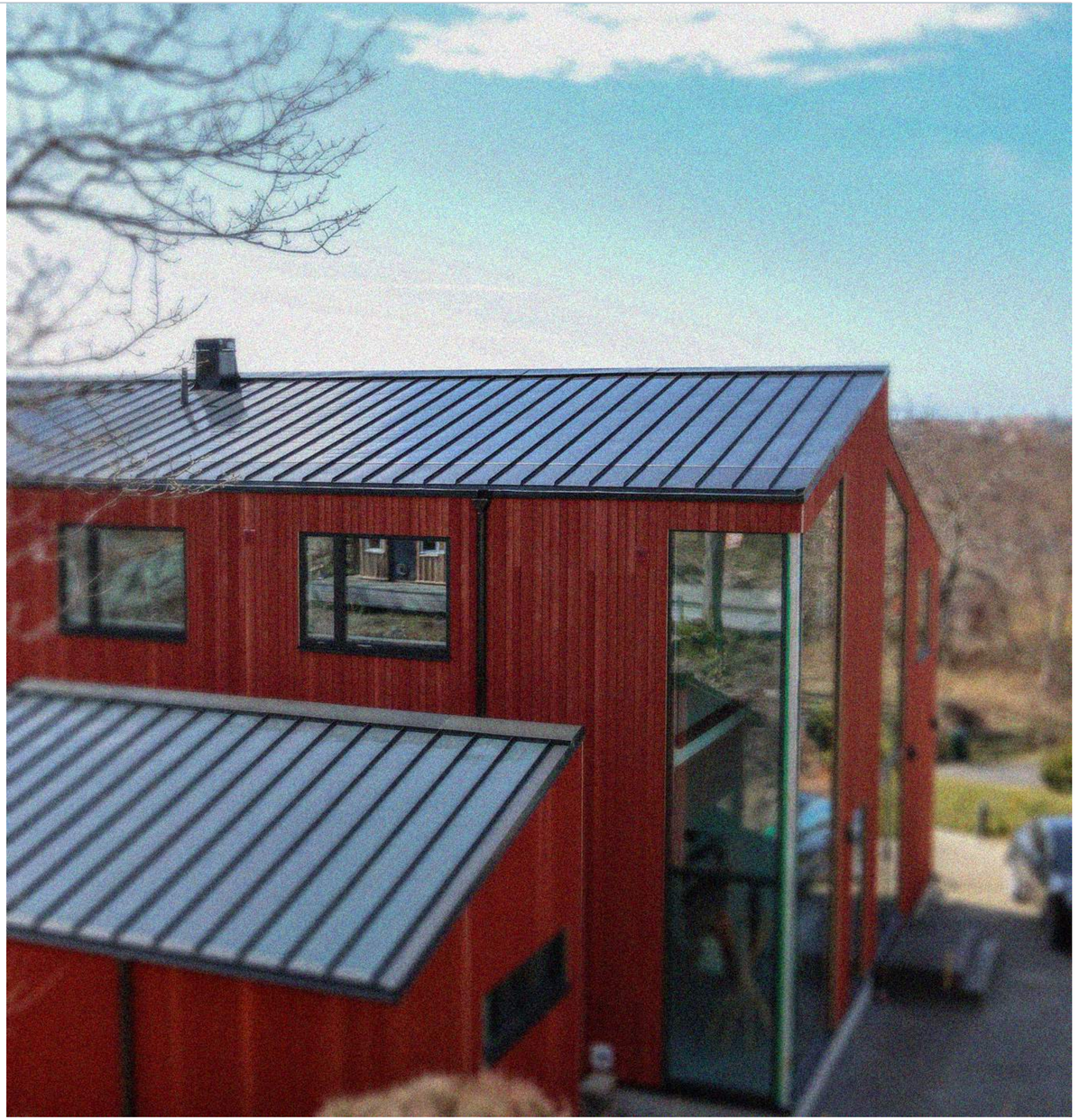
Impact Report

Sustainability at Midsummer AB, 2021

Contents

We are happy to share with you the first Impact report of Midsummer



As a manufacturer of solar cells and a major contributor to the energy transition towards renewable energy, being part of the climate solution is what we are.

We want to be a frontrunner in solar energy and improve society's well-being by providing safe, fair and healthy renewable energy resources. Enabling a transition to a climate positive future for people and organisations around the world.

Our sustainability work has been ongoing since the company was founded in 2004, and this reports marks the start of our reporting. 2022 will be about identifying what we want to measure and how.

CEO’s statement

Since the dawn of Midsummer, sustainability has been running as a common thread throughout our journey, from the embryo of converting and repurposing obsolete CD manufacturing equipment to making our first solar cells. Moving forward we designed our own all-in-one solar cell production system with the intention to optimise our use of the resources throughout our value chain. Until today we have been scaling our internal solar cell manufacturing capacity so that we can supply not only Sweden but Europe with locally produced light-weight thin film solar panels.

