

Exploring Opportunities for Women Entrepreneurs Driving Climate Solutions

A Discussion Note



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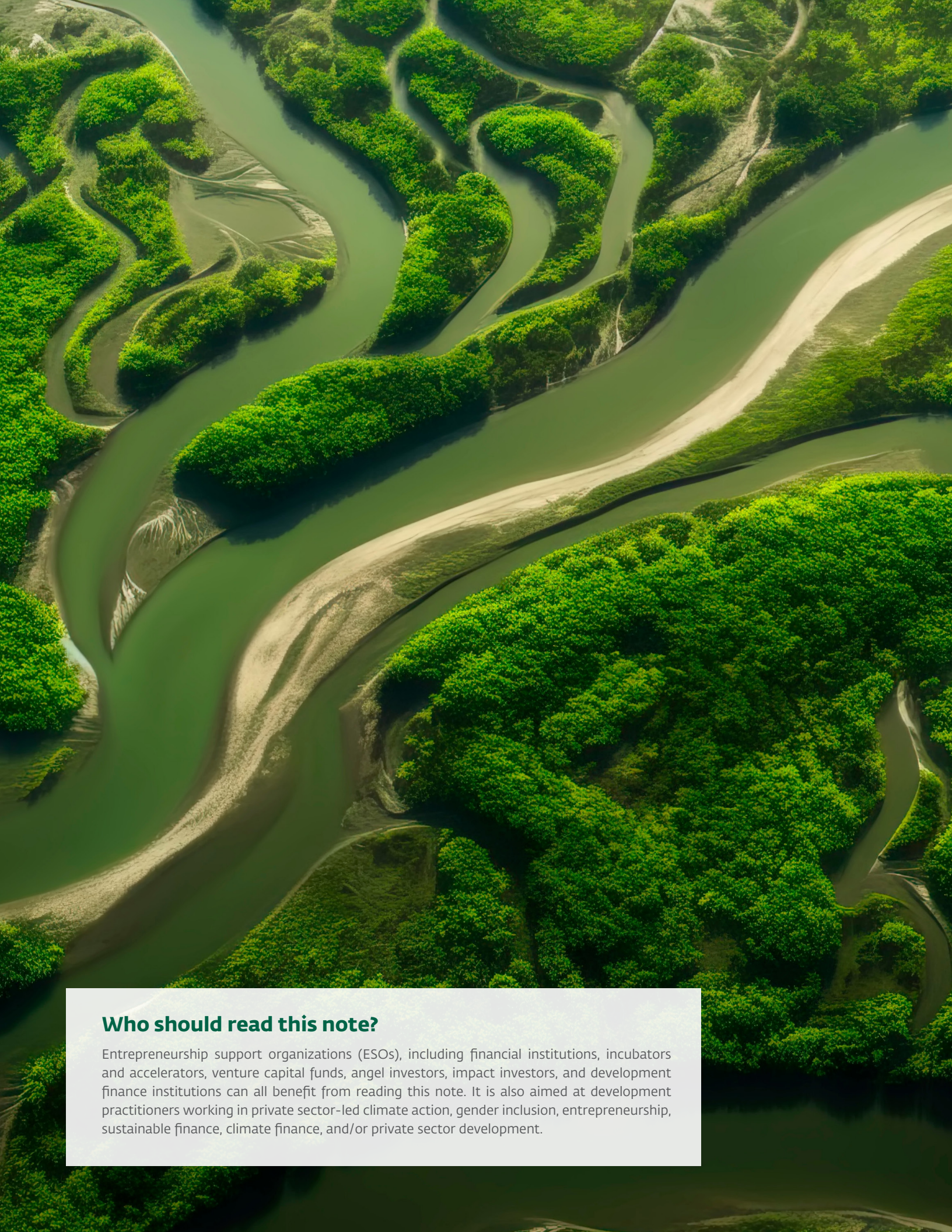
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Who should read this note?

Entrepreneurship support organizations (ESOs), including financial institutions, incubators and accelerators, venture capital funds, angel investors, impact investors, and development finance institutions can all benefit from reading this note. It is also aimed at development practitioners working in private sector-led climate action, gender inclusion, entrepreneurship, sustainable finance, climate finance, and/or private sector development.

I. Introduction

The call for inclusive and gender-responsive climate action is growing, as is the need to build and share evidence on how efforts to achieve gender equality and to counter climate change are linked. Research into intersections between gender, climate change, and entrepreneurship is a small but growing field with the potential to yield important insights to drive inclusive low-carbon development.

This note describes women's green entrepreneurship and explores the business case for supporting women-led businesses in green or climate-related sectors. It examines challenges and potential financing solutions for different categories of women green entrepreneurs, proposes areas for further research, and focuses on three core challenges and opportunities:

1. Climate Change Risks: Women face unique challenges in confronting climate-related risks.¹
2. Climate Transition Risks: Due to stubborn gender gaps, women and other disadvantaged groups are unlikely to benefit from new climate-related opportunities to the same extent as men.²
3. Climate Leadership Opportunities: Women's leadership and decision-making are key to effective and inclusive climate action.³

While large corporations emit the greatest share of global greenhouse gases, it is estimated over 80 percent of their emissions come from their global supply chains, which are often made up of smaller businesses (Bove & Swartz, 2016). Micro, small, and medium-size enterprises (MSMEs) represent 90 percent of businesses worldwide (IFC, 2023a), and in developing countries, more than half of women are, or aspire to be, entrepreneurs (World Bank, 2023a). This underpins the reason why the participation of MSMEs owned or led by women is vital to address climate change in a just and inclusive way, as well as the need to address barriers that hinder these businesses from responding to climate change and developing climate solutions.

Climate change risks, including more frequent and extreme droughts, floods, heatwaves, and rising sea levels, are already disrupting MSME operations. These threats are likely to have the greatest impact on women entrepreneurs who already face gender barriers. In emerging economies, women-led businesses are often concentrated in sectors that are highly vulnerable to climate shocks, such as smallholder farming.⁴ In addition, women often have fewer resources to adapt and respond to these threats. Climate change is also worsening the gendered distribution of household tasks, forcing women and girls to spend more time collecting resources such as fuel and water,

and in some contexts, lowering human capital investments for girls (UN Women, 2023; UNFCCC, 2022).

