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Capital for Green Innovation:

How Public and Private Actors Shape the Future of Fusion Power in Sweden

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Abstract

Climate change is regarded as one of the most immediate and severe challenges of our time, pushing a green transition in all sectors globally. At the same time, Sweden stands in front of rising energy needs while geopolitical conditions challenge energy independence. These conditions have created a promising opportunity for fusion power, a fossil-free solution capable of delivering large-scale, stable, and sustainable electricity. However, the commercialization of fusion power demands significant investments, while the deep tech field is characterized by long development timelines and high risk technologies. This thesis explores the funding of green hardware deep tech companies and its application on Swedish fusion power. Within green hardware deep tech, it identifies key motivations behind investors' investments, maps the interplay between public- and private capital, and explores the opportunities and challenges in the funding landscape. The results show that investor's and grant provider's interests are driven by factors such as technological advancements and maturity, expected return, public sector support, and internal team qualities. Furthermore, this paper highlights a strong interdependence between public- and private funding of deep tech companies: public funding de-risks innovation for private investors, while private investment validates market potential for public actors. Lastly, the deep tech funding landscape faces regulatory and policy related bottlenecks and limited Swedish capital, but shows promising opportunities for deep tech that prove technological- and market advancements and secures energy sovereignty. The results underscore the need for a more coordinated investment ecosystem in Sweden, where public- and private actors work together to accelerate the commercialization of fusion power.

Keywords: Fusion power, private capital, public funding, deep tech, green hardware deep tech, green innovation, energy transition, investment strategy.

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Popular science summary [swe]

Klimatkrisen driver på en grön omställning globalt. Detta ökar det nuvarande och framtida behovet av fossilfri el. I kombination med växande geopolitisk osäkerhet och ekonomisk sårbarhet, står Sverige inför pressande framtida utmaningar: att tillgodose det växande elbehovet inför den gröna omställningen och att bli energisjälvförsörjande. Som svar på detta väcker fusionskraft stor uppmärksamhet med dess löfte om en obegränsad, stabil och klimatsmart energikälla. Dock är fusionskraft fortfarande i ett tidigt skede och vägen från forskning till kommersiell verklighet kräver enorma investeringar samtidigt som finansieringslandskapet i Sverige inte är anpassat för sådan teknik.

Den här uppsatsen undersöker hur ett svenskt fusionsföretag kan attrahera kapital från både offentliga och privata aktörer. Genom intervjuer med dessa aktörer har studien kartlagt avgörande nyckelfaktorer som beslut om finansiering, hur offentligt och privat kapital interagerar, och hur framtiden ser ut för finansieringslandskapet. Resultaten visar på att investerare söker bevis på teknisk särprägel och mognad, potential för hög ekonomisk avkastning samt ett starkt internt team. Förhållandet mellan offentlig och privat finansiering visade sig vara ömsesidigt då den privata sektorn är beroende av offentligt stöd för riskminskning av investeringar medan den offentliga sektorn kräver bevisat privat intresse. Resultaten visar också på flera hinder och möjligheter i det svenska finansieringslandskapet för gröna deep tech bolag, där fusion ingår. Bland utmaningarna ingår kapitalbrist samt oförutsägbar politik och regelverk. Trots detta finns även stora stora möjligheter av finansiering för teknik som kan bevisa teknologisk och marknadsmässig tillväxt samt stärka Sveriges självständighet. Fusionskraft framstår därmed inte bara som en central del av Sveriges gröna omställning, men också som en lovande nyckelspelare i det globala arbetet mot klimatförändringar.

Resultaten tydliggör behovet av ett mer samordnat investeringslandskap i Sverige, där offentliga och privata aktörer samverkar för att påskynda kommersialiseringen av fusionskraft. Lärdomarna från denna forskning sträcker sig inte enbart till energisektorn, utan även det gröna innovationslandskapet i sin helhet. Med rätt finansieringsstrukturer, politisk påverkan och offentligt/privat samarbete kan Sverige bli en global pionjär för fusionskraft.

Acknowledgements

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1. Introduction

This chapter will firstly cover the problem definition where the context and motivation for the thesis will be explained. Secondly, the chapter will provide a definition for both deep tech and fusion power in order for the reader to familiarize themselves with the technology. Thirdly, the purpose of the study will then be explained, followed by the specific research questions that the thesis aims to answer. Lastly, the chapter will go into the scope of the research and expected contribution following its completion.

This thesis is written in collaboration with Novatron Fusion Group, a Sweden-based fusion company.

This thesis was written by the author alone and without content generation using generative artificial intelligence (AI) tools.

1.1 Problem definition

The climate crisis is the most urgent problem of our time, and a natural resource dependency such as burning greenhouse gas emitting fuels could be coupled with energy insecurity (Mayer, 2022). This is why nations globally are engaged in a so-called green transition where carbon-intensive industries are moving over into electrification (Tischler, 2025). The use of electricity in the world is also increasing and has more than doubled since 1990 (Öljemark, 2024a), and it is estimated to grow with 4% annually (International Energy Agency, 2025). As the world becomes more and more electrified, particularly in sectors such as transportation, heavy industries, and data centres, the demand for clean energy intensifies (Tischler, 2025). As Sweden tries to decarbonize its energy systems, it is argued that Sweden's industrial sector is expected to increase its energy consumption in order to shift into electrification (Ministry of Climate and Enterprise, 2024). Furthermore, geopolitical instability and the energy crisis, triggered by factors such as the war in Ukraine, has exposed Europe's vulnerability regarding energy dependency and security (Vattenfall, 2023). Vattenfall (2023) describes the main reason for the rising electricity prices in Europe to be Russia's invasion of Ukraine, which in combination with other factors such as global energy concern, has led to an European energy crisis.

To address the future energy demand, green transition, and the Swedish energy independence, fusion power has emerged as a promising solution capable of delivering large-scale, stable, and sustainable electricity (Roos, 2024). Partner at Bill Gates' "Breakthrough Energy

Ventures" says that nuclear fusion could be "more important than the industrial revolution", as it offers a whole new possibility for energy usage (Lee, 2023). However, despite its technological promise and strategic relevance for national energy security (Roos, 2024), the commercialization of fusion energy remains constrained by financial, regulatory, and structural challenges (Tischler, 2025).

In Financing Deep Tech by Nedayvoda et al. (2021), they describe how financing deep tech ecosystems in order to produce innovations globally is a crucial and pressing matter. Albert Cheung, Head of Global Transition Analysis at BloombergNEF (2025) explains how global energy investments are running well below their required level to reach net zero by 2050 (Cheung, 2025). Some of the challenges that have contributed to this have been the Trump administration, struggles in Europe's battery sector, limited progress of hydrogen power, difficulties in the offshore wind sector, and the COP29 finance deal that left many countries disappointed (Cheung, 2025). Moreover, deep tech innovations such as fusion power require significant early-stage capital and are marked by long development timelines, high technological risk, and global uncertainty (Dealroom.co et al., 2025). These conditions risk making raising investment particularly complex in Sweden's and Europe's innovation ecosystem. In recent years, Swedish and European deep tech companies have increasingly found themselves underfunded, particularly during scale-up phases. A report from Energiföretagen (2023) questions if the Swedish market is ready to generate enough investments to make the green transition in time, and for Sweden to reach its climate goals. The investments will have to be big and have a long life-span, creating a high-risk situation for investors (Energiföretagen, 2023). Moreover, the report mentions the long-spun regulatory processes that hinder innovation, and the global geopolitical security situation that leads to uncertainty in the funding market (Energiföretagen, 2023). The price surge of energy that followed the war in Ukraine has affected the conditions for the Swedish green transition and is very much affected by future political decisions (Energiföretagen, 2023). This ultimately puts pressure on green deep tech investments that are already high-risk and urgent (Energiföretagen, 2023). Reports by Industrifonden (2024) and Vinnova (2024) highlight particularly late-stage funding gaps and an investment climate that struggles to meet the needs of high-capital, long-horizon technologies such as green hardware deep tech companies. In the aftermath of partly state funded investments into projects surrounding green innovation such as Stegra or Northvolt, Swedish investors are objectively taking a step back (Dealroom.co et al., 2025). This questions the current Swedish conditions for green innovation and the technological, regulatory, and financial challenges that green innovation in Sweden faces.

Furthermore, the interdependency between public- and private investment adds another layer of complexity. Public grants can help de-risk early-stage technologies, while private- and public sector collaboration is often required to accelerate advancing deep technologies (Nedayvoda et al., 2021). Yet today, the partnership between these sectors are not sufficiently contributing to the flourishing of the deep tech funding landscape. The partner at "Breakthrough Energy Ventures" (Lee, 2023) explain how fusion energy will need collaboration between private and government sectors in order to unlock its full potential. This makes it relevant to examine the interaction between the public- and private sectors' investments and grants and its potential effect on green hardware deep tech, and more specifically a fusion company.

Fusion has the possibility to play a vital role in the green transition and its funding is therefore relevant for research. With geopolitical instability and growing energy demands, the need to understand how fusion companies can attract and sustain investment becomes both essential and urgent. This essay focuses on factors that contribute to raising capital within deep tech, in order to draw conclusions on how to successfully develop and implement fusion power in Sweden. As there exists a funding gap for deep tech innovations looking to scale (Industrifonden, 2024) , the internal and external needs for these companies to raise funding provides insight for both deep tech- businesses and investors. This is relevant not just for fusion power, but the whole of the green deep tech innovation field. This thesis addresses the lack of empirical and theoretical research focused specifically on critical success factors for raising capital in green hardware deep tech, using Swedish fusion power as a case study. It aims to uncover how investor motivations, public-private interaction, and structural conditions shape investment outcomes and what this means for Sweden's broader ambitions in sustainable energy innovation.

1.2 Purpose

The purpose of the essay is to investigate the current and future conditions for raising capital for fusion power in Sweden. This is done by exploring what makes a green hardware deep tech company attractive from an investor's or grant provider's perspective, how private- and public funding decisions influence each other, as well as what challenges and opportunities the funding landscape faces. Existing theories that address these questions are explored as they serve as an anchor in providing useful conclusions. The paper thereby aims to provide useful knowledge for a Swedish fusion company seeking funding, as these motivations and requirements from investors can be understood and leveraged. By examining these systems that realize green innovation, this paper is contributing to a broader understanding of investment strategies for deep tech and the complexity of public/private sector interaction.

1.3 Research questions

To successfully fulfill the purpose of this essay, the results will aim to answer the following research questions:

1. What key aspects motivate private- and public funding for a Swedish fusion company?
    a. How and why does this private- and public capital influence each other?
2. What challenges and opportunities does the funding landscape for fusion face?

1.4 Scope and expected contribution

The focus areas of this thesis are public- and private investments as well as factors for attracting capital into green hardware deep tech. Sweden is chosen as the specific geographical area covered, in accordance with the relevance for the collaborating Swedish fusion company Novatron Fusion Group. Global strategies for fusion power are lightly covered in order to give context and comparison. While some technical aspects are included, this essay does not focus on the specific technical challenges of fusion power, but rather the challenges in funding its industrialization. Further, the essay does not go into detail of the societal and environmental impacts of scaling fusion power in Sweden, other than stating the potential fusion has in covering Sweden's future energy needs and solving the global energy problem. With this, the scope of this essay is defined as the analysis of success factors for raising capital for Swedish fusion power.

This thesis combines several research fields, most notably innovation- and environmental studies, political economy, and green investments. There is a specific emphasis on deep tech commercialization and its role in the green energy transition. The paper contributes to the ongoing academic discussion on what financial, regulatory, and managerial barriers hinders capital-intensive explorative technologies to scale. Moreover, the thesis also covers the research field of the public- and private investment dynamic and more specifically their collective role in derisking early stage deep tech investments. By focusing on Sweden's funding conditions for fusion power, it engages with national energy strategy and industrial transformation while simultaneously offering insights into the European innovation funding landscape. The thesis also adds a pragmatic lens to the field of sustainable finance, highlighting how investment criterias, risk perceptions, and policy frameworks shape the future of innovation in green hardware deep tech projects.

The paper contributes to the discussion on sustainable innovation and green deep tech financing by combining research from industrial engineering, public policy, and innovation management. It also identifies the key factors for the success of securing investments for fusion power in Sweden. Attracting investment for a high-risk and high-reward technological innovation demands an understanding of the needs from the private- and public sector to stimulate these investments. Therefore, this essay contributes to both the theoretical and practical area of securing funding for green deep tech; this is by closing the gap in knowledge between existing investment behavior and optimal future funding strategies. The research can serve as a guide for a Swedish fusion company to raise funding for commercialized fusion power in Sweden; showing proof of how complex investment networks are motivated. Its results can also benefit innovation theory as the essay covers a multifaceted problem, with possible templates that can be translated into other areas of innovation. Even though the research questions are narrow, the results shed light on the specific area of funding fusion power in Sweden, a relatively unexplored topic compared to other energy sources.

2. Background

The chapter for the background aims to give an even broader context than the problem definition, and provide useful information that widens the context and picture of the deep tech funding landscape. This part focuses on examining the current electricity needs, Sweden's and Europe's future energy needs and goals, definitions on deep tech and fusion, current policies and regulations on green energy, investment statistics, and lastly a clarification on the relevant facts of funding stages and technical readiness levels.

2.1 The current electricity needs

> There is no substitute for energy; the whole edifice of modern life is built upon it. Although energy can be bought and sold like any other commodity, it is not "just another commodity" but the precondition of all commodities, a basic factor equally with air, water, and earth. (Schumacher, 1982, chap.2).

Even back in 1982, Schumacher described energy as a fundamental human necessity, and was described by Mayer (2022) as a prerequisite for human flourishing. This pushes for the importance of energy security, which also is the seventh goal of the United Nations sustainable development goals: "Ensure access to affordable, reliable, sustainable and modern energy for all" (United Nations, 2023). An insecure energy system is one that cannot provide a nation with sufficient, consistent, affordable, reliable, and sustainable energy (Mayer, 2022).

The climate crisis puts pressure on the electrification of societies, and while the climate crisis is only escalating, more than 80% of the global energy consumption is dependent on the burning of oil, coal, and natural gas (Statista Research Department, 2024). Most of which account for the heavy industries energy needs, while crude oil plays a dominant role in the transportation sector (Statista Research Department, 2024). Moreover, Europe is the world's fourth biggest polluter after China, USA and India (Landguiden, 2024). The consequences of global warming have also been accelerating more in Europe compared to the rest of the world, leading to natural disasters such as floods, storms, and heat waves (Landguiden, 2024). When it comes to electricity, it was estimated that in 2021, about 60% of the global electricity production came from burning fossil fuels (Öljemark, 2024a). The presumed 4% annual increase in global electricity consumption is mainly due to increased need in industry, air conditioning, electrification and data centers (International Energy Agency, 2025).

Emerging economies stand for about 85% of the growth in electricity demand with China having a pronounced role (International Energy Agency, 2025). China's electricity needs are led by both their traditional industry, as well as their expansion in electricity-intensive manufacturing of solar panels, batteries, electric vehicles, and supporting materials (International Energy Agency, 2025). A growing need for system flexibility globally in order to meet the electricity demand puts pressure on technical and regulatory parameters (International Energy Agency, 2025).

The production of electricity always needs to be the same as the consumption, otherwise, the electrical system crashes and causes a power outage (Öljemark, 2024a). In order to keep the electricity system in balance, surpluses or shortages in electricity need to be compensated by import and export of electricity from a different electricity system, for example from a different country (Öljemark, 2024a). In Europe, the price for electricity is decided through supply and demand and is sold and bought through the European stock exchange. (Vattenfall, 2023 & Björkman, 2025). This means that reduced electricity production, or difficulties in importing, in any European country, leads to a rise in electricity prices (Vattenfall, 2023). The price differences reflect the different energy types and their conditions for producing electricity within their country (Vattenfall, 2021). During times when weather conditions are poor for variable electricity producers in Europe, and planable production like nuclear is insufficient, the electricity system depends on fossil fuel run power plants, which drives up the electricity prices for the whole of Europe (Vattenfall, 2022). France is the largest exporter of electricity in Europe, but had to in 2022 shut down a considerable amount of their nuclear power plants because of extreme heat and repairs (Vattenfall, 2023). Lack of water in the Norwegian hydroelectric dams also led to an electricity shortage through Europe (Vattenfall, 2023). Other factors such as the slow recovery of the global economy after the Corona pandemic has led to high prices on fossil fuels and resulted in higher European electricity prices (Vattenfall, 2023).

Sweden's domestic production of electricity is not sufficient throughout the entire year, and imported electricity is sometimes cheaper than the domestic (Vattenfall, 2022). Swedish electricity production is also in demand internationally which gives rise to the Swedish electricity prices (Vattenfall, 2022). An analysis from ENTSO-E, that was summarized by "Sydsvenska Handelskammaren" states that there is generally a generous overproduction of electricity in the north of Sweden, while there is an enormous electricity shortage in the south (Nygren, 2025). The basal energy production in the north equals to 280% of the electricity need, while the production in the south equals 70% of the need in zone 3 and only 20% in zone 4 (Nygren, 2025). The heavy industry's dependency on oil in Sweden has declined rapidly since 1981, it has instead shifted over to a dependency on biofuel and electricity (Öljemark, 2024b). It should also be stated that the energy efficiency for the industry in Sweden has increased, which means that more value is produced today for the same amount of energy needed historically (Öljemark, 2024b). Under the last few years, the security for electricity deliverance has been insufficient, and the infrastructure for electricity has not been effectively used (Energiföretagen Sverige, 2023). The power insufficiency in the south of Sweden has even distinguished itself from a European perspective (Energiföretagen Sverige , 2023). As a reaction to the energy shortage in the south of Sweden, the state owned Swedish power grid bought several fossil run power plants, as an emergency solution to the lacking transmission capacity (Nyman, 2024). Tryding attributes the volatile energy market to the lack of political stability and urges for more investments into planable energy production in the south (Nygren, 2025). Turbulence in European and global geopolitics also puts more pressure on having an independent, self-sufficient, and secure electricity system, as import of electricity is not to be taken for granted (Energiföretagen Sverige, 2023). Therefore Sweden is in need of more electricity production to suffice future needs (Energiföretagen Sverige, 2023).

