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Policy approaches to stimulating and supporting green entrepreneurship in Canada, Germany and Israel

This chapter examines three case study countries – Canada, Germany and Israel – approach stimulating and supporting green entrepreneurship. Each of these countries has a particular relevance to the Danish context, and has been identified as a source of learning for Denmark as it seeks to build a hub for green entrepreneurship. This chapter analyses the direct policy measures that are in place to support green entrepreneurship in each of the case study countries, as well as the indirect policy measures that contribute to a business environment that is more conducive to green entrepreneurship.

Highlights

Canada

- **Context:** Canada's domestic market is much smaller than that of its neighbour (United States), similar to the way that Denmark is positioned within the much larger European Union (EU) market. Federal policy is framed in the "A Healthy Environment and a Healthy Economy" climate plan, which is complemented by provincial governments and non-government actors. Direct support is delivered by government and non-government actors, including a pipeline of funding offered through the Business Development Bank of Canada (BDC) and Sustainable Technology Development Canada.
- **Key success factors:**
 - **Tailored financing to support entrepreneurs:** The BDC has adopted a segment-based approach that targets businesses based on their size and growth trajectory.
 - **High reporting standards:** The Clean Technology Data Strategy recognises the importance of providing decision makers with high-quality data on the green economy.
 - **Pricing carbon:** The Carbon Pollution Price Schedule will provide a competitive advantage to entrepreneurs with low-carbon products and solutions.

Germany

- **Context:** Denmark and Germany's geographical proximity and cultural ties mean that there is an opportunity for mutual learning between policy makers on both sides of the border. The overall policy agenda is driven by the federal government with further actions delivered by state governments. Core public support for green entrepreneurs is delivered through KfW Capital, the German Energy Agency, the Borderstep Institute for Innovation and Sustainability and the German Federal Environmental Foundation.
- **Key success factors:**
 - **Linking green entrepreneurship policies with wider environmental objectives:** Public initiatives for the promotion of green entrepreneurship in Germany are well aligned with wider environmental objectives.
 - **Recognising the role of public procurement:** New public procurement regulations have the potential to accelerate the green transition and lift demand for green goods and services.

Israel

- **Context:** Israel is widely recognised as the "Start-up Nation" and a leader in innovation in a number of cleantech fields. As a country of comparable size to Denmark, Israel's success in fostering entrepreneurship yields many pertinent lessons for Denmark. Many of the direct supports to green entrepreneurs are delivered by the Israel Innovation Authority, but a number of ministries are also involved.
- **Key success factors:**
 - **Funding opportunities:** Key to Israel's thriving start-up ecosystem is its venture capital market, which rests alongside strong public investment.
 - **Co-operation between private and public entities:** Many of Israel's successful policy initiatives link private sector actors with the public sector.
 - **Fostering networks:** Public policies play an important role in building entrepreneurial ecosystems and innovative communities of knowledge.

Introduction

The three case study countries have been selected based on their relative success in fostering entrepreneurship, and in particular, green entrepreneurship. Table 4.1 presents data on a variety of indicators that are relevant to green entrepreneurship. All three of the case study countries, as well as Denmark itself, are among the world's top performers in at least some of these areas. For instance, the volume of venture capital funding in Israel is second only to Singapore on a per capita to basis (Glasner, 2021^[11]). Meanwhile, Canada was ranked third in the world in terms of the ease of starting a business in the World Bank's 2020 Doing Business study.

Table 4.1. Green entrepreneurship indicators: Denmark vs. Canada, Germany and Israel

	Indicator	Denmark	Canada	Germany	Israel
Entrepreneurship indicators	Business birth rate (2018)	11.0%	7.9% ¹	8.0%	8.5%
	Share of early-stage entrepreneurs who agree/strongly agree that they always consider the environmental implications of decisions (2021)	-	72%	63%	49%
	Venture capital funding per capita (28/10/2020 – 28/10/2021)	USD 340	USD 271	USD 202	USD 959
	Score for ease of starting a business (2019)	92.7	98.2	83.7	94.1
	Share of 18-64 population who agree that successful entrepreneurs receive a high status (2020)	-	81.3%	81.8%	83.7%
Environmental indicators	2030 target for GHG emissions	70% below 1990 level	40-45% below 2005 level ²	65% below 1990 level	27% below 2015 level ³
	Price on carbon (2021)	USD 24-28	USD 32	USD 29	-
	Environmentally related tax revenue as a share of GDP (2019)	3.4%	1.1%	1.8%	2.6%
	Environmental science citations per 1 000 people (1996-2020)	176	87	42	38
	Renewable energy, sustainability and the environment citations per 1 000 people (1996-2020)	37	14	8	8
	Share of patents in environmental technologies (2018)	24%	10%	14%	6%
	Environmental Performance Index score	82.5	71.0	77.2	65.8

1. Data for Canada are only available for employer enterprises.

2. Equivalent to 21-28% below 1990 level.

3. Equivalent to 42% above 1990 level.

Sources: (OECD, 2022^[2]), (Glasner, 2021^[11]), (Global Entrepreneurship Monitor, 2021^[3]), (Israel Bureau of Statistics, 2021^[4]), (World Bank, 2019^[5]), (Scimago JR, 2021^[6]), (Environmental Performance Index, 2020^[7])

Canada

Canada has a variety of policies and initiatives to promote green entrepreneurship, many of them under a multilevel governance framework. Environmental policy in Canada is led by the federal ministry of Environment and Climate Change. However, many other public actors have clear complementary roles. Innovation, Science and Economic Development Canada is the lead ministry for supporting environmental innovation and entrepreneurship. As the government supported bank dedicated to SMEs and entrepreneurs, the Business Development Bank of Canada (BDC) also plays a very important role in the green entrepreneurship ecosystem. This funding complements other initiatives, such as grants offered by

Sustainable Technology Development Canada (STDC), the Canada Clean Tech Fund, which aims to help green start-ups to scale up, and regional programmes such as the Alberta Energy Transition. Efforts are also being taken to co-ordinate the measures that are in place, for instance through the creation of the Clean Tech Hub for Canada.

Many of Canada's policy efforts to address climate change, including those related to green entrepreneurship, fall within the Pan-Canadian Framework on Clean Growth and Climate Change (PCF), which was developed with the provinces, territories and Indigenous peoples. Published in 2016, the PCF includes more than 50 concrete actions that cover all sectors of the Canadian economy. These measures aim to reduce emissions, build resilience to a changing climate and enable clean economic growth. While the PCF has a scope that extends beyond green entrepreneurship, one of its four pillars focuses on innovation and support for clean technology. A number of subsequent plans have been announced, including the recent "A Healthy Environment and a Healthy Economy" climate plan that outlines actions to reach net-zero emissions by 2050.

Overall, green entrepreneurship funding mechanisms and solutions are rather comprehensive and well established in Canada. The government has also established a public procurement policy that promotes the sourcing of green products. Additional efforts may be needed to facilitate a smooth transition from oil and gas economic activities to green economy activities. This in turn can help to reinforce citizen awareness and shift consumer preferences towards greener products, solutions and start-ups. It is also important for some Canadian green start-ups to move from being local to global leaders (Box 4.1), namely through the direction of funding towards specific unsolved challenges and the development of a national super cluster strategy.

Box 4.1. Example of a leading green start-up in Canada

A good flagship green start-up from Canada is Carbon Cure, which is headquartered in Halifax. It is based upon innovative CO₂ technology, which leads to the injection of carbon dioxide into concrete, where it is converted into a stable mineral product. This solution has already contributed to a reduction of 131 666 tonnes of CO₂. Carbon Cure was founded in 2012 by Robert Niven, with the target of achieving a 500 million tonne annual reduction of CO₂ emissions by 2030.

The remainder of this chapter maps the public policies and programmes that are in place in Canada to promote green entrepreneurship. This covers initiatives overseen by the following entities:

- The Business Development Bank of Canada (BDC)
- Sustainable Technology Development Canada (STDC)
- Other federal initiatives
- MaRS Cleantech

The above entities provide direct support to green entrepreneurs, although green entrepreneurship is not necessarily their sole or primary focus. Policies that indirectly support green entrepreneurs by creating an economic and regulatory landscape that allows them to thrive are also presented. The chapter concludes with the key success factors of the policy approach in Canada, as well as the challenges encountered.