Climate transition risks are greater for women-led businesses because persistent gender gaps in the entrepreneurial ecosystem mean they are less likely to gain from climate-related opportunities, investment, and venture capital. IFC research estimates that climate business could generate \$23 trillion in investment and create 213 million jobs, while avoiding four billion tons of greenhouse gas emissions in developing countries from 2016 to 2030 (IFC, 2016). Other research shows investments in electric vehicles, renewable power generation, clean energy equipment manufacturing, green finance, and greener global supply chains could reach \$10.3 trillion by 2050 (Arup & Oxford Economics, 2023). This would create major opportunities for new business ventures, but evidence shows women are unlikely to gain equitably.

Climate technology ventures received more than a quarter of all venture capital funding in 2022, but in emerging markets, only 11 percent of startups that attain seed funding are led by women (IFC, 2023b). Compared to their male counterparts, female investment partners invest in almost twice as many female-led businesses (Bittner & Lau, 2021), but globally, only 15 percent of senior investment teams are gender balanced and nearly 70 percent are all male (IFC, 2019a). In Canada, only one in ten greentech business founders are women (MaRS, 2021). Information and communication technologies are key to build green economies, but only 2.7 percent of women entrepreneurs are starting businesses in this sector compared to 4.7 percent of men (OECD, 2012; Global Entrepreneurship Monitor, 2022). Women also remain underrepresented in science, technology, engineering, and mathematics professions, which are considered highly valued fields for the green economy (OECD, 2022).

Climate leadership opportunities for women and their participation in climate action not only enable a just and inclusive transition, but they also contribute to better climate outcomes in the private sector. There is emerging evidence that women in senior positions are more ambitious and effective in corporate climate action.⁵ However, more research is needed to assess this relationship in the context of green entrepreneurship and climate technologies. For example, in addition to the established business case for supporting MSMEs owned or run by women, is there evidence that demonstrates the business benefits of investing in women-led ventures that contribute to environmental and climate objectives? Do women-led businesses offer unique solutions to the climate crisis, including innovations for adapting to climate change, building community and household resilience, and developing new emission reduction technologies?

1. Langsdorf, 2022; UNFCCC, 2022; Deininger et al., 2023; Fruttero et al., 2023.

2. Deininger et al., 2023; UK AID & WOW, 2021.

3. Altunbas et al., 2021; BoardReady, 2021; FP Analytics, 2021.

4. Atela et al. find that women-led MSMEs in Kenya face heightened climate risks because they are concentrated in agricultural sectors that are highly vulnerable to climate change.

5. FP Analytics, 2021; BNEF, 2020; Altunbas, 2021; BoardReady, 2021; Gambacorta et al., 2022.

II. Understanding Women's Green Entrepreneurship

Green Entrepreneurship

There are many ways to define entrepreneurship that drives climate and environmental objectives. Entrepreneurs can be considered 'green entrepreneurs' if they address climate change and/or create positive environmental value in one of two ways. Firstly, they use clean, energy-efficient processes to deliver their products and services, for example, by using renewable energy sources and limiting waste. Secondly, they provide products or services in what is traditionally considered a green sector, such as solar power or battery storage. These two definitions are not mutually exclusive, and green entrepreneurs can belong to any sector if their operations are climate-smart and environmentally friendly.

Green entrepreneurs contribute to mitigation, adaptation, and resilience-building. For example, they can mitigate the effects of climate change by developing carbon sequestration technologies. They can help communities to adapt to the impacts of climate change through new food production systems or create more climate-friendly sectors by replacing heavy industry with circular economy processes. Green entrepreneurs can drive biodiversity, restoration, and conservation activities that may or may not have climate benefits but contribute to broader environmental objectives ([Kim et al., 2023](#)). Green entrepreneurship is also a driver of more sustainable employment, creating decent jobs with positive environmental or climate value.⁶

Green micro, small, and medium-size enterprises are central to the private sector's response to climate change. MSMEs make up 90 percent of businesses worldwide and provide more than 50 percent of jobs ([IFC, 2023a](#)), but they also have lower capacity to adapt to extreme weather events and other climate threats ([Wedawatta et al., 2010](#); [Crick et al., 2018](#)). Furthermore, while individual MSMEs have a small environmental footprint, on aggregate they contribute significantly to emissions and pollution. Estimates vary, but one study found small firms produce 50 percent of greenhouse gas emissions globally ([ITC, 2021](#)), while the International Energy Agency found that small and medium-sized enterprises account for 13 percent of total global final energy demand ([IEA, 2015](#)).

Growth-oriented MSMEs can introduce climate innovations, develop technical solutions, strengthen demand for new

climate-smart goods and services, and drive sustainable behaviors. Scaling these businesses can create new green employment opportunities, with prospects for greater integration of marginalized groups. MSMEs in corporate supply chains also contribute to the decarbonization efforts of larger corporates. A growing number of corporates are including their supply chains when complying with environmental, social, and governance (ESG) requirements or they are doing so voluntarily to support their corporate brand and values. ([OECD, 2021](#)).

Through greater technical capacity building and access to finance, MSMEs can build climate resilience, reduce emissions, or pursue climate innovations, while also strengthening economies, providing jobs, and achieving global development goals. Compared to larger companies, MSMEs face greater financial constraints in responding to new climate realities, including risks and opportunities. In developing countries, an estimated 43 percent of formal MSMEs cannot access the finance they need, representing a financing gap of \$4.1 trillion ([IFC, 2022](#)). A survey of small and medium-sized enterprises (SMEs) in the European Union found that three-quarters of SMEs plan to implement green measures, but cited associated costs and complex legal and administrative processes as common obstacles ([European Commission, 2022](#)). Barriers that limit access to finance and human capital must be addressed, along with uncertainty around the cost-effectiveness of green measures, if MSMEs and entrepreneurs are to fully contribute to an equitable, inclusive, and sustainable climate future.

Women's Entrepreneurship

Women's entrepreneurship encompasses businesses created and managed by women and they range from micro-businesses that foster basic income generation to high-growth ventures with disruptive technologies.⁷ Women operate approximately one-third of all SMEs in developing countries ([IFC, 2022b](#)). Seventeen percent of women run their own businesses and 35 percent aspire to do so ([GEM, 2023](#)). These figures do not capture regional variation among women-led businesses and the diverse scale, ambition, and growth potential of these enterprises.⁸ Women's entrepreneurial experiences can manifest in different ways depending on the formal and

6. The International Labour Organization emphasizes decency, safety, and inclusivity in the definition of green entrepreneurship, recognizing that the workplace is where social, economic, and environmental dimensions are inseparable (ILO, n.d.).