2.2 Sweden's future energy needs and climate goals

The demand on energy is enormous and only increasing (International Energy Agency, 2023). Therefore the goal is to have affordable, clean, and reliable energy sources that can supply enough energy and push for a global green electrification (International Energy Agency, 2023). After the EU's climate goal for 2020, a new goal was set for 2030. In accordance to the Paris Agreement, the Commission assessment of the draft National Energy and Climate Plan, 2021-2030, binded EU to reach the target of reducing greenhouse gas emissions by 40%, increasing energy efficiency by 32,5%, growing share of renewables to 32%, and guaranteeing 15% electricity interconnection between neighbouring EU nations. According to the revised EU Effort Sharing Regulation (ESR), Sweden has a target of reducing emissions by 50% from 2005 to 2030 (Ministry of Climate and Enterprise, 2024). This is heavily dependent on fossil-free energy sources, which are expected to reach 78% by 2030 (Ministry of Climate and Enterprise, 2024). Although, the EU's estimation does not include the scenario of increasing electricity consumption in Sweden that is required in order to decarbonise (Ministry of Climate and Enterprise, 2024). Even more ambitious, Sweden's target by 2040 is to have 100% fossil-free electricity production (Ministry of Climate and Enterprise, 2024). As of 2045, the goal for Sweden is to have our net emissions of greenhouse gases at zero (Energiföretagen Sverige, 2023).

In order for this readjustment to happen, focus lies on the independence of fossil fuels, the new industrialisation, and the electrification of the transport sector (Energiföretagen Sverige, 2023). This demands an enormous amount of electricity which entails the development of production as well as distribution (Energiföretagen Sverige, 2023). Garbis et al. (2023) explain how despite Sweden's goal in reaching its climate goals, particularly in reducing its greenhouse gas emissions, Sweden's energy usage increases annually. Further, according to Energimyndigheten (2022), the electricity needed in Sweden in 2035 is estimated to double. The surge of electricity needs stems from the "green" shift for heavy industries as well as the immersion of new electricity intensive industries, a so-called new industrialization (Energiföretagen Sverige, 2023). It is estimated that the largest increase will be in the northern part of Sweden, as a consequence of the electrification of the iron- and steel industry (Energiföretagen Sverige, 2023). Garbis et al. (2023) explain how this green transition in the northern part of Sweden has put pressure on the need for rare metals as well as a thirteen fold increase in renewable energy. Although, according to a forecast from 2025, the increased Swedish electricity need from green investments will begin in 2026 as global worry has led to a delay of the new industrialization (Energimyndigheten, 2025).

Further, the prognosis is also that the electricity shortage in the power balance in Sweden will increase; this means that the difference between the expected electricity- production and demand will be negative, resulting in an import of electricity during peak demand times (Öljemark, 2025a). If domestic energy sources are incapable of producing enough power for a given time, while the transfer capacity for foreign electricity also is low, it can cause the Swedish power grid to have to shut down parts of the electricity system, causing blackouts (Öljemark, 2025b). Between 2024 and 2028, the lack of power in zone three is expected to rise from zero to 2,24 hours (Öljemark, 2025b). This entails a historically fast expansion of the electricity production and power grid in order to meet this increasing demand (Energimyndigheten, 2022).

2.3 What is deep tech and fusion power?

2.3.1 Deep tech

Ericsson, head of KTH Innovation, describes deep tech as:

> It is a collective term and is often used when talking about research-based start-up companies that use pioneering research to tackle complex issues, often major societal challenges, where the research is complex, takes a long time and there is a long way to the market. These companies often have the potential to change several different industries from the ground up. This is in contrast to start-up companies that have a clear product or solution where the time from idea to market is much shorter. (Klackenberg, 2023, st. 2).

Moreover, deep tech is present on eight different platforms: Artificial Intelligence & Data, Cleaner Energy, Pollution and Waste Management, Industrial Biotech, Advanced Materials, Robotics & Communication, Quantum Computing, and Life Science (Klackenberg, 2023).

When deep tech companies turn to commercialisation, there is a pronounced need for capital as the technology and market then needs to scale, and deep tech companies often have higher capital expenditures (Nedayvoda et al., 2021). Many deep tech companies encounter difficulties in this stage for raising enough capital to enter a growth phase, especially in Europe as the fund size is generally smaller than in the US or Asia (Nedayvoda et al., 2021). Private investors are also often not familiar with the challenges that deep tech companies face and the different investment criteria that they require (Nedayvoda et al., 2021).

The 2025 European tech report created by Dealsoom.co in partnership with Lakestar, shows how the risk profile for deep tech companies is very different to regular tech companies, and is something that needs to be understood by investors (see Figure 3). While the capital expenditure, development risk, and technology risk is higher for deep tech companies, they are also less prone to competition risk and market risk, leaving them at a greater advantage if the technology is successfully commercialized (Dealroom.co et al., 2025). As previously stated, deep tech companies need more capital to enter a commercial phase than regular tech, they also possess a greater advantage because of their unique technology that creates a greater barrier for other competitors to enter, opting for a technological advantage and following investor interest (Industrifonden, 2024). When these investments into deep tech are done correctly, they also allow deep tech companies to grow bigger for longer, compared to their

SaaS counterparts (Dealroom.co et al., 2025). In contrast to common belief, the failure rates for deep tech versus regular tech is about the same, looking at numbers from 2010 to 2020 (Dealroom.co et al., 2025).

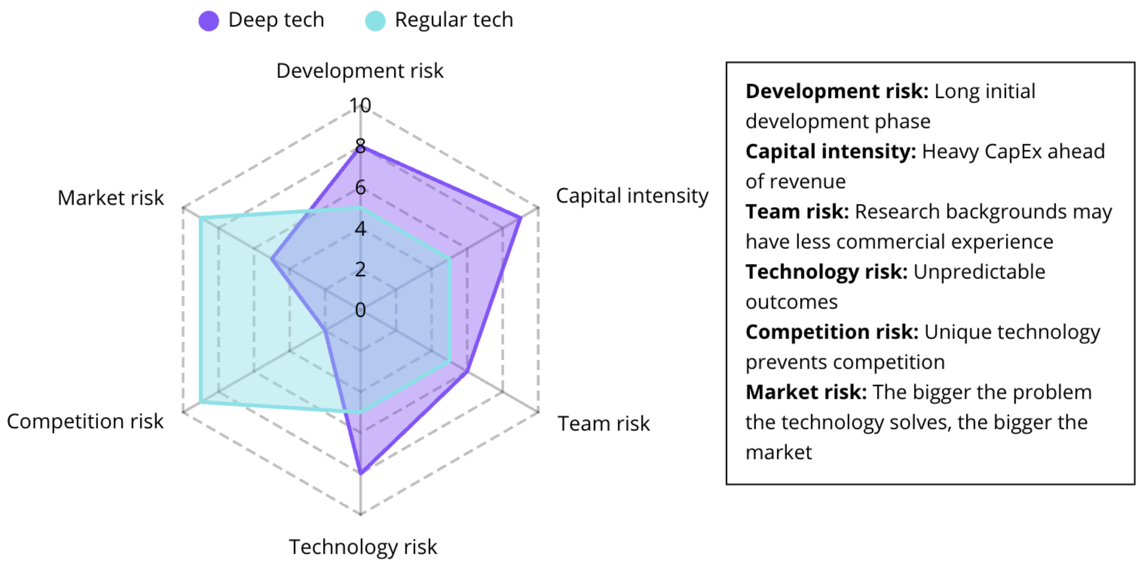

Figure 1: The risk profile for deep tech and regular tech companies (Inspired by Dealroom.co et al. (2025). Adapted and redrawn by the author.).

2.3.2 Fusion power

Fusion power is a form of deep technology as it is still being researched and not yet commercially proven. Still, nuclear fusion is the most dominant reaction in our universe, and is the reaction that powers the energy in stars, such as our sun (Euro Fusion, n.d. b). Fusion works by the sun's gravity generating a large amount of pressure in order to merge two hydrogen nuclei into a larger helium one, resulting in the generation of an enormous amount of energy (Conroy, 2024). Because of fusion's only fuel being seawater and lithium, it requires ten million times less fuel than a coal-fired power plant, and is also more secure in a geopolitical- and supply chain perspective, compared to fossil fuels (Tischler, 2025). It should be stated that because fusion energy is derived from the action of nuclei, fusion is a form of nuclear energy (Euro Fusion, n.d. a). Nevertheless, in contrast to nuclear fission, fusion has the potential to produce only a minimal amount of short-lived nuclear waste. Moreover, the bi-product of a fusion reaction is helium which is a harmless gas that can also be useful in various industries (Roos, 2024). Therefore, nuclear fusion plants can offer a cleaner, more effective, and safer alternative over nuclear fission plants (Conroy, 2024).

Fusion is according to the Atomic Energy Agency expected to be able to generate four times more energy per kilo fuel compared to fission power (Conroy, 2024). Fusion also has no carbon emissions from operations and no risk of a meltdown (Tischler, 2025). The energy source can be described as both a planable energy source and a provider for baseload power (Energy education, n.d. a). Planable energy sources are independent from external conditions while variable energy sources rely on external conditions in order to produce electricity (Energy education, n.d. a). Baseload power means that it provides the minimum amount of power needed for the electrical grid at any time, supplying constant and highly reliable energy all year round (Energy education, n.d. a). Fusion also has the potential to fill critical gaps left by variable energy sources such as solar and wind and thereby stabilize the grid (Tischler, 2025).

The history of our awareness of fusion power dates back to the 1920's (Euro Fusion, n.d. b). The first design for a fusion reactor came about in the 1950's by two Soviet scientists. The first fusion device design was called Tokamak and is today's most advanced concept for a fusion power plant despite efforts of other models (Euro Fusion, n.d. b). Up until the middle of the 80's, the rector design mirror machine was researched (Womengineer Radio, 2025, Ep. 103). Because of loss of funding, the research was shut down, and focus was instead layed on the Tokamak (Womengineer Radio, 2025, Ep. 103). Mirror machine had the potential to make these reactors much more stable, less complex, and therefore easier to build (Womengineer Radio, 2025, Ep. 103). The primary reason for this focus shift to the tokamak was that at that time, the tokamak displayed more potential (Womengineer Radio, 2025, Ep. 103).

There are several fusion power projects around the world, one of which is in the U.S. at the National Ignition Facility (NIF). In 2022, a breakthrough milestone in nuclear fusion research took place at NIF as for the first time ever, scientists succeeded in ignition, which means that the reaction generated more energy than it consumed (Tollefson & Gibney, 2022). Specifically 54% more energy (Tollefson & Gibney, 2022). Despite this success, several researchers and experts are still sceptical of the vision's timeline (Tollefson & Gibney, 2022). One of the significant challenges that fusion faces include engineering roadblocks such as design and construction of plants in order to extract the energy generated and then turn it into serviceable electricity (Tollefson & Gibney, 2022). Since 2022, NIF has succeeded in several ignitions (US Department of Energy, n.d. b). The US Department of Energy (n.d. b) declare these advancements are indications of fusion's increasing technical readiness (US Department of Energy, n.d. b). Cutting edge research into other deep tech fields such as superconductors, artificial intelligence (AI) and advanced materials, have the potential to accelerate the R&D of fusion power further (US Department of Energy, n.d. b). The DOE-sponsored NASEM report states that production of a fusion power pilot plant design will start in 2028, in order to deliver fusion energy to the US electricity grid in the timeframe of 2035 to 2040 (Osolin, 2021). Moreover, the European reactor in France named ITER is planning on having a functional reactor that can start producing electricity in 2035 (Tollefson & Gibney, 2022).

The aim with fusion power research is to create a near-limitless clean energy source on Earth (Tollefson & Gibney, 2022). The US Department of Energy (DOE) (n.d. a) declares that realizing fusion power on earth would have significant effects on human civilization and the planet, as a reliable primary energy source. Once commercialised, it can insure energy security, meet the growing clean energy needs of the world, and serve as both heat and power (US Department of Energy, n.d. b). Furthermore, Peter Roos (2024), CEO of Novatron Fusion Group explains how it can reduce global conflict by ensuring energy independence for almost any country as it can be produced anywhere. He further elaborates on the potential of fusion power to become so cheap, sustainable, and pervasive that it will streamline into other applications such as farming and producing drinking water (Roos, 2024).

2.4 Supporting the green energy transition: policies and regulations

Throughout history, new green energy has had support from both the private and public sector. When solar energy was introduced to commercial use, Germany’s government was first to launch a program in 1999 for 100 000 solar power roofs (Nättidningen Svensk, Historia n.d.). This support was vital for the development of solar power use for houses, as the technology was very expensive at the time. Similarly, a program for solar powered roofs was launched a few years earlier in Japan, supporting the installation of 70 000 solar roofs (Nättidningen Svensk Historia, n.d.). In 2007, investments into clean energy boomed and solar power became the leading technology for private- and venture capital (Nättidningen Svensk Historia, n.d.). There are similar stories of clean energy sources that have been supported early on by public funding and state initiatives. In Sweden, wind power was initiated by a government program in 1974 in order to find alternative energy sources after the oil crash in 1973 (Jansson Myhr, n.d.) The state owned “Vattenfall” came to collaborate with the private sector for a long time to develop wind power into the electricity source it is today (Jansson Myhr, n.d.). In the 1980’s the political interest in wind power fell, and it was not until 1991, when the public funding support came, that wind power could scale

(Nohrstedt, 2021). Regulations that were introduced the following years further accelerated the commercialisation of Swedish wind power (Nohrstedt, 2021). For nuclear fission power, this was very much also a question of support and initiatives from the public sector (Hadenius, 2024). Up until 1971, the politics were unanimous in Sweden's investment in nuclear fission and the construction of new power plants (Hadenius, 2024). This soon changed after the nuclear reactor accident in Harrisburg, US, 1979 (Hadenius, 2024). The issue was discussed in Sweden as well as voted on in the EU, and after the referendum in 1980, no new nuclear reactors were going to be developed, beyond those that were already decided (Hadenius, 2024). This was up until 2022, when new directives from the government concluded new investments into nuclear fission power plants.

The Swedish government is specific on reaching their goals in a cost-effective and socio-economically efficient way, in order to not compromise the competitiveness of Swedish companies (Energiföretagen Sverige, 2023). It is described how there are various measures and policies that can result in necessary investments into the green transition (Energiföretagen Sverige, 2023). These policies result in funding for areas such as research, infrastructure, and co-financing of investments in private activities. In order to fill this gap of electricity and power needs, as well as reach Sweden's and the EU's set climate goals, investments into energy production and the power grid needs to be made as the majority of the electricity production reaches the end of its technical life-span before 2045 (Energiföretagen Sverige, 2023). This rise in need for electricity also needs to follow competitive prices for green electricity and a high degree of security of supply in the electricity system nationwide (Energiföretagen Sverige, 2023). The shift toward electrification also entails an opportunity for Sweden to innovate and thereby increase its competitiveness globally, as well as increase welfare and employment (Energiföretagen Sverige, 2023).

A proposal of price hedging contracts toward nuclear fission electricity in Sweden is under referral and if accepted, could come into play in May 2025 (Wickström, 2024). This contract means that if the price for electricity is under 80 pennies per kWh, the government pays the nuclear operator, and if it is over, the nuclear operator pays the government (Nyman, 2024). This hedging contract, along with "risk free" state loans to nuclear fission plants, are efforts of financing the state investment into nuclear energy (Wickström, 2024). Another initiative from the public sector in order to accelerate investments and commercialisation is state loans for green innovation. This means that the government stands for 75% of the cost of the loan for the construction phase, de-risking the production significantly (Wickström, 2024). Åsa Petterson, CEO of "Energiföretagen" mean that there is no private actor on the market that can invest in big nuclear projects, which puts pressure on the government to bear some of the financial burden of building new planable electricity production plants (Wickström, 2024). Sweden's focus on the expansion of nuclear fission plants, have brought mixed opinions. Some believe that the government also needs to put efforts into other energy sources instead of "laying their eggs in one basket" (Wickström, 2024). The International Energy Agency (2023) also emphasizes that in order to hold a sufficient energy system and completely transition from fossil fuels, a diverse energy portfolio is needed.

In an effort to support green innovation and for Sweden to reach its climate goals, the Swedish Swedish National Debt office has of 2021 been ordered by the government to govern public-credit-guarantees (Swedish National Debt Office, 2025). This means that The Swedish National Debt Office can give credit-guarantees for companies looking to take out large loans to finance an industrial transformation that aids Sweden's climate goals (Swedish National Debt Office, 2025). The reach for the guarantee is 80 billion Swedish crowns (kr) as of 2025, the maximum time length for the guarantee is 15 years, and to qualify for the guarantee the loan has to exceed 500 million kr (Swedish National Debt Office, 2025). The guarantee means that if the company fails to pay back the loaned amount, the Debt Office will cover 80% of the loan (Swedish National Debt Office, 2025). The Swedish Swedish National Debt office is responsible for analyzing the company or project according to their legal-, financial-, and sustainability merits (Swedish National Debt Office, 2025).

2.5 Investment statistics on green hardware deep tech

As of 2024, the world invests almost twice as much capital in clean energy as in fossil fuels, with energy investments only rising (International Energy Agency, 2023). Although, there is a large underrepresentation of emerging market and developing economies (EMDE) outside of China, as they represent only 15% of the global clean energy investments (International Energy Agency, 2023). At the same time, wealthy countries with large amounts of raw material resources also have the largest amount of fossil fuel consumption per capita (Statista Research Department, 2024). Mazzucato (2024) urges countries not to slide into green protectionism by only prioritizing their own low-carbon development, while emerging economies suffer, leading to worse global outcomes for the environmental mission. She therefore pushes for collaboration before individual green industry build-up (Mazzucato, 2024). As an example, Mazzucto (2024) brings up how American policies have driven Europe to prioritize domestic decarbonisation of their own industries, leading to reduced international decarbonization initiatives. Instead, Mazzucato wants national industries to consider the international implications for trade, development, and supply chains (Mazzucato, 2024).

