



Stockholm Green
Digital Finance

Unlocking the Potential of Green Fintech

How fintech innovations catalyse the transition to sustainable societies and the role Sweden can play

Is fintech the answer?

An estimated USD 5-7 trillion of annual investment will be needed to deliver on UN Sustainable Development Goals and the Paris Agreement on Climate Change (Brookings, 2016). Unprecedented mobilization of both public and private financing will be required, and alignment of the operational and incentive structures in the financial system with these development priorities.

The fintech sector has the potential to realize the potential of green finance and secure this mobilization by drawing on its innovational character and innate organizational agility. For its part, Sweden has become a hotbed of both fintech and Green Finance innovation with several success stories in both areas.

An estimated USD 5-7 trillion per year will be needed to deliver on UN Sustainable Development Goals and the Paris Agreement on Climate Change.

Over recent years, green finance has progressed significantly – in terms of the integration of environmental, social and governance (ESG) criteria into financial decisions as well as the financing of environmental solutions such as renewable energy, improved water quality, efficient natural resource use.

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We have witnessed clear policy support and industry level leadership, yet international capital redeployment remains low. The G20 Study Group on Green Finance specifically classifies as 'green' only a small fraction of bank lending, less than 1% of global bonds are labeled, and less than 1% of the holdings by global institutional investors.

In response, actors ranging from governments to investors are asking how the barriers can be effectively overcome to scale green finance and investment.

This paper investigates how innovative financial technology – both in startups and established players – can help unleash the full potential of green finance to deliver solutions to the urgent challenges faced by people and the planet. This paper focuses on how green fintech innovations can address persistent problems associated with the following four areas:

- ① Extending capital to green startup firms
- ② Lowering the threshold for consumer action
- ③ Ensuring green investments
- ④ Valuing nature's assets and providing practical solutions to sustainable lifestyles

In addition, the paper looks at the opportunity for Sweden to consolidate its leadership within green financial technology and innovation and move societies towards sustainability.

① **Financing Green Innovators**

The finance sector plays a central role in extending capital to new companies offering environmental solutions and technologies that facilitate the transition to sustainable societies. However, asymmetric information, difficulties in measuring assets, and other requirements to putting forward collateral, pose critical barriers and can make the cost of raising external funds especially high for green startups (Löf, Martinsson and Mohammadi, 2016). These barriers are especially present in debt finance with the IFC estimating that 75 percent of loans worldwide require borrowers to put forward collateral. It can also be difficult for equity investors, such as venture capitalists, to fully monetize the potential success of the business proposition.

Fintech solutions can help green startup firms bypass the constraints of traditional financial systems and bring entrepreneurs closer to their funders through, for example, peer-to-peer (P2P) solutions. An example of this is Dutch company Bundles, which offers consumers a lease on washing machines and an app to reduce their laundry footprint and failed to raise funding from banks. Instead, the startup embraced crowdfunding – thanks in part to the company’s positive track record from past business transactions (Toxopeus, Achterberg, & Polzin, 2016).

Green finance startups here in Sweden share similar experiences. One such example is TRINE, which successfully used crowdfunding to extend access to electricity through off-the-grid solar power in Sub-Saharan Africa (Morlin-Yron, 2016). Others are Bzzzt, who followed the same route to put electric taxi pods on the streets of Stockholm, and Urban Green that works together with Pepins to scale green tech solutions.

Fintech could also offer financial actors new models for assessing risk and reward that help extend capital to green innovators. Traditional credit assessments exclude relevant data concerning the borrower. This is especially troublesome for smaller companies, especially circular entrepreneurs, due to the very nature of such businesses – i.e. not to own goods, but rather offer a service in support of sustainable lifestyle choices (Achterberg et al, 2016). In the case of Bundles, the washing machines were leased and could not be qualified as collateral and, in the case of TRINE, nor could the solar panels.

This not only poses a barrier to green innovators and society at large, it also prevents banks from successfully engaging with exciting new firms. Even though finance is a critical barrier in the transition towards a circular economy, banks are interested (Fischer and Achterberg, 2016).

Blockchain technology that can enable asset and interaction based reputation systems to help SMEs demonstrate value and build trust.

By using alternative data, fintech applications can identify creditworthy companies not identified by traditional bank measures (Blue Institute, 2017). Particularly, blockchain technology that can enable asset and interaction based reputation systems to help SMEs demonstrate value and build trust. Nordic fintech company hiveonline offers blockchain technology that enables small companies to effectively demonstrate their trustworthiness and sources of income through a reputation based system using smart contracts. Such solutions could help bridge the gap between finance and green innovation.

