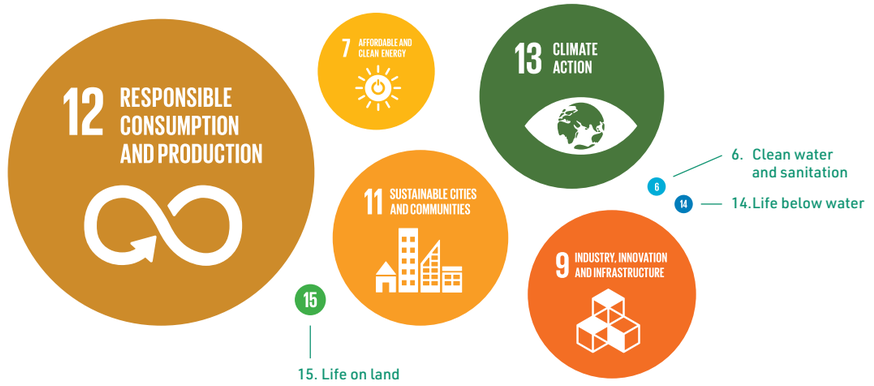
Distribution of impact startups in the ecosystem

Out of the total 4028 startups and scaleups that currently make up the Danish ecosystem, 409 can be classified as being an impact startup,[9] which indicates that sustainability and positive social and/or environmental impact is produced simultaneously with financial gains. In total, the 409 impact startups account for 10.2% of the total ecosystem (Figure 18).

Breaking down the compartmentalisation of impact startups, we found that 310 of these 409 startups can be classified as a venture within Cleantech; in other words, 75.8% of the total 10.2% share of the startup ecosystem can be attributed to startups that have environmental sustainability as their primary impact focus. This showcases that Cleantech and environmental sustainability are by far the most popular focus areas for the Danish impact landscape.

[9] An impact startup is an organisation that seeks to create social and/or environmental value through their business operations. Profit is not a goal in itself, but rather a tool to produce positive social/environmental impacts.

Figure 19. Cleantech area



Calculations: TechBBQ · Data source: TechBBQ Startup Database Project.

Sustainability focus of Cleantech startups

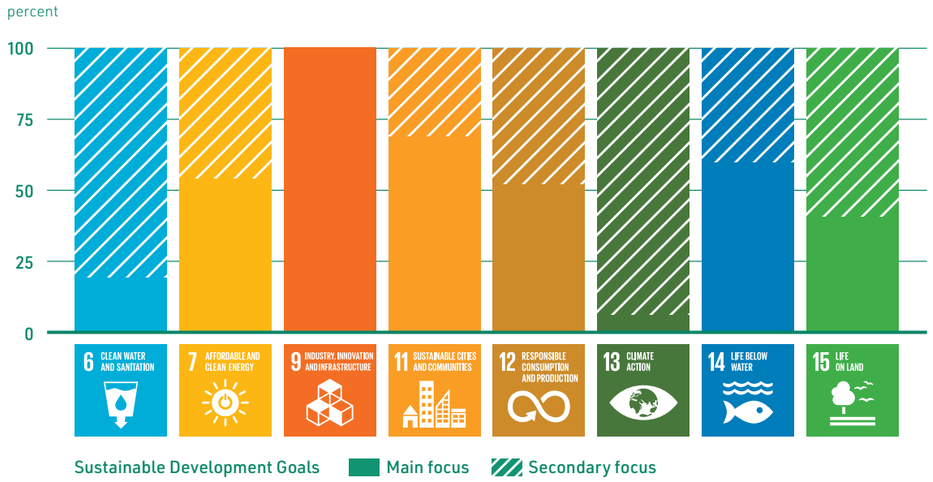
The simplest way to quantify which areas of environmental sustainability Cleantech startups target is to break them down as they relate to the Sustainable Development Goals (SDGs). Cleantech startups target eight different SDGS, including Clean Water & Sanitation (SDG 6), Sustainable Cities & Communities (SDG 11), and Life on Land (SDG 15).