7. Recent literature on women's entrepreneurship specifically avoids the use of 'women' as a generic proxy for 'gender' and acknowledges the intersectional nature that informs women's experience with entrepreneurial pursuits (McAdam, 2022). Also see IFC's definition of women's entrepreneurship.

informal institutions that govern their geographic context and their access to information and resources. Women's needs and financing strategies will also differ based on the size and maturity of their enterprises ([ITC, 2020](#)).

Over the last decade, the narrative among policymakers has gradually shifted focus from encouraging the creation of high numbers of women-led enterprises to supporting women-led, growth-oriented businesses with sustainable and inclusive job creation potential. The prevailing narrative that women constitute the poorest and most vulnerable entrepreneurs is being challenged by high-performing women-led ventures that contribute to household resilience, innovation, job creation, and economic development. This recognizes that women entrepreneurs can move far beyond subsistence activities and provide innovative solutions to global challenges, including climate change, if they have equal opportunity to compete in the market.

However, a range of constraints continue to limit the growth potential of women-led businesses.⁹ Women-led MSMEs face an estimated \$1.7 trillion financing gap ([IFC, 2022b](#)). In total, 104 of 190 economies have at least one legal constraint that prevents women from running a business in the same way as men ([World Bank, 2023b](#)). Only two percent of global value chain purchases are made from women-led businesses, and women spend three to five times as much time on unpaid care work than men, which reduces the time available for business development activities ([We-Fi, 2022](#)). These figures reflect just a sample of the financial, legal, and normative barriers that constrain women's business aspirations and their capacity to launch, scale, and bring new ventures to market.

Women's Green Entrepreneurship

Describing women's green entrepreneurship is more than just a theoretical task—it is key to understanding climate-related risks and opportunities for women in the entrepreneurial ecosystem. Uncovering these risks and opportunities allows investors and development practitioners to identify and test business support and financing solutions for women-led businesses in this space. Exploring constraints, motivations, and prospects allows entrepreneur support organizations to simultaneously drive impact across climate and gender inclusion.

Women's green entrepreneurship can be approached in two ways:

1. Input-Based: Women entrepreneurs who actively green their business by adapting their operations to climate-related risks, by reducing emissions, or by minimizing their

impact on the environment, for example by lowering water consumption or managing waste.

2. Output-Based: Women entrepreneurs whose primary business is the development or deployment of green or climate-smart technologies that contribute to climate mitigation, adaptation, resilience-building, and/or environmental conservation.

It is important to note that these categories are not mutually exclusive. Businesses can simultaneously reduce their operational carbon footprint, while also developing green and climate-smart technologies. Furthermore, women green entrepreneurs can exist within any sector, including hard-to-abate industries or climate-vulnerable sectors such as agriculture.¹⁰

These approaches can be further refined to provide important information about the types of financing and business support required to drive both climate and gender inclusion objectives through entrepreneurial activities. Businesses can be differentiated by women's participation in the ownership and management structure; by the sectoral focus of the business; and by the climate and environmental focus, including mitigation, adaptation, conservation, and biodiversity (see Box 3). Assessing the size of the enterprise, business maturity, growth potential, and market access offers insights into the capital requirements and business support required for profitability, expansion, financial stability, and adaptation to market changes.

Important distinctions exist between women entrepreneurs who adapt their businesses out of necessity in response to new climate realities, and women-led ventures developing disruptive climate technologies. Underlying this distinction are women's motivations to start green businesses, as well as their capacity to do so. Research by the Aspen Network of Development Entrepreneurs (ANDE) found that women were motivated to launch climate enterprises for a variety of reasons, including recognizing market opportunities, witnessing the harmful impacts of climate change on their families, experiencing a desire to protect the community and the environment, or gaining awareness of climate issues through academic studies ([ANDE, 2022](#)). These distinctions are important when investigating and responding to the needs of women-led businesses operating in green and climate-related fields (see Section IV).

8. For example, in Sub-Saharan Africa, women are often driven into entrepreneurial activities by necessity and as a means of survival (Olawajumi & Fernando, 2020). In the Middle East, women's entrepreneurial intentions are high but startup rates are low, while in Central and East Asia, there are high rates of established business ownership (GEM, 2022).

9. For a recent overview of the constraints faced by women-led and owned businesses and measures to reduce gender gaps, see What Works in Supporting Women-led Businesses (World Bank, 2023a).

10. Carbon-intensive sectors with few clear, viable low-emission alternatives, such as steel and cement-making, chemicals, aviation, and deep-sea shipping.

Box 3: Understanding the Universe of Women's Green Entrepreneurship

Women	Green	Entrepreneurship
<p>Ownership and/or Leadership:</p> <ul style="list-style-type: none"> • Women founder or co-founder • Women owner or co-owner (≥ 51%) • Women board members (critical mass of 30%) • Women C-suite members (Chief Executive Officer, Chief Operations Officer, Chief Financial Officer, etc.) • Women senior managers 	<p>Input-Based Approach: Lowering the environmental or climate footprint of their business in any sector or industry.</p> <p>Output-Based Approach: Technologies and business solutions that contribute to:</p> <ul style="list-style-type: none"> • Climate mitigation • Climate adaptation • Disaster management and resilience • Biodiversity • Conservation 	<ul style="list-style-type: none"> • By types of business support, for example, equity financing, debt financing, grants, and concessional financing. • By funding sources, such as venture capital, incubators and accelerators, angel investors, and impact investors. • By business maturity, including pre-seed, seed, series A–E funding, startup, early stage, growth stage/active growth, organizational development, or business expansion. • By size, for examples, please see definitions by IFC, the SME Finance Forum, and ANDE.
<p>By climate innovation stage, such as commercially-viable solutions, nascent solutions, or unexplored solutions (adapted from ANDE),</p>		



III. Developing the Business Case

Investment in Green Entrepreneurship

Climate investing experienced breakout growth in 2022, driven not only by the urgency of the climate crisis, but also by the value proposition of sustainable, net-zero economies (Sonnenfeldt, 2023). However, 2023 figures point to a significant correction, with private market equity and grant funding in climate-tech startups decreasing by 40.5 percent in line with geopolitical and macroeconomic headwinds affecting most global capital markets (PwC, 2023). This is still lower than the 50 percent decline year-over-year in total venture and private equity investment, but it shows that the climate finance ecosystem is not immune to market volatility.