Policy actions that directly support green entrepreneurship

1. Business Development Bank of Canada

As the financial institution devoted to Canadian entrepreneurs, the BDC plays a key role in the promotion of green entrepreneurship. It focuses on entrepreneurs whose profitable companies create value for

society and meet high environmental, social and governance standards, thus helping to foster a prosperous, inclusive and green economy. The BDC's activities are guided by three main principles:

1. Increasing access and reach, particularly for under-served groups;
2. Driving SME competitiveness by providing the advice and capital needed for companies to increase productivity, innovate and expand, and;
3. Providing an excellent client experience, including through the use of digital technologies.

The BDC has a long history of supporting clients hit by climate related disasters. However, the greatest contribution that it is making towards achieving climate resilience is by supporting entrepreneurs whose innovations are aiding in the transition to a low-carbon economy. This is achieved through the following channels:

CleanTech Practice

The BDC's Cleantech Practice invests in globally competitive cleantech firms as they discover and commercialise ways to combat climate change and pollution. Through the Cleantech Practice, the BDC assists green entrepreneurs in meeting their capital intensive needs for scaling and accelerating growth.

The BDC offers equity and flexible financing to cleantech firms with:

- A commercially validated and IP-protected technology that demonstrates a positive environmental impact;
- Proven market traction with significant potential for revenue growth and commercial contracts;
- The ambition to scale beyond CAD100 million in annual revenue, and;
- A clear pathway to profitability.

For the fiscal year of 2020, the BDC's total commitments through the Cleantech Practice reached CAD 253 million. The BDC is therefore well on track to deliver its CAD 600 million commitment to help build globally competitive Canadian cleantech firms, which can ultimately foster a long-term, commercially sustainable cleantech industry that can attract significant private capital investment.

Venture Capital

BDC Capital backs innovative Canadian companies that are reinventing industries and making them more energy efficient. The BDC is an active investor, providing equity investment alongside expert guidance and trusted advice in order to help entrepreneurs to scale up their businesses. In the fiscal year of 2020, BDC's Venture Capital division received CAD 431 million from divestiture investments, compared to CAD 125 million in 2019. This is in line with the BDC's strategy of supporting the best performing Canadian companies with the technology and talent needed to assume leadership at the global level, leading to revolving funds that support green entrepreneurship.

B Corp Certification Process

The BDC helps Canadian companies to achieve B Corp certification, thus encouraging entrepreneurs to examine their companies' environmental, social and governance (ESG) performance, and the impact of their products or services. The B Corp certification process was built by entrepreneurs who believe that the purpose of a company goes beyond making profits and extends to creating social and environmental good. B Corp entrepreneurs are a global movement of people whose companies create local prosperity, strong community values and a sustainable environment, under a framework that includes the following stages:

- *Assessment*: a free, online and confidential assessment to benchmark the positive impacts of entrepreneurs' companies;

- *Comparison*: a snapshot of how the start-up compares to thousands of peers worldwide;
- *Improvement*: a customised improvement plan accompanied with best practices.

Business services

The BDC provides a range of business services to clients. Offers includes entrepreneurial skills development, support in development of business plans and the development of marketing plans, including the identification of unique selling points and potential new customers. In addition, individualised technical support can be offered and some business development services are offered freely and openly through the Entrepreneur's Learning Center (users must create an account).

Fostering inclusivity

Women, young people, ethnic minorities, and indigenous people have traditionally faced more challenges in becoming entrepreneurs and running and growing businesses in Canada. This is often due in large part to difficulties accessing finance. BDC helps entrepreneurs from these under-represented groups to reach their full entrepreneurial potential by supporting their access to finance, providing networking opportunities and partners, and also championing their stories.

New businesses and young entrepreneurs often have difficulty finding the capital and advice they need to launch and grow their projects. To support them, BDC has developed a partnership with Futurpreneur Canada, a national non-profit organisation that offers mentoring, financing and other business resources to young entrepreneurs. BDC and Futurpreneur work together to promote youth entrepreneurship and increase financing for young entrepreneurs (18 to 39 years old). Under the recently renewed co-lending agreement, Futurpreneur and BDC provide loans of up to CAD 60 000. Given the values and priorities of younger generations, supporting youth entrepreneurship is also an effective means of promoting green entrepreneurship.

2. Sustainable Development Technology Canada

Sustainable Development Technology Canada (SDTC) plays a considerable role in supporting the advancement of clean technologies in Canada. SDTC seeks to identify and fund Canadian companies that are developing technologies with the potential to deliver sizeable environmental and economic benefits. Since its formation in 2001, SDTC has invested more than CAD 1.38 billion in 460 Canadian companies. Grants are provided to entrepreneurs at multiple stages of development, from the development of emerging innovations to commercialisation and market leadership. Cleantech companies that receive SDTC funding also benefit from SDTC's knowledge of entrepreneurial support systems and its network of federal and provincial partners. The average grant size is CAD 3 million, which typically covers around 33% of the project's costs. There is also a requirement for 25% of the project costs to be covered by private investment and for 50% of the costs to be incurred within Canada.

3. Other federal initiatives

Impact Canada

Impact Canada is a government initiative designed to generate solutions for government departments. This is achieved through Impact Canada's challenge platform, where solutions to challenges identified by government departments are developed by a diverse range of actors. An outcomes-based approach is adopted, whereby innovators are rewarded based on the measurable results and improvements that their solutions yield. Within this programme, Natural Resources Canada launched a CAD 75 million clean technology stream. This stream comprised challenges in the areas of decarbonising aviation, modernising

power grids, designing better batteries, reducing energy use in mining, increasing the participation of women in the clean technology sector and improving sustainability of indigenous and remote communities.

Clean Growth Hub

The Clean Growth Hub, co-led by Innovation, Science and Economic Development Canada and Natural Resources Canada, is a whole-of-government focal point for clean technology and a unique advisory service model dedicated to helping Canadian clean technology innovators and adopters identify and navigate federal programs and services most relevant to their needs. More than 2 300 clean technology stakeholders have sought this service since its launch in 2018. The Clean Growth Hub leverages the knowledge, expertise, and network of its 17 member departments and agencies to provide tailored advice, including on research, development and demonstration, scaling up, and exporting. It also enhances co-ordination among federal organisations in delivering clean tech programmes and strengthens federal capacity to track clean technology outcomes through the Clean Technology Data Strategy (see below).

Clean Technology Data Strategy

The Clean Technology Data Strategy (CTDS) was established in 2017, with the objective of providing up-to-date information on the economic, social and environmental contribution of the environmental and cleantech sectors in Canada. Under the strategy, Statistics Canada publish a number of data products, including:

1. The Environmental and Clean Technology Products Economic Account, which measures the economic impact of environmental and cleantech products in terms of GDP, exports, imports and employment. These data are broken down by province.
2. The Survey of Environmental Goods and Services, which estimates the production of environmental goods and services by industry.
3. The Environmental Protection Expenditures Survey, which monitors expenditures made by industry to protect the environment.

The data published under the CTDS are an important tool in monitoring Canada's progress in the green transition. They also allow for regional and industry comparisons, which can be used to inform priority areas for public support or intervention.

4. MaRS Cleantech

Another impactful component of Canada's green entrepreneurship ecosystem is MaRS, a private, not for profit incubator and innovation hub. Originally conceived to support health sector solutions in Canada, it has since expanded its focus areas. Indeed, MaRS is now engaged with over 200 cleantech start-ups at varying stages of maturity. MaRS aims to provide comprehensive support to green start-ups, including facilities, technology surveillance, market exploitation, funding, networking or any other needs related to a particular green venture. MaRS is selective in its intake, only accepting and engaging with companies when there is a match between a project's needs and the resources that MaRS can provide. Specific green entrepreneurship targets are also promoted, through nurturing projects with high potential to reduce GHG emissions. For instance, "Mission from MaRS" is a new programme aimed at supporting 10 Canadian start-ups, which are together expected to contribute to a reduction of over 41 megatons of GHG emissions by 2040.