It needs a collective effort to reach world wide long term sustainability, and everyone is needed to contribute, including the European solar cell producers. With this impact report we want to share where Midsummer is today, and how we set our sustainability goals continuously striving towards our mission which is making photovoltaics an integrated part of our lives, as essential as a roof on a house.

Throughout the pandemic, not everyone has had the luxury of working remotely but has had to continue to commute to work daily which has been the case for our production and installation staff. I want to take this opportunity to emphasise the fantastic work all our Midsummer colleagues have done during this pandemic. From solar cell production to final installation at our customers’ sites, everyone has played an important part in making the planet a more sustainable place.

We want our customers to feel assured that the solar panels are designed and produced to be safe and long-lasting. As a company we will continue being an active player on the PV market with our commitment to the entire life cycle, regardless of the product end of life, whether it is 20, 50 or 100 years from now.

Finally, I want to say that we are humble and extremely happy to have both our investors and Midsummer’s customers with us along our journey of transitioning the European energy market, from fossil fuels to renewable energy.

Energy market in Europe

Europe is at the brink of transition from a fossil driven energy production to net zero commitment by 2050

Energy situation in Europe	Midsummer's contribution
Climate change Rising demand for alternative and clean energy sources	. PV is a climate solution and a clean energy source
Consumption Increased energy demand and usage . Increased use of electricity (vehicles, energy intense industries located in Europe)	. PV will add more energy to the system
Net zero commitment Shift from fossil fuels to clean energy . Net zero by 2050	. PV enables the shift from fossil fuels to clean energy . Midsummers products have a minimal CO_2 footprint
Geopolitics A vulnerable and unstable system . Dependency on imported fossil fuels . Dependency on imported clean energy production systems	. PV production in Europe means less dependency on energy import . Midsummer: large scale production possible within one year from financing
Infrastructure A system not adjusted to current needs . Under-dimensioned transmission grid . Long lead times to build new grid capacity . Challenges expanding wind power, hydro	Local energy production from solar roofs . No impact on grid capacity . No energy losses transporting energy . Making valuable use of adjacent roof space

1. Who we are

Who we are

Midsummer is a leading European producer and installer of flexible thin film solar panels and offers state-of-the-art manufacturing equipment for the thin film solar cell industry. With the most sustainable solar panels, we aim to transform conventional roofs and accelerate the transition to renewable energy.

Our vision is for renewable energy to be produced where it is consumed, and for the energy source to be produced close to where it will be used. We believe this vision is achievable if photovoltaic solutions are designed with simplicity, sustainability, functionality and aesthetics in mind.

For us, sustainability means considering both environmental and socioeconomic impact that our actions make. We strive to reach a future where our operations are within the planetary boundaries.

Since 2004 we have been a part of the Swedish solar cell research community, collaborating with universities and research institutes to unlock the potential of thin-film solar cells, developing our own turn-key production equipment and establishing a production site in Sweden.

“Renewable energy should be produced where it is consumed, and the energy source should be manufactured closed to where it will be used.”

Today, we are still a small player on the global arena, but what we lack in size we make up in ambition and agility, Our vision in the coming eight years is to expand and establish multiple local production sites in Europe. With this growth we hope to increase awareness about sustainable European photovoltaic solutions and form key partnerships with renowned European suppliers and push them towards refining and producing materials and components sustainably in Europe.

Our products

Midsummer produces and retails thin-film solar panels. Our approach has been to develop products that work in tandem with conventional roofs, such as standing seam metal roofs, roof tiles and membrane roofs.

This impact report focuses mainly on the manufacturing of the Midsummer's solar panels, given that the latest Life Cycle Analysis (LCA) has studied the life cycle of the solar panels and not the solar cell manufacturing equipment.

Midsummer offers equipment solutions for thin-film applications, focusing on solar cell development and mass production. Our machinery is based on sputtering, a method to apply very thin but robust layers on multiple types of surfaces. Together with the equipment, we supply a Cadmium-free, all-in-vacuum CIGS (Copper, Indium, Gallium and Selenium) solar cell manufacturing process.

Our current equipment line-up consist of:
DUO – Mass-manufacturing equipment tuned for CIGS solar cells.
UNO – Research and Development equipment for thin-film applications.

Our path to tackle climate change

In 2020 we conducted our first LCA with a third party to analyse the total climate impact of our value chain. We now have a clear understanding of our footprint and the areas where we can make the greatest impact.

In 2022 we release our first impact report, the one you are reading now. Our goal for 2022 is to continue refining the analysis of our products and our value chain, setting our ambitions, targets and plans for continuous improvement to further reduce our climate impact.

We share the ambitions and targets of the Paris Agreement, and we support it wholeheartedly. Our activities for 2022 will give us even better insights on how we as a company can improve in striving for net-zero manufacturing and going beyond becoming climate positive.