Figure 19 highlights the largest sustainability areas in relation to Cleantech. The bigger the bubbles are, the higher the proportional share that SDG has of Cleantech as a whole.

Interestingly enough, SDG 12 has by far the greatest amount of focus, both in terms of startups addressing it, but also as the single biggest SDG for Cleantech as a whole. SDG 12 is then quickly followed by SDGs 13, 11 and 9 in second, third and fourth places respectively. SDG 7 only ranks fifth, which is surprising as it indicates that clean energy-focused startups are not as popular as consumer/production orientated ones. One reason for this might be that the energy market is already rather saturated, leaving other areas of environmental sustainability less populated, increasing the rate of growth for startups that target more 'unexplored' SDGs.

An important point to be made in regard to this asymmetry, is that a heavy focus on single SDGs does not necessarily create effective solutions targeting climate change and environmental degradation. Approaches based on the SDGs work best by interlinking multiple sustainability areas, as most climate related problems are interrelated. As such, strategies to foster or incentivise the creation of Cleantech companies that target multiple SDG areas could prove helpful for the creation of more impactful solutions that also help to accomplish some of the less-explored SDGs, like 15 and 16.

Figure 20. Cleantech startups: main/secondary focus



Calculations: TechBBQ · Data source: TechBBQ Startup Database Project.

Distribution of SDG focus

Luckily, hybrid and interlinking approaches are somewhat present in the fabric of Danish Cleantech startups. By looking at the distribution of SDGs, we arrive at a more nuanced understanding of how specifically Cleantech startups focus on sustainability. By virtue of their interdisciplinary nature, most Cleantech startups target more than one SDG, whether directly or indirectly. The most commonly-targeted SDG among the 310 impact startups is SDG 12, Responsible Production and Consumption. 160 of these startups place this SDG as either a main or secondary focus.[10]

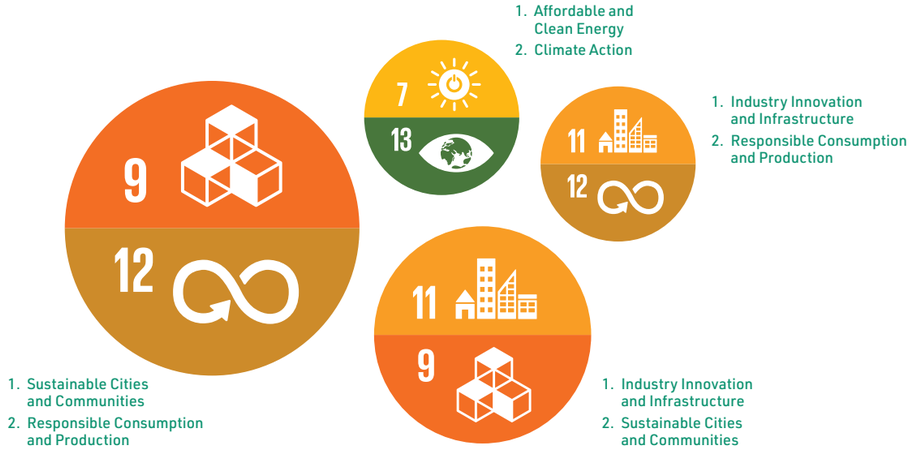
If we solely look at main-impact focused startups, then the picture is a bit different (Figure 20). Here, SDG 11 (Sustainable Cities and Communities) has the largest share of main-focused startups with 68.8% out of the total 96 startups that place focus on this goal. SDG 12 appears to be more balanced, with an equal share between main and secondary SDG focused startups, as is the case for SDG 7. This leaves SDG 9 as the only anomaly in the data, as all startups focused on this goal have it as their main SDG focus, signalling that there are currently no interlinking approaches in relation to industry and sustainable infrastructure solutions.