MaRS works in close collaboration with the government, trade commissions and other entities in order to facilitate access to domestic and international markets for green start-ups, and to assist these companies in moving from pilot schemes to full-scale commercial activities. Overall, MaRS is believed to be the largest urban innovation hub in North America, occupying 1.5 million square feet and having helped over 1 400 Canadian science-based start-ups that employ over 17 000 people.

Policy actions that indirectly support green entrepreneurship

Environmental regulations and mitigation

Canada has made significant progress implementing measures to reduce emissions throughout the economy. These include the phasing out of coal-fired power generation by 2030, reducing methane emissions from the oil and gas sector, phasing down the use of hydrofluorocarbons, continuing to improve the emissions performance of vehicles, and introducing a clean fuel standard. Other measures include work to develop and adopt increasingly stringent building codes to reduce energy use, as well as initiatives to accelerate the uptake of zero emissions vehicles. New funding will support these mitigation activities, such as investments in clean and renewable power generation. For instance, the CAD 675 million Emissions Reduction Fund's Onshore Program is helping Canadian onshore oil and gas companies to invest in green solutions that aim to lower methane emissions.

Carbon pricing

A strength of the Canadian policy framework is its carbon pricing system. Since 2019, carbon pollution pricing systems have been in place throughout Canada. Provinces tailor the pricing systems to local needs while ensuring they comply with the minimum national stringency standards set by the federal government. The government has also released a schedule for future changes to the price of carbon, which will see the minimum price of carbon rise from CAD 65 per tonne of GHG emissions in 2023 to CAD 170 in 2030. The higher price of carbon will create an increased demand for green products and solutions, representing a major opportunity for green entrepreneurs. The pricing schedule will also encourage investment in the green entrepreneurship ecosystem by providing greater certainty about the viability of green enterprises in the medium to long term.

Net Zero Accelerator Initiative

The Net Zero Accelerator Initiative, which is part of the Strategic Innovation Fund, will provide up to CAD 8 billion in funding for projects that contribute to lowering Canada's GHG emissions. The focus is on projects that support the decarbonisation of large emitters, the development of clean technologies and the creation of a batteries ecosystem in Canada. However, it is important to note that the minimum contribution to projects is set at CAD 10 million, meaning that the initiative principally benefits large or established companies rather than green entrepreneurs.

Success factors for stimulating green entrepreneurship

The above mapping of Canada's green entrepreneurship ecosystem has highlighted the following key success factors:

- **Tailored financing support to entrepreneurs:** The BDC has adopted a segment-based approach that allows it to deepen its understanding of clients and develop more relevant and applicable solutions. Six distinct client segments have been identified based on the size and growth trajectory of the business, and each segment now benefits from an adapted operational model that tailors the relationship according to client needs.
- **High reporting standards:** The Clean Technology Data Strategy recognises the importance of providing policy makers and other stakeholders with high-quality and regular data on the green economy. The availability of this data can assist with progress monitoring and the design of policy interventions. Another example of Canada's high reporting standards is the publication of annual reports on the status of implementation of the Pan-Canadian Framework on Clean Growth and Climate Change.¹ These reports summarise the progress made along the four pillars of the framework and outline the policy programmes and interventions that are planned for the future.

- **Pricing carbon:** The policy framework in Canada is helping to develop an economy in which there is space for green entrepreneurship to flourish. For instance, the Carbon Pollution Price Schedule will see the price of carbon rise significantly and consistently from an already high base (World Bank, 2021^[8]). The relatively high price of carbon provides a competitive edge to entrepreneurs with low-carbon products and solutions. Meanwhile, the price schedule sends a strong signal to investors that market conditions will become increasingly accommodating to green enterprises (OECD, 2016^[9]), which can help today's green entrepreneurs better meet their financing needs. Studies on the impacts of carbon pricing schemes elsewhere show that these policies can also significantly increase innovation in low-carbon technologies (Calel and Dechezleprêtre, 2016^[10]).
- **Inclusive entrepreneurship:** The BDC has created a wide range of programmes to increase participation in entrepreneurship among under-represented groups. These programmes include the Indigenous Growth Fund, the Black Innovation Fund, the Women in Technology Venture Fund, and the Supplier Diversity Programme. The BDC also established a partnership with Futurpreneur Canada, to encourage young entrepreneurs that would like to develop their green projects.
- **Consumer preferences are shifting:** Although price remains the most important purchasing criterion for Canadian consumers, there is a growing demand for green products. 68% of consumers aged 18 to 34 are willing to pay at least 5% more for eco-friendly products, while fewer than half (46%) of older consumers are willing to pay this premium. Consumers are more likely to be willing to pay more for greener appliances (31%), food (30%) and vehicles (29%). Meanwhile, three-quarters of consumers have a positive view of businesses that care about the environment, highlighting the role that environmentally sustainable practices can play in enhancing brand image.

Pitfalls and challenges to consider

Although Canada is home to a number of thriving green entrepreneurship ecosystems, there are some challenges and pitfalls that are useful to consider and be wary of in the Danish context:

- **Challenges of moving online:** E-commerce is changing the business environment for entrepreneurs, bringing with it both challenges and opportunities. The COVID-19 pandemic accelerated the trend towards e-commerce for business-to-consumer and business-to-business companies. BDC research finds that Canadian SMEs will have to improve their online presence to remain competitive, since only 46% of them are currently selling online. Moreover, close to a third of entrepreneurs who sell online say that this channel is less profitable than their traditional operations.
- **Labour shortages:** Before the COVID-19 pandemic, many entrepreneurs and SMEs were having difficulty finding workers, a reflection of Canada's ageing population. The large baby-boom generation is heading to retirement, and there are fewer young Canadians to replace them in the workforce. As the economy improves, entrepreneurs and green entrepreneurs will once again be faced with recruiting difficulties in the years to come.
- **Challenge of adopting new technologies:** Big data, artificial intelligence, machine learning, robotics and the internet of things are redefining business models in all sectors. These technologies offer opportunities to reduce costs, increase efficiency, innovate and expand to new markets. However, they are also challenging to implement, namely due to the investments and expertise needed.

Germany

Climate change is a major issue in Germany, which is reflected by the array of public and private initiatives that are in place to support the green transition, many of which relate specifically to fostering green entrepreneurship. Germany also has a number of large industrial companies with well-established sustainability practices, providing opportunities for green entrepreneurs within their supply chains. The provision of venture capital and incubation is already being pursued by major German companies. For instance, BASF has had a venture capital arm since 2011. Another example is Next47, a venture capital fund founded by Siemens in 2016 that provides innovative start-ups with investment, acceleration and access to customers and networks. In 2021, Volkswagen also announced that it would be establishing a EUR 300 million venture capital fund to invest in decarbonisation start-ups.

The policies, initiatives and programmes developed in Germany are helping green entrepreneurs to establish themselves and grow. Indeed, Germany is home to 276 climate tech start-ups, a number which compares to 180 in the UK, 103 in France and 44 in Denmark (Speedinvest, 2021^[8]). Moreover, the 2021 Green Start-up Monitor (GSM), established by the Borderstep Institute for Innovation and Sustainability and the German Start-ups Association together with the University of Duisburg-Essen and PwC Germany, finds that 30% of German start-ups can be classified as green, up from 26% in the 2018 GSM (Borderstep Institute, 2021^[9]). Green start-ups therefore play a key role as engines of structural change in Germany, and they are well placed to be pioneers in bringing environmental innovations to the market. In areas such as energy storage and green hydrogen, German start-ups are among the world's leaders (Box 4.2). More broadly, Germany's share of the environmental and efficiency technologies market is three times its share of global economic output, highlighting once more the importance of green entrepreneurship for the German economy. Going forwards, maintaining certainty and stability with regards to green policies will be important in facilitating private sector investments. Also key will be efforts to bolster demand for green products across all segments of the German population.

Box 4.2. Example of a leading green start-up in Germany

A good example of a flagship German green start-up is Liliium, which is developing innovative electric-powered air vehicles, with headquarters and manufacturing facilities located in Munich. It aims to build radically better ways of moving, leading to a revolution in sustainable high-speed regional air transportation. With the ambition to become a global leader in air mobility, it was founded in 2015 and now has over 700 employees, who are working to make electric flights a reality, by developing the first electric vertical take-off and landing jet. The launch of commercial operations is expected to take place by 2024.