CO_2 emission ratio for our products cradle to grave, 2020

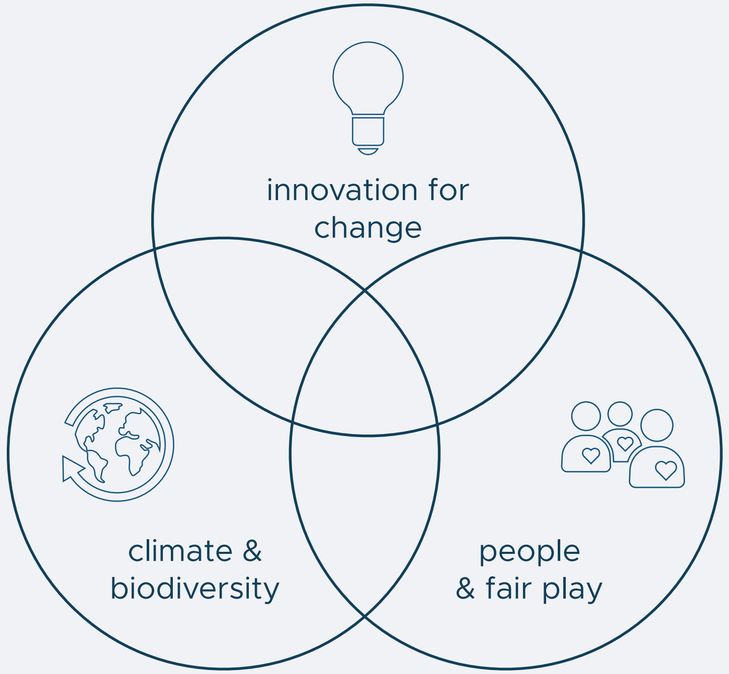
Our sustainability agenda

Among multiple global solar cell manufacturers, as a smaller Swedish actor, Midsummer plays an important role in supplying one of the market's most ecologically and socially sustainable products, both of which aspects are tightly integrated into our business strategy and operations.

We aim to accelerate the transition to renewable energy by enabling solar energy production for private and commercial actors with our product range. We believe transition to renewable energy sources contribute to health, influence, competence, impartiality and meaning-making, all of which we recognise as basic human rights. Through production and distribution of solar panels, our goal is to increase access to renewable clean energy sources and make with a significant impact on people and the planet.

We work together with our suppliers and partners to limit our climate and environmental impact as much as possible, advocating for fair play along the entire value chain. This includes identifying risks and opportunities, as well as living up to the expectations of others. We aim to inspire by leading the way with state-of-the-art technology and profitable growth, and we hope that others will follow.

To continue our journey and innovate for change, we put great value and effort in our collaborations with industry organisations, academia and other industries.



Our sustainability strategy

We want to lead the energy transition to renewable energy sources by innovating for change, while making the least impact as possible on the climate and biodiversity. On this journey, our goal is to be a role model in provision of fair jobs for all and contribution to social communities with inclusive and diverse workplaces.

Highlights from our contribution to sustainable solar cell manufacturing

96% lower energy consumption during substrate washing

Since 2017 we have moved from a high energy and water consuming cleaning process of our solar cell substrate[1] to an energy efficient cleaning system utilising cloth based wiping system.

2017

75% reduced silver consumption

During 2020 our production and product developers were able to reduce the amount of silver we use in order to collect the current from our solar cells with 75%.

89% reduced transportation emissions with new in-house operation

In 2020 we initiated new raw material assembly operations which reduced transportation weight and sizes. This allows our suppliers to pack their goods in a more effective way, fitting more goods per package volume.

6% Increased substrate size

In 2020 we increased the solar cell area by 6% through implementation of a larger radius on our solar cell substrates, without increasing the material consumption while reducing the production waste of both key materials and steel.

2020

20% reduction in key material usage

During 2021 our process and production team implemented a process which allowed us to reduce material use by 20% while sustaining the solar cell performance.

2021

1. The Midsummer solar cell substrate is the base in the solar cell and is made of a semiconductor steel grade that has been especially developed for and by Midsummer to be used for thin-film solar cell applications. To ease reading in the report, this solar cell substrate can be referred to as: "stainless steel substrate", "steel substrate" or "substrate".

2. Our operations

Can a solar cell be even more sustainable?

The most common solar cell today is made out of pure silicon, which needs to be refined from quartz sand through a process that requires pure coal and temperatures up to 2000°C to obtain the pure semiconductor.

This process emits large quantities of carbon dioxide,

not only in the chemical process between sand and coal, but also through the high demand for electricity, usually from fossil fuelled power sources. The reason is that most silicon solar cells are refined, processed and assembled in China. In addition, reports from the international press points towards questionable and possibly unethical working conditions in the Chinese silicon and solar industry.

US Department of Labor added polysilicon produced in China to the **"List of Goods Produced by Child Labor or Forced Labor".**

We have consciously placed our production sites in Europe, where we are better reassured of transparent working conditions. We promote responsible workplace conditions within the solar industry.

Midsummer owns the entire value chain, from solar cell to module assembly and installation.

By using thin-film, we have decided to take a different route for producing solar cells. This method requires 97% thinner light-converting material than conventional silicon solar cells, which enables us to **continue creating a more sustainable solar cell for the world.**

The lower material usage, and our energy efficient production process dramatically decrease the carbon footprint per installed kW. In fact, by up to 90% compared to silicon solar cells.