Green energy innovations have been triggered for acceleration by the more recent energy crisis and geopolitical uncertainty, with recent advancements in energy sources like wind-, hydro-, and solar power; reducing costs and increasing output (International Energy Agency, 2023). The cost efficiencies for these technologies have increased at such a rate that each dollar invested in wind or solar power in 2023, yielded 2,5 times more energy output than a dollar spent on these same technologies a decade ago (International Energy Agency, 2023). According to the assessment done by The International Energy Agency (2023), clean energy investments are predicted to reach USD 320 billion in 2024; with leading investments in renewable power (International Energy Agency, 2023). To be noted is that these investments in clean energy are also supported by investments and advancements in grids, battery storage, energy efficiency, and electrification in buildings and industry (International Energy Agency, 2023). Unfortunately, these positive clean energy investment trends are not enough to reach the climate goal of 1,5℃, agreed at the 2023 United Nations Climate Change Conference (COP28) (International Energy Agency, 2023). In order to meet the COP28 goal, the investments in clean energy need to double by 2030, and quadruple in EMDE outside of China (International Energy Agency, 2023). The doubling of these clean energy investments have a chance at tripling their capacity and spending, in order to double their efficiency (International Energy Agency, 2023).

Even though energy security is a matter of national security, energy investments globally are primarily financed by the private sector, as seen in Figure 1 and Figure 2 below (International Energy Agency, 2023). Governments have both direct and indirect roles in the controlling of capital flow for energy investments (International Energy Agency, 2023). There are however great differences between countries; half of all energy investments in EMDE are government- or state owned enterprise (SOE) funded, compared to 15% in advanced economies (International Energy Agency, 2023).

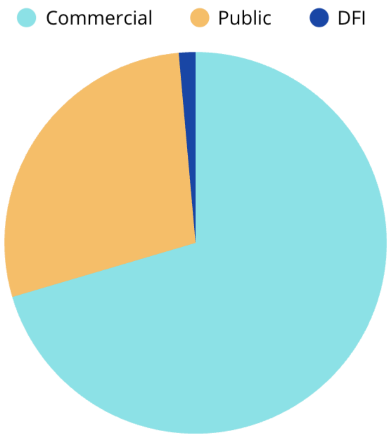

Figure 2: Sources of investment in the energy sector, average 2018-2023. (Inspired by International Energy Agency (2023). Adapted and redrawn by the author.).

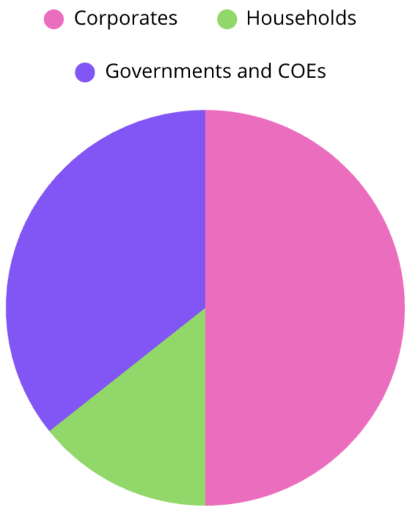

Figure 3: Sources of finance in the energy sector, average 2018-2023 (Inspired by International Energy Agency (2023). Adapted and redrawn by the author.).

In the 2025 European tech report created by Dealsoom.co in partnership with Lakestar, Walden Catalyst, and Hello Tomorrow, the projections for the deep tech landscape are discussed. Deep tech is described as a high risk landscape and the origin of venture capital (2025). While deep tech companies fail at a higher rate, deep tech portfolios also outperform conventional tech. The report also brings up how the exit landscape is still too immature for deep tech, which poses problems in attracting capital (Dealroom.co et al., 2025). The report states that there is an opportunity for Europe to become a global deep tech hub, as it is rich in research competence and facilities (Dealroom.co et al., 2025). The top countries responsible for the vast amount of investment capital in European deep tech are the UK, France, and

Germany and the top segments for increased invested capital, percentage wise, are novel AI with 113% increase, novel energy with a 75% increase, and resilience with a 74% increase (Dealroom.co et al., 2025). The growth in AI is seen in several application areas such as transport, biotech, and materials while resilience is driven by the European defence expansion with US domestic defense focus (Dealroom.co et al., 2025). The report also states that in the venture capital (VC) markets, investments have gone down 28% for deep tech and 60% for regular tech, compared to 2021 (Dealroom.co et al., 2025). For 2023-2024, deep tech raises more capital than regular tech, and these deep tech companies also require significantly more time and capital than regular tech, in order to reach significant revenues (Dealroom.co et al., 2025).

In the report "Deep tech funding landscape in Sweden" from Industrifonden (2024), it is described how in the last five years, startups within deep tech have emerged in Sweden. Over 90% of Swedish deep tech companies have received public funding in an early stage, which helps develop the initial product, patents, and validation for private investors (Industrifonden, 2024). This mix of private and public investors are crucial for deep tech companies, especially as public funds provide security and validation (Industrifonden, 2024). These companies are now in a scale-up phase for the coming 3-5 years (Industrifonden, 2024). While public funding is more common for deep tech companies in the earliest stages, when it comes to validating the technology and conducting a pilot, CVCs, VCs and Evergreen funds get involved (Nedayvoda et al., 2021). Due to a smaller number of VC funds specialized in deep tech, and not enough available capital, a funding gap has occurred as these VCs cannot meet the funding needs for the amount of deep tech companies (Nedayvoda et al., 2021). The report also highlights a significant challenge in late-stage funding for Swedish deep tech companies, making it difficult to realise the full technological potential of the deep tech ecosystem (Industrifonden, 2024). Research from OECD from 2016 suggests that Sweden's innovation performance has declined despite increased funding for new research.

In contrast to other European countries, Swedish deep tech companies are underfunded, with approximately two million Euro less than the average European A-round (Industrifonden, 2024). This leaves these companies with a fear of being too slow to market from a global perspective (Industrifonden, 2024). Granath (2021) explains these hurdles for a deep tech company when transitioning from a research-driven development to a market-driven business. This stage Granath (2021) describes as "The valley of death", and entails uncertainties that most investors are not willing to handle.

While early-stage funding is available inside Europe, 50% of growth capital comes from non-European investors, where American investors have played a large role in the largest exits (Dealroom.co et al., 2025). Since 2010, approximately half of the investors in Swedish deep tech companies have been Swedish. When looking into the investors in specific stages, it is apparent that non-Nordic investors are overrepresented in B-rounds, with a representation of 80% (see Figure 4 below).

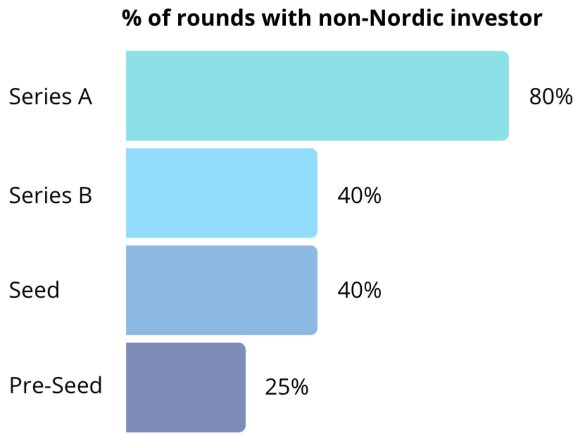

Figure 4: The proportion of non-Nordic investors in Swedish deep tech companies between 2010 and 2024. (Inspired by Industrifonden (2024). Adapted and redrawn by the author.).

2.6 Funding stages and technical readiness levels

Funding can be crucial for especially capital intensive industries such as the hardware deep tech sector (Lager, 2024). Each stage of funding comes with its own challenges, and differs depending on the sector and company (Lager, 2024). For a startup, there are four stages of funding: Seed (or even pre-seed), Series A, Series B, and Series C. Each phase usually lasts for 18 to 24 months (Silicon Valley Bank, n.d.). Pre-seed funding can be characterized by the fact that the company is still collecting proof of performance metrics, needed in pitching for seed money or Series A funding (Silicon Valley Bank, n.d.). Seed funding is mostly dependent on venture capitalists, angel investors, and government grants (Lager, 2024). The capital for Series A is typically for producing the first product and launching; this marks an important milestone as you move from having the potential to scale, into expecting to scale (Silicon Valley Bank, n.d.). You can have several rounds of Series A, but the first one usually is the most influential one (Silicon Valley Bank, n.d.). Series B is aimed at financing expansion of the company, for example hiring or office expansion (Lager, 2024). In this stage, the company has gone from a risky start-up to a company with sustainable growth (Silicon Valley Bank, n.d.). Series C funding is used to finance even further expansions, which could include new markets or products (Lager, 2024). At this stage, some founders even consider exiting the company (Silicon Valley Bank, n.d.). When looking at early startups, Series A funding can be difficult to attract due to high-risk, especially in deep tech as the technology may not be proven to even work (Lager, 2024). However, this does not mean that Series B or C is easy, as they come with their own set of challenges such as proving progress, implementability, and scale (Lager, 2024).

There are a few different types of investors such as: venture capitalists, angel investors, or government grants or loans (Lager, 2024). Venture capitalists are organisations or individuals who buy equity in companies, and are often more risk-taking (Lager, 2024). Angel investors are individuals who invest their own money and are usually personally involved in the business (Lager, 2024). Governments can offer both investments and grants, depending on regulations and sector (Lager, 2024).

Technology Readiness Levels (TRLs) are levels that indicate the level of maturity of a certain technology (Kungliga Tekniska Högskolan, n.d.). The levels are used to compare immature technologies in different industries based on their technical advancements (Kungliga Tekniska Högskolan, n.d.). The scale consists of nine levels, with level one being the lowest and most immature, and 9 being the highest and most developed (Kungliga Tekniska Högskolan, n.d.). The description of each level is explained in Table 1 below.

Table 1: Displays the different TRLs, their characteristics, and their description. (Inspired by Infra Sweden 2030 (2022). Adapted and redrawn by the author.).

TRL	Characteristics	Description
9	Technology has successfully performed mission operations	The technology is successfully applied under real-world conditions. The performance of the technology is a success. The technology has been launched into the market.
8	Technology is qualified through demonstration	The technology has been proven to work under real-life conditions. Performance is validated.
7	The technology prototype is demonstrated in an operational environment	Prototypes of technology have been proven to work in demonstrations in operating environments. Technological performance has been compared to requirements in the operational environment.

6	Technology demonstrated in the environment	A prototype of the technology has been demonstrated in a relevant environment under reasonable conditions. There is evidence of full-scale performance.
5	Technology validated in the environment	Subsystems of the technology have been validated in simulated environments. Basic technological components are integrated. This is so the technology can be tested with equipment that can simulate all system specifications. Design rules have been secured. The results conclude the feasibility of the technology.
4	Technology has been validated in the laboratory	Integrated technology components have been validated in a laboratory. The concept of the technology has been observed in other sectors. Interaction with other relevant systems has been determined.
3	Proof-of-concept of a critical function	Analytical and experimental tests have validated functionality and performance of elements of the technology. Experimental performance investigation using analytics or simulations is underway.
2	Formulation of technology concept	Possible applications have been formulated. There have been simulations or experiments of application of technology. Predictions of performance are refined.
1	Basic principles are observed	Basic principles have been both observed and reported. Application of research into development has started. There is a prediction of the technology's performance.

3. Methodology

This chapter will go through the methods of this thesis in detail and why they were chosen. Both the choice of approach for answering the research questions and the choice of analysis. Lastly, ethical considerations that were taken into account during the research will be covered. In order to answer the research questions, ten semi structured interviews were conducted with interviewees from both the private- and public sector. The interview study gave up-to-date insights in how existing investors and grant providers operate. The results from the interviews were analysed through a thematic analysis in order to compile and compare the results in an objective manner.

3.1 Semi-structured interviews

The collection of interviews were conducted at several investment firms, private equity businesses, and grant administrations; interviewing investors from both the private- and public sector. See table 2 below for more detailed information on each conducted interview. These interviews were semi-structured, qualitative, and had a free form but with topic-focused questions. Ten interviews were conducted as it was seen as a sufficient number of interviews by the thesis' examiner given its width and time restriction. Although some could say that the number of interviewees has limited the generalizability of the paper; but given the restricted focus area of Swedish green hardware deep tech, the number of interviewees can be seen as sufficient. The length of the interviews varied between 45 and 60 minutes, depending on the time available for the interviewee. The reason for performing semi structured interviews was to get a comprehensive discussion in order to answer the research questions, as they are a part of a complex context that risk being oversimplified with a quantitative approach. With a semi-structured approach, it also became possible to collect the interviewees' unique personal experiences while sticking to predetermined themed questions. One of the main advantages with semi structured interviews is that they become more nuanced as appropriate follow up questions can be asked (Larsen, 2018). Smith et al. (1995) further explain how researchers use semi-structured interviews in order to gain a more detailed picture of a group of interviewees' beliefs or perceptions of a particular subject. The method opens up for more flexibility than conventionally structured interviews such as questionnaires or surveys (Smith et al., 1995). This is partly because the researcher is able to follow up particular opinions or questions that emerge in the interviews, which allows the interviewee to paint a fuller picture (Smith et al., 1995).

Table 2: Displays detailed but anonymous information on the interviews and interviewees.

Interviewee #	Pseudonym	Date of interview	Sector	Funding type	Description of the company	Role of the interviewee
1	Adele	26/2-25	Private	Investment	Early-stage deep tech investment firm with a focus on long-term research-based investments	Principal
2	Joakim	18/2-25	Private	Investment	Early-stage venture capital fund with a wide portfolio of companies and expertise	Analyst
3	Anders	26/2-25	Private	Investment	Early-stage deep tech investment firm	Chief Executive Officer
4	Johan	18/2-25	Private	Investment	Investment bank that raises growth capital for tech	Head of commercial strategy
5	Daniel	17/2-25	Public	Investment	Venture capital company for startups	Investment Manager
6	Einar	28/2-25	Public	Investment	Investors for sustainable projects with impact objectives	Energy Specialist
7	Emilia	24/3-25	Public	Grant	Widespread financing for the commercialisation of research	Head of acceleration of deep tech companies
8	Amanda	7/3-25	Public	Grant	Finance research, development, and the commercialisation of innovations	Business Developer
9	Mats	14/2-25	Public	Grant and investment	A bank that provides financial solutions for sustainable projects	Senior Director
10	Hanna	27/2-25	Public	Grant and investment	An energy company that partners with sustainable start-ups	Head of Research and Development

Information on how these investors operate might not always be accessible, especially with deep tech being such a modern phenomenon. This is why performing interviews was crucial for answering the research questions. The interviews aimed to answer the research questions, but with slight shifts in focus depending on the interviewees' field of expertise and knowledge. Because the interviewees differ in expertise, it was important to tailor the individual interviews to fit the situation and person and not to be driven solely by the interview questions. Larsen (2018) explains that with a semi-structured interview, there is room for a free discussion, opening up for nuances where the conversation is not controlled by prepared questions. On the other hand, it also opens up for more interviewer bias, which has been prevented by careful, unbiased formulation of the interview questions.

The interview questions also had the overall same structure for all interviewees and consisted of open questions with the aim to give the interview direction, depth, and a free form (see Appendix A for interview guide). The interview questions were based off of the research questions, which were created both in accordance with previous existing theory as well as in discussion with the collaborating fusion company, as they provided insights into what areas could be interesting to research. Some of the interview questions were changed in order and formulation after the first few interviews in order to clarify the questions and prevent follow-up questions from the interviewees. This could have created inconsistency in the results and should therefore be taken into consideration. It was also important to have categories of questions, where a bigger question would become easier to answer with the help of several “smaller” and more concrete questions. Although not all small questions were asked in every interview as it was not deemed necessary at the time. This, as well, could have created inconsistency in the results.

The interview study consisted of four investors from the public sector and six grant providers, investors, or a mix from the public sector. This allowed the paper to incorporate both public and private perspectives. All interviews were conducted via Microsoft Teams, as this allowed for easy accessibility and time management. Online individual interviews aim to capture the spontaneity of in-person interviews, and their individual aspects help the conversation to have more depth (Lobe, Morgan & Hoffman, 2022). Although there is a possibility that the respondent could have answered the questions slightly differently if the interviews had been held face-to-face. Moreover, some interviews encountered technical difficulties at times, which interrupted the conversation. The interviews were held in either Swedish or English, depending on the interviewees’ native language. This could potentially have introduced inconsistency between the English and Swedish interviews.

All of the interviewees had access to the interview questions before the interview, in an attempt to prepare them for the questions and get more detailed answers. The interviews were also recorded for evaluation, analysis, and transcribing purposes. Although, all of the interviewees and the organisation they represented are anonymous; this was to gain trust and provide more ethical and participation-accessible research in a sensitive field like investments. All participants were informed that they would be anonymous prior to the interview start; this minimized the risk of answers being distorted because of fear or judgement or professional consequences.

Even though not all interviewees were Swedish or operated in Sweden, the choice of interviewees were outlined by relevance for the Swedish deep tech market. This means that all interviewees had influence on the funding of Swedish deep tech companies, and were all situated within Europe. The paper focuses on the Swedish green hardware deep tech market and its effect on fusion power, which resulted in the interviewees being picked out of their ability to potentially fund fusion power. The criteria for the interviewees were thereby that they had a part in either investing in or providing grants for Swedish deep tech companies and had previously provided capital for high tech companies with a sustainability focus. All participants were chosen by the author of this thesis, which does invite bias. It was important to interview individuals from both the private- and public sector as the previous theory of capital allocation within deep tech involved both the private- and public sector. Moreover, the research questions were judged to have the ability to differ depending on respondent. Several organisations and individuals other than the participants were asked to participate, but declined or failed to respond. This could introduce a bias to the thesis, as those who declined to participate may hold valuable insights into the subject. The organisations that were contacted were so by email, and further got follow up emails if non-responsive. This meant that the several individuals who could have been interviewed were not, as their emails were not publicly available, which led to perspectives being left out. The individuals who were interviewed were chosen because of their position, as the questions required influence in choice of funding for companies.