This chapter maps the public policies and programmes that are in place in Germany to promote green entrepreneurship. This includes initiatives organised by the following entities:

- The German Federal Environmental Foundation (DBU)
- KfW Capital
- The German Energy Agency (Dena)
- Other federal initiatives
- The Borderstep Institute for Innovation and Sustainability

It is important to note that while these entities' activities provide direct support to green entrepreneurs, green entrepreneurship is not necessarily their sole or primary focus. Policy actions that indirectly support green entrepreneurship are also described, after which the key success factors and challenges associated with Germany's policy approach to stimulating green entrepreneurship are presented.

Policy actions that directly support green entrepreneurship

1. German Federal Environmental Foundation

The German Federal Environmental Foundation (DBU) supports the transition to a sustainable economy by funding innovative and solution-oriented projects that contribute to the protection of the environment. Since 1991, DBU has supported more than 10 300 projects with EUR 1.9 billion of funding.

The DBU's Green Start-up Programme supports green start-ups with innovative and economically viable solutions to environmental challenges. Funding of up to EUR 125 000 per project is provided in the form of a non-repayable grant. The approval rate for the programme is approximately 7%, and in 2021, 14 new green start-ups received funding. One of the programme's main goals is to strengthen green start-ups in their role in the development of the green economy through innovative funding approaches. Support is provided to established start-ups as well as to start-up projects that have not yet been formally founded. Innovative spin-offs or start-ups created from an existing employment relationship, as well as university graduates and individuals with a suitable background or training are also welcomed. The programme aims to make green start-ups in Germany more visible and improve networking within the green start-up community by promoting suitable means of communication and providing information tailored to target groups.

The DBU also supports fathers and mothers who are involved in a new company, through the option of part-time founding. Through these support schemes, start-ups can be created during parental leave, and entrepreneurs are allowed to work up to 30 hours a week. Some of these start-ups are green start-ups.

2. KfW Capital

The public sector plays a significant role in bolstering Germany's venture capital industry, which is an important source of funding for entrepreneurs. An important player in this space is KfW Capital. With the support of the European Recovery Program (ERP) Special Fund, KfW Capital provides funding to start-ups by investing in German and European venture capital and venture debt funds. The level of investment of the ERP Venture Capital Fund Investment Programme in a particular fund is capped at EUR 25 million, or 20% of the fund's capital. KfW Capital, along with the Federal Ministry for Economic Affairs and Climate Action and a number of private investors, is a major investor in the High-Tech Gründerfonds (HTGF), which has a volume of around EUR 900 million and has invested in more than 650 high-tech start-ups since 2005. KfW Capital, the ERP Special Fund and the European Investment Bank also fund Coparion, which is a venture capital fund with a fund size of EUR 275 million. Coparion invests alongside private investors, with a requirement that these private investors commit the same funds and on the same terms and conditions.

The Future Fund is a new German umbrella equity fund with several financing instruments for technologies of the future. KfW Capital is responsible for co-ordinating the Future Fund. In 2021, the Federal Government provided an additional EUR 10 billion for the Future Fund, for an investment period up to 2030. Together with private investors, it is anticipated that more than EUR 30 billion of venture capital for start-ups will be made available through the Future Fund. The Future Fund is comprised of a variety of distinct components, including:

- **The DeepTech Future Fund (DTTF):** The DTTF is a new fund that will invest in German high-tech companies during their rapid growth phase, alongside private investors. EUR 1 billion has been made available over the next 10 years. The DTTF is managed by the High-Tech Gründerfonds (HTGF), potentially focusing – among others – on a number of industries related to green entrepreneurship including e-mobility and new energy.
- **The European Recovery Programme (ERP) / Future Fund Growth Facility:** EUR 2.5 billion has been made available by 2030 for KfW Capital to invest up to EUR 50 million in German and

European venture capital funds in order to enable larger and more frequent financing rounds for start-ups.

- **The German Future Fund / European Investment Fund (EIF) Growth Facility:** EUR 3.5 billion has been allocated within this facility for the period until 2030 to invest in growth funds and growth financing rounds for start-ups.

Sustainability is an important consideration for KfW Capital, as reflected in its Sustainability Policy (KfW Capital, 2021^[13]) and its Exclusion List (KfW Capital, 2021^[14]).² The wider KfW Group has also developed an innovative approach to monitoring the impact of its activities, by mapping its financial commitments to each of the 17 Sustainable Development Goals (SDGs). This indicates that in 2020, KfW made EUR 40.5 billion worth of new financial commitments that contributed to the Affordable and Clean Energy SDG, which compares to a figure of EUR 26.4 billion the previous year. Meanwhile, KfW's new financial commitments contributing to the Climate Action SDG rose from EUR 28.2 billion in 2019 to EUR 43.2 billion in 2020.

3. German Energy Agency

The Start Up Energy Transition (SET) is a platform run by the German Energy Agency (Dena) and the World Energy Council. SET seeks to stimulate innovation in the transition to cleaner energy sources. The SET Hub supports start-ups in developing innovative solutions that contribute to the energy transition, through the provision of education, training, mentoring and networks. A key element of this support is the SET Network Online Platform, which connects the more than 1 700 start-ups in its network with an array of investors, researchers, corporations, accelerators and public sector organisations involved in the energy innovation ecosystem.

4. Other federal initiatives

Micro-mezzanine Fund (*Mikromezzaninfonds Deutschland*)

The Micro-mezzanine Fund (MMF), which was established by the Federal Ministry for Economic Affairs and Climate Action, provides equity funding to start-ups, micro businesses and small businesses of up to EUR 50 000 per company, in the form of dormant equity holdings with a term of 10 years. Enterprises with a focus on environmental responsibility are particularly targeted by the MMF, and can therefore receive financing of up to EUR 150 000 per company. Other targeted groups are social enterprises, companies that were founded by unemployed people, and companies that are run by women or people with a migration background.³ The Fund is co-financed by the European Social Fund and the European Recovery Program (ERP) Special Fund. Through the MMF II, which was set up in 2016 following MMF I, EUR 153 million can be issued to companies.

Business Meets Climate Action forum

Between 2017 and 2020, the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety hosted the “Business meets Climate Action” forum, which allowed entrepreneurs to network on matters related with climate action.

5. Borderstep Institute for Innovation and Sustainability

The Borderstep Institute for Innovation and Sustainability is an independent research institute with a focus on green innovation, sustainable entrepreneurship, climate change and smart energy systems. It conducts publicly-funded research projects and also initiates collaborative projects with businesses, universities and trade associations.

Green Start-Up Investment Alliance

The Green Start-Up Investment Alliance, which is co-ordinated by the Borderstep Institute for Innovation and Sustainability, aims to support business angels and other early investors involved in the field of green enterprises. Criteria for assessing the sustainability of entrepreneurial ventures were developed for this purpose, in addition to transparent, reliable classifications of green start-ups. This initiative also provides high-quality matching services between green start-ups and investors. It is aiming to develop a permanent online offer for start-up financing in the green economy and to stimulate innovative financing opportunities for green start-ups, by facilitating the pooling of small investors in investor syndicates. Furthermore, the alliance plans to devise and test a monitoring instrument to record developments achieved in the field of start-up financing in the green economy.

StartGreen

StartGreen is an online information and networking portal for green start-ups in Germany, facilitating the exchange of knowledge and experience and the formation of partnerships. Members of the network gain access to the StartGreen newsletter and are also able to publish material on the platform and reach out to other network members. In order to celebrate and raise the visibility of innovative start-ups in the field climate protection and sustainability, StartGreen issues annual awards to standout companies in particular areas. StartGreen is funded by the National Climate Initiative and the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, and is operated by the Borderstep Institute for Innovation and Sustainability.

StartGreen originated from the Startup4Climate initiative, which ran between 2013 and 2017. Startup4Climate was organised by the Borderstep Institute for Innovation and Sustainability, ADT, the German Association of Innovation, Technology and Business Incubation Centres, and the University of Duisburg-Essen, with the aim of increasing the proportion of green start-ups in Germany. It focused on start-up activities that could both open up new economic opportunities and create the basis for a new, long-term approach to reducing greenhouse gas emissions (GHG). The project compiled best practices in the field of green start-up investment and also offered direct support to new green businesses.