Our entire production is supplied with 100% renewable energy. We actively work to decrease our waste in our production line – from raw material to finished product, striving for net zero in our manufacturing.

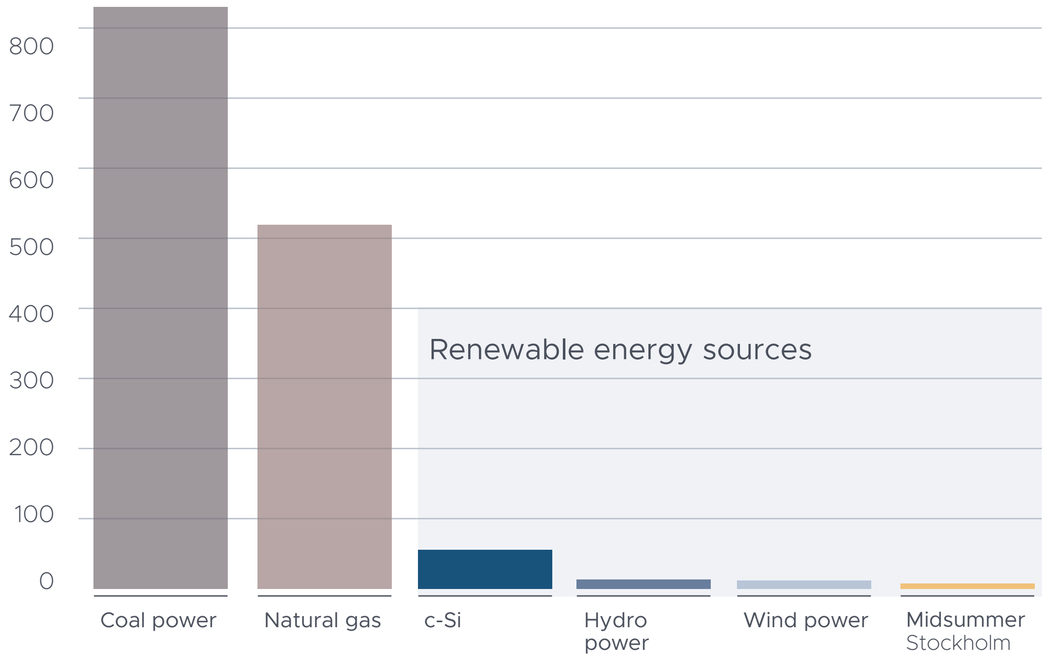
90%
lower carbon footprint

100%
renewable energy in production

Source: U.S. Department of Labor, List of Goods Produced by Child Labor or Forced Labor, 2021

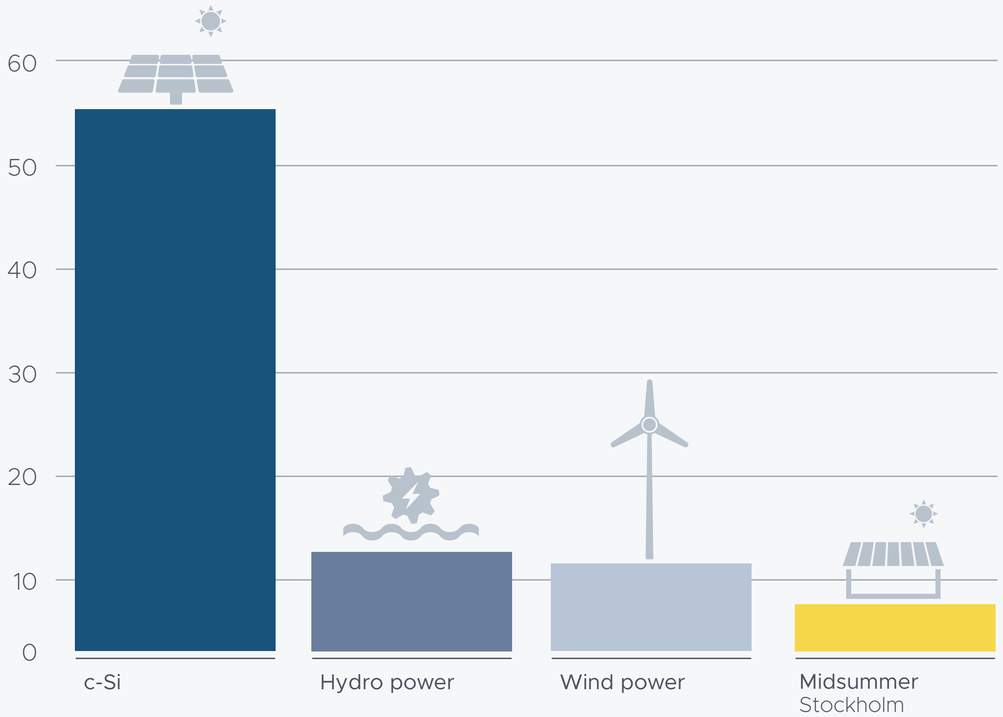
Our CO_2 emissions compared to other energy technologies