Global sentiment and activity around greener investments continue to grow. Development finance institutions, banks, and other types of investors are expanding their climate portfolios. For example, IFC delivered \$7.6 billion in climate finance and mobilized an additional \$6.8 billion from other sources in the 2023 fiscal year, continuing an upward ten-year trend on own-account commitments. The green, social, sustainability, and sustainability-linked bonds, while observing the first decline ever in 2023, are predicted to recover in 2024, bringing the cumulative increase to 10 percent over the next two years (IFC, 2023c). Other positive indicators include the launch of more than 330 sustainability, ESG, and impact funds by private equity investors from 2019 to 2022.

Evidence is emerging linking green innovation and stronger business performance. Green entrepreneurs can achieve cost savings from greater resource efficiency, improved logistics, and sales from commercialization, as well as indirect benefits such as reputational advantages; better relations with suppliers, customers, and regulators; and enhanced innovation (Sarkar, 2013; OECD/IEA, 2015). Moody's data shows that green infrastructure projects have lower default rates than non-green projects. This is driven by higher quality contracts and the backing of government mandates or subsidies, which reduce the risk of financial losses (SVB, 2023). IFC's climate finance portfolio demonstrated a non-performing loans ratio that was lower or equal to the non-climate finance portfolio.¹¹

The Business Case for Women's Green Entrepreneurship

A growing body of evidence demonstrates the business case for closing gender gaps in entrepreneurship (see Box 4), but women's business contributions and leadership in climate and environmental fields have received far less attention. Examining whether the economic rationale for supporting women-led enterprises extends to climate-related sectors is an important area for investigation. If more sustainable, climate-smart businesses outperform relative to other businesses, and women-led businesses do the same, is there an interaction or multiplying effect for women's green entrepreneurship? Conversely, are there additional barriers and challenges unique to climate-related fields that prevent women from succeeding in this space, relative to other domains?



¹¹ The FIG 2019 Climate Survey of 129 IFC clients in 64 countries, showed that 96 percent found NPLs in their green portfolio to be lower (56 percent) or the same (40 percent) compared to non-green portfolio.

Box 4: Why Women in Business is Good Business: A Decade of Research

Recent literature has focused on the business case for investing in women-led and founded enterprises—from micro enterprises operating in last-mile energy distribution to high-potential startups. This business case has developed across three primary dimensions:

- 1. Corporate performance:** Gender diversity in business leadership has been linked to a variety of financial and nonfinancial benefits:
 - Businesses founded by women deliver more than two times the revenue per dollar invested than those founded by men ([Abouzahr et al., 2018](#)).
 - Data from over 700 funds and 500 portfolio companies found that gender-balanced leadership teams correlate with approximately 25 percent greater increases in valuation than unbalanced teams ([IFC, 2019a](#)).
 - Within IFC financial institution clients, the average non-performing loan ratio for women-led small and medium-sized enterprises was lower than the average for the total SME portfolio for six consecutive years (2017-2022) ([IFC, 2023d](#)).
 - Venture capital firms that increased their proportion of female partner hires by 10 percent had a 1.5 percent increase, on average, in fund returns each year, and their exits were 9.7 percent more profitable ([Gompers & Kovvali, 2018](#)).
 - According to a World Bank survey, women-led businesses responded to the COVID-19 pandemic with resilience and innovation, and were more likely to use digital platforms compared to those led by men ([Iacovone et al., 2021](#)).

- 2. Community level:** The case for supporting women-led businesses includes their positive impact on local development and social wellbeing:
 - Women are more likely to invest their earnings in their children's health and education, improving their own children's prospects, while growing human capital ([We-Fi, 2022](#)).
 - Women-led businesses are more likely to provide vital services in their communities, while also creating jobs and other opportunities ([Cherie Blair Foundation, n.d.](#)).
 - Women entrepreneurs can increase awareness of gender issues within their businesses and challenge gender norms by serving as role models for younger generations ([Quak et al., 2022](#)).

- 3. Macroeconomic level:** Women-led businesses bring diverse perspectives that fuel innovation, enhance competitiveness, and contribute to overall gross domestic product (GDP):
 - If women and men participated equally as entrepreneurs, global GDP could rise by an estimated three to six percent and boost the global economy by up to \$5 trillion ([Cherie Blair Foundation, n.d.](#)).
 - Women-led businesses tend to employ more women ([We-Fi, 2022](#)), and advancing women's employment could add \$12 trillion to global GDP and boost economic output by as much as 35 percent in some countries ([McKinsey Global Institute, 2015](#)).

There are several reasons why supporting women in green and climate-related enterprises could lead to additional business gains and drive more sustainable impact:

- **Women tend to be more impacted by climate change and related challenges, providing them with unique insights and the ability to identify new business solutions for mitigation, adaptation, and community resilience.** This knowledge—particularly at the local level where behavior change happens—make women important stakeholders for developing and disseminating strategies for combating climate change ([ILO, 2018](#); [ICRW, 2020](#)).
- **Women outperform on environmental, social, and governance metrics when compared to men, including in the realm of entrepreneurship.** Women are more likely than men, on average, to change their habits in ways that contribute to emission reductions ([Oliver Wyman, 2020](#)). In seven of 11 developed countries, women were more likely to consider climate change a serious problem that requires major lifestyle changes ([Zainulbhai, 2015](#)). Evidence suggests that women entrepreneurs are more strongly motivated to green their businesses and are more proactive in pursuing green networking opportunities compared to their male counterparts ([Braun, 2010](#)). Companies with women on corporate boards are more likely to perform better in a range of environmental metrics, including renewable energy generation and emission reductions ([McElhanev & Mobasser, 2012](#)). A meta-analysis of women's business leadership and ESG performance shows that women-led firms achieve higher ESG scores ([IFC, 2019a](#)), a finding recently confirmed in Europe ([EIB, 2022](#)).¹²
- **Women perform better in leadership, problem-solving, and innovation, which can contribute to advancing green technologies and climate solutions.** Women's entrepreneurship in energy and agriculture can help to diversify value chains, reduce risks, increase competitiveness, and enable climate-responsive innovation ([UK AID & WOW, 2021](#)). Furthermore, women must overcome additional hurdles when launching and scaling their business ideas. This makes them particularly robust candidates if given the chance to compete in male-dominated sectors. During the pandemic, the number of unicorn companies owned by women increased from 18 in 2020 to 83 in 2021, demonstrating the resilience and adaptability of women-led ventures ([World Economic Forum, 2022](#)).
- **Women have comparative advantages in developing climate technologies and green solutions that benefit women consumers and they influence up to 80 percent of buying decisions** ([Deloitte, n.d.](#)). Women understand the customer base for products and services such as clean cookstoves and household cooking fuels, climate-

smart public transportation, and environmentally friendly agricultural products that have a majority of women users. In turn, women are likely to design and market products more effectively and reach a larger customer segment, which could improve returns and offer attractive investment opportunities.