The most commonly-targeted SDG among the 310 impact startups is SDG 12, Responsible Production and Consumption

SDG 13, Climate action seems to have the lowest share of main SDG focused startups with 94.1% of startups targeting Climate mitigation as a secondary impact goal. This indicates that solutions targeting climate action are seen as additive features of primary SDG targets. The most popular combination herein appears to be SDG 9 as the primary target, with SDG 12 as the secondary target followed by SDG 11 + SDG 9. Lastly we have SDG 7 + SDG 13 together with SDG 11 + SDG 12 tied in third place. The proportional size of the bubble indicates how many startups have that specific combination

[10] Main focus signifies that the mentioned SDG is primary for the business. Secondary focus entails a more additive approach

Figure 21. Popular SDG combinations (primary and secondary SDGs)



Calculations: TechBBQ · Data source: TechBBQ Startup Database Project.

However, understanding the most popular combinations says little about the startups' potential for contributing to social change for any of the highlighted SDG areas. It is important to understand that popularity in and of itself does not say anything about the potential for achieving correlational or causal positive effects towards combating climate change and environmental degradation. To complicate things further, it becomes even more difficult to isolate direct effects, as the highlighted SDGs cross boundaries across their different indicators and sub-goals.

A more data driven assessment of Cleantech startups' environmental effects thus requires that founders have an extensive understanding of how, for instance, environmental and climate feedback loops work, or how various environmental areas feed into each other, in both positive and negative ways.

This would enable startups to establish better strategies for understanding, capturing and measuring their positive impact creation, as well as create more impactful SDG combinations. This would for instance lead to a more detailed understanding of how a given startup specifically targets environmental problems, and which specific SDG subgoals and indicators are relevant to their products/services.

Without this compartmentalisation, understanding the nuanced and concrete environmental benefits will become difficult to assess. Processes to mature and refine SDG based data as well as increase and professionalise knowledge of how to strategically work with sustainability need to be taken into account going forward.

Business models of Cleantech startups

In relation to the diversity of business models, data on Cleantech startups seems to fit well with the general tendencies that are evident for the sector as a whole, as most startups' business models (roughly 110) seem to have a manufacturing and material base as their main approach. SaaS-based business models (57) come in second and Marketplace and e-commerce (45) take third place. Moreover, most business models tend to be singular in their approach, with only a small fraction representing hybrid approaches (Figure 22).

If we look at the distribution for each business model area - hybrid business models account for less than 10% of each area (Figure 23). This cements that there is a rather static and uniform approach to business development, as the lack of hybridity could indicate a lack of integrative and lean approaches to business development.

Such a development could produce negative impacts for the adaptability of Cleantech ventures in general, as the dominant technological trends within environmental sustainability to a higher degree place importance on IoT, connectivity, and systems integration approaches.

Impact foundation of Cleantech startup's business models

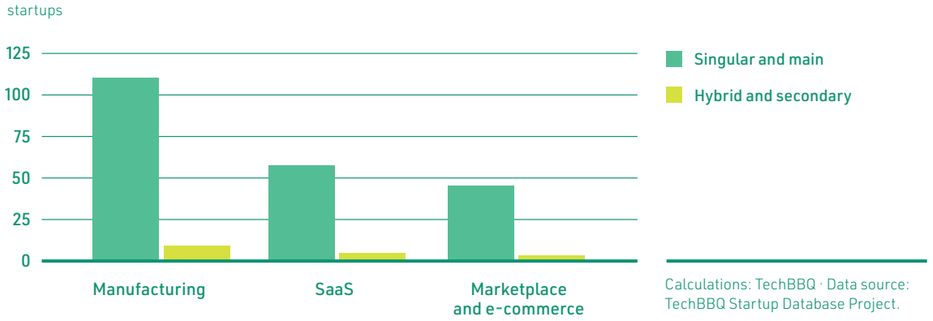
Most of the 310 Cleantech startups appear to have a core impact business model. In other words, 70.3% of Cleantech startups have environmental sustainability as a core component of their business model, indicating that sustainability is well integrated into the foundation of these ventures. However, this does not mean that the remaining 29.7% of Cleantech startups do not take environmental impacts into account. It just signals that for these entities, a strategic and managerial implementation of sustainability is not as thorough, suggesting a more incremental rather than a disruptive approach (Figure 24).