LCA CO_2e, g/kWh



Renewable energy sources

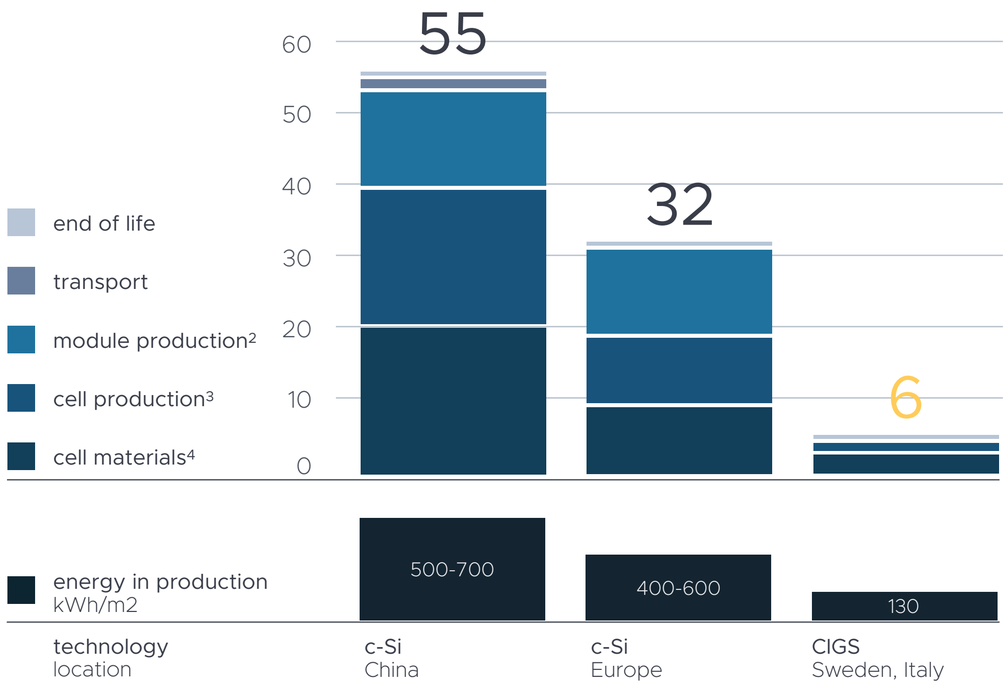
LCA CO_2e, g/kWh



Source: UNEP, Miljögiraff,IPCC Technology-specific Cost and Performance Parameters Annex III

Breakdown of CO_2 emissions within the PV industry

Emissions per PV technology **installed in Sweden**
LCA CO_2e, g/kWh[1]



minimum CO_2 emissions over a product life cycle **6** CO_2e, g/kWh

Midsummer's CO_2 emissions is 90% lower than conventional solar panels due to the efficient and resourceful use of solar cell materials that contain the key elements.

The active solar material is only 1/100 as thick as hair, which means that each gram of material is important for us since it can contribute to generating fossil free energy.

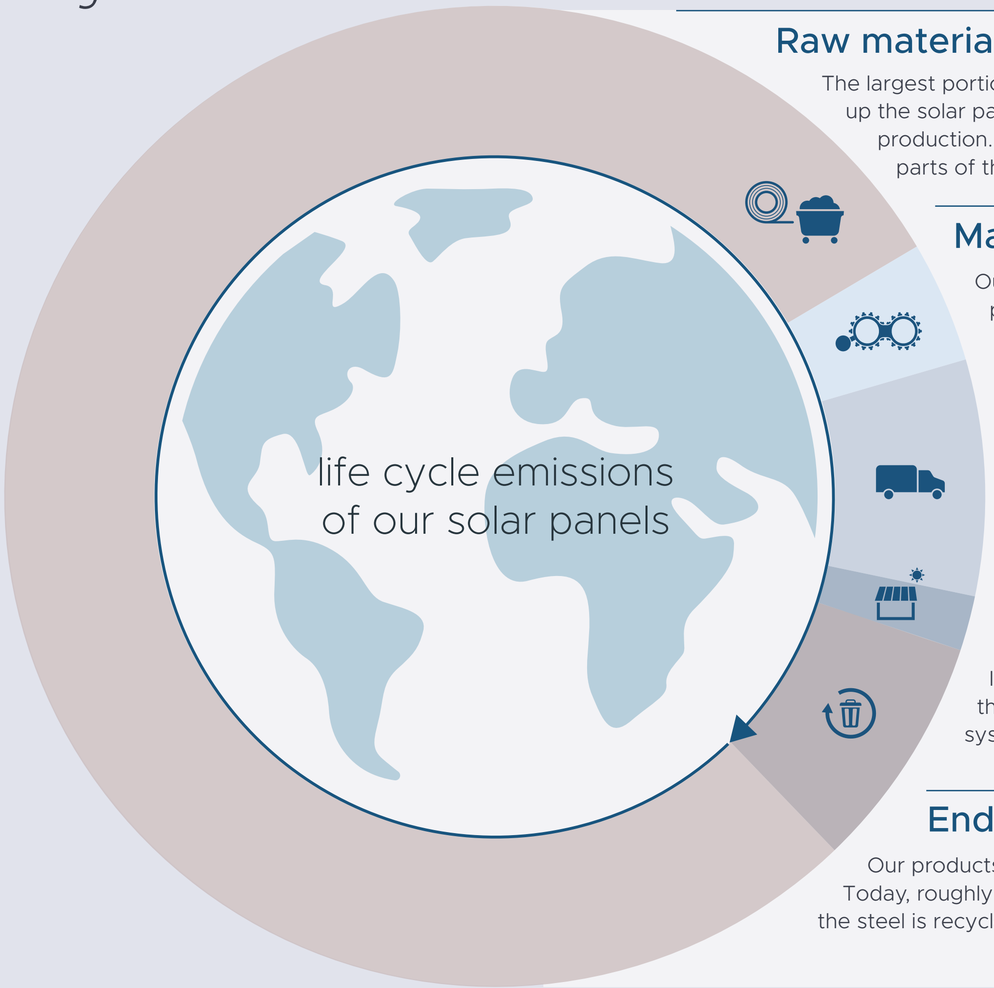
Another attribute is the use of polymer encapsulants instead of using high grade glass and aluminium frames in silicon solar panels. In conventional methods, glass formation requires natural gas to melt the material, and aluminium purification requires large amounts of energy, which increase the carbon footprint of silicon solar panels significantly.

