

ENVIRONMENTAL START-UPS IN THE SOLAR ENERGY SECTOR: SOCIAL INITIATIVES OR PROFITABLE PROJECTS?

Tetiana Stroiko^{1*}, Carlos de las Heras Jambrino², Patricia P. Iglesias Sánchez²

¹V.O. Sukhomlynskyi National University of Mykolaiv, Mykolaiv, Ukraine

²Universidad de Málaga, Spain

*Corresponding author: tanyastroyko@gmail.com

A special category of startups is social startups, which primarily seek to solve a certain social, environmental or cultural problem, and not to make money on it. This approach makes it difficult to monetize and attract funds, which endangers their survival. A typical startup measures success by revenue and profit. The goal of a social business is to recoup its costs (optimistic scenario) and solve a social problem. Its success is measured by impact (positive impact, return). We have to prove that green start-ups (alternative solar energy) can be effective business projects that can ensure project profitability and realize social and environmental benefits.

In recent decades, the world has seen a tendency to move away from traditional sources of energy to alternative ones. A responsible business, realizing the importance of preserving the environment, tries to minimize the negative impact of its activities on the environment. On the basis of global reports, the development of the global market for green technologies and sustainable development is studied.

The peculiarity of eco-startups is that they are created not only to make a profit, but primarily to solve the problem of environmental protection. Therefore, the implementation of such projects will also contribute to the formation of an environmentally conscious generation.

Keywords: start-ups, solar energy, profitable project, green start-ups

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Introduction

The focus of startups as a business is on growth, scaling and profit. This is the goal of all stakeholders: founders, investors, and employees. A special category of startups is social startups, which primarily seek to solve a specific social, environmental or cultural problem rather than make money from it. This approach makes it difficult for them to monetise and raise funds, and thus puts their survival at risk. Social entrepreneurship uses business approaches to solve social, environmental and cultural problems. A typical startup measures success by revenue and profit. A business is created to make money by meeting a specific need in society. The goal of a social business is to recoup its costs (an optimistic scenario) and solve a social problem. Its success is measured through impact (positive impact, return). Fundamentally, social entrepreneurship is the process of applying creative economic models to address environmental and social issues while bringing about long-lasting, significant change.

Can environmental startups be highly profitable? Should they have special evaluation criteria or specific business models? For example, due to their hybrid nature, social startups may even benefit more than other startups from the values of signalling and brand protection (Hirschmann & Block).

We have to prove that eco-friendly start-ups (solar alternative energy) can be effective business projects that can ensure project profitability and realise social and environmental benefits.

Materials and Methods

Based on the retrospective analysis of the reports of the international comparative systems Sustainable Development Report, Sustainable Market Share Index, the development and efficiency of startups in the field of solar energy were studied using the examples of Ukraine and Spain. In recent decades, the world has seen a tendency to move away from traditional sources of energy to alternative ones. A responsible business, realizing the importance of preserving the environment, tries to minimize the negative impact of its activities on the environment. On the basis of global reports, the development of the global market for green technologies and sustainable development is studied. According to experts, it has been proven that the growth of green technologies is ahead of the predicted indicators (Sachs et al., 2023).

Results and Discussion

As of January 15, 2023, there are 80 Climate Tech Unicorns around the world who are now collectively valued at \$180B+ (GCTU, 2024). The global GreenTech and sustainability market was estimated to hold around \$417 billion by 2030 (Statista, 2023). Some experts say the growth of green technology has already outpaced predictions, having passed the €4 trillion (\$4.3 billion) mark in 2020. As per Roland Berger Insights (Berger, 2022), by 2030, global environmental technology and resource efficiency revenues are expected to reach €9.4 trillion (\$10.1 trillion) (Bridgehead, 2021), which presents a massive opportunity for green tech startups and scaleups to grow their businesses while addressing the global climate challenges (Table 1).