Examples of women pioneering green and climate business solutions are emerging across various sectors, including climate-smart agriculture, renewable energy, and in financial institutions. For instance, women's participation in farm training initiatives has been linked to increased uptake of climate-smart agriculture technologies and higher farming yields. Women energy entrepreneurs have delivered business value for renewable energy companies, particularly in reaching last-mile energy consumers. When it comes to financing green enterprises, women's presence in capital allocation decisions is positively associated with more lending to greener businesses. For examples, see Box 5.



12. Including monitoring and target-setting on energy consumption, CO₂, water, and pollution; strategic objectives mentioning environment; heating and cooling improvements; upgrade of machines and vehicles.

Box 5: Women Entrepreneurs Driving Business and Climate Value

Agriculture, forestry, and land use account for one fifth of global greenhouse gas emissions, making climate-smart approaches essential.¹³ Women represent an estimated 34 percent of workers in global agricultural value chains, and up to 60 percent in least developed countries. Women also make up an estimated 21 percent of workers in fisheries and aquaculture and up to 85 percent in small-scale and industrial fish processing (FAO, 2022). Despite this, women hold just 23 percent of agribusiness management positions and make up only 5.4 percent of entrepreneurs in these sectors worldwide (GenderSmart, 2021).

Emerging evidence of women's positive impact:

- In **Rwanda** and **Malawi**, closing the gender gap in agricultural productivity could increase crop production by 19 and seven percent respectively. In **Ethiopia**, a 1.4 percent increase in crop production could translate into a \$221 million increase in agricultural GDP (UN Women, 2019).
- In **Liberia**, GROW, a business and investment advisory agency, partnered with cooperatives to improve planning and management of cocoa production. An impact assessment revealed that women's participation in farmer training programs was linked to higher cocoa yields, with households where both men and women farmers were trained reporting a 36 percent higher yield per acre compared to households where only men were trained (GROW, 2020).
- In **Indonesia**, IFC found that productivity increased by 131 percent for coffee-farming groups that trained both men and women, compared to only 95 percent for groups that only trained men (IFC, 2017).
- In **Tanzania**, a study found that women's control of farm resources was a major determining factor in the adoption of technologies to boost crop and livestock diversity, irrigation, application of chemical fertilizers, and agroforestry (Kurgat et al., 2020).

The energy sector produces three-quarters of global greenhouse gas emissions, with coal combustion alone responsible for nearly one third (World Bank, 2021b). At the same time, 800 million people live without electricity, and hundreds of millions of people have unreliable access. Almost three billion people cook with biomass, causing significant air pollution and disproportionate health risks to women and girls, who typically perform the brunt of cooking-related activities. In 2022, only seven percent of startup founders in the energy sector were women, compared to 14 percent across all sectors (IEA, 2022).¹⁴

Emerging evidence of women's positive impact:

- The Women's Economic Empowerment program from the International Network on Gender and Sustainable Energy (ENERGIA), supports women's energy enterprises through technical, managerial, leadership, and empowerment training. Seventy percent of entrepreneurs who received support through the program reported positive profit margins, 82 percent reported involvement in household purchasing decisions, and 72 percent were taking active business decisions. The program also improved access to off-grid renewable energy technologies, particularly for poorer and more remote communities (Dutta, 2019).
- In **Nigeria** and **Tanzania**, Solar Sisters operates a network of entrepreneurs who deliver sustainable energy solutions to last mile communities, linking gender equity, climate justice, and clean energy access. According to its latest impact report, Solar Sisters has worked with more than 6,000 women energy entrepreneurs, reached almost three million people with clean energy products, mitigated over 890,000 tons of emissions, and brought \$215 million in economic benefits to customers (Solar Sisters, 2021).
- In the **United States**, firm-level data from 2008 to 2016 found that a critical mass of two more women on corporate boards correlates positively with renewable energy consumption and on the firm's financial performance (Atif et al., 2021).
- In **India**, woman-founded Frontier Markets raised \$2.25 million in pre-series A financing. It employs a network of women to sell solar and digital connectivity appliances. Today, the company's 10,000 rural women entrepreneurs earn a 15 percent margin on sales. Collectively, they have sold 2.2 million products to 350,000 households, earning an estimated \$12 million. Customers, 65 percent of which were women, experienced \$120 million in income and savings from these products (GenderSmart, 2022) (GenderSmart, 2022).

¹³ Climate-smart agriculture (CSA) is an integrated approach to managing landscapes (e.g., cropland, livestock, forests and fisheries) that addresses food insecurity and accelerating climate change. CSA aims to achieve 1) increased productivity, 2) enhanced resilience, and 3) reduced emissions (World Bank, 2021a).

¹⁴ Excluding consumer goods.

Box 5: Women Entrepreneurs Driving Business and Climate Value (continued)

Financial Institutions, including banks, insurance companies, and microfinance institutions, are key intermediaries in the fight against climate change. Climate change creates new credit and reputational risks as portfolio companies confront the direct costs of emissions, make new CAPEX investments to manage climate risks, and respond to changing customer demand. At the same time, the financial sector is pivotal in mobilizing the extensive financial resources required to achieve a low-carbon transition and to help economies build resilience and adaptation ([ECB, 2020](#)).