1. PV technologies compared under average US irradiation | Source: Commissioned research; UNEP; Hemsol; Svenska kraftnät
2. Non-cell materials and manufacturing. c-Si: e.g. aluminum frame (~50% of emissions), junction box, glass and back sheet. CIGS: front sheet, filler sheet, back sheet | Source: Commissioned research; Fraunhofer institute for solar energy system
3. c-Si: CZ-crystal growth, CIGS electricity in production
4. c-Si: silicon production. CIGS: steel, gallium, indium, silver

CO_2 emissions of our solar panels throughout their life cycle

6 CO_2e, g/kWh

We regularly assess life cycle CO_2 emissions for continuous improvement in our products and our value chain.



Raw materials

The largest portion of our emissions comes from the input materials that makes up the solar panel. Materials are mined and refined before being used in our production. These processes require energy, which emits CO_2 in different parts of the world.

Manufacturing

Our production process requires electricity and cooling water to produce our thin-film solar cells. Today our production site runs on 100% renewable energy – which lowers the CO_2 emissions during manufacturing, but it cannot be eliminated.

Transportation

Our products, and the materials that go into them, are shipped around the globe. We work with global shipping companies utilising trucks, trains, boats and air freight, which are currently mainly powered by fossil fuels.

Installation and customer use

Installation of our products at customer site involves use of third party mounting hardware such as cables and fastening systems.

End of life

Our products are mainly made up of polymer sheets and stainless steel. Today, roughly 70% of plastic waste is incinerated in Sweden while 75% of the steel is recycled.

Our value chain

	Development	Procurement	Production	Transportation	Installation & use	End of life
Our footprint	Waste is produced during the iterative development process.	Our products are dependent on vital raw materials as well as other input materials and technical components for manufacturing. The main materials for the solar panels are sourced from suppliers in Europe, US, China and Japan.	We use energy and water in manufacturing and create waste from the consumables that we use. Our production materials are recycled, incinerated or deposited in landfills at different degrees.	Our manufacturing depends on transport of materials such as raw materials, metals, electrical components and packaging materials from domestic and overseas suppliers. Our deliveries also entails transport to the end customers.	Roof top installations can be hazardous work environments. Building waste is also produced on installation sites.	As for all products our solar panels have a certain life span. After reaching their end of life they can be recycled, incinerated or deposited in landfills to varying degrees.
Our influence	We develop products that are highly energy efficient and consume minimal energy and resources in production. Our solar cell production machines are used to conduct research on next generation solar cells both internally and at universities.	For volume reasons, Midsummer's opportunities to purchase locally produced raw materials are so far limited. With increased demand and volumes we have received promising response from European actors to initiate production in Europe. We carefully choose our suppliers with the ambition to build long-lasting partnerships in compliance with our ambitious social and ecological standards that are assured by our code of conduct agreements.	Minimum amount of materials are used throughout our entire production of solar cells and panels by optimising utilisation and recycling of raw materials. We continuously improve our production and product efficiency to reduce our environmental impact. The production facility is powered by 100% renewable energy and our cell production is done in a vacuum production process, eliminating the emissions of toxic materials. Our local presence also ensures good working conditions.	Through analysis of our flows we are optimising our transport strategy to reduce our climate impact. Our products are thin and lightweight which enable them to be co-shipped with other goods by truck or train. We use sustainable and reusable packaging material and sustainable means of transport when possible.	Our installation employees and contractors are supported with training and guidance materials ensuring their health and safety. Additionally, employees are informed about correct waste disposal of building materials. Our installation waste is disposed by established waste management companies. The lightweight and durable characteristics of our products require minimum amount of material for mounting and installation. Midsummer customers produce net zero electricity with minimum carbon footprint, contributing to a fossil-free future for people and the planet.	We collaborate with universities and waste management companies to ensure that our products don't end up in landfills in Sweden, but are recycled to be reused as steel and plastics. We are sponsoring Chalmers University for the development of technology and know-how on the recycling of silver and indium from waste solar cells. As part of expanding in the future, we also aim to collaborate with raw material suppliers to recycle and reuse a greater amount of our solar cells.