Table 1. Statistics on the top green technology companies (January 2023)

	Numbers of companies	Av. year of foundation	Total funding
Green Tech companies	1525	2009	\$30.7b
Green Tech Startups	358	2016	\$9.8b
Europe ¹ Green Tech companies	584	2010	\$9.1b
U.S. Green Tech companies	494	2007	\$6.2b
EU ² Green Tech Startups	403	2010	\$5.4b
Female-founded Green Tech companies	159	2015	\$1.5b

¹ Companies and startups in the Green Tech space in Europe

² Companies and startups headquartered in European Union (EU)

The total number of existing GreenTech companies worldwide is difficult to estimate; over 1.5K of them are listed on Crunchbase, the leading database for company insights from early-stage startups to the Fortune 1000. Some have been in the market since the early 2000s, raising \$31B in total funding (Crunchbase,2024) The funding destined for climate tech organizations reached \$59B in 2022 (Net Zero Insights, Q3 2022).

At the same time, investors are pouring more and more funding into upcoming solar projects. The International Energy Agency forecasts that solar investments will hit \$382bn this year, exceeding the \$371bn expected to be funnelled into oil production — 10 years ago, oil funding was about 130% more than solar's each year.

Ukrainian case study

At the end of 2021, solar energy in Ukraine accounted for more than 5% of total electricity production. As of the end of 2021, the total capacity of solar power plants was 6320 MW (excluding those located in the temporarily occupied territories).

In recent years, Ukraine has had one of the highest rates of solar energy development in Europe. However, the aggressor's invasion caused significant damage to the industry. Two-thirds of solar power plants in Ukraine are located in the south, where active hostilities are currently taking place. According to various estimates, more than 30% of solar power plants in the occupied territories, which is approximately 1120-1500 MW of installed capacity, have been damaged. In addition, more than 25% of non-industrial (private) solar power plants have been destroyed.

Ukrainian eco-startups are not inferior to the world's best-known innovative ideas and have been winning prizes at international startup competitions (such as the University Startup World Cup) in recent years. Some of the most famous of them are:

1. HelioPulse is a highly efficient solar collector-concentrator for domestic and industrial use. The system allows heating water up to 80-120 °C (and oil even up to 250 °C). This is achieved by concentrating the sun's rays, which fall on a mirror and are directed to a tube that is constantly in focus.

2. SolarGaps are window blinds with solar panels attached to them. The blinds are controlled by a mobile app, and the device itself also automatically adjusts the tilt of the panels to get as much energy as possible. The energy generated can be used to charge small home gadgets. In 2017, the startup raised €50,000 from the EU's Horizon 2020 grant programme for entrepreneurs and was included in the global ranking of alternative energy startups compiled by CBInsights analysts. In the same year, the Ukrainian startup started raising funds on the Kickstarter crowdfunding platform and raised \$100,000 to set up mass production [<https://ua.solargaps.com/#>].

The peculiarity of eco-startups is that they are created not only to make a profit, but primarily to solve the problem of environmental protection. Therefore, the implementation of such projects will also contribute to the formation of an environmentally conscious generation.

Spain case study

Spain, with its sunny climate and commitment to sustainable development, is becoming a leader in the renewable energy sector. Start-ups are playing a crucial role in this change, developing technologies and solutions that are redefining the country's energy landscape. Germany, Spain and Italy are the three most attractive solar markets for investors in Europe. This is one of the main conclusions of the first report on the attractiveness of the European solar market prepared by Aurora

Energy Research. According to its forecasts, in 2030, these three countries will combine 58% of the photovoltaic capacity installed on the continent. They will also attract 83% of the investment needed for the projected growth between 2023 and 2030 (Aurora Energy Report, 2023).

It is the optimal economics of solar projects that are the most prominent factor in Spain, where Aurora expects investors to receive the highest returns from those unsubsidised developments that will come online in 2030.