Women are underrepresented across all levels of the global financial system, including as decision-makers and as recipients of business financing. Globally, women hold 21 percent of board seats, 19 percent of C-suite roles, and five percent of CEO positions in financial institutions ([Deloitte, 2022](#)). Only seven percent of private equity and venture capital is invested in female-led businesses in emerging markets ([IFC, 2019a](#)), and globally, an estimated 400 million women-owned businesses experience a \$1.7 trillion financing gap ([IFC, 2022b](#)).

Emerging evidence of women's positive impact:

- An IFC survey of banking clients showed that for six consecutive years, loan portfolios to women-led small and medium-sized enterprises exhibited lower non-performing loans than the total SME portfolio ([IFC, 2023d](#)). The climate finance portfolio also showed lower or equal non-performing loans compared to the non-climate finance portfolio of financial institutions.¹⁵ To date, there has been no investigation into the performance of green or climate loans supporting women-led enterprises and their relative portfolio performance compared to a control group.
- Research into the lending behavior of 52 banks, representing 60 percent of total banking assets in the euro area, found that banks with more gender-diverse boards provide more credit to greener companies. Lending volumes to corporate customers with higher direct and indirect emissions than their peers were ten percent lower when banks had at least 37 percent membership of women on their boards ([Gambacorta et al., 2022](#)).

Challenges for Women's Green Entrepreneurship

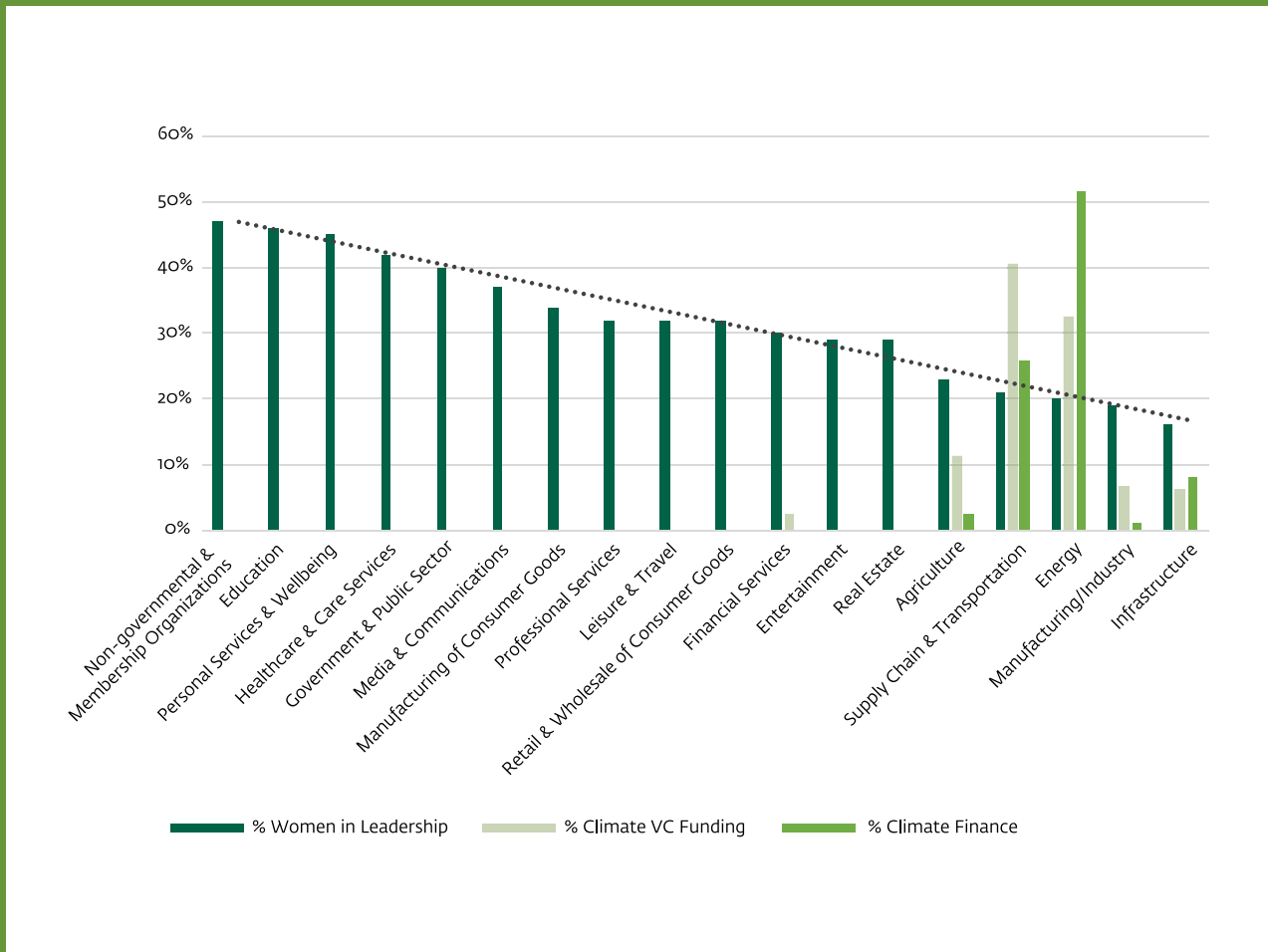
Despite these examples of the potential impact of women's green entrepreneurship, many challenges remain. Climate technologies can require large capital investments upfront and longer payback periods for investors, and this can increase the difficulty of attracting venture capital and other types of financing ([World Bank, 2014](#)). A single renewable energy project can cost billions in upfront capital, while breakthrough technologies, also called deep tech, involve complex development processes and particular revenue models to scale effectively ([So, 2021](#)). Women founders tend to face higher interest rates and receive smaller ticket sizes compared to their male counterparts in venture capital ([Female Founders Fund, 2022](#)) and through traditional bank credit lines ([Montoya et al., 2020](#); [Brock & de Haas, 2022](#)). Climate-focused technical assistance is limited, including the facilitation of climate financing for small businesses and gender-inclusive technical assistance ([ANDE, 2022](#)). This makes entry barriers even more challenging for women-led green startups.