Our stakeholders

An open and continuous dialogue with our stakeholders provides information about requirements and expectations. What needs to be prioritised, what can be improved and how we can contribute. During 2022, Midsummer will be working on forming an extended and formal stakeholder dialogue. The input from the stakeholder dialogue is fed into the materiality analysis, ensuring that we steer in the right direction and make the best priorities on our sustainability journey.

Customers
Midsummer's products are tailored to the needs of the domestic and industrial customers, and they reflect the needs of the end customers. Currently we offer solar rooftops and solar panels to end customers alongside with delivering production equipment to manufacturers and research institutions.

Raw material suppliers
The quality and efficiency of our products are tightly connected to our raw material suppliers. At the same time, our suppliers comprise the highest proportion of CO_2 footprint across our value chain. In order to reduce our impact and ensure fair and equal work conditions across our value chain, we apply a code of conduct and other policies with our suppliers.

Employees and contractors
We are proud to have 101 employees and we work with many contractors from R&D to manufacturing and installation, while focusing on creating a fair, safe and equal work environment for all.

Ecology
Since the very beginning, we have based our decisions on leaving the lowest climate and environmental footprint we possibly can, and on making the ecology one of our core stakeholders.

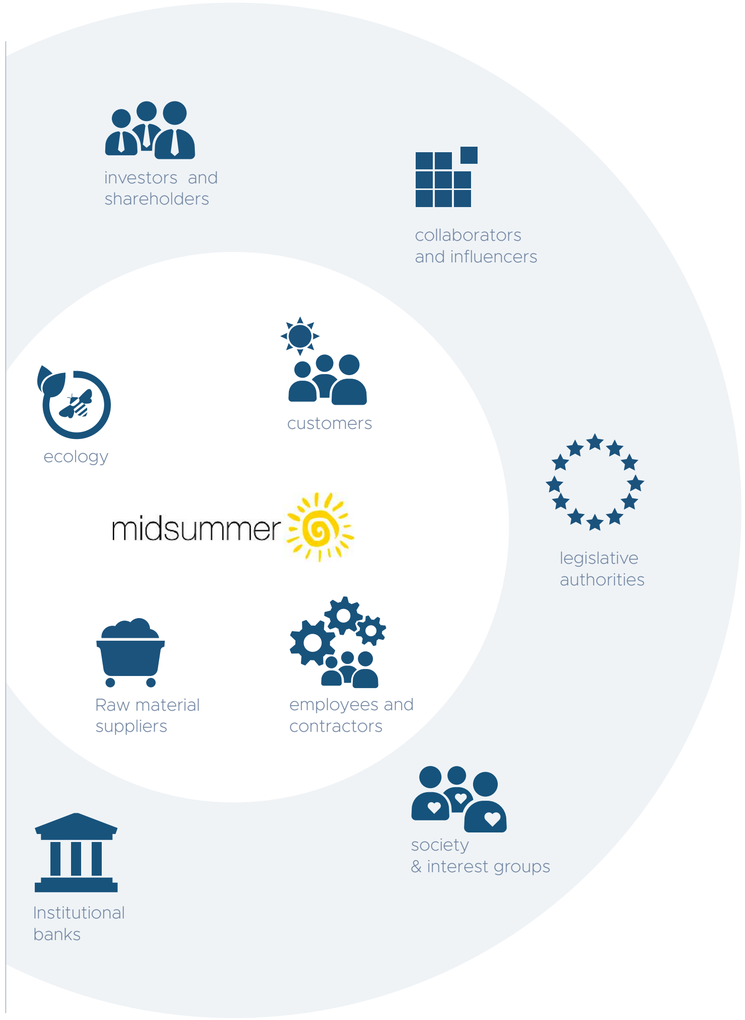
Investors
Our investors take part in the annual general meetings and contribute to Midsummer's vision and goals. They have influence on our sustainability strategy and provide continuous feedback on the progress and improvements to be made.

Collaborators and influencers
Midsummer's products are mainly influenced by the industries of energy, construction and roof. We also have ongoing research collaborations with diverse organisations exploring other application areas, as well as production methods.