According to the European Solar Energy Association Solar Power Europe the number of GW markets in the European Union keeps increasing, growing from 12 GW markets in 2022 to 14 GW markets in 2023. According to forecast data in 2024, the EU-27 is assessed as a whole, ranking 2 in terms of combined annual installed capacity; only European markets outside the EU are featured individually (Solar Power Europe, 2024).

Another advantage that Spain offers investors is exposure levels that are higher than in most other European markets. This fact has kept projects profitable despite the rapid capacity growth that has taken place in recent years, which has helped to reduce the prices that these assets can achieve.

By 2027, solar PV will become the largest source of energy production worldwide. In 2023, it will account for 65% of global renewable energy growth.

In addition, the company plans to supply 80% of the already installed capacity. Looking to the future, unsubsidised projects will become increasingly attractive as construction costs will be reduced by more than 40% between 2023 and 2050 (Aurora Energy Report, 2023).

Finally, the report suggests that project economics can be improved by encouraging innovative business models, such as installing battery storage systems alongside solar power plants. This could save costs and generate additional revenue.

Examples of effective startups are:

1. Sunalizer is a startup that simplifies the process of using solar energy. Its online platform allows users to assess the solar potential of their properties, providing a cost-benefit analysis. Its goal is to make solar energy accessible and understandable to everyone by removing the technical and financial barriers that often hinder the use of this renewable energy source.

2. Rated Power: maximising the efficiency of solar installations. Rated Power focuses on improving the efficiency and performance of solar installations. Its core product, pvDesign, is software that optimises the design of solar installations, enabling operators to maximise energy production while minimising costs. With customers in over 100 countries, Rated Power is helping to accelerate the global transition to renewable energy.

3. Frenetic: revolutionising energy storage. Frenetic, a company in the Bankinter Innovation Foundation portfolio, is at the forefront of the energy storage revolution. It specialises in customised transformers and inductors for power electronics, a key technology for efficient energy storage. Its innovative approach to the design and manufacture of these components is delivering significant advances in energy storage efficiency and capacity, a key aspect for the future of renewable energy (Fundacion Innovacion Bankinter, 2023).

Summarizing the research, it can be noted that the current environment of startups offers investors many opportunities to invest in solar energy projects. Ukraine in particular has a large selection of photovoltaic (PV) and concentrated solar power (CSP) projects that can generate millions of kW per year, with both utility-scale and rooftop installations being viable options.

As renewable energy sources become more and more popular in the world, so does the need for efficient energy storage solutions that can ensure a reliable supply of electricity at all times.

Investing in energy storage is a great way to maximize the value of solar energy, as it can help stabilize fluctuations and provide reliable power to households and businesses when they need it most.

Investing in companies developing innovative solutions for generating or storing renewable energy can be a great way to take advantage of the growing demand for green solutions in today's Europe.

Conclusions

Startups focusing on solar energy are promising due to several factors:

- growing demand for renewable energy, so startups offering innovative solar solutions can tap into this growing market.

- constant advances in solar technology, such as improved photovoltaic energy efficiency, energy storage solutions and smart grid integration, provide opportunities for startups to develop advanced products and services.

- the cost of solar energy has been steadily decreasing over the years, making it more competitive compared to traditional energy sources. Startups focusing on further cost reduction, efficiency gains and new business models can take advantage of this trend.

- many governments around the world offer incentives, subsidies and favorable policies to promote the use of solar energy. Startups can take advantage of these support mechanisms to accelerate their growth and market penetration.

- startups that disrupt existing business models by offering decentralized, autonomous or local solar solutions can gain a competitive advantage.

Solar energy is not limited by geographical boundaries and can be used in both developed and developing regions around the world. Startups with scalable business models can expand globally and enter multiple markets.

However, startups in the solar energy sector also face challenges such as regulatory barriers, technological risks, fierce competition and access to financing. Success in this industry requires innovation, sustainability, strategic partnerships and a deep understanding of market dynamics. Overall, the outlook for solar startups remains favourable, driven by the growing urgency to address climate change and transition to a sustainable energy future.

Conflict of interest

The authors state no conflict of interest.

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