Because of the free structure of the interviews, there is a possibility that some aspects are left out, such as those that were not discussed simply because the interview did not steer towards that direction. It should also be stated that the respondents' responses reflect only their perception of reality and not necessarily reality in itself. There is also a possibility that some aspects were seen as obvious to the interviewees, resulting in them not covering them during the interview. As the choice of interviewees were restricted to funding of green deep tech, some perspectives are left out, such as the technical side and the perspective of the innovators themselves. This was a conscious decision, as this essay centers around answering the research questions from the perspective of the ones providing capital; a perspective that demands more depth than breadth. Although, further research where the more technical perspective of funding deep tech is researched could provide a more realistic, wide, and insightful picture of the fusions future in Sweden.

3.2 Thematic analysis

To analyse the semi structured interviews, a thematic analysis was conducted. This type of analysis was chosen as a way to observe patterns in large amounts of qualitative data (Naeem et al., 2023). In qualitative research, thematic analysis is a popular method of analysing qualitative data (Naeem et al., 2023). It is a technique used to identify and interpret patterns and themes in data, which can lead to a new type of understanding or meaning (Naeem et al., 2023). Moreover, a thematic analysis is also described as an accessible and theoretically flexible approach to analysing qualitative data (Braune & Clarke, 2006). The analysis naturally has a pragmatic view, as the research questions are pragmatic. Focus was also given to sort out the most valuable information in order to answer the research questions, even though the interviews sometimes covered other interesting but less relevant areas. Given the free form of the interviews, there was a risk of oversimplifying the empirical data when presenting the findings in themes. This risk was minimized through allowing a large number of themes, reevaluating coding and themes throughout, and including full quotes in the results. A thematic analysis consists of six steps: selection of keywords and quotations, coding, theming, interpretation, and development of the model (Naeem et al., 2023). For this report, an inductive approach was used, which means that the themes were selected from the data alone without preconceived ideas (Naeem et al., 2023). Although, because of the fact that the themes were collected by the author of this essay, this invites bias as well. The coding was done through firstly reading through the transcription, then marking opinions and information with colours corresponding to each research question. From the market quotes, themes were interpreted for statements that were similar. The themes were created as a summarized and short sentence that gave an insight into the interviewees opinions on the research questions. Each theme had to be mentioned at least twice in different interviews for it to be interpreted as a theme. During the thematic analysis process, quotes were collected and sorted under each theme in order for easy accessibility when writing the results. Quotes were chosen for their ability to convey the theme as a whole in a concise way.

3.3 Ethical considerations

With ethics in consideration, this study adhered to the four principal ethical guidelines established by the Swedish Research Council (VR, 2021): (1) the information requirement, (2) the consent requirement, (3) the confidentiality requirement, and (4) the good use requirement.

1. Information requirement: All interviewees were informed in advance about the purpose of the study.
2. Consent requirement: Participation was voluntary and all interviewees provided informed consent to be recorded prior to the interviews.
3. Confidentiality requirement: The data collected has been treated with confidentiality as interviewees' names remain anonymous. Table 3 to 5 disclose if the organisation of the interviewees were from the private- or public sector, as well as if they provided grants or investment capital, without disclosing personal identities.
4. Good use requirement: The interview material has been used exclusively for the purpose that was communicated to the participants.

Moreover, the interviewees received the opportunity to add or revise the empirical data if they so wanted to.

4. Theory

The research is divided into three parts; key capabilities for attracting investment in deep tech and lessons from fission, public and private funding interaction, and projections for the deep tech funding landscape. The first chapter goes into the abilities of a successfully funded deep tech company. The second chapter explains views on the public sector's responsibility and the interaction of the private- and public sector in funding green deep tech. The last chapter investigates theories on the opportunities and challenges that the deep tech landscape faces moving forward.

4.1 Key capabilities for attracting investment in deep tech and lessons from fission

Looking at key capabilities for attracting investment, it is appropriate to start by examining what the potential investors prioritize. From the perspective of an investor, research by Lewis (2001) suggests that both "ethical" and "ordinary" investors have motives other than solely economic. He continues to explain that in his study, both types of investors had criteria that were both economic and ethical, as a result of an attempt to mitigate risks. When looking at the differences in expectations for traditional investors and those with non-financial motives, Bachmann, Meyer, and Krauss (2024) find that those more ethically focused investors are more likely to expect an overperformance compared to a traditional investor. Even after losses, ethical investors were less likely to reconsider their investments (Bachmann, Meyer & Krauss, 2024). Roundy, Holzhauer, and Dai (2017) follow a similar logic when they group investors as either for-profit or "impact investors". The motives for for-profit investors can be summarized by a quote from one of the venture capitalists interviewed in the study:

> There's one and only one calculation [for venture capitalists] at the end of the day: what's the IRR [Internal Rate of Return] on my investment. Because I have a fiduciary responsibility. They [the investors] gave me money. My job is to invest it and maximize the return to them over a certain period of time. […] My job is to make them [the investors] money (Gabriel; venture capitalist). (Roundy, Holzhauer & Dai 2017, Findings)

Roundy, Holzhauer, and Dai (2017) continue to explain how impact investors have both financial and social motives for investing, emphasizing that just seeking social impact does not equal impact investing, as it differs from social philanthropy. This gives an insight into how investor preferences and goals affect expectations and choice of investments, and can therefore be utilised to predict investor behaviour.

With investors prioritizing ROI, this poses a challenge for hardware deep tech companies in particular. Cheung (2025) explains how when these technologies start to scale, their growth will ultimately slow down and start to look more linear than exponential. This goes against the idea that energy transition technologies always grow exponentially (Cheung, 2025). To challenge the idea that slowing growth is not always a projection for a long term downfall, but rather a consequence of surrounding circumstances; Cheung (2025) brings up the sales of electric vehicles (EV) as an example. While EV sales in the EU were down by 2024, the EV companies were subsided to the same EU climate goals from 2021 to 2024 (Cheung 2025). As the majority of EV companies met their climate demand in 2023, they likely held back in 2024, waiting for the next EU climate goals for 2025 to be set before launching their new models (Cheung, 2025). This means that the EV slowdown was a subject to the EU climate goals, and Cheung (2025) projects for a new surge in growth for 2025.

When looking at green hardware deep tech companies funding, and more specifically fusion power, lessons can be drawn from previous emerging deep tech technologies and their funding. One of these technologies is nuclear fission power. Finan (2023) goes into depth on the lessons from American fission power and the "Valley of death". As described in the background section of this essay, The valley of death lies between an innovation's research phase and the deployment phase, and got its name as this step requires long time periods, large investments, and include challenges regarding regulations and changes in infrastructure (Finan, 2023). To attract enough capital and thereby cross The valley of death, Finan (2023) advises these companies to set bold time-limited targets as this urges private-public partnerships to rise to the challenge. This was observed in projects such as financing solar power in the US in 2011 and nuclear fission power in 2010 (Finan, 2023). In contrast, both Finan (2023) and Industrifonden (2024) also emphasize not to be too hasty in the deployment of fusion power, as the technology faces several scientific challenges. Rushing into product development phases in order to satisfy investors with shorter investment horizons can lead to compromised technological potential (Industrifonden, 2024).

To further seek lessons from the funding of fission power, Finan (2023) encourages fusion companies to engage closely with regulators as well as the public. She continues to explain how the early stages of fission power came with secrecy, unanswered questions, and safety issues that lead to fear amongst the public. Finan (2023) now points out that fission power is obtaining more modern regulations and training, and attributes this to strong collaboration between industry and the US public sector. As fusion shares some of the characteristics of fission power, it also reflects the same fears amongst the public (Finan, 2023). Contrary, Gupta et al. (2025) explains how fusion is broadly viewed in a positive light amongst the public, and does not carry the same emotional baggage as fission. Although, most people have little knowledge about the technology (Gupta et al., 2025). Both papers state that there is opportunity for fusion development that clearly addresses public fears, a culture of responsible safety, societal benefits, and issues such as energy justice publicly in order to build public trust. Finan (2023) also encourages fusion operators to engage with its end user in order to incorporate useful feedback.

Nedayvoda et al. (2021) agrees with Finan (2023) as they explain how early collaboration with industry and corporate partners is a strategic way to manage a deep tech company's funding. In later stages for deep tech startups, where there is opportunity for exits or mergers and acquisitions, it is especially important to have established a relationship with corporate partners through earlier investments (Nedayvoda et al., 2021). This relationship could aid in validating the technology and proving market readiness as the deep tech ecosystems are vital for finding the right buyer (Nedayvoda et al., 2021). This is why the authors describe developing this relationship with corporate partners early on as essential for future growth, access to market, and potential exits (Nedayvoda et al., 2021).

Another challenge these deep tech companies face when attracting investors lies in the pitching paradox (Industrifonden, 2024). This challenge emerges when deep tech companies try to explain their new and intricate technology to investors, who often do not have special expertise in that area, leading to confusion and difficulty to convey clarity and reassurance (Industrifonden, 2024). Nedayvoda et al. (2021) further reinforce this idea by explaining how the more generalized VC funds have a too high degree of perceived risk as the result of a lack of in-house experts. Other factors that could play a role in the perception of deep tech investments being too risky for VC investors are: 1) Longer and more unpredictable development timelines, 2) Unpredictable metrics such as product-market-fit that do not fit into VCs' evaluation metrics leading to too many unknowns (Nedayvoda et al., 2021). To master these challenges that lie in the pitching paradox, the report from Industrifonden (2024) suggests demonstrating credibility via validation, the team's expertise, and a clear plan to market. Granath (2021) further suggests successfactors in which capital-seeking deep tech companies should adhere to and that addresses the pitching paradox: (1) To find an investor with a solid understanding of the particular industry, (2) Have a diverse team with industry experience and contacts, (3) Be able to demonstrate market proximity, (4) To demonstrate a detailed plan on how to reach a potential that justifies the heightened risk, (5) To showcase positive impacts on sustainability.

What Granath (2021) fails to address but is fundamental to attracting capital is costs. Early advanced fission technology did not focus on costs, but rather on its societal benefit (Finan, 2023). Although addressing costs and markets could be crucial for late-stage development of fusion power if the goal is to address hard-to-decarbonize markets (Finan, 2023). Costs became especially critical following the bankruptcy of Northvolt, a company that transitioned from being a pioneer in the deep tech space to a cautionary tale. Dealroom.co et al. (2025) takes on to explain why and how to avoid this outcome as a capital-heavy hardware deep tech company. First of all, they explain how it is vital to focus on the core business and not take on too much capital through equity financing, as it can lead to the company losing focus on the core business, relentlessly pushing for growth, and taking on too much debt (Dealroom.co et al., 2025). Secondly, even though Northvolt's technology was a success, their competitors built faster and cheaper, leading to the win of contracts and being able to optimize quality and cost even more (Dealroom.co et al., 2025). Lastly, the report criticises Nortvolt's culture by comparing it to The emperor's new clothes, and thereby signifying that the culture was not open to challenging the senior leaders (Dealroom.co et al., 2025).

4.2 Public and private funding interaction

4.2.1 Public sector's responsibility

In the funding of industries that require a vast amount of capital and provide benefits nationwide or even globally, both public and private funding are often involved and required. Mazzucato (2021) states that government has an important role in supporting innovation, and further explains how the public sector should have "moonshots" that serve a bigger goal, where there is a clearly defined plan with a tangible outcome, much like the American president John F Kennedy's mission to put a man on the moon (Nelson, 2019). Mazzucato (2021) advocates for us to rethink the role and purpose of government within the economy in order to present results for society. She prompts the public sector to be more bold in their actions in order to reap clear results. She further explains how the public sector's focus should be on creating new jobs rather than shaping the market (Mazzucato, 2021).

Nedayvoda et al. (2021) further highlight the public sector's role by the opportunities it has to engage the private sector in favourable sectors. They explain how the public sector plays a crucial role in derisking private investors by both funding, alleviating regulatory constraints, and spreading information on deep tech and start-ups (Nedayvoda et al., 2021). This responsibility from the public sector in supporting green innovation is described by Khan, Johansson, and Hildingsson (2021) as a Nordic model for a green economy, where the public sector collaborates between societal actors and social welfare. This view is also shared by Åsa Pettersson, CEO for "Energiföretagen" as shared in Energiföretagen's report (2023). Pettersson emphasises the need for action; societal cooperation and new regulations in order to prepare for the future clean energy needs (Energiföretagen, 2023). There are funding gaps that need to be filled for deep tech, and the public sector needs to take steps in order to re-risk the market for these companies (Nedayvoda et al., 2021).

In accordance with this stance, Weibezahn and Steigerwald (2024) conclude in their study of European fission power plants that these nuclear plants would only become bankable if the public sector is involved in de-risking investments for the private sector. As fusion and fission power have a lot of similarities in their road to market, this proves that the public sector has a large role in attracting capital to European fusion power and thereby its commercialisation (Weibezahn & Steigerwald, 2024). This is because of the competitiveness of the European energy market, which makes cost-efficiency a priority, an aspect which could be unbearable for the heavy CapEx costs of nuclear fission power (Weibezahn & Steigerwald, 2024). This means that funding models that would expose private investors to large market risks, would not work for fusion power.

As previously touched upon in the background, Industrifonden (2024) invites a conflicting view, were they explain how public funding also entails restrictions in spending for the deep tech company, leading to these companies having to raise private equity in order to not restrict potential, which makes corporate venture capital (CVCs) overrepresented in the B-rounds (Industrifonden, 2024). In Sweden, CVCs participate in 30% of the A-rounds and 60% of the B-rounds (Industrifonden, 2024).

While many of the previously mentioned authors highlight the importance of public sector financing, Cheung (2025) brings up the importance of private capital in realizing clean energy technologies. He explains how public capital alone will never be able to generate enough growth within the sector, and how clean energy needs to generate risk-adjusted return in order to attract private investors (Cheung, 2025). The government is also the only actor that has the ability to create the right conditions to attract private investments into clean energy (Cheung, 2025). Similarly, Mazzucato (2024) describes how public investments can catalyze innovation by having spillover effects on society. When the public sector invests capital in a sector, it catalyzes investments from the private sector, spurring growth for innovation and new ideas (Mazzucato, 2024).

Furthermore, a study by Economic Insight (2015) shows that public funding in science, research, and innovation resulted in a crowding-in effect. It estimates that a 1% increase in public investments in R&D results in between 0,48% and 0,68% increase in private investments in R&D (Economic Insight, 2015). Because private funding in R&D represented 70% of the funds, a 1£ increase in public funding leads to an average increase of 1,36£ of private funding (Economic Insight, 2015). This shows a positive relationship between public and private funding. Although, a study on developing countries shows that public investments tend to crowd out private investments (Atukeren, 2005). These two-sided results highlight the importance of investigating the interplay between public- and private investments.

4.2.2 Private and public collaboration

Nedayvoda et al. (2021) explain how public- and private interests are shared and therefore call for collaboration when it comes to realizing innovation in society. Similarly, Mazzucato (2021) describes how the public and private sector needs to collaborate on a massive scale in order to face and solve global problems, such as the environmental crisis. Mazzucato's ideas encapsulates the dream of a "mission economy" in order to restructure capitalism, which she describes as the mantra to "get shit done" through missions in a capitalistic society (Nelson, 2019). She emphasizes the fact that it is not the state's obligation to correct market failures, and that they should focus on clear actionable policies that move us closer to the mission (Mazzucato, 2021). According to Mazzucato (2021), the companies should collaborate with society in order to create shared values; this way, the companies can profit from the mission driven economy by identifying new markets, getting the civil society to trust them more, and encouraging social and environmental responsibility. In fact, Mazzucato (2021) argues that all actors should collaborate more in order to achieve the mission, as they did with Apollo 11 during the Cold war. Mazzucato (2021) also brings up industrialisation aspects of the mission, and states that the strategies for industries are in need of missions and collaborative efforts. In order to reach the desired results in a small time frame, there needs to be collaborative efforts from all actors of society (Mazzucato, 2021). Mazzucato explains how many companies will still prioritize their windfall profits ahead of productive economic activities, creating a drawback for the mission. This is why Mazzucato calls for strict conditions in public-private collaborations where private companies are held accountable for their alignment with the mission. (Mazzucato, 2024).

By looking at the collaborative efforts from the private- and public sector in fission power, insights on similar technology can be made. Historically in the US, research on both fission and fusion have been led by universities and national laboratories, with little to now private sector involvement (Finan, 2023). In later stages for fission, its public-private partnerships have been crucial to its commercialisation (Finan, 2023). Furthermore, American fission power has had ties with the US industry and fleet, creating early ties. Fusion has been showing similar promising private/public partnerships, which puts even more pressure on the public sector to de-risk investments for the private sector (Finan, 2023). Finan (2023) continues to put even more emphasis on the importance of fusion's alignment with policy goals and collaborations, as policies are crucial in order to make rapid constructions and address supply-chain challenges that are present in both fission and fusion.