The sectors typically considered most relevant for climate solutions are also those where women are historically underrepresented, which may amplify existing gender gaps. Sectors that attract the most climate capital are also where women are most underrepresented in business leadership (see Box 6). This exacerbates the shortage of women role models and mentors in corporate leadership positions. For example, the energy sector, where women represent only seven percent of startup founders ([IEA, 2022](#)), attracted more than half of the \$632 billion in average annual climate finance (including public and private sources) in 2019 and 2020 ([Climate Policy Initiative, 2022](#)).¹⁶ In venture capital, areas like food, agriculture, and land use—where women have conceivable comparative advantages—receive only a small proportion of global venture capital funding: \$11 billion in 2021, compared to energy at \$16 billion and transport at over \$50 billion ([PwC, 2022](#)).

¹⁵ In a 2019 IFC Climate Survey, 96% of 129 financial institution clients in 64 countries reported NPLs in their green portfolio were lower or the same compared to their non-green portfolio.

¹⁶ Excluding consumer goods

Box 6: Women's Representation in Business Leadership and Climate Investment Flows



% Women in leadership is estimated using high-frequency data from LinkedIn for 155 countries to examine women's representation in business in 2022 ([World Economic Forum, 2022](#)).

% Climate funding shows global venture funding to climate tech startups for Q1-Q3 of 2022 ([PwC State of Climate Tech, 2022](#)).

% Climate finance shows the global landscape of climate finance, including from private and public sources, using average capital flows data from 2019 and 2020 ([Climate Policy Initiative, 2022](#)).

IV. Industry Examples and Entry Points for Investors

A range of potential investment solutions and support can help overcome challenges facing women's green entrepreneurship, maximize opportunities, and advance women's contributions to both gender inclusion and climate goals. This section explores possible interventions by different types of investors and development institutions in relation to three categories of women-led green businesses with varied stages of maturity, capital needs, and entrepreneurial motivations. These categories are exploratory and require validation through in-depth research.

- 1. Climate Risk Frontliners** are micro and small-size businesses owned or led by women in sectors such as small-scale agriculture, fisheries, and ecotourism, where climate-related impacts can cause major disruptions to core business activities. Their primary motivations are likely to focus on adapting their businesses to climate-related threats, identifying alternative and sustainable forms of income-generation, and building adaptive capacity for their households and communities. Examples of financing solutions that could benefit climate risk frontliners include:
 - Climate insurance products for women and businesses that protect against extreme heat for outdoor workers, known as [parametric insurance](#), or crop losses caused by drought or other climate-related impacts.

- Grant financing to enable access to climate-smart agriculture solutions or technologies that provide climate-related information, such as early-warning systems.¹⁷
- Gender-responsive banking products such as savings accounts that can increase access to digital services and build adaptive capacity through greater financial security.
- Loss and damage payments such as social protection, catastrophe risk insurance and bonds, and contingency finance to provide rapid pay-outs following disasters.
- Innovative climate finance instruments such as green or blue finance, transition finance, sustainable finance, and sustainability-linked finance facilitated via financial intermediaries or development finance institutions deployed for larger businesses with women entrepreneurs in their value chains. These could include climate finance instruments for a renewable energy company that employs last-mile women entrepreneurs, or agribusinesses that provide climate-smart agriculture solutions to women smallholder farmers.
- Blended finance for green companies with built-in performance-based incentives that provide bonuses for sourcing from women-led businesses.

Box 7: Examples of Support for Climate Risk Frontliners:

Grant Funding for Early-Stage Enterprises: The [Climate Gender Equity Fund](#) (CGEF) is a partnership between Amazon and USAID to provide direct grant funding to climate-smart women-led and women-benefitting businesses and investment vehicles. The fund's grant-based approach seeks to fill the financing gap that exists for early-stage enterprises, which typically lack startup capital and technical assistance to bring solutions to scale. Grants go to women-led businesses, as well as incubators, accelerators, networks, and community-based organizations working in support of climate and gender equality goals.

Grant Funding to Pilot Climate Solutions Led by Women: The Aspen Network of Development Entrepreneurs is working with the Aga Khan Foundation Canada and the World University Service of Canada to strengthen the investing ecosystem for growth-oriented women entrepreneurs to scale climate-related businesses in Sub-Saharan Africa. The [Accelerating Women Climate Entrepreneurs](#) (AWCE) project seeks to support women entrepreneurs in climate-related value chains, while also building a roadmap for international development practitioners to advance more gender-responsive business support. One-year grants of up to \$65,500 support three organizations to test models for investing in women climate entrepreneurs through innovative approaches.

Grant Funding to Support Blended Finance Solutions: The [Gender-Responsive Climate Finance Window](#) awards early-stage grants to fund the design and launch of innovative blended finance vehicles driving climate impact and gender equality in emerging markets. The initiative seeks to develop a pipeline of gender-climate finance vehicles to reach bankability and drive more private capital towards gender-responsive climate mitigation and adaptation. Supported by the Government of Canada, the initiative was launched by Convergence, a global network for blended finance, including public, private, and philanthropic investors and sponsors of transactions and funds.

¹⁷ For an overview of potential climate-smart agriculture solutions for smallholder farmers, see Frost et al., 2023.

2. **Climate Transition Players** are small and medium-size businesses owned or led by women operating in green or climate sectors, such as off-grid renewable energy, waste collection and other municipal services, or in medium-scale agriculture production. Climate transition players also include small and medium-size businesses contributing to emissions reductions or environmental protection by actively greening their operations, for example by reducing energy consumption or managing waste. Enabling additional finance for climate transition players can drive scale, enabling their access to more profitable value chains. Financial support can also be leveraged for more efficient, climate-smart technologies and business solutions. Climate transition players could benefit from financing solutions such as:

- Gender-responsive debt financing provided by financial institutions, such as microfinance institutions, banks, and insurance providers, leveraged for business growth and development.
- Green or blue finance, transition finance, sustainable finance, and sustainability-linked finance facilitated via financial intermediaries or development finance institutions that have targets or carve-outs for women-led or -owned businesses.
- Innovative climate finance instruments such as green or blue finance, transition finance, sustainable finance, and sustainability-linked finance facilitated via financial intermediaries or development finance institutions deployed for larger businesses that include women entrepreneurs in their value chains.¹⁸ For example, these could be climate finance instruments for large renewable energy companies or agribusinesses that employ women entrepreneurs.
- Gender bonds targeting women-led or -owned businesses operating in climate or green sectors, or leveraging finance to reduce emissions, climate-adapt their businesses, or build community climate resilience.
- Carbon finance for women entrepreneurs producing enough carbon credits through their business activities, for example by selling cookstoves or solar panels, or planting trees.¹⁹ The scale of businesses using carbon finance must justify the costs of carbon credit certification and verification.