In general, Cleantech startups also appear to have more strategic engagement with environmental sustainability compared to non-Cleantech impact startups. Non-Cleantech impact startups tend to have a side-impact foundation for their business model (72.9%) leaving only only 27.1% of non-Cleantech impact startups that have a core-impact business model.

From an investing perspective, such trends signal both positive and negative tendencies. Firstly, the thorough and strategic implementation of sustainability as a foundational approach for the startups with a core-impact focus highlights a higher degree of professionalisation within the domain of sustainability, which in turn feeds positively into their possibilities of attracting hybrid-value based investments. The strong correlation between financial gain, the production of environmentally orientated solutions and measurement of impact are all necessities for attracting 'smart' capital from areas such as impact investing.

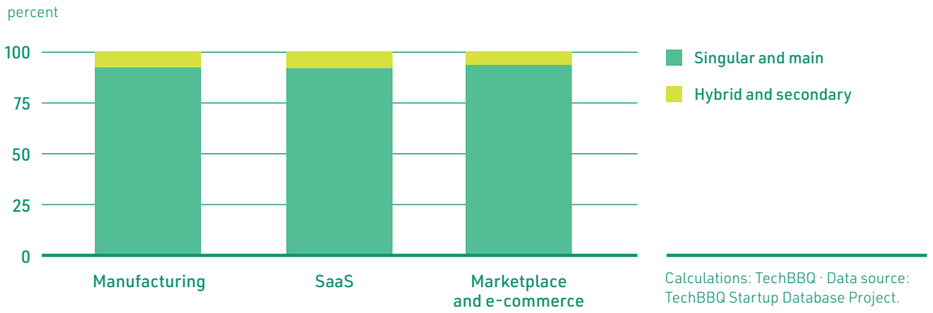
Secondly, and for the same reasons as previously given, it is vital that startups with a side impact based business model, attest and account for how sustainability is a part of their services or products. Without professionalising their knowledge on sustainable development, their chances of attracting alternative investments are significantly narrower than their core-impact peers. However, their chances of acquiring more traditional investments are not significantly impacted, as these approaches tend to solely focus on the commercial potential of their business models. Therefore, if impact is a side effect of their business approach, chances are that they have a stronger and more singular focus on commercial success. With this in mind, let's now turn to data on how Cleantech startups are progressing in terms of their growth and funding.

Figure 22. Cleantech business model



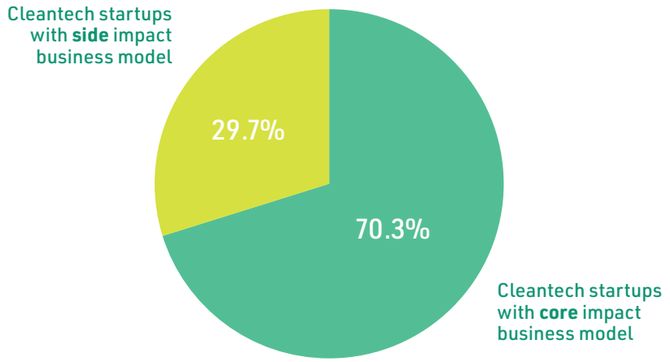
Calculations: TechBBQ · Data source: TechBBQ Startup Database Project.

Figure 23. Distribution of Cleantech business model



Calculations: TechBBQ · Data source: TechBBQ Startup Database Project.