Policy actions that indirectly support green entrepreneurship

Climate Action Programme 2030 and Climate Change Act

In October 2019, the Federal Government of Germany agreed on the Climate Action Programme 2030, which was followed by the Climate Change Act in December 2019. While the Climate Action Programme 2030 pursues a comprehensive, three-pronged approach comprising regulatory law, price incentives and financial support, the Climate Change Act provides the legal framework for achieving Germany's climate targets. The two instruments are complementary and intended to help Germany achieve its climate target of reducing GHG emissions by 65% relative to 1990 levels by 2030.

Both of these programmes follow the guiding principle of enabling Germany to comply with its climate targets in an economically sustainable and socially equitable manner. The measures assumed pave the way for climate-friendly behaviour and climate-friendly investments. The federal government will provide EUR 54 billion between 2020 and 2023 to implement the initiatives established in the Climate Action Programme 2030. The projects funded span a broad spectrum of climate action activities, such as the National Climate Initiative, aimed to help cities, municipalities and districts to draw up climate action concepts or manage their energy supply and demand. Taking into account national targets for lowering emissions, it includes annual emission reduction targets for individual business sectors in the period between 2020 and 2030. In the energy sector, greenhouse gas emissions are to be reduced by 62% compared with 1990, in the buildings sector by 67%, in the transport sector by 42%, in the industrial sector

by 51%, and in the agricultural sector by 36%. The German Climate Action Report 2019 shows that Germany is still about 4% short of achieving the 2020 target, largely because of higher emissions in the transport and buildings sectors. However, the report also indicates that Germany is getting significantly closer to achieving the climate target for 2020 than had previously been expected.

Renewable Energy Sources Act

Germany's Renewable Energy Sources Act came into force in 2021. Through this, Germany has adopted the target of significantly increasing the share of renewable sources in its energy production. In 2019, about 43% of electricity was generated from renewable sources, including wind and solar power, due in part to the wide range of state assistance made available. Germany is phasing out the use of coal to generate electricity. It is also aiming to refurbish more buildings to enhance energy efficiency, and is forging ahead with climate-friendly mobility. By 2030, the aim is for renewables to account for 65% of gross electricity consumption and by 2050 all electricity generation and consumption should be GHG-neutral. The electricity grids are being developed to ensure that green power can be used nationwide.

Energy Efficiency and Climate Protection Networks

The formation of networks for green entrepreneurs is another area of focus in Germany. Dena co-ordinates the Energy Efficiency and Climate Protection Networks (EEKN) initiative. The initiative was extended in 2021 to include climate protection. These networks are typically comprised of 5-20 members, which can include companies of any size, sector or geography. Their aim is to establish targets and implementation plans to enhance energy efficiency and climate protection measures among the participants. In order to facilitate a successful exchange, the network activities are supported by experts, including operators, moderators and energy consultants. This support is provided throughout the running time of the networks, which is usually between two and three years. Currently, there are over 350 EEKNs across Germany. Between 2021 and 2025, Dena plans to establish up to 350 new networks, with a goal of achieving a 5 to 6 million tonne reduction in GHG emissions through the measures implemented by network members.

Public Procurement

General Administrative Regulation for the procurement of climate friendly services (AVV Klima)

Each year, public procurement in Germany amounts to EUR 350 billion. The AVV Klima, which has been in force since 1st January 2022, introduces more stringent requirements in the area of sustainable public procurement. This recognises the important role that public procurement can play in driving demand for green solutions. AVV Klima stipulates that preference be given to climate-friendly options and that publicly procured products or services meet the highest possible energy efficiency class. Moreover, where possible, forecasts of lifecycle greenhouse gas emissions caused by the procured goods and services must be developed. AVV Klima also contains a list of products and services that are not permitted for public procurement on health or environmental grounds.

Competence Centre for Sustainable Procurement

The Competence Centre for Sustainable Procurement (KNB) is situated within the Procurement Office of the Federal Ministry of the Interior, Building and Community. The KNB provides training, information and education on sustainable procurement, acting as a central point of contact for federal departments, states, municipalities and other public procurement offices.

Success factors in stimulating green entrepreneurship

The above mapping of Germany's green entrepreneurship ecosystem has highlighted the following key success factors:

- **Linking green entrepreneurship policies with wider environmental objectives:** Public initiatives for the promotion of green entrepreneurship in Germany are well aligned with wider environmental objectives. For instance, the funding areas of the Green Startup Programme of the DBU are informed by the United Nations' Sustainable Development Goals (SDG), while KfW maps its financial commitments to the SDGs. These practices help to promote coherence between different green entrepreneurship initiatives.
- **Recognising the role of public procurement:** The new public procurement regulations that came into force in January 2022 require decision makers to take concrete steps to ensure that their purchasing decisions are as climate friendly as possible. These bold policy measures have the potential to accelerate the green transition and raise demand for goods and services provided by green entrepreneurs in Germany.
- **Recognition of economic and environmental goals within firms:** According to the Green Start-up Monitor, almost nine out of ten green start-ups attribute an important role to profitability in their current corporate strategy, and three out of four green start-ups rate the corporate strategy of "achieving a high market share" as being important (Borderstep Institute, 2020_[15]). While all green start-ups in the dataset attach great strategic importance to their social and environmental impact, this is true for only two out of three of other start-ups. This difference becomes even clearer when it comes to converting the sustainability strategy into concrete management guidelines. Indeed, while all green start-ups integrate social and environmental impact into their key performance indicators, this is true for only 23% of the other start-ups.
- **Supporting staff development, motivation and participation:** For two-thirds of the green start-ups covered by the Green Start-up Monitor's analysis, strengthening the development and motivation of employees is also considered to be important, compared with just half for the other start-ups (Borderstep Institute, 2020_[15]). Green start-ups more frequently adopt the approach of involving not only selected groups (such as top managers) but all employees in decision-making. This much stronger emphasis on the motivation, development and participation of their team members indicates that green start-ups not only pursue a positive external impact with their products and services, but also integrate ecological and social sustainability internally within their corporate culture and policies. The results of the Green Start-up Monitor also show that this philosophy has a positive effect on the human resource planning and recruitment of green start-ups.

Pitfalls and challenges to consider

It is useful to be aware of the following challenges that exist within Germany's green entrepreneurship ecosystem, which also offer lessons for other contexts:

- **Finance gaps:** Current entrepreneurship funding policies in Germany do not yet fully reflect the "double dividend" that green entrepreneurs provide by supporting economic and sustainability goals. Green entrepreneurs cannot fulfil their potential without suitable funding mechanisms in place, which is a particular challenge given the risk-averse nature of large investors in Germany (Borderstep Institute, 2020_[15]). In fact, a major problem in Germany seems to be cultural conflicts between green founders and investors. Green entrepreneurs are often profit and growth oriented, but the economic metrics that investors look at are not the only deciding factor for green entrepreneurship. Green start-ups do not always expect a quick profit, since working sustainably may also mean slower growth, and therefore sometimes they are perceived by investors as being

risky. As a result, very innovative green growth companies with a high potential to exert positive economic, social and environmental impacts cannot always exploit this potential due to a somewhat limited access to important seed and growth funding.

- **The need for recognition:** The lack of awareness of the importance of green start-ups in environmental and economic policies has limited the role that green start-ups are playing as a transformation engine for Germany. Up to now, green start-ups are working under the shadow of the digitisation and IT start-up landscape, and have not been recognised as an independent group that is critical for the sustainable development of Germany.

Israel

Israel is widely recognised as the “Start-up Nation”, with one of the world’s most developed networks of venture capital funds. The country faces significant environmental challenges related to its small size, high population growth, geographical location and lack of natural water resources. These challenges have necessitated innovation, which has helped Israel to become a dominant actor in the cleantech field and a recognised leader in desalination and water recycling.