4.3 Projections for the deep tech funding landscape

4.3.1 Challenges

Industrifonden (2024) highlights ongoing challenges faced by Swedish deep tech companies in securing late-stage funding, the so-called "Valley of death", suggesting a potential risk of continued difficulties in the future. A report from the Swedish innovation authority Vinnova and Patent and Registration Office (PRV) (Vinnova, 2024 b), also highlights not only the lack of late-stage funding, but the lack of funding for R&D compared to the US. Dealroom.co et al. (2025) suggests that this lack of funding can partly be traced to Europe's lack of entrepreneurship needed to move deep tech from research to commercialisation. This is reinforced by Vinnova and PRV (Vinnova, 2024 b) as they explain how there are roadblocks in transforming academic research to commercialised products or services. This calls for the European founder ecosystem to not only limit themselves to shallow tech (Dealroom.co et al., 2025) and for Europe to achieve a more connected ecosystem for deep tech (Vinnova, 2024 b). Nedayvoda et al. (2021) argue that the funding gap is partly a result of unadapted funding models. They explain how traditional funding models fail to meet the needs of early-stage deep tech companies, as they do not follow the linear venture stage investing process

(Nedayvoda et al., 2021). The publication signifies the importance of the development stages being goal-oriented and eco-systembuidling, as the investors should be aware that they are financing a solution not just a project (Nedayvoda et al., 2021). They continue to explain how a big challenge for deep tech startups is their ability to build their technology simultaneously as they build a market strategy (Nedayvoda et al., 2021). This is because of the longer time frame for the technology advancements and building a revenue market for scaled commercialization with a changing market (Nedayvoda et al., 2021). At the same time, Cheung (2025) also explains how this funding gap can be traced back to the fact that the market of clean energy in Europe has become more competitive, suggesting a burst of increased entrepreneurship, as metrics such as economic value and national security benefits are more and more prioritized. Moreover, it is especially important for deep tech companies to attract not only capital in itself, but the strategically right investor for that specific deep tech company (Industrifonden, 2024). Industrifonden (2024) suggests that investors in deep tech need to be patient and prepared for an extended development time, for both's sake.

Eupes's lack of patient investors and thereby lack of late-stage funding has led to a so-called European brain drain (Bradshaw, 2025). Stabbings describes Trump's international politics as an attack on Europe's competitiveness, leading to top talent being sold to The US and damaging the future of European innovation (Bradshaw, 2025). He further explains how investments are treated with more respect and accountability than grants, and should therefore be prioritized (Bradshaw, 2025), opening up a conversation about the public sector's best used efforts in deep tech innovations.

When it comes to the public sector's role in supporting deep tech innovation; a survey from Atomico further describes how there is a growing concern that regulations and policies within Europe are hindering entrepreneurs and innovations (Bradshaw, 2025). Further, Finan (2023) describes how policy makers have to consider the regulatory challenges that some of these deep technologies face, fusion in particular, in order for innovation to accelerate. Regulatory engagement therefore needs to be prioritized so that it develops at the same pace as the technology (Finan, 2023). It can thereby be concluded that Europe faces regulatory and policy related challenges in financing its deep tech innovation moving forward. Cheung (2025) continues to suggest that a nation's public sector should focus on broadening their horizons on clean energy technologies, where there is opportunity for national competitive advantage, and create a demand for clean tech; a view that is shared by the report from Dealroom.co et al. (2025). Dealroom.co et al. (2025) also urges governments to take more responsibility in deep tech in order to strengthen exit channels and promote diversity within founders and investors (Dealroom.co et al., 2025). Vinnova and PRV suggest three important actions that the public sector can take: to formulate a deep tech strategy for Sweden as a ground for a national investment, develop financing instruments and public risk sharing, and develop the ecosystem for deep tech companies (Vinnova, 2024 a). It is also important for policy makers to understand that shutting out foreign companies will raise the price of the energy transition nationally and Cheung (2025) thereby calls for appropriate policies to work together.

4.3.2 Opportunities

Cheung (2025) expresses his optimistic view of investments into clean energy as he explains how there are technological developments each year that are followed by record levels of investments. Despite previously mentioned expressions from Cheung (2025) of global energy investments running low, he describes a strong future for clean energy and how the energy transition will not slow down. This view is shared by Industrifonden's report (2024) as it projects promising investments for energy-innovations as new venture funds in Sweden emerge and the Swedish market shows a wider spread (Industrifonden, 2024). Opportunities within the deep tech funding landscape is further explored by Braune (2020) as he explains how there is limited access to high capital in underexplored energy sources, and that this can be fixed through investor knowledge within academia and natural sciences. Barune (2020) focuses on investments in high-tech within renewable energy, and how it is possible to reduce the funding gap for newer, more experimental energy sources. Moreover, findings by Siedshlag and Yan (2021) show that firms with a higher energy usage, as well as industry-heavy firms, tend to invest more in green technologies. This also spills over into the industry as a whole, as firms within the same industry tend to invest in an environmentally friendly direction (Siedshlag & Yan, 2021). This means that there is opportunity for funding and partnerships between deep tech- and industry-heavy companies, and for larger investments in deep tech through improved investor knowledge and communication.

As mentioned in the background, the recent top segments for increased invested capital in Europe have been AI, novel energy, and resilience, with wide applications into different sectors (Dealroom.co et al., 2025). This addresses a huge potential in affecting deep tech in Europe, and it could be the engine of the next wave of European innovation if the trend continues (Dealroom.co et al., 2025). The report continues to explain how if European defence spending keeps rising, we can expect about 10% of the annual spending to be on deep tech; accelerating advances throughout the deep tech ecosystem and reinforcing Europe’s global technological competitiveness (Dealroom.co et al., 2025). This means that there is opportunity for increased deep tech funding though defence related sources.

Regulations and policies also play a crucial role in shaping the funding landscape and enabling innovation. Ma, Liu, and Wu (2024) examine if tax incentives for innovation can attract high-technology investment from emerging markets. The study was done in China, but can open up for discussion on how Swedish taxes can influence the deep tech market (Ma Liu & Wu, 2024). They concluded that the high-technology investment increased significantly with reduced taxes on intellectual property related income (Ma Liu & Wu, 2024). Ren, Liu, and Yan (2024) continue on the path of the effect of political incentives on innovation; they describe how political incentives have the power to influence corporate green innovation, and highlight the value of establishing an environmentally friendly evaluation system in order to promote sustainable development. Industrifonden (2024) also suggest policy changes to attract more funding for late stage deep tech companies. Such as policies focused on attracting more global investors and those enabling pension funds institutions to fund. The report also encourages deep tech founders to look for investors outside of Europe for late stage funding (Industrifonden, 2024). This is because there are bigger funding opportunities globally and a geographical mix of investors is beneficial for the network possibilities they can offer (Industrifonden, 2024).

In summary, the theory chapter highlights that attracting funding for green hardware deep tech, particularly within fusion power, could profit from focusing on more ethical investors with technological expertise, setting bold targets, having a diverse team, and showcasing sustainability. Moreover, focusing on handling costs could also set the funding up for success. The theory section also presents that the public sector within developed countries has a significant role in fueling innovation, both in regards to de-risking investments from the private sector but also in aiding financially in early-stage deep tech. Collaboration between private- and public sector as well as regulators, could have a profound effect on the outcome of deep technologies and their commercialisation. Moving forward, the theory section describes how the deep tech funding landscape faces several opportunities and challenges, some of these challenges include: the valley of death as a result of ill-adapted funding models, deep tech companies struggling to find the right investor, the European brain drain, and a growing concern on policies and regulations affecting deep tech innovations. The section also highlights future opportunities within the funding landscape: technological development within deep tech, investment interest in sustainable technologies, increased investment capital for resilience, and global funding opportunities. With these theoretical foundations established, the following Results and Thematic Analysis chapter will explore how these themes materialize in practice.

5. Results and Thematic Analysis

The results from the interviews are divided into three categories:

1. Key aspect in motivation for funding
2. Public- and private investments interaction
3. Opportunities and challenges for the deep tech funding landscape

These categories are followed by subheadings that represent the themes that were identified.

These results one again aimed at answering the research questions:

1. What key aspects motivate private- and public funding for a Swedish fusion company?
    a. How and why does this private- and public capital influence each other?
2. What challenges and opportunities does the funding landscape for fusion face?

The empirical findings have been summarized and are presented in table 3, 4, and 5. If the theme was mentioned by the interviewee, their box was coloured. The interviewees were divided into if they are a part of the private sector or public sector, as well as if the organisation they work for provided grants, invested capital, or provided a mix of both. The themes were ranked on the share of interviews they were mentioned in, given a score out of ten.

It is also important to note that just because these themes were not specifically mentioned within the individual interviews, does not mean that that theme is untrue for that specific interviewee. The questions that were asked were open and therefore the interviewee chose which aspects to discuss. Although, all of their answers are presented in the results, instead similar answers among the interviews have been gathered. The interviewees were not asked of the significance of each theme, as these themes were identified after all of the interviews had been conducted. The interview guide can be observed through Appendix A.

5.1 Key aspects in motivation for funding

Several key aspects that motivate an investor to invest in a green hardware deep tech company were identified during the interviews. To which extent each theme was mentioned throughout the interviews, are presented in Table 3 below. The themes that were identified were: height of innovation, appropriate time horizon and amount of requested capital, potential for great market share, motivated team, high potential return on investment, high climate return, proven technology, and lastly stable finances.

Table 3: Displays the empirical results from the interviews and the themes that were identified within the category of what key aspects that motivate funding into green hardware deep tech companies.

Sector	**Private**				**Public**						**Score**
Funding type	**Investor**						**Grant providers**		**Mix**		
Theme/ Interviewee #	1	2	3	4	5	6	7	8	9	10	
Height of innovation											9
Appropriate time horizon and amount of requested capital											7
Potential for great market share											7
Motivated team											7
High potential return on investment											6
High climate return											6
Proven technology											5
Stabile finances											2

5.1.1 Height of innovation and proven technology

Two of the aspects that emerged as significant motivators for funding green hardware deep tech companies were: the demonstration of proven technology and the perceived height of innovation. Height of innovation was mentioned in nine out of ten interviews, and proven technology was mentioned in five, as key aspects in motivation for funding. The findings indicate that while the risks associated with unproven technology within deep tech create uncertainties among investors and grant providers, third party technological validation and a high degree of innovation attract potential investors by signaling significant potential.

Height of innovation was described as most important by several interviewees. Having height of innovation means that the product is new and provides a solution that is yet to exist on the market. Oftentimes, when the company originates from research, innovation height is included. The need for innovation height from an investor's standpoint mainly originates from the deep tech company being able to patent their innovation. As patented innovations often create a great competitive advantage in relation to market share.

> What's the status of IP? Has that review been done? Are you sure that this can be patented and protected? How low can it be protected? Have you taken an alternative path to patenting? (Anders, interviewee #3 (Investor from private sector)).

Without a patent, the margins can be small and competition high, which puts a lot more pressure on business strategy. An important factor was pointed out by an investor as they explained that a patented product should be innovative enough not to compete with China. This emphasizes the importance of not only a Swedish patent, but international ones as well.

Even though the deep tech funding landscape is by nature a high risk landscape, there has to be some type of proof of technology for there to be an investment interest. The TRL required for investors were different, depending on both public- or private sector and amount of investment ready capital. The TRLs expressed within the deep tech landscape ranged from one to seven. The higher numbers on TRL were mainly expressed by those who were less willing to take larger risks. There was a unanimous stance that the technology had to have potential and that there had to be hard data, drawings, and calculations on the technological potential of scalability of the product and its ability to generate value. If the deep tech company cannot provide this, many private investors will wait for proof of technology and invest at a higher price. When asked about proof of technology, two private investor said:

> Some investors say that I would rather be prepared to step in at a higher valuation for the company when I know it works, than to bear the risk the first time. (Johan, interviewee #4 (Investor from private sector)).
>
> Most people want to get in a little later when it comes to advanced technology. They want to have a product on the market, to show that it works. (Johan, interviewee #3 (Investor from private sector)).

The progress rate within the TRL scale incrementally creates a “fear of missing out” for investors, and can even attract early investments from investors who normally wait longer before joining a deep tech company.

5.1.2 Appropriate time horizon and amount of requested capital

The interviews concluded that an appropriate time horizon and amount of requested capital was a key aspect when private- and public investors and capital providers assessed deep tech companies. This means that the investors were looking for appropriate deep tech companies that fit their target time- and capital frame, while grant providers were more lenient when it comes to time frame.

Depending on the investor, the time horizon for when to invest and when to exit is different. In several interviews, it was explained how state grants are normally introduced in the first stage of a start-up, then investments from angel investors come in, followed by venture capital. For a venture capital fund, the fund cycle is between seven to ten years, but can be prolonged to fifteen years in total. The investment period lasts for three of those years, followed by seven years of management. One of the VC funds interviewed described the last three years as the most critical. Investors from both the public and private sectors reinforced the notion of knowing when the project will yield a return for their investors. It was described that if the time horizon for the project goes over the lifespan of the fund, they will have to be able to exit before that happens. It was continuously described how these deep tech companies would be able to attract more early investors by making it possible to make a secondary.

As these VC funds have this set time period of where they want to be able to exit the investment, one of the VC-firms described it as highly unlikely for a fusion company to be able to deliver in that amount of time commercially. There were investors from both the public- and private sector who explained that they did not participate in the base funding for companies. The private sector motivated this by explaining how the time to market becomes more of a qualitative judgement call, rather than a decision that they can base on current market and numbers. There was no mention of time horizons for public grants, and public loans from banks were not driven by a fast repayment. Although, there needed to be a detailed plan for how the technological and financial development would unfold, and thereby a planned timeline for commercialisation. “So we like to see that there is a clear goal and a vision of what they're gonna do and the small milestones of steps of how they will get there.” (Einar, interviewee #6 (Investor from public sector)). As timelines are difficult to construct with deep technologies such as fusion power, fusion’s potentially long timelines could clash with private investors’ shorter fund cycles, which indicates a great challenge for deep tech companies.

Interviews with representatives from private investors explained how they have a range of the amount of capital they are ready to invest in a singular company. This range therefore determines which projects they are willing to invest in or not. Representatives from the public sector also explained how they most often have limits of how much capital they go in with. While loans were dependent on the requested amount, grants were set beforehand in the description of specific grants announcements. Although, some public sector grants had no limits and were dependent on how the deep tech company motivated the amount of requested capital. Banks do not want to finance too small projects within the hardware deep tech sector, as the risks are perceived to be too high. Instead, they leave those projects to the private sector. They also do not finance big projects (around three billion Euro), but with projects like Stegra or Northvolt, they explained how the whole European banking world is involved.

5.1.3 Potential for great market share and return on investment

Deep tech companies are analyzed by investors by looking at the future market, the company's value, and the projected return. A high potential for market share and economic return was crucial for investors, while economic return was not important for public grant representatives. In order to attract private investors, the company has to be able to scale exponentially, have a clear strategy for the market, and preferably a global market.

All investors prioritized high returns as it constitutes the purpose of their existence. Depending on the investor's and the company's expertise, the judgment of the deep tech company differed. The investment companies with a technology focus and expertise had a more optimistic view of deep technologies compared to investment funds that were more generalists. This reveals the importance for deep tech companies to look for investors with the right expertise. While a high return was prioritized for all types of investors, it did not trump positive climate return, as in they did not invest in fossil fuels, for example. However, this does not mean that a higher climate return was prioritized over a higher capital return on investment for private investors.

> Even our investors expect us to help the world with technology and to move forward, so that's usually something we look at. As I said, I'm more finance-focused so for me they're connected. I have a hard time seeing how you could start a ten billion dollar company in something like oil technology; it's a dying business, you have to think ahead. For me, the impact part is actually a bit redundant, but we include it anyway just to make sure we don't forget it. (Joakim, interviewee #2 (Investor from private sector)).

As several both private and public investors described it, climate return and return on capital are often connected. If a company yields good outcomes for the environment, planet, and people, it often has a corresponding rate of return as the value of the company is linked to the priorities of society. While evaluating the return on investment, the worst and best cases are analyzed and then weighed against each other. In VCs, the realistic potential for exponential growth is low, which means that in the best case, a company has to be able to return the whole fund. This also means that the VC normally wants about 15 to 20 percent equity before they get diluted by other investors.

A private investor emphasized the importance of investors having the opportunity to liquidize their equity if the emission becomes oversaturated. From an investor perspective, this could lower the risk of investing, but would also require an acceptance of equity liquidization from the owners. This type of opportunity was described as getting more and more popular as more deep tech companies begin to see its value. Moreover, this describes a demand for developed funding alternatives for deep tech companies.

As repeated numerous times throughout the interviews, when the risks are high, the potential return is high. Although it was also mentioned several times by both investors and grant-permitters that it is important that the deep tech company is working on reducing the risk throughout the development journey.

As a singular investment within a VC has to be able to return the whole fund, the scalability of a deep tech company has to be exponential. Sometimes, a VC can plan for one or two companies out of 40 to deliver the profitability of the fund. An exponential growth proves that the product delivers a streamlining effect. This means that deep tech companies that have more potential for scalability become more attractive from an investor standpoint.

> These companies become much more investable the more exponential potential there is in scalability. [...] It's about the company having to be investable. They should not only be interesting because of good technology; they must also be able to attract capital. (Daniel, interviewee #5 (Investor from public sector)).

In order to scale, the deep tech company has to deliver both technologically and financially, being able to attract other investments. One of the private investors explained that there is a saying that the company has to deliver a product that is ten times better than what the current market can offer, but giving leniency when the market is larger. This showcases an advantage for deep tech companies as their product distinguishes itself by nature.

Given that hardware deep tech companies require a lot of capital to become commercialized, an appropriate strategy to market was continuously expressed as crucial, having a detailed plan with the future financial and technological developments. It was clear that the deep tech company had to deliver significant value to its market and be able to navigate through it. Several interviewees expressed how they analyze the size of the market, with one private investor detailing that the company had to be able to take about five to ten percent of its market size for them to invest.

> Is the market big enough that it actually has an impact? If it's a very big effect on a fairly small market, it can still be quite interesting. But if it's a small effect on a small market, it's not so interesting anymore. (Amanda, interviewee #8 (Grant provider from public sector)).

This potential that Interviewee £8 refers to was also determined by the company's ability to deliver value without relying on specific regulations that were inherently dependent on time and situation.