② **Scaling From The Bottom Up**

Green finance has focused largely on top-down approaches for mobilizing funds for green investments. There are some efforts underway seeking to complement this with bottom-up approaches empowering consumers to make informed choices concerning their savings accounts, pension schemes, or other investments. Svanen, the Nordic eco-label for investment funds, is an example of this – as are investment funds in Sweden that make green bonds available to the retail segment.

Fintech applications can take such efforts to the next level by lowering the threshold of consumer power as well as investigating new domains for scaling citizen action.

Fintech applications can take such efforts to the next level by lowering the threshold of consumer power as well as investigating new domains for scaling citizen action. Ålandsbanken has teamed up with the World Wildlife Fund in Finland to launch a credit card that enables users can trace their environmental footprint by analyzing their purchasing behavior. This initiative not only makes environmental impact more easily understood by consumers, but also offers clients the option to donate money to green projects.

The impact of such initiatives should not be underestimated. A similar initiative by Ant Financial Services Group in China has managed to engage a remarkable number of people around climate action. The initiative

encourages users to reduce their carbon footprint through a combination of mobile payment platforms, big data, and social media. Since its inception in January 2017, more than 200 million people have voluntarily joined the program, which corresponds to 3 percent of the world population. Behavioral change over this period resulted in the reduction of 150,000 cubic tons of carbon emissions and over a million trees planted (GDFA, 2017).

According to the Bank of America, 85 percent of millennials want to invest with a purpose (Wharton, 2017).

These examples suggest that markets are ready to offer opportunities for citizen action through fintech applications. Looking ahead, wealth will be transferred to millennials, a group characterized not only by their tech savviness, but also their preference for impact investments. According to the Bank of America, 85 percent of millennials want to invest with a purpose. This should pave the way for even more impact through bottom-up solutions.

3 Verifying Green Investments

UN Principles for Responsible Investment has a record-high of 1700 signatures, representing 62 trillion USD committed to integrating ESG issues into investment decisions (PRI, 2017). A growing number of investors are looking for opportunities to make green investments. Yet companies not disclosing relevant environmental information creates added search costs for green assets (G20 Green Finance Study Group, 2016). This poses a barrier for green investments to take off at scale.

Additionally, investors are increasingly concerned about being able to understand and demonstrate the positive impact of their green investments. Swedish finance authority Finansinspektionen states that access to relevant information to calculate environmental risk is a prerequisite for financial markets to contribute to sustainability (Finansinspektionen 2016). However, when companies or projects provide environmental information, there is a lack of consistent and reliable 'labeling' of green assets, according to the

G20 Green Finance Study Group (G20 Green Finance Study Group, 2016). This has led to the excess demand for green bonds as they represent one of the few trustworthy investment products that abide by certain principles and require third-party verification on a green use of proceeds.

The application of blockchain technology and big data offers companies and investors a cost-effective tool to ensure sustainability claims and the greenness of investments. Everledger has built a global digital ledger that collects dozens of cross-referenced data points on each recorded diamond to develop transparency within the market and eliminate criminal activity. The technology can be used to verify other sustainability claims as well, such as fair trade, green foreign direct investment, property rights, or the use of green bond proceeds, especially in less transparent markets.

4 Tokenizing Green Assets

“We treasure what we measure”. This saying is often used by the environmental community when investigating ways for successfully incentivizing better environmental stewardship through valuing what is green. In 2013, the Swedish government commissioned an inquiry to identify ways to make nature’s assets more visible so they could be safeguarded and efficiently integrated into economic positions and other decisions in society (Ministry of the Environment, 2013).

The fintech sector has the potential to revolutionize the way biophysical assets are valued and monitored, says the UNEP Inquiry (UNEP Inquiry, 2016), while a growing number of actors are increasingly interested in the opportunities for moving real-world assets onto blockchains (Cameron-Huff, 2017). This technology can be used to convert physical assets in the real economy into digital tokens. This presents opportunities for placing a value on natural assets, or the rights to a green asset, thereby creating incentives for better management or growth.

SolarCoin, a digital currency whose value is tied to solar energy produced and consumed within a community, stimulates and grows solar power production worldwide by rewarding individual solar power producers. The

currency is currently being used in local markets in 19 countries (SolarCoin, 2017).