Israel is widely recognised as one of the most advanced countries in a number of technologies, including green technologies, with a considerable number of entrepreneurs who are developing state of the art solutions for supporting the green transition. Indeed, Israel has an estimated 637 climate tech start-ups and growth companies (Box 4.3), and the share of Israeli start-ups that are climate tech companies has increased from 3% in 2011 to nearly 10% in 2020 (Moise, Klar and Siegmann, 2021^[10]).

Green entrepreneurs benefit from a strong start-up ecosystem in Israel, supported by a highly skilled workforce, a dynamic venture capital industry and a supportive policy environment. The Israel Innovation Authority is an important policy player in Israel’s start-up ecosystem, through its role in developing a network of technological incubators and innovation labs and allocating funding to researchers and entrepreneurs. Further efforts may be needed to create additional awareness and make sustainability a higher priority factor in determining purchasing decisions. This can include the use of green public procurement policies, since these are still relatively under-developed and price often remains the predominant consideration. Green labelling can also play a role in influencing purchasing decisions across the wider economy.

Box 4.3. Example of a leading green start-up in Israel

A specific example of one promising green entrepreneurship start-up coming from Israel, which is also a finalist for the 2021 Quality Sustainability Award of the International Academy for Quality, is UBQ Materials. Based upon disruptive new technologies, protected by international patents, the UBQ material converts urban and landfill waste into the most climate-positive thermoplastic on the market. With headquarters in Israel, UBQ is already working at a global scale, with tremendous potential impacts and opportunities being explored and considered.

The remainder of this chapter provides a description of the green entrepreneurship policy landscape in Israel, covering policies and programmes administered by the following organisations:

- The Israel Innovation Authority
- The Switchers Support National Partnership of Israel
- The Israel Innovation Institute

While green entrepreneurship is not the sole or primary focus of the above entities, they each have programmes and/or initiatives that provide direct support to green entrepreneurs. Policy actions that support green entrepreneurs indirectly through their impact on the wider economic and regulatory environment are also analysed.

Policy actions that directly support green entrepreneurship

1. Israel Innovation Authority

The Israel Innovation Authority (IIA) is an independent publicly-funded agency that was created to provide a variety of practical tools and funding platforms aimed at effectively addressing the evolving needs of the

national innovation ecosystems, actively collaborating with all sectors and ministries. The IIA's Start-up Division aims to provide support throughout the entire entrepreneurial journey, from the early development of ideas to global market commercialisation. Help to green entrepreneurs is provided across all types of environmentally friendly technologies, from renewable and alternative energy to environmental conservation and water management. In total between 2018 and 2020, the IIA has supported 290 climate tech start-ups with a total of USD 250 million of funding. A description of the key programmes operated by the IIA's Start-Up Division is provided below:

Technological Incubators

Israel runs a national network of technological incubators, managed by private entities, which support the establishment of start-ups as they transition from an idea to a commercial product. The programme aims to nurture initiatives with disruptive technologies that are still at early Technology Readiness Levels (TRL) and thus have difficulties in raising private capital, with public support helping to de-risk the companies. The support offered by the incubators includes a physical site and infrastructures, administrative services, technological and business guidance, legal advice and access to partners, as well as connections with investors or potential customers. In approved early stage disruptive start-ups, 85% of the budget is covered by public funds (for up to a maximum of ILS 3.5 million over two years) and 15% is financed by the private incubator operators. In 2020, 90 requests were submitted to the various incubator programmes, of which 80 were approved for total grants of ILS 151 million.

Joint government support for pilot programmes

In a range of selected fields, the IIA collaborates with government departments in order to provide Israeli tech companies with support for R&D or pilot programmes. For instance, the Support Program for Innovation in Environmental Protection aims to develop and apply innovative clean technologies that will lead to a reduction in the use of natural resources and/or GHG emissions and examine their feasibility at an industrial scale. It is intended to reach Israeli technology companies in the field of environmental protection, which receive financial support covering 20%-50% of the approved R&D expenditure, with special funding of 75% provided to projects with exceptional potential. In order to address the regulatory obstacles that green entrepreneurs can often encounter, regulatory assistance may also be provided by the Ministry of Environmental Protection for conducting pilot tests under a unique regulatory framework. Meanwhile, the Support Program for Innovation in Reducing Greenhouse Emissions, which is run by the IIA in collaboration with the Israel Investment Centre and the Ministry of Environmental Protection, provides extensive support for projects that involve the first-time application of Israeli technologies in the areas of energy efficiency and GHG reductions. The programme provides up to 40% of funding support for investments in relevant projects. In total, the various support programmes for innovation in selected fields have provided climate tech start-ups with USD 60 million in funding towards R&D and pilot testing between 2018 and 2020.

Innovation Labs

The Innovation Labs facilitate collaboration between industry and entrepreneurs. They are operated by leading corporations within a particular industry, providing start-ups with access to unique technological infrastructures, market insights, marketing channels and expertise. The IIA funds 33% of the setup costs (up to a maximum of ILS 4 million) and 50% of the operating costs (up to a maximum of ILS 500 000 per year) of the innovation labs. Meanwhile, entrepreneurs are provided with a grant of up to 85% of the approved budget, up to a maximum grant of ILS 1 million for the first year, which can be followed by a grant of up to 50% of the approved budget for a second year.

An example of an innovation lab that supports green entrepreneurs in Israel is the Environmental Sustainability Innovation Lab (ESIL), located in Haifa. It aims to accelerate the growth of start-ups that use

commercially viable technological solutions that support the green transition, through the provision of financial assistance, technological infrastructure and marketing expertise. The lab was founded by the IIA and is operated with the support of three large companies: EDF Renewables, Bazan Group and Johnson Matthey. In order to “connect global needs with Israeli technology solutions”, ESIL provides “a dynamic ecosystem delivering economically viable technology solutions that support a socially just transition to a NetZero world”, by nurturing and accelerating green start-ups and “connecting industries looking for green technology solutions with Israeli sustainability tech entrepreneurs and start-ups developing innovative and disruptive solutions to environmental problems” (ESIL, 2022^[17]). The challenges that ESIL wants to address through green entrepreneurship cover the following topics: clean energy production and storage; optimisation of production processes; energy streamlining; advanced materials and chemistries for energy transitions; pollution treatment; air pollution reduction; control, prevention and reduction of risks and hazards; monitoring of pollution treatment processes; development of green products; material recycling and sewage treatment. Services and support provided by ESIL include funding, facilities, pilots, expertise and business development support.

Ideation (Tnufa) Programme

The Ideation (Tnufa) programme is intended for fledgling entrepreneurs who are interested in formulating and advancing an innovative technological concept. The programme supports entrepreneurs in developing a proof of concept, thereby enabling them to raise private funding or recruit a business partner for further development. It is designed to fund activities that are directly linked to the development of new technologies, such as prototype development, intellectual property, business development and exhibition expenses. Grants of up to 85% of the approved budget are provided, with a maximum value of ILS 100 000 per year over a two year period. In 2020, 539 requests were submitted to the programme, of which 152 were approved for total grants of ILS 16 million.

Seed Programme

This programme, which began operating in 2021, is intended for start-ups in the seed stage that are developing technologies in fields with stringent regulation, an extended timeframe before implementation, or an evolving market. These conditions often apply to green entrepreneurs’ technological innovations. Support is given to companies that have not raised more than ILS 3.5 million and that have already signed a memorandum of understanding with a venture capital investor who is potentially interested in investing in the start-up.

Entrepreneurial Incubators in the Periphery

This programme aims to promote the development of innovation systems, technological entrepreneurship and employment in Israel’s geographical periphery, through collaboration between designated incubators and higher education institutions, students, entrepreneurs, and start-ups. This collaboration is achieved by research activities and the development and commercialisation of projects that utilise local initiatives and resources. As part of this initiative, a local project operating within an incubator will be entitled to a grant of 85% of the approved budget from the Israel Innovation Authority, for up to a maximum budget of ILS 1 million, with the possibility of supplementary funding being provided by the incubator.

Young entrepreneurship

The Israel Innovation Authority is working in conjunction with the Ministry of Education to promote an entrepreneurship programme that will encourage and educate young people in business, scientific and technological entrepreneurship. The participants in the programme will gain experience in developing knowledge and products while making use of infrastructures such as science centres and museums, as additional important partners of this joint effort.