The timing aspect was further mentioned by a private investor as being crucial. They described how they analyze whether this is specifically the right time for this investment or if it is strategically better to wait. Further, this investor explained how the timing for investment is connected to the market and consumer behaviour. For example, if the energy prices are high right now, that means that there is a customer demand for managing those costs. Therefore, they often want there to have been some kind of crucial event that has newly created that demand and thereby an unsaturated market. A product that fills that demand, therefore, makes the deep tech company more attractive from an investor standpoint. Although it was further explained how the competition first has to be analyzed in order to evaluate if it is advantageous to be first on the market, or more profitable to wait. This uncertainty eventually contributes to the funding issues of deep tech companies.

As mentioned in several interviews with both private and public investors, the potential for a global market for the deep tech company is an important factor when analyzing its potential. If the technology can be patented in countries like the US or China, then the best case scenario becomes much more profitable. This is why several investors described how they investigate the global market for deep tech and what their development looks like, although one described how they could have more focus on this segment, and several interviewees did not have information of the current developments within fusion globally. One interviewee explained how this could partly be because of the lack of information on early stage deep tech companies globally and their progress. They continued to explain how this lack of transparency decreases when the deep tech companies become more mature and well-known.

This overall lack of knowledge and transparency hinders interests in deep tech companies both in Sweden and internationally, as global trends and developments are more difficult to know about.

5.1.4 Motivated team

The majority of interviewees expressed the importance of the team of the deep tech company before funding. Some of the team's abilities that were listed as important were:

- Ability to execute
- Competence throughout the team
- An experienced and skilled CEO
- Cooperative founders
- Openness to recruiting new team members
- Ability to recruit top talent
- Proof of success through previous achievements
- Motivation for their mission and passion
- Does not solely consist of consultants

There was a lot of focus on the leaders of the deep tech company and their ability to lead the team towards a common goal. The founder's passion for the company was expressed as the building stone for the whole project, and therefore a pivotal part of the success of the company. This also gave a hint if the team would be able to fund later stages of their development, which is an important factor when assessing funding from an investor perspective. Among the private investors, it was also relevant that the leader stood out from the crowd, their background, and their ability to cooperate with the investors.

> To then run a company, they usually need expertise from industry or someone who has that experience, that you don't just come from academia. [...] So it's quite important that they are people who are dynamic and can collaborate. I don't think everyone needs to know everything, but you need to be able to complement and strengthen the team. (Adele, interviewee #1 (Investor from private sector)).

One expressed how this could be because private investors are more involved in the development of the company than most public grant or loan providers. This is also why some private investors expressed how the cooperation of the founders is crucial, as there have been times when founders have been former researchers and not been able to cooperate with employees from the industry. One of the public grant providers conveyed that gender and equality are important in the composition of the team. None of which the private investors mentioned. An indication that the public sector is more concerned with social benefits than private investors.

5.1.5 High climate return

The importance of a high climate return for deep tech companies was mentioned throughout the interviews. Hardware deep tech companies were also described as often having a bigger positive impact on the planet than software companies, which makes these companies more attractive. Depending on whether the capital came from private or public sources, their view of how important climate return was differed. Several of the public investors, loan and grant providers, expressed the importance of climate impact on funding, and how that criterion was at the top of the list. They continued to explain how their main purpose is social benefit, which motivates them to prioritize climate-positive innovations, as well as positive social returns. The higher the reduction of greenhouse gases, the higher the priority. Although public capital providers expressed that the energy potential of a deep tech company is prioritized over its greenhouse gas reductions, which acts in favor of energy companies. "When we look at our energy potential, we make sure that [the project] contributes to a sustainable energy system more than, for example, carbon dioxide reductions." (Amanda, interviewee #8 (Grant provider from public sector)). This is where the motivation from the deep tech company comes into play and becomes crucial for attracting public investors. If there already is stable financing from the private sector for a deep tech company, then there is no drive for the public sector to give out advantageous loans to that particular company.

In contrast, several private investors explained how times have changed and that climate impact is no longer at the top of the list, as the economic side is more prioritized. They also expressed how a deep tech company cannot survive on climate returns alone, as that kind of company will not be able to sell in the future. Several private investors also argued that a deep tech company with high climate return often comes with a high economic return, which makes these aspects connected. This is because if a deep tech company creates value in the form of, for example, greenhouse gas reduction, then that creates value for people, which creates economic return on investment.

5.1.6 Stable finances

Public grant providers did not look at the finances of the deep tech company when assessing grants, but a public loan provider and private investors did. For these, they looked at whether the deep tech company had had an even cash flow for the last five years. They expressed how the financial side is high in waiting, and that they do not give out loans to companies that have a negative economic rate of return. The motivation for this was that they are obligated not only to support innovation but also to provide stable finances for society.

Several private investors expressed how the global macroeconomic changes control how private investors invest their money. When the interest rates went up after Russia invaded Ukraine, investors became more restrained with their capital and would therefore rather invest in mature companies with stable finances rather than early-stage companies. These hard values, like cost, income, and results, become more important when the amount of capital is restricted. A private investor also expressed their prognosis that deep tech companies where the cash flow was easier to predict would become more attractive for private investors.

5.2 Public- and private investments interaction

There were several different opinions on the interaction between private and public investments, as the subject had a central role in the interviews. The most significant findings were that interviewees believed that the public sector's role is to fund big and early, that public funding lowers risk for private investors, and that public funds demand private interests before funding. The empirical findings from this category are presented in Table 4 below.

Table 4: Displays the empirical results from the interviews and the themes that were identified within the category of ways in which the public- and private sectors interact.

Sector	**Private**				**Public**						**Score**
Funding type	**Investor**						**Grant providers**		**Mix**		
Theme/ Interviewee #	1	2	3	4	5	6	7	8	9	10	
The public sector's role is to fund big and early											9

Public funding lowers risk for private investors											8
Public funds demand private interest											3

5.2.1 The public sector's role is to fund big and early, but it demands private interest

In almost all of the interviews, it became clear that the public sector was crucial in the early stages for high-risk deep tech companies. If an early-stage project was in need of a large amount of capital, the private sector left it to the public sector to fund in the form of grants, equity, or guarantees, before they went in with funds. Public loans were on the other han, wered considered more cautious. “But to get a loan at all, you have to be at a stage that is a little more mature. You are almost at the point where you have turnover.” (Anders, interviewee #3 (Investor from private sector)).

Too early stages of deep tech companies were considered too risky for banks to give out loans, and too big projects were considered too independent to give public grants to.

> So [the grant] also decreases with how big the company is and what you think they should be able to produce themselves. So that there is not an unnecessary amount of public money. (Amanda, interviewee #8 (Grant provider from public sector)).

The public grants do not expect to gain money through grants, as they are considered as support, and are expected to be repaid to society through the generation of new jobs.

> We can bring in quite a lot of tax money without the state owning anything. And if this initiative crashes, nothing will come of it, which for a start-up is ninety-five percent, we are not demanding any money back, but we expect it to pay off through new jobs. (Emilia, interviewee #7 (Grant provider from public sector)).

The public capital was seen as extremely important in the deep tech financing scene, but was also highlighted as lacking by a few private investors. They considered the public grants and loans to be way too small in comparison to what the early-stage deep tech market needs. One private investor also highlighted that this public support takes way too long to be granted. They continued to explain how these grants have a long processing time, and with consideration to the fact that deep tech companies act in an agile market, the conditions for the grant could have changed by the time it has taken to be processed. This investor continued to explain how the company almost has to be mature to get accepted for a public loan, which means that these loans do not benefit early-stage deep tech companies.

Interviews with both the public and private sectors confirmed that the deep tech company has to attract a certain amount of private capital before the public sector can give grants. This is to secure the public capital, and to prove that there is a market for the product so that the company will be able to continue to finance on commercial grounds. In this way, the private interest drives up the public grants even more.

> Both that the risk is shared between the private and the public and that you look at each other a little bit. Do they dare to get involved? [...] If it is a customer who sees value in this innovation and dares to put their money in, then they see a great need for it that there is a market potential. And then we are more inclined to also think that [...] And if we can then say that there is sufficient energy potential and innovation level, then it is easier for us to think that it is a good project to support as well. (Amanda, interviewee #8 (Grant provider from public sector)).

A private investor also discussed how, when there are political initiatives for deep tech investments without commercial grounds, it will lead to poor development. This is because when there is no proven commercial potential for the product, the public grants will go to waste. Despite this, there were several mentions in interviews regarding global fusion funding and how the public sector in both the US and Germany grants bigger amounts of capital for fusion power.

> What we have seen is that the state is extremely keen on fusion power, but not specifically in Sweden. We have mainly looked at fusion power companies in the US and Germany. But they can get their facilities for billions paid for. The state is really into it. (Joakim, interviewee #2 (Investor from private sector)).

It was mentioned in one interview that the Swedish National Debt Office, which guarantees up to 75% of private funding into deep tech companies, does not have its risk analysis. They instead rely on the private investors' internal risk analysis, and they do not invest in too risky projects. Other public actors have their own set of experts who analyze and validate the deep tech company and its potential.

5.2.2 Public funding lowers risk for private investors

There were several ways mentioned in which public funding can lower the risk for private investors. In smaller projects, for example, the EU can give guarantees to banks to go in with capital in early-stage deep tech projects. This makes private investors more likely to invest, and opens up a close relationship between private and public funding. It was discussed how public funding makes companies more attractive to private investors as their investment will accelerate towards an economic return faster.

“[public grants] become a kind of risk minimization or risk reduction for private capital. That you might be a little more daring with your private money.” (Amanda, interviewee #8 (Grant provider from public sector)). Otherwise, private investors are more restrained when it comes to investing in deep tech companies, as it often comes with higher risks. Public funders who were interviewed focused on their role in lowering the risk for the private market. Both by providing capital, but also by validating the technology.

Despite public funding lowering the risk, several private investors pointed out that they still rely on their analysis rather than the public sector’s, as their criteria are different. They still acknowledged that the public funding helped the development of the technology tremendously, but that the commercialisation of technologies lacked funding from the public sector.

> I would like to trust our own assessment more than the institutions. However, it is obvious that for this type of company it can be quite a long journey before it becomes commercial. So it can be quite good to get grants, and most often you get grants for the development part and not for the commercial part. (Adele, interviewee #1 (Investor from private sector)).

Both public and private actors pointed out that there needs to be a mix of investors from both the public and private sectors in order to provide capital and knowledge. As well as a mix of different types of public funding, such as loans, grants and equity.

> It's about joining forces with state- and private actors. The main purpose is to create the conditions for this company, for innovation, and the solution, rather than to run in the interest of investors. But you need both parts; it's a puzzle to get the development forward. (Emilia, interviewee #7 (Grant provider from public sector)).

A different point of view was also expressed by a private investor was that public funding lowered the attractiveness for private investors, because public investment funds have lower requirements for economic return, which in turn sends a signal to the private investors that the return probably will not be that high for that particular deep tech company. “Generally speaking, government funds have lower return requirements than other venture capital funds. So if a government fund went into this company and they are happy with a certain return, then we will listen to a completely different return. It would be quite strange.” (Joakim, interviewee #2 (Investor from private sector)). This reveals a contradictory relationship between public- and private funding, where on one hand public funding derisks investments for private investors, but on the other hand also signals to the market what return is expected from a company.

5.3 Opportunities and challenges for the deep tech funding landscape

The opportunities and challenges for the deep tech funding landscape fluctuated between interviewees depending on their expertise. As the question for this part also was posed as an open question about the funding landscape of deep tech globally, it should be noted that these opportunities and challenges are not representative of the company the interviewee worked for, but for their personal view of the future of the deep tech funding landscape as a whole. The main opportunities that were expressed were that: energy security is a priority, technological development yields high potential, public regulations can promote innovation, and foreign investors possess greater investment initiatives. These opportunities and challenges can be shown in Table 5 below.

Table 5: Displays the empirical results from the interviews and the themes that were identified within the category of opportunities and challenges for the deep tech sector.

Sector	**Private**				**Public**						**Score**
Funding type	**Investor**						**Grant providers**		**Mix**		
Theme/ Interviewee #	1	2	3	4	5	6	7	8	9	10	
Energy security is a priority											8
Technological development yields high potential											7
Public regulations can promote innovation											6

Foreign investors possess greater investment initiatives											5
Challenges for the deep tech sector/ Interviewee #	1	2	3	4	5	6	7	8	9	10	
Public regulations can inhibit investments											8
Capital shortage in the private sector											7
Unproven technology poses too high of a risk											6
Climate is no longer a priority											6

5.3.1 Climate is no longer a priority, but energy security is

> It's not that simple but investors speculate on what will happen in the future. So I think generally speaking, climate used to be at the top of the agenda. Now we have other things that are higher up. (Joakim, interviewee #2 (Investor from private sector)).

As a portion of the interviews was spent discussing the effects of global events on the funding landscape of hardware deep tech companies, there was a collective view that events such as the war in Ukraine and the American president Trump's politics had a substantial effect on the investing climate. It was explained how the war in Ukraine had had an effect on European safety priorities, policy shifting from sustainability to independence and defence.

> We have ended up in a situation where we have a war with Russia and Ukraine very close to us and we keep hearing from the outside world that these goals that were set very hard with the green transition to 2030 are now starting to be pushed back and so we have all these companies that would benefit from tough requirements and regulations that companies must meet. Now maybe it's more of an uncertainty. Will this transition really have to happen at that pace? Based on the fact that you might think that the war issue is even higher on the agenda than the environmental issue, unfortunately. (Johan, interviewee #4 (Investor from private sector)).

The climate goals are no longer as important as European safety, which makes investments in cleantech overall less attractive. This was reinforced by an interviewee who explained that there are not enough people interested in investing in green energy or their supporting technologies in Sweden in order to cover the future energy needs. One even expressed the need for more public investments in energy companies, in particular fusion power, as it is a matter of Swedish energy independence.

> Northvolt was driven by European security. They needed battery technology in Europe, so it was more of a political investment. The same thing with fusion. It becomes a political investment. You see that we need this, it's worth taking the risk to some extent. (Anders, interviewee #3 (Investor from private sector)).

> I think there are also shifts with Ukraine and Trump, that there is much more focus on energy and independence. These [climate] goals too, they were very ambitious goals and there are many who believe that we will not reach them in Europe or in Sweden. (Emilia, interviewee #7 (Grant provider from public sector)).

The prospects of reaching the EU's and Sweden's climate goals are fading in realization and respect from private investors, which makes them more guarded with their investments. An important technology aspect that was brought up during the interviews was that the heart of the technology has to serve a direct benefit to society, and cannot be based on positive externalities. Carbon capture was then brought up as an example of when the externalities were at the heart of the business, leading to an unbeneficial outcome. There is a push for companies to become more economically justifiable rather than sustainable.

> In general, people have lost faith in building companies around positive externalities. A few years ago, you could build a company that would live on carbon credits: we reduce emissions and we will get paid for it. That's over. (Joakim, interviewee #2 (Investor from private sector)).

Although energy companies were described as having an advantage after the war, as sovereignty and robustness of the electrical system became more important. On the other hand, President Trump's hints of reinvestments in oil further destabilize green energy investments.

> Now we also have an American president who talks about oil and that they're going to drill, drill, drill! All such signals from the world's leading players naturally play a role in how quickly this green transition will happen and what pressure there is on large companies to adapt. (Johan, interviewee #4 (Investor from private sector)).

> As soon as there was something that could be used for those kinds of military purposes, it was ice cold. Now it's the opposite. Now there are lots of funds, so that's also a big difference. I also think that the funds that appear around defense and equipment will also look at energy and fusion. (Anders, interviewee #3 (Investor from private sector)).

There has been an increase in the number of deep tech funds in the last five years in Sweden, but those funds have had a focus på software rather than hardware. After the war in Ukraine, more funds have also focused on materials and defense, and in several interviews, there was a prediction that more of these funds are going to get more interested in energy companies, with fusion being a part of that. As the interest from investors in deep tech has increased, so has the interest in energy companies, as energy independence is a part of national defence.

> We cannot be dependent on energy from Russia. Instead, we must create a stronger Europe and be able to provide ourselves with energy, for example, to grow food in a new way, to take care of our water resources etc. These types of technical solutions are absolutely crucial. (Emilia, interviewee #7 (Grant provider from public sector)).

5.3.2 Technological development yields high potential

There was also an optimistic viewpoint that became more obvious throughout the interviews. That included that Sweden is well-positioned for rapid research and development within hardware deep tech. This is partly because of Sweden’s talent density, which makes Sweden well-positioned in a global perspective. One interviewee suggested that AI could be a part of the puzzle in accelerating the development towards realized fusion power, as well as highlighting the fact that the overall development for renewable energy is under rapid development. With this development, the cost reduction is increasing, and is expected to continue to decrease with time. This pattern yields good prospects for deep tech energy companies.

> I think that the development of renewable energy is going very quickly. We haven't stopped there yet. The cost reduction hasn't stopped, it will continue for a long time. (Daniel, interviewee #5 (Investor from public sector)).

Sweden is well-positioned for advancements in fusion energy, thanks to its high density of technical talent and strong expertise in hardware deep tech. Investors highlight that the rapid development of renewable energy technologies suggests that fusion could follow a similar trajectory, especially with the integration of AI to accelerate progress. According to an interviewee, the costs of these technologies continue to decrease and are expected to decline further, making innovation more accessible. This, combined with Sweden's strong foundation of technical competence, creates a favorable environment for the growth of fusion power startups.

5.3.3 Public regulations can promote innovation

Several interviewees expressed that there has been a shift in priorities in the EU towards more strategic investments, especially towards energy, with an expectation of increasing along with increasing demand for energy safety. The amount of capital that is being invested has also increased. It was described as an effort to keep European innovation in Europe, amidst President Trump's energy policies. Even regulations have started to ease in the EU in order to make it easier for energy innovations. In this instance, Sweden was described as being late to the game, as Sweden still does not have tax reliefs for startups.