The blockchain technology for tokenizing physical assets can be used for rewarding other types of green assets. The Natural Capital Alliance has applied blockchain technology to protect critical biodiversity assets such as rainforests, mangroves, and coral reefs. The UNEP Inquiry highlights how new currency can represent biodiversity assets and help empower issuers to digitize and monetize natural capital (UNEP Inquiry, 2016). Another potential could, for example, be putting carbon credits on blockchain for more effective carbon trading (Gogerty, 2017).

Technologies and capabilities applied in fintech, such as blockchain, the Internet of Things (IoT), and artificial intelligence (AI) can be extended beyond the traditional borders of the financial markets in support of sustainable lifestyles and a circular economy. Bundles managed to create incentives for producers to expand the life expectancy of their products as well as develop incentives for efficient use of the same products by consumers. Microgrid systems for solar power generation, smart homes, and sharing economy are other areas that can benefit and scale from fintech solutions.

Evaluating The Risks

Just as fintech is positioned to address some critical barriers in the financial system to scale green finance, there are risks associated with the technology. Calculations suggest that each bitcoin transaction consumes about the same amount of electricity for validation as the average American home does for 1.5 days (Malmo, 2015). The next generation of blockchain technology shows promise to be much more energy efficient.

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Another set of risks concerns robotized solutions. Some studies suggest

algorithmic trade increases the risk of large price-swings in commodity markets, resulting in rapid shifts in commodity production landscapes (Galaz, Gars, Moberg & Repinski, 2015). While cost efficient, the growing use of robo-advisors risks disregarding the investor's value systems and direct clients to a bank strategy whose investment strategy doesn't align with that value system such as fossil fuel investments (UNEP Inquiry, 2016). Policymakers and regulators should engage early in the fintech revolution to ensure that the positive benefits for society are harnessed, while minimizing the potential risks.

With just 13 years to go until 2030, and with much demonstrated willingness to deliver, the leveraging opportunities presented by fintech to mobilize green finance at scale needs to be urgently explored.

The Role of Sweden

Sweden has been at the forefront of green finance in areas such as green bonds, disclosure and reporting, as well as scientific research. With just 13 years to go until 2030, and with much demonstrated willingness to deliver, the leveraging opportunities presented by fintech to mobilize green finance at scale needs to be urgently explored.

International policy forums have more recently started to fully apprehend the potential for delivering sustainable development and green finance through solutions underpinned by fintech. There is now demand for a champion to systematically test out the opportunities in this domain. Sweden is uniquely positioned to pick up on this call-to-action and lead the way in how financial technology and innovation can speed up the transition to sustainable societies:

- In Sweden, there is broad political commitment to deliver on the Sustainable Development Goals and the Paris Agreement, as well as an understanding of the key role of financial markets to succeed with the task at hand.

- Sweden has both a history and a future of demonstrated leadership in green finance. The Government is currently investigating multiple ways for scaling green finance, and has also (together with Nordic partners) explored how experiences and practices to green transformation and financing can be relevant in a global context.
- Sweden's relatively small but well-developed finance system offers opportune conditions to explore market solutions. Should a new green digital service be developed in collaboration with three to four banks, it becomes a market standard.
- Sweden is one of the most tech savvy and fintech-dense countries in the world demonstrating the market friendliness to power technology innovation.

The conclusion is that Sweden can complement its ongoing efforts in green finance and sustainability innovation, while at the same time be a first mover internationally and offer the needed experience to scale global green finance. Green fintech innovations will help unlock the full potential of green finance to deliver on UN Sustainable Development Goals and the Paris Agreement on Climate Change.

AUTHOR



Cecilia Repinski

Executive Director
Stockholm Green Digital Finance

cecilia@stockholmgreenfin.tech

www.stockholmgreenfin.tech

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James Pearse
Stockholm Fintech Hub

Michal Gromek
Stockholm School of Economics

Adam Strandberg
Stockholm Fintech Hub

Sofie Blakstad
Hiveonline

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Stockholm Green Digital Finance

Stockholm Green Digital Finance demonstrates and raises awareness around how green fintech solutions can help advance the transition to sustainable societies.

Established in collaboration with the Stockholm Fintech Hub, Stockholm Green Digital Finance aims to collaborate with the finance sector, both established and new players, as well as our international partners to help scale green finance and innovation globally. Stockholm Green Digital Finance is a not-for-profit and independent platform.

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