2. Switchers Support National Partnership of Israel

Entrepreneurs and start-ups are key enablers of the green and circular economy business models needed for the transition towards sustainable consumption and production patterns. The Switchers Support National Partnership of Israel was established to support Israeli green and circular entrepreneurs. This partnership is led by the Entrepreneurship Centre at Tel Aviv University (TAU) and is implementing a green entrepreneurship programme in Israel.

In May 2021, applications were opened for green entrepreneurs to develop a set of business development methodologies that boost sustainability and the circular economy. Following the launch of this first call, the Israeli Switchers Support National Partnership, led by the SwitchMed local partner ([Tel Aviv University](#)), has selected 12 green business projects to complete this green entrepreneurship programme. In total, 18 green entrepreneurs, of which 10 are women, are participating in workshops to develop their sustainable business models.

3. The Israel Innovation Institute

In partnership with a number of government bodies, the Israel Innovation Institute supports Israeli entrepreneurs whose ventures are helping to address global challenges. It does this by building innovation ecosystems that comprise relevant start-ups, corporations, academics, investors, government bodies and regulators in a particular field. Through disseminating information and hosting a variety of events, competitions and workshops, these innovation ecosystems facilitate knowledge sharing, networking and collaboration. An example of an innovation ecosystem that supports green entrepreneurs in Israel is EcoMotion, which is made up of 12 000 members and 600 start-ups in the field of smart mobility. The Israel Innovation Institute also encourages intrapreneurship, by empowering innovation leaders within established organisations and leveraging its networks to connect researchers with large organisations.

Policy actions that indirectly support green entrepreneurship

National programmes to reduce pollution

In recent years, Israel has taken a stronger stance on environmental policy matters. By the end of 2016, Israel had ratified the Paris climate agreement. Earlier that year, the government approved an ILS 500 million national programme aimed at reducing GHG emissions and increasing energy efficiency. As part of the 2017-18 budget, ILS 260 million was also allocated to a two-year programme focused on reducing air pollution. A reduction in emissions intensity was reported by the Ministry of Environmental Protection in 2017, indicating some early success in these policy efforts.

Carbon Tax

In 2021, the Israel Tax Authority and the Ministries of Energy, Finance, Environmental Protection and Economy jointly announced that an escalating carbon tax will be applied between 2023 and 2028. The tax will be capped to ensure that consumers do not experience more than a 5% increase in electricity prices during the taxation period. This means that the impact of the carbon tax on consumers' behaviours will be more limited than in other countries that have introduced heftier carbon pricing schemes.

Natural Resource Efficiency and Environmental Innovation Programme

The National Resource Efficiency and Environmental Innovation Programme was introduced in 2018 by the Israeli government, with an annual budget for environmental projects of ILS 756 million, of which ILS 143 million is allocated to the circular economy. An additional ILS 15 million is available to assist those working on environmental innovation and resource efficiency.

National Action Plan for the Circular Economy

The Ministry of Economy has created a national action plan for the circular economy. The corresponding roadmap focuses on three industrial sectors that have the largest potential to become circular: construction and infrastructure, packaging, chemicals and pharmaceuticals. The support tools defined under this action plan are the creation of a circular economy knowledge and consulting centre, funding for circular projects, and a leadership programme.

Israel Resource Efficiency Centre

The Israel Resource Efficiency Centre (IREC) helps manufacturing plants to use raw materials more efficiently through the provision of training and webinars. IREC estimates that raw materials account for 50-80% of companies' production costs. IREC's methodology therefore allows companies to significantly reduce their costs and limit their exposure to volatile swings in input prices, while also delivering wider environmental benefits. The centre is funded by the Ministries of Economy and Industry, Environmental Protection and Finance. Following a surge in demand for IREC's services during the COVID-19 pandemic, which created further pressures for businesses to make efficient use of resources, IREC received an additional

ILS 8.3 million. This allowed it to assist over 60 factories in becoming more resource efficient. The Ministry of Economy and Industry also operates an industrial symbiosis project, which seeks to identify potential ways in which one business' waste can become another business' input. The ultimate goal of the project is to reduce the landfill generated in Israel. Other active measures already in place to support the move towards a circular economy are the Institute for Advanced Manufacturing, a Circular Economy Accelerator, and a Circle Plastics Consortium.

Success factors in stimulating green entrepreneurship

The above mapping of Israel's green entrepreneurship policy landscape has highlighted the following key success factors in Israel's approach to stimulating green entrepreneurship:

- **Access to risk capital:** Israel's thriving start-up ecosystem is strengthened by a flourishing venture capital market, which rests alongside strong public investment. In Israel, there are approximately 70 active venture capital funds, 14 of which are international. With the highest volume of venture capital funding per capita in the OECD, Israel is able to support and fund the creation and growth of innovative industries and green start-ups. Israel's venture capital industry was initiated by the Yozma programme, under which a number of public-private venture capital funds were established. Through offering a range of incentives, the Yozma programme was highly successful in attracting private investors to Israel, to the extent that the public sector's role in the venture capital industry shifted away from direct investments in companies and towards providing guidance and stimulating the involvement of private investors.
- **Co-operation between private and public entities:** In many of the initiatives described above, private players combine efforts with the public sector, which is seen as the most promising and efficient way to achieve the desired outcomes and impacts in Israel. A good illustration of this approach is the Environmental Sustainability Innovation Lab (ESIL) in Haifa. Experience in Israel also shows that bottom-up approaches to green entrepreneurship can be effective, thus letting the private sector and entrepreneurs guide the choices being made and the nature of the projects being supported. This is then combined with a small number of very selective large consortia aimed at addressing major challenges that are considered a national priority.

As technologies get more mature in Israel, public support is gradually reduced and new areas of priority may be assumed, as happened with the phasing out of public support for water related

solutions. There is now an ongoing interest in promoting cultured food products, where some future unicorns are expected to appear.

- **Fostering networks:** Another defining feature of the policy framework in Israel is the role of public policies in building innovative communities of knowledge and efficient ecosystems, where multiple symbiotic players are brought together in order to share experiences and create collaborative projects. For instance, the IIA has been proactive in fostering collaborations between entrepreneurs and larger corporations, in particular through the Innovation Labs programme. However, the success of these collaborations relies on the innovation lab operators having the venture creation skills necessary to support start-ups. Also critical is having an open innovation mindset, which involves a focus on future technological gaps rather than current gaps.
- **Supporting low-tech green entrepreneurs:** Although there is no doubt that Israel has strong ecosystems in place for the promotion of green entrepreneurship, there is a lack of specific support programmes for green entrepreneurs that do not have a strong technological component attached to their projects. To tackle this challenge, Israel is now involved in an international project, entitled SwitchMed, which aims to speed up the shift to sustainable consumption and production patterns in the Southern Mediterranean, notably through the promotion of the circular economy and green entrepreneurship that is not technologically focused.
- **Investment in R&D:** Israel invests 4.1% of its GDP in R&D, compared to an OECD average of 2%. This is particularly important since strong research is the engine that drives science-based and green entrepreneurship.
- **Workforce skills:** According to the World Economic Forum's 2017-18 Global Competitiveness Index, Israel has the sixth highest availability of scientists and engineers in the world (World Economic Forum, 2017_[18]). The country also has one of the highest ratios of university degrees and academic publications per capita. The STEM focus in Israel is driving many green entrepreneurship projects and successful start-ups.

Pitfalls and challenges to consider

- **Funding obstacles:** Despite Israel's rich investment landscape, in a survey of nearly 200 Israeli climate tech companies, 72% cited access to capital as their main challenge (Moise, Klar and Siegmann, 2021_[16]). 85% of companies surveyed were hardware-based businesses, which often require larger investments and longer development timelines. Indeed, two-thirds of 4-7 year old climate tech start-ups in Israel have fewer than 10 employees, which is a symptom of the long development phase and delayed growth often associated with start-ups in the field. These factors can inhibit access to venture capital for climate tech start-ups. Israel does not currently have a dedicated climate tech investment group, although Firsttime Ventures did announce a USD 100 million fund dedicated to sustainable investments at United Nations Climate Change Conference in November 2021.
- **Policy co-ordination:** There is also room for improvement in better integrating many of the ongoing initiatives that exist in Israel, such as the cleantech and circular economy activities. As an example of progress in this area, the 2050 Zero Carbon Action Plan is managed by the Prime Minister's Office and involves points of contact across multiple ministries (such as Economy, Industry, Transportation, Energy, Environment or Housing).