> Our companies here (in Sweden) must be able to get enough money in a sufficiently favorable way from the EU. [...] What you start with is easing the rules, and having clearer rules. There are many nations that have their own regulations and protocols and Sweden is a little behind in that. [...] Sweden is the only one that does not have its own regulations or reliefs for startups. (Amanda, interviewee #8 (Grant provider from public sector)).

5.3.4. Foreign investors possess greater investment capital

Several interviewees from both the private and public sectors expressed the lack of financing for deep tech companies in Sweden, but also the lack of entrepreneurs and investors who are willing to take the risk that hardware deep tech demands. In addition, there were several mentions of the bureaucracy in EU countries, being too heavy, making it difficult for research to commercialise, and leading to Nordic research being bought by foreign investors.

> It hasn't been a priority before, but back then it was seen as quite natural that you start your company in Sweden, get a small market here and then move to the US with your company and expand globally from there. Whereas now you've probably started to think that the US might not be our best friends as we always thought. Amanda, interviewee #8 (Grant provider from public sector)).

Especially when hardware deep tech companies are in the stages of going commercial, when the required investments are substantial. With this, the patent and rights for the product is also sold.

> Usually, when it comes to companies like in climate for example, or hardware and so on, you usually have to go to the US when you want to raise big money and do risky things. You might be able to raise the first round of capital and the second round of capital here in Europe, but then you have to go to the US. (Joakim, interviewee #2 (Investor from private sector)).

The US was described several times as being a capital-heavy country with an interest in Nordic deep tech companies and research. Nationally, the US was also described as being better at going in with capital at early stages, even in the research stage, as they have a more mature ecosystem for venture capital. Americans were also described multiple times as more positive than European investors when looking at high-risk investments, seeing potential where Europeans see risk. One private investor who was interviewed explained how some might have thought that more American investors would have come into Swedish cleantech by now because of the fall of the Swedish crown, but because of factors such as Trump's politics that shift away from sustainability and green energy, that is not the case.

"It is important to bring foreign investors into Sweden because we need their money, their expertise, and their network is also needed." (Daniel, interviewee #5 (Investor from public sector)). Investments from private investors from other countries, such as in Asia, were also described by the private investors as critical and in demand. While some interviewees expressed fear of Swedish research being bought by foreign buyers, others explained how the companies do not become foreign-owned until the majority of the company is owned by foreign investors. It was also explained how these foreign investors possess capital, competence, and a network that could be very important for the industrialization of hardware deep tech products.

5.3.5 Public regulations can inhibit investments

Most interviewees stated that national and EU regulations have the power to regulate the funding landscape of deep tech companies. To some extent, these regulations can inhibit investments in innovations by creating heavy bureaucracy or scaring private investors.

As the government's focus shifts after geopolitical changes, this leaves private investors with a sustainability focus concerned, as they do not know when the state grants are going to come. The hardware deep tech industry is also very dependent on infrastructure and, thereby, state involvement, which makes private investors dependent on government priorities. During one of the interviews, it was also explained how European investments are dependent on the alignment with the national climate goals. This means that Swedish climate goals regulate the allocation of European funds. It was also explained how the sustainability demands on the European deep tech companies have been lowered, which lowers the private interest in green tech overall.

> Before, climate was at the top of the agenda, now we have other things that are higher. Maybe it's the economy, the recession. It's not going exactly as well as we had hoped for a few years ago, unemployment for example. What are the politicians talking about? It's not green investments in the same way. (Joakim, interviewee #2 (Investor from private sector)).

The sudden shift towards nuclear fission power was mentioned in several interviews as something that made private investors wary of sudden regulation shifts in energy policy. It became more uncertain for these investors to go in with large amounts of capital in energy businesses, as the road to commercialisation is often long. Public grant providers also expressed concern about shifting policies regarding energy. Although some interviewees also expressed a minimized risk in investments in fission power, as a result of changing regulations. “It feels like there is less risk in green energy, but especially nuclear fission.” (Joakim, interviewee #2 (Investor from private sector)).

> Because you can swing in a couple of years, when do you swing again? You build a nuclear power plant for billions that you know that in five years you might have changed your mind. Then you have to have guarantees that this will probably last for 30-40 years. It's a repayment period that probably extends longer than that actually. So you can't make this type of large investment that can possibly be regulated away within a while. (Anders, interviewee #3 (Investor from private sector)).

> Do we dare to invest in this technology or will there be a regulation that says we are not allowed to develop it? [...] Right now we have received a lot of money to finance the development of nuclear fission power, whereas ten years ago, no one would dream of spending money to finance the development of nuclear fission power. [...] So that probably makes investors hesitant to invest. Both because they know that the process

is long, and because they don't really know what regulatory obstacles may come up along the way." (Amanda, interviewee #8 (Grant provider from public sector)).

Several investors also mentioned the heavy bureaucracy regarding energy regulations, and how these regulations have to keep up with the developments in deep tech. An example that was brought up was the regulations in fusion power. Nuclear fission and fusion are under the same regulations, even though they are very different operation-wise. In order to implement hardware deep tech innovations, regulations in the whole of Europe have to be streamlined and easily implemented into the infrastructure, as the implementation of new energy plants will already be taxing financially and technologically.

> There is no regulatory framework for fusion. They live under fission, the same as our nuclear reactors. They have quite strict tests as they have to show how they are going to dispose of waste. At fission nuclear power plants they have radioactive waste, you have to put it in bedrock, bury it and so on. It is the same legislation that follows for fusion even though it is actually water that comes out. It is extremely difficult to maneuver regulatorily. (Anders, interviewee #3 (Investor from private sector)).

Moreover, it was expressed by another private investor how public grants lower the agility of the deep tech company, as it is in an accelerating growth phase and grants demand a lot of processing time. This highlights how heavy Swedish bureaucracy can inhibit growth in hardware deep tech companies.

> Then it takes time to put together an application [for the grant], plan based on the stage you are in today, submit this, wait for a response and then I will get money in maybe six months or eight months. Already there, during that time, this company has had time to take a few different turns. When you get [the grant], you get it because of this project you planned six or eight months ago. [...] An investment is more flexible than with public capital. (Anders, interviewee #3 (Investor from private sector)).

> You absolutely get the public support and the money, but it also comes with requirements that you have to do what you have said for the money. At the same time, you don't know at the time of application exactly what the right way forward is." (Amanda, interviewee #8 (Grant provider from public sector)).

This shows the contradictory relationship between a deep tech company and public grants, as they can provide crucial capital in early stages, but also stagnate growth for agile start-ups.

5.3.6 Capital shortage in the private sector

The sector of hardware deep tech demands a larger initial investment than many other sectors, as well as connections and collaborations with infrastructure, which many private investors cannot afford. The first step out into full-scale production is capital-heavy, and there are not enough investors who are interested in taking that risk.

> And this is incredibly difficult because there are some deeptech investors, who are making a name for themselves in that field, but they are far too few in relation to the number of companies that need capital. (Johan, interviewee #4 (Investor from private sector)).

This, in addition to situational circumstances such as economic uncertainty and high interest rates in Sweden, makes it difficult for deep tech companies to find private investors willing to invest.

> It's because we've had very high interest rates, we've had high inflation, and then unfortunately, we've also had some poor performance. We've had some companies in energy and Cleantech that haven't done so well. (Daniel, interviewee #5 (Investor from public sector))

> An uncertain environment, economic uncertainty, high interest rates; this contributes to the fact that it is more difficult to find investors. They keep their money tight. (Emilia, interviewee #7 (Grant provider from public sector)).

Some interviewees from the private sector described Scandinavia as lacking in available equity capital, but also mentioned Europe as having this problem.

> Financially, we have a big problem in Sweden, in the Nordics, and perhaps in all of Europe, and that is getting financing in the later stages. Even good companies that are showing progress have difficulty attracting venture capital. So we have a shortage of, a big shortage of equity capital available here in Scandinavia. So that we are very dependent on getting capital from the US, from Asia and getting investors from other parts of the world. (Daniel, interviewee #5 (Investor from public sector)).

European hardware deep tech companies have problems in gaining investments in later stages, from series A and forward, as this is a capital-heavy segment. One investor described how it takes three times the time to close a round today than it did three years ago, which they further explained as being a consequence of high interest rates, high inflation, Covid, and bad performance from previous cleantech companies. They theorized why these cleantech companies had bad performance, with explanations such as not bringing in sufficient capital, spending capital too quickly, or a lack of innovation. For these deep tech companies to advance in their capital raising, there needs to be a mix of investors, private, public, and foreign.

Generally, venture capital funds are ready to take more significant risks than private equity, because venture funds spread their risks across more companies. With this, venture capital also spread their risks throughout different industries, having climate-focused and hardware companies being a small part of their portfolio. Private equity invests more in a singular company, and therefore wants more control and equity in that company. A problem that private equity then faces is that the founders of the deep tech companies rarely want to sell the majority of their company, leaving the business on the shelf. Moreover, if a private investor wants significant ownership of a hardware deep tech company, like a fusion company, the investment would become overly expensive.

5.3.7 Unproven technology poses too high a risk

It became obvious throughout the interviews that the risk level is at its highest when the technology is not yet tested. This means that there is a long time to market, which often comes with a long time with negative cash flow that has to be accompanied by a value increase of the company. It was expressed that the biggest challenge is the journey from research to commercial product, because this means that you are dependent on industrial collaborations in order to realise the commercialisation.

> The most difficult thing is this transition from lab and development to a commercial product. They are very dependent on industrial collaborations. So it is very critical to both achieve this and also that the companies you collaborate with also prioritize it internally. (Adele, interviewee #1 (Investor from private sector)).

It was brought to attention by a few interviewees that Sweden is generally bad at bringing research projects into commercialisation. One interviewee thought that this might be because of the fact that Sweden does not have any rules or demands for research to be commercialized. Comparing Sweden to the US, one private investor expressed:

> What makes the US stand out is that there is quite a lot of money early on. People are willing to actually invest money in technological innovation. It is quite common to

> have a million dollars that you give to researchers in a lab to commercialize their research who are interested in it. Which is unheard of [in Sweden]. (Anders, interviewee #3 (Investor from private sector)).

There was a unanimous stance that the growth within the hardware deep tech sector needs to be stimulated, as it is not moving fast enough. It was explained how this sector needs collaboration in order to grow, because of access to infrastructure and its resource-heavy nature.

In the majority of the interviews, the saying about fusion was brought up by the interviewee that "Fusion is always 40 years ahead of us", with various periods ranging from 20 to 60 years. There were speculations about fusion development moving too slowly to compete with the other energy types. Although, there was also a split opinion on the continuous expansion of fission power plants, where some believed that it was a positive investment to secure base power, while other expressed their concern with fission being an obsolete technology for when the power plants have been built, and that Sweden will lose its competitiveness globally if fission power is prioritized.

The three most important takeaways from the empirical data can be summarized as follows:

1. Green hardware deep tech companies need to lower the perception of risk for potential investors and grant providers through different means
2. There needs to be a mix of both private and public funding to maximize invested capital into a green deep tech hardware company
3. Unstable geopolitical and regulatory shifts pose a challenge for the hardware deep tech funding landscape, but there is an opportunity in high-potential technology that strengthens national independence

6. Analysis

Building upon the empirical findings presented in the previous section, this analysis summarizes the key points and delves deeper into how these results are connected and how they position themselves in regard to the theory section. The subheadings for this section are created based on the research questions: What key aspects motivate private- or public funding in the early stages of a green hardware deep tech company?, How and why do these private- and public funds influence each other?, What challenges and opportunities does the funding landscape for this sector face moving forward?

6.1 What key aspects motivate private- and public funding for a Swedish fusion company?

The height of innovation being the number one key aspect for funding is no surprise because it is what defines deep tech in a way. This also goes along with “potential for great market share”, and “High potential return on investment”, as innovative and disruptive ideas that come with deep tech often have the aspiration to be market-dominating and if successfully commercialized, generate considerable revenue. Roundy, Holzhauer, and Dai (2017) confirm this finding by highlighting how all investors seek to make a profit at the end of the day, as it separates them from social philanthropy. Several interviewees mentioned that the growth should be projected to grow exponentially for them to be interested in investing; that there had to be significant scalability in the project. This could pose a challenge, as even if the technology is groundbreaking, Cheung (2025) explains how clean energy technologies will have more of a linear growth rather than exponential growth because of their dependence on surrounding circumstances and high CapEx. “High potential return on investment” was only mentioned by investors, and not stakeholders that provided grants, which is not that surprising, as they expect a return in contrast to grants, which expect repayment through, ex. new jobs, etc. This confirms Mazzucato’s (2025) statement that the government’s focus should be on creating new job opportunities rather than shaping market opportunities. The interviews concluded that while actors within public funding focus on creating new job opportunities, the Swedish government’s regulations, as those that promote the expansion of fission power, shape the investment market for Swedish energy companies. This, in some way, goes against Mazzucato’s (2025) view of the government’s responsibilities and best efforts.

As Nedayvoda et al. (2021) point out, it is important to find a match with investors. This was also confirmed during the interviews, as those interviewees with more technological expertise within deep tech expressed a more optimistic view of funding those companies. This somewhat complements ideas by Bachmann, Meyer, and Krauss (2024), as they conclude that ethical investors are more likely to be optimistic about impactful investments, given that investors knowledgeable about green energy systems naturally have an ethical focus. Another option would be for more generalized investors to adopt a more tailored approach to funding deep tech, as their funding needs differ significantly from regular tech, as described by Nedayvoda et al. (2021). It was mentioned in the interviews how the opportunity to make a secondary or the possibility to liquidate their investment could also lower the risk for investors and therefore attract more capital. Risk-minimizing initiatives such as these are encouraged by Dealroom.co et al., (2025), and the report presents how the exit channels within deep tech need to be strengthened in order for deep tech companies to attract capital.

From "Appropriate time horizon and amount of requested capital" we see that a considerable number of funders are not willing to budge when it comes to their set time horizon and budget for funding. This could be seen as a clear hinder for deep tech funding, as the time horizons and future budgets are more unknown than regular tech. It also reinforces the importance for deep tech companies to display a clear industrialization plan with proof of growth for investors in order to make them feel more inclined to fund. The importance of an industrialization plan is discussed by Nedayvoda et al. (2021) when they explain how unpredictable product-to-market fit and long development timelines can put off VC investors. The clear plan's significance was also brought up in several interviews and also encouraged by Finan (2023), as he explains how bold time-limited targets urge action from the private- and public sectors. Although Industrifonden (2024) warns against rushing into development that the technology is not ready for, which was not reflected in the interviews. From the findings, it also became prominent that validation of technology, global market, market share, progress rate or TRL, height of innovation, climate return, number of generated jobs, and excellent team qualities are aspects that can motivate investors and grant providers to fund.

Being able to display proof of technology and convey a feeling of FOMO, presented in the interviews as a key motivator for funders. This reinforces the recommendations presented to combat the pitching paradox in Industrifonden (2024), where it is emphasised that founders should prioritize the way they convey their technology to investors who do not have special expertise in that area. The report (Industrifonden, 2024) therefore suggests validating the technology through third parties and demonstrating a clear plan to market. Motivated team also scored high, which signifies the company's internal significance and its ability to attract talent. Having the right mix of team experiences was also highlighted by Granath (2021) and brought up in several interviews.

Even though high climate return was presented on all companies' websites, it was only mentioned in six of the ten interviews. This may be because of a presumption that it is understood that climate goes under the criteria, or it is a sign that climate actually is not a priority. As mentioned in an interview, the market controls the investments, and it is hard for a company to see a good investment in oil, for example. Another explanation could be in the question, as it was formulated with the presumption that the company they are looking at is "green": "What key aspects are you looking at when funding a green hardware deep tech company?"

Something that was not brought up in the interviews was the company's ability to address the public in such ways as minimizing public fear, displaying safety, and building public trust. These qualities were highlighted by Finan (2023) and Gupta et al. (2025) in the theory section. Moreover, the interviewees failed to consider the deep tech company's early collaboration with industry and corporate partners as a success factor. This aspect is something that both Finan (2023) and Nedayvoda et al. (2021) have described as essential for future growth. Lastly, the core lessons learned from failures such as Northvolt were highlighted by Dealroom.co et al., (2025) as not focusing on the core business, taking on too much equity financing, relentlessly pushing for growth, taking on too much debt, and not focusing on creating an open culture. These abilities were not mentioned directly by any interviewee, having in mind that the case of Northvolt or Stegra was not asked about in the interviews.

6.2 How and why do private- and public funding influence each other?

The overall takeaway from this part is that the public sector has a lot of power and responsibility when it comes to what industries get funding and which companies get commercialized. Grants, loans, and public investments are all important for green hardware deep tech companies. This finding also resonates with Mazzucato (2021) as she states: "Government does and should have a big role in supporting innovation", which is through creating an environment favourable for innovation. She also emphasized that the public sector needs to be more bold (Mazzucato, 2021), which was an ongoing trend throughout the interviews through statements about public investments and regulatory and policy uncertainty. Overall, the interviews concluded that public funding can be seen as a positive contribution to a deep tech company, as it lowers risk for private investors and accelerates technological development, but policies and regulations need to be followed. This is also in line with both Cheung (2025) and Nedayvoda et al. (2021), who describe the public sector's role as de-risking for the private sector. This is especially important for hardware deep tech companies, Weibezahn and Steigerwald (2024) explain, as they often bring heavy CapEx costs. However, interviews suggest that public funding also comes with its challenges. Both in regard to heavy bureaucracy, but also as it sends a signal to private investors about what return they are expecting on their public investment. Industrifonden (2024) also highlights this as they lay out how public funding can entail restrictions in spending, resulting in these companies looking for capital within the private sector instead. Private interests are also key in getting the attention from public funds, and a mix of both public and private funding seems to be optimal for lowering risk and optimizing network possibilities for deep tech companies, a stance that the interviews, as well as Industrifonden (2024), Cheung (2025) and Nedayvoda et al. (2021) agrees on. Both interviews and authors such as Cheung (2025) see that both the public- and private sectors have a responsibility in investing in innovations that help combat climate change.