Figure 24. Cleantech startups with core or side impact based business model



Calculations: TechBBQ · Data source: Tech BBQ Startup Database Project.

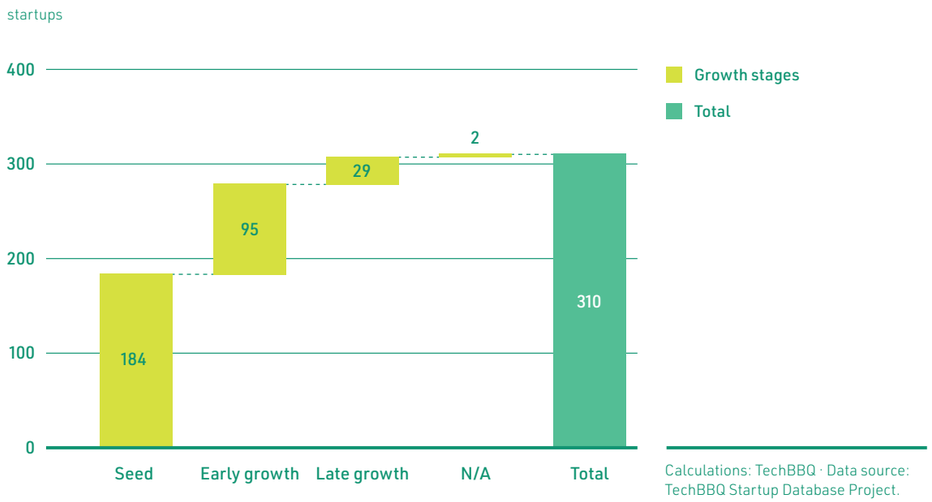
Growth and funding stages of Cleantech startups

Of the total 310 startups that made up this analysis, the largest proportion are to be found in the seed stage (Figure 25). This fits well with known and available data, as detailed earlier in this report. Given that the largest share of Cleantech startups are to be found on the seed stage highlights that these ventures require early and risk-willing capital in order to grow and mature. Without specific programmes or funding schemes that target or alleviate early funding hurdles, the general rate of startups maturing will decline, and so will future prospects of attaining economic and environmental value.

In terms of actual funding received, only 104 of the total 310 startups have received an investment, with 64 having disclosed information on received investments (Figure 26).

This is equal to 33% of all Cleantech startups. Available data on actual invested amounts furthermore signal an average investment of 22,6 million DKK, with the top investment being 267 million DKK. If the number of successful investments made in Cleantech is to go up, then solutions to increase public support schemes, which tend to be less risk-averse than private capital and more orientated towards creating social value, or incentivise the creation of new Cleantech orientated venture capital foundations as well as attracting impact investing programmes, are necessary. This would greatly alleviate the early funding challenges of Cleantech startups which is a problem that, as shown throughout this report, is endemic for the sector.

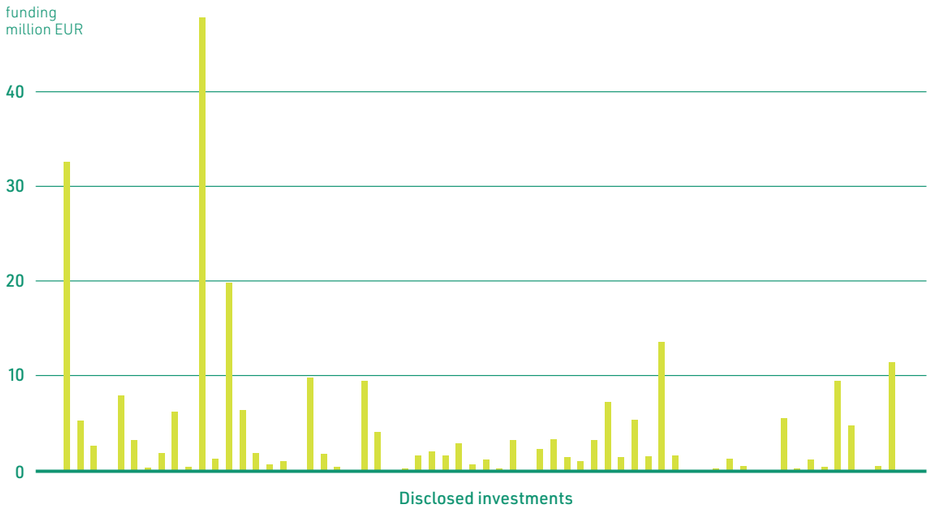
Figure 25. Growth stages of Cleantech startups