Lessons from Canada, Germany and Israel in promoting green entrepreneurship

1. Integrated governance models tie the system together

Many policy actions put forward by public authorities in the case study countries are managed by a common effort that connects different authorities, ministries and public agencies. Developing high levels of co-operation between public entities for the promotion of green entrepreneurship is important because it enables a greater degree of policy coherence and effectiveness (OECD, 2021^[19]). For example, some programmes in Israel are specifically targeted to solve concrete problems that the country is facing in the environment and entail a shared effort from different public entities. These include the Support Programme for Reducing Greenhouse Emissions and the Support Programme for Environmental Protection. Both of these programmes are operated jointly by the Israel Innovation Authority, the Israel Investment Centre, and the Ministry of Environmental Protection.

2. A “whole business” approach to support green entrepreneurship

The path to success for entrepreneurs requires significant efforts in a variety of different areas. The experiences in the three case study countries highlight the benefits of taking a “whole business” approach to supporting green entrepreneurs, notably the ability to respond to different needs as they arise. In Canada, the BDC adopts a segment-based approach that provides tailored support to entrepreneurs depending on the businesses’ size and growth trajectory. Each segment benefits from an adapted operational model that modulates the relationship according to specific client needs. For instance, BDC Capital has an arm dedicated to businesses with an intellectual property (IP) portfolio, providing them with patient capital and guidance from experts with experience in funding companies with intangible assets. The DBU Programme in Germany also provides tailored information to different target groups. In Israel, the Ideation (Tnufa) programme is intended for fledgling entrepreneurs who are interested in formulating and advancing an innovative technological concept in the initial R&D stage, in preparation for proof-of-concept and/or construction of an initial prototype.

3. Green entrepreneurship is about cleantech but not only about cleantech

Businesses are generally classed as being either high-tech or low-tech based on the share of their annual turnover that they invest in research and development (Reboud, Mazzarol and Soutar, 2014^[20]). High-tech green businesses are often referred to as cleantech businesses, therefore green entrepreneurship is typically associated with cleantech businesses involved in the development of technologies, products and services that help to solve environmental problems. Entrepreneurs involved in these endeavours can benefit from being embedded within technological ecosystems and connected with financing partners, including venture capitalists. The cleantech industry is growing rapidly, with the sector’s global market volume reaching EUR 4.6 trillion in 2021. Future prospects are also positive, with global revenues in environmental technology and resource efficiency set to reach EUR 9.4 trillion by 2030. Therefore, governments have invested in developing cleantech support programmes. For example, Germany identified its buildings and transport sectors as being the largest polluters in its economy and is seeking to use new technologies from the cleantech sector to improve sustainability in these areas. This has been encouraged through the provision of public support to green entrepreneurial projects that create solutions to these environmental challenges. In Canada, BDC created the dedicated Cleantech Practice, which invests in globally competitive cleantech firms.

Although high-tech green entrepreneurship (or cleantech) is rightly a focus for policy makers in the case study countries, it is also important to acknowledge the role that low-tech projects can play in achieving environmental objectives. Indeed, the definition of green entrepreneurship encompasses all individuals that pursue ideas and solutions that have the potential to deliver environmental improvements, regardless

of whether their activities are technology intensive or not. Examples of low-tech green entrepreneurship include plant-based restaurants or consultants providing advice on the implementation of green solutions. It is important to ensure that public support schemes also address the needs and challenges of low-tech green entrepreneurs, to avoid a situation in which these businesses fall through the cracks. Examples of public projects that support low-tech green entrepreneurs are the SwitchMed project in Israel and the DBU's Green Startup Programme in Germany.

4. Development of strategic partnerships to advance green entrepreneurship

In each of the three case study countries, governments invest in building networks of public and private sector stakeholders to support green entrepreneurs. These networks are an invaluable resource for green entrepreneurs because they can offer knowledge, expertise, as well as access to funding and market opportunities. Government actions can play an important role in the development of strategic partnerships with business associations, private incubators, universities and other relevant stakeholders. In Canada, BDC uses its network of 100 business centres across the country to provide in-person services to entrepreneurs with more complex borrowing needs. At the same time, it collaborates with both private and public sector organisations to increase their outreach and to engage more actively with entrepreneurs who want to contribute to environmental goals. These partnerships create a more favourable environment for starting and growing a business. In Israel, the entrepreneurial programme in the periphery regions collaborates directly with designated incubators and higher education institutions to improve entrepreneurial support in the areas of research, business development, and commercialisation.

5. Overcoming funding gaps

Green entrepreneurs often face higher levels of difficulty in accessing finance for their environmental projects. This is due to a variety of factors including a more extended path to market, policy uncertainty and the capital-intensive nature of many environmental projects, which can deter business angels, venture capital funds or other financial investors from lending. All of the case study countries have identified and addressed this challenge, developing a range of initiatives to reinforce the financial support that is available to green entrepreneurial projects, particularly in the areas of clean technologies. In Canada, BDC created the Cleantech Practice, which invests in globally competitive cleantech firms as they discover and commercialise ways of combatting climate change and pollution. Many of BDC's financing options provide long-term funding with flexible repayment terms, alleviating some of the challenges encountered by green entrepreneurs in funding capital-intensive projects over extended periods of time. In Germany, the GreenUpInvest initiative aims to involve business angels and other early investors in the field of green start-ups. The Israel Innovation Authority's Seed Programme supports start-ups in areas with stringent regulation, while the Ideation Programme helps entrepreneurs to develop a technological proof-of-concept, which in turn assists them in raising private funding or finding a business partner for further development.

6. Green entrepreneurship policies go hand-in-hand with national climate goals

As seen in Canada, Germany and Israel, green entrepreneurship policies and initiatives are usually well-aligned with national strategies aimed at achieving climate goals. These include international efforts such as the UN's Sustainable Development Goals and the Paris Agreement. Supporting green entrepreneurs who are innovating in the transition to a low-carbon economy can directly contribute to the achievement of climate targets. As specific examples of this alignment, the funding areas of the Green Startup Special Programme of the German Federal Environmental Foundation are informed by the scientific findings on the Planetary Boundaries and the United Nations' SDGs. Still in Germany, the StartUp4Climate initiative focuses on the consistent alignment of start-up support systems with climate protection and sustainability goals. At the same time, Germany decided to boost its efforts on innovation and climate technologies directly linked to the sectors that may contribute the most to greenhouse gas emissions, such as buildings

and transport. In Canada, BDC's measures are also well aligned with the United Nations' SDGs and support the objectives of the Paris Agreement for a cleaner, more sustainable future.

7. Inclusion of under-represented groups

Many groups are under-represented in the area of entrepreneurship such as women and youth (OECD/European Commission, 2021^[11]) but there is potential to boost green entrepreneurship by involving more of these under-represented groups in entrepreneurship. There is some evidence that entrepreneurs from some of these population groups are more likely to be involved in green entrepreneurship such as youth and women. There are some examples of governments using dedicated schemes to tap into this potential for boosting green entrepreneurship. For example, the Israel Innovation Authority is involved with several programmes that seek to engage young citizens or those from the peripheral regions in the country's green transition. In Canada, BDC has created a wide range of programmes that boost inclusivity, such as the Indigenous Growth Fund, the Black Innovation Fund, the Women in Technology Venture Fund, and the Supplier Diversity Programme. To encourage young entrepreneurs that would like to develop their green projects, BDC also established a partnership with Futurpreneur Canada, a national non-profit organisation that supports young entrepreneurs.

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Notes

¹ The last synthesis report was published in July 2020.

² The KfW Capital Sustainability Policy is not directly applicable to the German Future Fund / European Investment Fund Growth Facility, which is covered by the European Investment Fund's sustainability regulations.

³ In Germany, people who were born without German citizenship as well as those with at least one parent who was born without German citizenship are classed as having a migration background (Will, 2019^[22]).



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