A somewhat complicated situation appears where the public and private sectors both listen and act according to one another. This somewhat goes against Mazzucato's (2021) wishes of having a collaboration between the private and public sectors on a massive scale. Based on the empirical results, for the private and public sectors to have shared values when it comes to deep tech, regulations and public funding need to lead the way for private interests. A mission-driven decarbonisation act, as described by Mazzucato (2025), will lead to a first-mover advantage on the market. This means that even if the Swedish mission is focused on either decarbonization or national independence, deep tech companies within these areas will most likely be in a good position on the market to receive funding from both private and public sectors. While Mazzucato (2024) encourages holding the private sector accountable for their alignment with the mission, results from interviews rather indicate that the first step of responsibility should fall on the public sector, derisking investments into deep tech companies; as well as for the government to adjust regulation to create an environment for these companies.

6.3 What challenges and opportunities does the funding landscape for fusion power face?

From the results, it seems as if there is potential within deep tech in Europe and Sweden, with the more technologically knowledgeable investors being more optimistic. Sweden has a high talent density, and research yields continuous cost reductions within deep tech. This promising outlook is shared by Industrifonden (2024) as they describe promising investments for energy innovations. Investors and grant providers see this as an opportunity for European innovation, but it has also become clear that Sweden is bad at turning research into commercialised products. This resonates with the research done by Granath (2021), where he calls this period between research and product: “The valley of death”, which describes the difficult late-stage funding stage. Further, Vinnova (2024 b) also depicts Sweden as a country lacking in entrepreneurship to move deep tech to commercialisation. In addition to this, a funding gap for these deep tech companies was discussed in multiple interviews. The funding gap was discussed as a possible result of capital shortage in the Swedish private sector because of the recession and uncertainty, both geopolitically and financially. Interviewees explained how tougher financial times lead to investors gravitating towards more predictable markets, away from high-risk developments and unproven technologies such as hardware deep tech. Rather than relying on improvement in the Swedish economy, Nedayvoda et al. (2021) reveal how this situation is created as a consequence of too few specialized VC funds for deep tech and unadapted funding models.

It became clear from the interviews that public funding, regulations, and policies play a crucial role in both derisking private investments and setting up appropriate regulations to promote deep tech developments. Sudden regulatory shifts scare investors, and heavy bureaucracy can inhibit investments and growth within deep tech. Interviewees suggested easing regulations, especially on startups, and providing grants in order for these companies to commercialise, as crucial measures in order to promote deep tech startups. This theme is reinforced by Ma, Liu, and Wu (2024) when they explain how regulations can promote investments into deep tech. Dealroom.co et al. (2025), (Bradshaw 2025), and Finan (2023) further reinforce this by expressing how the biggest challenges ahead for deep tech are regulatory and policy-centered. Interviews and authors such as Dealroom.co et al. (2025), Cheung (2025) and Mazzucato (2024) agree that the government should take more responsibility in creating a favourable environment for innovations.

Investors and grant providers question the efficiency of climate goals and are curious about how regulations will adapt. Cheung (2025) means that the rise of clean tech companies is coupled with regulated policies, as their demand will be reflected in the region's incentives for adoption. Meaning, in order to manage investors' cynicism towards climate goals and their effect on the growth of the industry, the governance of the European or national climate goals has to show determination and uphold strict standards for green deep tech companies to attract funding.

As interviews indicate that climate issues move down the priority list, and European independence, especially within energy, moves up, the funding of deep tech companies becomes an even more important issue for public interest. In line with Mazzucato (2024), American policies have driven Europe to prioritize domestic goals ahead of international ones, promoting industries that accelerate independence. This stance is also emphasized by Cheung (2025) as he explains the growing market for clean energy as European independence is prioritized. More specifically, this resonates with Industrifonden's (2024) estimation that 10% of defence spending will go to deep tech. As communicated in an interview, there could be an opportunity for more defence-centered investors to go into deep tech within the energy sector, as this would strengthen Swedish independence. This is in line with Dealroom.co et al. (2025), as they explain how investments in energy and resilience are accelerating. Contrary, Braune (2020) suggests that deep tech companies go for investors who have a lot of technical expertise within the specific deep tech area, which might not be true for resilience-focused investors. An apparent insight from the interviews is that Sweden could take a lesson from the US in catalyzing greater investment initiatives, as foreign investors display greater investment initiatives, capital, network, and knowledge. At the same time, foreign investors were also regarded in a more negative light by several investors because of the fear of Europe missing out on important innovations. This is reinforced by what Bradshaw (2025) calls the European brain drain, while Dealroom.co et al. (2025) explain how, particularly American investors, have played a large role in the largest exits in European deep tech, and could therefore be a promising player in future scale-ups.

7. Discussion

This section is divided into: contribution and then recommendations for a fusion company. The chapter aims to give the research a broader context by explaining its contribution, implications, limitations, and future recommendations.

7.1 Contribution

This thesis has explored the critical success factors for raising capital in the Swedish green hardware deep tech sector, with a specific focus on fusion power. The findings highlight the complex and nuanced relationship between the public- and private sectors in financing green hardware deep tech, and potentially fusion power. The implications of the results from this thesis stretch beyond the funding needs of a single fusion company; they address the conditions necessary for green innovation to thrive in Europe and Sweden. These conditions are crucial for Sweden to promote innovation within its borders and to protect European and Swedish research, innovation, and sovereignty. Moreover, the case for current Swedish fusion power reflects a larger picture of national and global trends within green investments, national security, and private- and public capital interaction. If sector cooperation fails between finance, innovation policy, and regulation, the sector of green hardware deep tech will fail in allocating the right amount of capital that is motivated in order to prepare for a green transition. These results therefore signify the urgency in designing instruments that aid the financing of innovation that support long-term societal value.

The findings revealed that funding decisions, both from public and private actors, are influenced by a range of factors such as the height of innovation, the appropriate time horizon, potential for great market share, and a motivated team. These key aspects were generally supported by theory, as technological potential could benefit national sovereignty while economic gain is prioritized in tougher financial climates. Investors' primary purpose is gaining a return on their investment, which could turn both in favour and against the funding of deep tech. This is because their risk profile differs from regular tech in regards to potentially higher returns, but also longer development timelines and higher CapEx. Europe and Sweden have set ambitious climate goals, which investors are not convinced will be met. While these climate goals can be seen as beneficial for a green, prosperous future, profitability is also a key component to sustainability. Looking at cases such as Northvolt and several comments from the interviews, companies can not survive on green externalities alone but must prioritize profitability for long-term growth. The conclusion can be made that there is no sustainability in an operation if it does not create value for its stakeholders, giving grounds for greenwashing and justification to investors prioritizing economic return.

At the same time, challenges arise when investors solely look at return on investment and focus on short-term growth. This highlights the limitations of conventional investment strategies, as declining growth can be a consequence of national and geopolitical circumstances rather than a bad investment. Realizing the full potential of deep tech investments calls for a private sector that is aligned with "the mission" and values long-term impact and profit. As investors interested in deep tech are more prone to taking risks, they are also more prone to look for technologies that fit within broader geopolitical, climate, and energy security contexts. Thus, fusion power is positioned not just as a technological breakthrough but as a strategic solution that can be leveraged globally, capable of reducing fossil fuel dependence, enhancing energy sovereignty, and contributing to climate goals.

One of the most notable results was the interdependence between public and private capital; public- grants and investments often de-risk early-stage deep tech, which makes them more attractive to private investors. This also makes it even more critical for public actors to have their own evaluation and analysis systems and not solely rely on the private actors' judgment, as this could lead to misleading capital. Meanwhile, private capital signals market validation for public organisations, which makes them more inclined to fund. The results also demonstrate that investments into fusion power can be de-risked by policy frameworks and regulations in order for investors to invest in deep tech. For Sweden to take the lead in the development of new green energy sources, such as fusion power, the public sector must take action in regulatory and policy reform, public funding, and expanding innovation ecosystems. As other green energy sources have had either funding or regulatory involvement in their industrialisation, so calls for the industrialisation of fusion power. The findings suggest that the interaction between public- and private capital is essential. Without this cooperation, many promising Swedish innovations could be lost in the so-called "valley of death". This is why the interplay between private and public capital needs to meet the complexity of the funding of sustainable technological innovations. Even with consensus on the need for collaboration, several roadblocks stand in the way, such as short-term political cycles, differences in motivation, and underdeveloped ecosystems for deep tech. This could limit coordination between public- and private actors and calls for productive mechanisms to unite the sectors under one mission.

The future of the funding landscape of green hardware deep tech, and fusion in particular, is difficult to predict; the funding landscape stands in front of several opportunities as well as challenges. The most prominent challenges lie in late-stage funding, the adaptation of public regulations and policies, and capital shortage in the Swedish funding sector. An important takeaway also lies in the effect of shifting political majorities on long-term projects such as fusion, as these projects demand stability from the public sector. This calls for a cross-party consensus on longer deep tech projects that show promising national benefits. Opportunities that the landscape faces are also many: increased funding for deep tech within resilience, technological development, and opportunities for foreign investor contributions. The funding bottlenecks for fusion and other deep technologies can be resolved through many different means, and given Europe's rising independence and defence, there is an incentive for European countries to work together to close the funding gap. While more technology-specialized investors are emerging, their rise and investment capital needs to grow at the same rate as deep technologies scale. In a broader context, it can be concluded that successful funding for technologies such as fusion could lead to a successful green transition for both Sweden and Europe. This escalation of innovation could contribute to industrial competitiveness and a strengthened energy independence. Moreover, if implemented at scale, fusion could be the catalyst of a global energy transformation that addresses global energy poverty and climate change.

7.1.1 Limitations

While this paper offers several valuable insights into the funding of green hardware deep tech companies, several limitations must also be acknowledged. One limitation lies in the number of interviews that were conducted. Even though the number of interviews was relevant and motivated for this paper in particular, it also limits generalizability. The study is also geographically limited to Sweden, which may limit the relevance of the results to be applied to the context of other countries. Additionally, the research was focused on the perspective of the investors and funders, leaving out opinions and priorities from other stakeholders, such as end-users and technical experts. There is a possibility that these perspectives could further enhance the understanding of the deep tech funding landscape. Moreover, fusion power and other emerging technologies remain exploratory. Despite recent advances, fusion is still not at a commercial stage, which means that projections about the technology at an industrial scale remain speculative. This limits the reliability of these projections about its industrialisation and future investment needs.

7.1.2 Further research

Given the complexity and uncertainty associated with green hardware deep tech funding, further research is critical to accurately predict and understand the elements that shape its funding landscape. Further quantitative studies could also test the relationship between the public- and private sectors for funding that was suggested in this research, thereby strengthening its analysis. Examples of additional research that could shed further light on the subject are:

a. Quantitative research on how public- and private funding develop in parallel to each other for the commercialization of green hardware deep tech companies in Sweden.
b. Studies on the perspective of regulation and policy makers in funding green hardware deep tech in order to understand additional investment barriers and accelerators.
c. Assessment of foreign practices that have significantly accelerated or slowed down the funding for deep tech companies, in order to identify models that can be replicated in Sweden.
d. Analysis of how long-term funding for deep tech affects society as a whole and its end user.
e. Investigation of new instruments other than capital that address the late-stage funding gap and can accelerate the development of deep technologies.

7.2 Recommendations for a fusion company

For a fusion company to succeed on the Swedish deep tech market and prepare for industrialisation, several metrics need to be considered. It is important to possess the key qualities that investors and grant providers look for when considering funding, but it is also key to be able to successfully convey your message to the investors as well as to find the right investors and attract both public- and private funding.

When talking to potential investors or grant providers, the ability to clearly present the company is crucial. This is particularly important when talking to investors who do not have a specialist background in your specific field. In order to inform these stakeholders of the height of innovation, proof of technology, and climate return, there needs to be a third-party validation or a full explanation of the technology at hand and its potential. It is also important to emphasize fusion's role in Swedish and European energy independence during the current geopolitical climate, as this could be a factor that increases interest. On top of the validation of technology, validation of sustainability and climate return could positively affect the chances of attracting investment. Demonstration of market proximity is also valuable, as this goes hand in hand with a clear and detailed plan for technology development, market share, and return on investment.

Aside from the hard values, soft values are also considered by investors and grant providers. To be a motivated team with diverse backgrounds and expertise can de-risk investments. This means that the fusion company has to look inward and attract the right talent that displays motivation, cooperation, expertise, and charisma. To succeed when scaling up the business, an open culture is encouraged as it welcomes people to question authorities and prevent errors. From this report, it is also clear that a focus on the core business and its technology is more important than perfecting the market strategy for deep tech companies. The technological development should not be rushed, as it is the number one competitive advantage deep tech companies overall possess.

While having the right qualities to attract funding, finding the right type of funding is equally important. This means that a fusion company wants to find the right type of investor, and a mix of both private-, public- and foreign funding. This mix lowers the risk for future investors and optimizes the network for further expansion. Not all types of funding are beneficial, as some private investors who do not have expertise in the technology tend to want to exit sooner, and public funds with a low required return on investment can send the wrong signals to other investors. Public grants also risk tying the hands of the deep tech company, as they come with terms. This could lead to the company becoming less agile and having a slower acceleration to market. It is important to find the right investor with the technical expertise, appropriate time horizon and capital, and ethical focus, as these are ready for a longer investment and are more inclined to see potential in green hardware deep tech. Moreover, industrial collaborations and corporate partners can aid in preparing for industrialisation, as they can provide knowledge, network, and capital for the next step. Alternative funding possibilities are defense funds and other stakeholders that prioritize European and Swedish independence. This is as geopolitical tension rises globally. There could also be an opportunity in looking for investors within an industry that has high energy usage, is industry-heavy, and moving toward a more environmentally friendly direction.

Moreover, international investors have the potential to offer broader funding ecosystems and larger amounts of capital.

8. Conclusions

This study set out to identify the current and future critical success factors for attracting investment into green hardware deep tech and its application to Swedish fusion power, particularly focusing on the perspectives of private- and public actors within the funding landscape. Swedish deep tech funding is lacking as a result of an anxious market and geopolitical uncertainty, which strengthens the relevance of exploring the success factors for the current and future funding landscape of fusion.

The findings suggest that investment decisions in green hardware deep tech are driven by a combination of key capabilities for a deep tech company, such as: height of innovation, appropriate time horizon, potential for great market share, and a motivated team. Further, displaying a clear explanation and plan for both technology and market is crucial for motivating, especially non-tech-expert investors. The results also show that public- and private capital are strongly interdependent. The interaction between public and private funding can be summarized as complex, revealing how public initiatives can de-risk projects and pave the way for increased private sector engagement, while private sector initiatives provide market validation, providing a feedback loop in public-private sector interplay. Regulatory issues, heavy bureaucracy, capital shortage, and geopolitical uncertainty lower investment initiatives within green hardware deep tech, but there is oan pportunity for technology that is more focused on securing European sovereignty. Further technological acceleration and political support could also create a favourable investment environment. Lastly, the results also find that foreign investors could provide greater investment capital, knowledge, and ecosystems for Swedish deep tech companies, but also risk depriving Sweden of innovative technologies.

Navigating through the changing opportunities and challenges within the deep tech funding landscape is crucial for fostering the development and commercialisation of deep tech companies. This research contributes to theory on sustainable finance and innovation management while it provides a clearer understanding of private and public investment dynamics. The findings can prove helpful for investors, grant providers, policy- and regulation makers, deep tech companies, and especially a Swedish fusion company looking to grow commercialized fusion power in Sweden. While this research was focused on the perspective of the funding actors of fusion, further research into other perspectives is encouraged in order to paint a complete picture of the complex deep tech funding landscape and as technology advances and changes in incentives for investment are ongoing.

If Sweden is to successfully lead a green transition, the public- and private sectors must create a resilient investment ecosystem that is capable of supporting green hardware deep tech companies. While fusion power is in an early stage of commercialization, it holds the potential to play a leading role in Sweden's energy security, green transition, and reaching the climate goals. Ultimately, it may even solve humanity's most urgent challenge: the climate crisis.

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10. Appendix A

Appendix A: Interview Guide

Interview introduction:

Hello, my name is Sofie, and this interview will take approximately 30 to 45 minutes to complete. Thank you for taking the time to talk to me. As previously mentioned, I am writing my thesis on investment into green hardware deep tech companies in Sweden, and how the public- and private sector interaction affects their funding. More specifically, the thesis is centered around how this can be applied to fusion power, but with regards to limited knowledge and expertise within fusion power, feel free to answer the questions based on green hardware deep tech in general. I will hold about ten interviews and they will be analysed thematically, where I may use quotes from the interviews. You, as an interviewee, are anonymous, as well as the organisation you represent. If there is anything you would like to add after our talk, feel free to email me. There is no right or wrong answer, as I am only asking your opinion. Do you have any questions, or is it okay if I start recording?

Q1: What are your responsibilities?

Q2: Which criteria are crucial for you when you assess investments in green hardware deep tech energy companies?

a. Are these measurable?
b. How are soft vs. hard values valued?
c. How do you balance sustainability with return on investment?
d. What is your investment horizon? When do you plan to exit, and how do you balance this with longer investments into technologies such as fusion?
e. What is your stance on Swedish fusion companies regarding other green energy sources?
f. Do the criteria change depending on the level of risk? (Ex. existing technology, such as windpower vs new technology such as fusion power?)
g. To what degree do you compare the investment to similar investments or projects in other countries?

Q3: What challenges and opportunities do you see for investments in this sector in Sweden?

a. What is your opinion on obstacles that are regulatory, technological, or financial?
b. What are your thoughts on investments in fusion power?
c. What has been a challenge historically when investing in green hardware deep tech? Do you have any concrete examples?

Q4: How do you view the interaction between public and private capital for funding, before investing in a company?

d. When does the collaboration with public capital become relevant?
e. How do the industrial aspects of an investment get affected by public/state interference? Does it look different for fusion?
f. Has there been a shift in the relationship between public- and private relations in this matter?

Q5: Do you have anything to add?

End of Interview guide.