Calculations: TechBBQ · Data source: TechBBQ Startup Database Project.

Figure 26. Cleantech investments

Calculations and data source: TechBBQ Startup Database Project. Data is based on historical data spanning 10+ years.



Early, capital-heavy, high risk investments are of great importance for the continued development of Cleantech ventures

Concluding remarks

Throughout this report, we have established that The Danish Cleantech sector is diverse in nature, with businesses targeting areas such as clean energy and water technologies, resource management, renewable energy, recyclability and waste management. Moreover, the sector as a whole has a net positive impact on economic growth and development by contributing to exports and job-creation. It has a higher aggregate productivity than the economy's baseline and provides a positive impact for sustainable development by optimizing resource utilization and reducing negative environmental impacts. All of which point to a significant competitive advantage, as global demand for clean and energy-efficient technologies increase.

Yet, we are challenged on several structural issues. A low degree of risk-willing capital investments by venture capital, combined with declining public support schemes create long-term risks for the innovative capabilities and the creation of new clean technologies. Moreover, the lack of a structured overview of existing Cleantech startups as well as an inconsistent Cleantech investment/development pipeline complicate things further by producing communication lags. Some of the potential solutions to the above problems include:

- *Incentivising the creation of a more diverse investment landscape, which places a higher importance on sustainable development;*
- *Increasing public support schemes for the early development of clean technologies and establishing a more transparent investment pipeline;*
- *Creating a better, data-driven overview of the Cleantech startup ecosystem.*

With the last part of the report, we at TechBBQ have tried to contribute with a solution to the incoherence and opacity that surrounds Cleantech startups. We have done so with the goal of supporting the continuous growth and expansion of the startup ecosystem. The unique features that we have uncovered with our initial mapping indicate that:

- *Cleantech startups have a higher degree of professionalism in relation to working with sustainability than regular startups and non-Cleantech impact startups;*
- *Consistent with macro-economic data, most Cleantech startups utilize a manufacturing orientated business model and interlink various SDG's in their approach to sustainability;*
- *Responsible Consumption and Production (SDG12) is the most important single SDG target for Cleantech startups, while Climate Action (SDG 13) appears to be the most popular secondary sustainability target;*
- *Most startups are still in the Seed stage, highlighting the need for providing early and risk-willing capital if we are to reap the economic and social benefits that are inherent to most Cleantech approaches.*

We hope that this report has provided helpful insights into the foundations of the Danish Cleantech sector – including Cleantech-focused startups and that our findings can find use for future developments on both a public and private sector focal point.

References

Bocken, N., 2015. Sustainable venture capital - catalyst for sustainable startup success?. Journal of Cleaner Production, 108(A), pp.647-658.

CDP-Worldwide, 2020. Doubling Down. Europe's Low-Carbon Investment Opportunity. CDP-Worldwide.

Cleantech.com. 2020. Cleantech Group | Championing Sustainable Innovation, Catalyzing Business Opportunities. [online] Available at: www.Cleantech.com [Accessed 20 November 2020].

Cleantech Cluster, 2019. Clean Årsrapport 2019. [online] Clean. Available at: www.cleancluster.dk/wp-content/uploads/2019/08/1211849471.pdf [Accessed 20 November 2020].