3. **Climate Technology Leaders** are early-stage climate tech startups with high growth potential led or owned by women driving climate impact at scale. These businesses are developing climate technologies that reduce emissions

or increase climate adaptation, either commercially or for deployment in large-scale industry. Women entrepreneurs operating in this space require access to incubators, accelerators, seed funds, and later-stage patient capital to bring their solutions to market. Climate technology leaders could benefit from the following indicative financing solutions:

- Support from Incubators, accelerators, and seed funds to help early-stage women-led companies grow and become ready for later-stage investment.
- Venture capital and private equity funding to accelerate the scale, commercial viability, and deployment of women-led and -owned climate solutions for broader commercial or industry-level adoption.
- Innovative climate finance instruments such as green or blue finance, transition finance, sustainable finance, and sustainability-linked finance facilitated via financial intermediaries or development finance institutions deployed for funds investing in climate technologies with targets for women-led or women-owned businesses.
- Growth capital from banks, governments, and other providers to pay for technology deployment at scale, particularly to support women-led companies and infrastructure owners that no longer require technology innovation but need sustained financing for existing low-carbon technologies.



¹⁸ Larger businesses that procure from climate transition players can simultaneously reduce their Scope 3 emissions.

¹⁹ Carbon finance is a specialized form of climate finance that offers credits for products or services that result in greenhouse gas emission reductions and are tradeable in carbon markets. Producing carbon credits can offer entrepreneurs a form of revenue beyond the creation of the carbon credit, but businesses must weigh the cost of certification and verification, which may be prohibitive (ANDE, 2022).

V. Conclusion: Supporting Women's Green Entrepreneurship

Recommendations and Areas for Further Research

How can climate finance be directed, or re-directed, to support women-led businesses? More data and evidence are needed to understand the linkages between gender inclusion, climate change, and entrepreneurship. Data on the current flows of climate finance to women's enterprises is needed to assess the baseline from which progress can be tracked. Furthermore, to direct more equitable climate finance in an effective way, evidence must be developed on how women-led businesses can be supported to green their businesses and develop climate solutions, which types of business support and financing they require for different phases of business development, and where they face the biggest barriers. Research opportunities are explored further in Box 8.

Addressing evidence gaps will allow different types of investors to deploy more inclusive climate capital with impact. For example, if women green entrepreneurs are overrepresented in low-value sectors with little potential for scale, actors could direct their attention to moving women-led businesses into

higher-value sectors poised for growth. If women are absent from the funding pipeline, efforts could examine systemic barriers that prevent women from realizing their business ideas. If women are incubating climate business ideas but not getting funded, the biggest issue may be unconscious differences in how investors assess women-led ventures. If women climate tech leaders are getting funded but not reaching scale, focus could be placed on more equitable growth capital.

Despite knowledge gaps in this space, a critical first step is to apply a gender lens to climate finance allocation and decision-making. Without this lens, climate finance—from public or private sources—is unlikely to tackle persistent gender gaps and could inadvertently widen them. Inequalities in the way business capital is allocated in the global financial ecosystem are likely to persist, irrespective of growing investor attention on climate change. Raising awareness, building capacity, and strengthening the business case for supporting women's green entrepreneurship among governments, development finance institutions, venture capital and private equity fund, banks, and other financial institutions is vital to direct more climate capital to women-led businesses.

Box 8: Opportunities for Further Research

Research on Women Entrepreneurs:

1. What are the impacts of climate change on women-led businesses?
2. What is the potential of entrepreneurship to be a mechanism for building women's adaptive capacity in response to growing climate fragility?
3. What is women's representation in green entrepreneurship, as climate risk frontliners, climate transition players, and climate technology leaders?
4. What is the nature of these businesses and what is the composition across sector and climate priority (mitigation and adaptation)?
5. What are women's motivations to green their businesses or develop climate solutions?
6. What are the gender gaps at different entrepreneurial stages, for example, at the level of business incubation, acceleration, seed funding, or later-stage funding?
7. What are the unique challenges and barriers that women face in starting and scaling their businesses in green and climate-related sectors, and where do these occur?
8. What kinds of capacity building, technical assistance, training, and financing do women green entrepreneurs need for different types of businesses?
9. What tools and capacity building are required for women to access climate and sustainable finance?

Box 8: Opportunities for Further Research (continued)

Research on Investors:

10. What is the role of different entrepreneurship support organizations, including incubators, accelerators, traditional financial institutions, venture capital and private equity firms, development finance institutions, and digital financial service providers in supporting women's green entrepreneurship?
11. What partnerships between the public sector and private sector could accelerate women's green entrepreneurship and could they include, for example, utility companies, suppliers of energy efficient technologies, business development centers, incubators, and accelerators?
12. What mechanisms and financing strategies can support different types of women's green entrepreneurship across a variety of contexts?
13. What is the business case for driving more gender-equitable distribution of early-stage capital to bring climate change technologies to market?
14. Where are gender biases emerging among investors, for example, at incubation, business acceleration, seed funding, or later stage funding?
15. How can climate finance, sustainable finance, blended finance, and other financing innovations be leveraged to advance women's green businesses?
16. What tools and capacity building are required for investors to extend climate and sustainable finance to women-led businesses?

All stakeholders in the finance and entrepreneurship ecosystem are encouraged to use this note as a starting point to develop the business case for supporting women-led businesses in their green ambitions, whether they are responding to new climate-related risks, greening their operations, or developing the next generation of catalytical climate technologies. Early examples across agriculture, energy, and financial institutions are emerging but more evidence is needed to accelerate climate finance for women-led businesses. Understanding challenges unique to women in climate-focused sectors and how these manifests in different contexts is also key to lowering barriers.

Financing and development support must be responsive to different entrepreneurial motivations, business maturity, growth potential, and access to markets. Supporting women in green entrepreneurship—whether they be climate risk frontliners, climate transition players, or climate technology leaders—requires a range of solutions from investors and development partners, including traditional financial institutions, multilateral climate finance vehicles, and venture capitalists. Closely investigating and tailoring instruments and financial products to meet the needs of different women driving adaptation and mitigation solutions—locally and at scale—will be critical to achieve the shared global goals of gender equity, inclusion, and climate justice.



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