Climate Action - European Commission. 2020. European Commission - 2050 Long-Term Strategy - Climate Action. [online] Available at: ec.europa.eu/clima/policies/strategies/2050_en#tab-0-0 [Accessed 20 November 2020].

Cumming, D. and Henriques, I., 2016. 'Cleantech' Venture Capital Around the World. SSRN Electronic Journal, 1.

Dvca.dk. 2020. Danish Venture Capital And Private Equity Association. [online] Available at: dvca.dk/analyseunivers [Accessed 20 November 2020].

Energiforskning.dk. 2020. Udvikling I Tilskud Fra 2016-2019, Fordelt På Teknologiområder | Energiteknologiske Forskningsprojekter. [online] Available at: energiforskning.dk/da/stats/udvikling-i-tilskud-fra-2016-2019-fordelt-paa-teknologiomraader [Accessed 20 November 2020].

EY, 2020. Venture Capital And Start-Ups In Denmark. Capital Matches Opportunity. EY.

Gaddy, D., Sivaram, D. and O'sullivan, D., 2016. Venture Capital And Cleantech: The Wrong Model For Clean Energy Innovation. [online] MIT Energy Initiative. Available at: energy.mit.edu/wp-content/uploads/2016/07/MITEI-WP-2016-06.pdf [Accessed 20 November 2020].

IDA, 2018. Cleantech I Danmark: Analyse Af Beskæftigelse, Produktivitet, Værdiskabelse Og Eksport I Markedsrettede Erhverv, Der Arbejder Med Miljøbeskyttelse Og Ressourcebesparelse. IDA.

IEA, 2020. World Energy Investments 2020. [online] Paris: IEA. Available at: www.iea.org/reports/world-energy-investment-2020 [Accessed 20 November 2020].

Jensen, F., Lööf, H. and Stephan, A., 2020. New ventures in Cleantech: Opportunities, capabilities and innovation outcomes. Business Strategy and the Environment, 29(3), pp.902-917.

McNutt, P., 2002. The Economics Of Public Choice, Second Edition. Cheltenham: Edward Elgar.

Ministry of Climate and Energy, 2016. Grøn Vækst Og Beskæftigelseseffekter Som Følge Af Regeringens Energiudspil"Vores Energi". København.

Monitor Deloitte, 2017. Danmark Som Energiteknologisk Pionerland. Monitor Deloitte.

Mundaca, L., Sonnenschein, J., Steg, L., Höhne, N. and Ürge-Vorsatz, D., 2019. The global expansion of climate mitigation policy interventions, the Talanoa Dialogue and the role of behavioural insights. Environmental Research Communications, 1(6).

OECD, 2015. Coo Policy: Climate Change Mitigation Supporting Growth. OECD Economic Outlook, Volume 2015 Issue 2. OECD.

Onen, D., 2016. Appropriate Conceptualisation: The Foundation of Any Solid Quantitative Research. Electronic Journal on Business Research Methods, 14(1), pp.28-38.

Pierce, A., 2020. How To Find The Right Impact Investing Fund For Your Organization. [online] Sopact.com. Available at: www.sopact.com/perspectives/impact-investing-funds-how-to-find-your-ideal-match [Accessed 20 November 2020].

Razak, A. and White, G., 2015. The Triple Helix model for innovation: A holistic exploration of barriers and enablers. International Journal of Business Performance and Supply Chain Modelling, 7(3), pp.278-291.

State of Green. 2020. State Of Green: Connect. Inspire. Share. Think Denmark. [online] Available at: www.stateofgreen.com/en [Accessed 20 November 2020].

USSIF, 2020. Report On US Sustainable And Impact Investing Trends 2020. USSIF.

Vækstfonden, 2020. Fra Startup Til Scaleup. Status På Kapitalmarkedet For Danske Iværksættere og Vækstvirksomheder.

ERHVERVSSTYRELSEN

+impact by Danske Bank

TECHBBQ //IMPACT SERIES