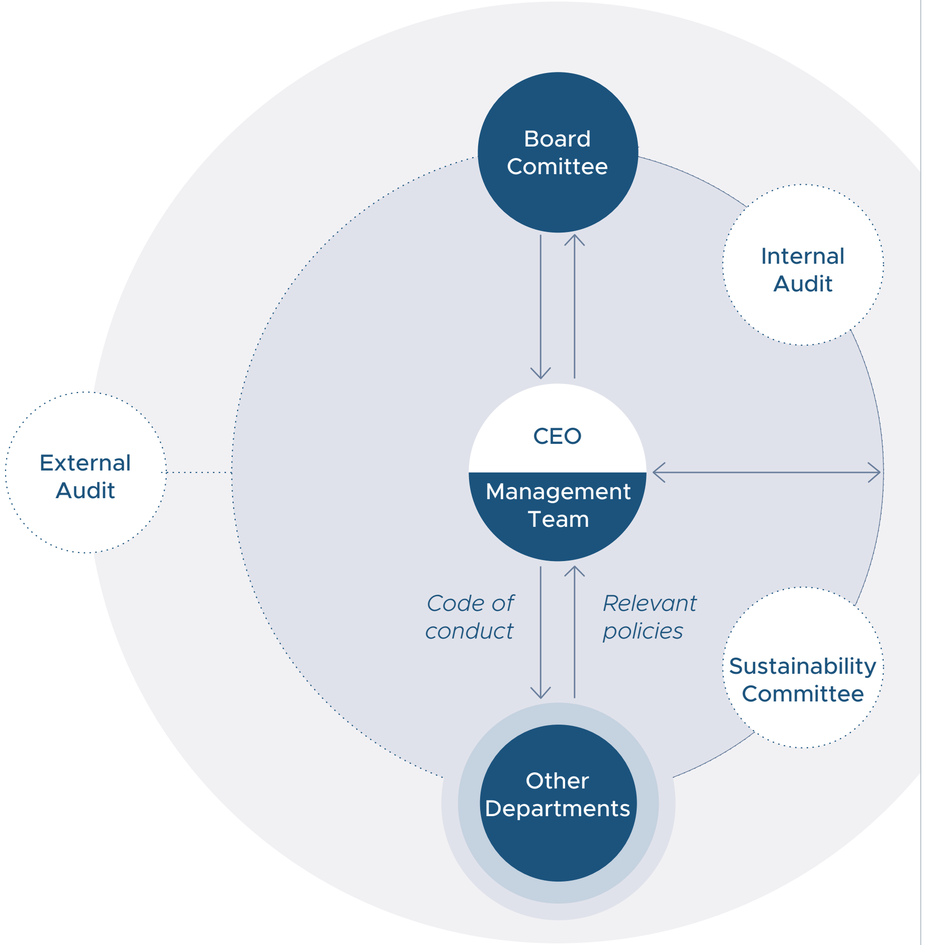
Legislative authorities
Both international and local authorities set the very conditions of the socio-economic context where we operate, and they have a strong interest in transitioning the society towards renewable energy sources. Midsummer actively engages with legislators to ensure that the right policies are set for the future.

Institutional banks
Midsummer's green bond is listed on a regulated market (Nasdaq Stockholm Sustainable Bond List) that enables development and implementation of green technology fulfilling the goals for climate action and reducing the overall environmental and social impacts.

Society and interest groups
Being a provider of one of the recognised climate solutions, we actively connect and work with interest groups and non profit organisations such as Svensk Solenergi and European Solar Manufacturing Council (ESMC).



Our way of governance



Sustainability is integrated in every part of the organisation. Our code of conduct and other policies describe how Midsummer operations are run and how our sustainability work is governed. The function-specific policies are followed-up by each unit, available on the intranet to all employees and on the website under Sustainability/ Hållbarhet.

All suppliers commit and sign off to Midsummer Code of Conduct before signing any agreements with Midsummer.

The following areas are addressed in the Midsummer Code of Conduct: Respect to human rights, Employee's health and well-being, Equality, Safe work environment and Respect to the environmental policy. Midsummer Code of Conduct and Supplier Code of Conduct were updated in 2020 and more information about its content can be found on the website on the section Sustainability/Hållbarhet.

In 2022 we implemented our new Sustainability Committee, whose main task is to ensure that set sustainability goals and targets are complied within the organisation.

By consistently working in developing our sustainability strategy and relevant policies, strategies for sustainability work are developed and relevant data are collected to be used for reporting intentions.

The Sustainability committee consists of representatives from different groups and functionalities, aiming to increase the engagement and knowledge about sustainability throughout the organisation. Meetings with the committee are held once a month, reporting on targets and goals are presented to the board committee twice a year.

Furthermore, the sustainability committee is responsible for the communication of Midsummer sustainability work in terms of our website but also our impact report.

We have chosen to use KPMG as our appointed external auditor. More about internal and external audits in the Annual report.

Our key policies for a sustainable business

Code of conduct
Code of ethics included in the code of conduct
CSR policy
Discrimination policy
Diversion and inclusion policy
Environmental policy
Supplier code of conduct
Whistleblower policy
Working environment policy
Work safety policy

3. Moving forward

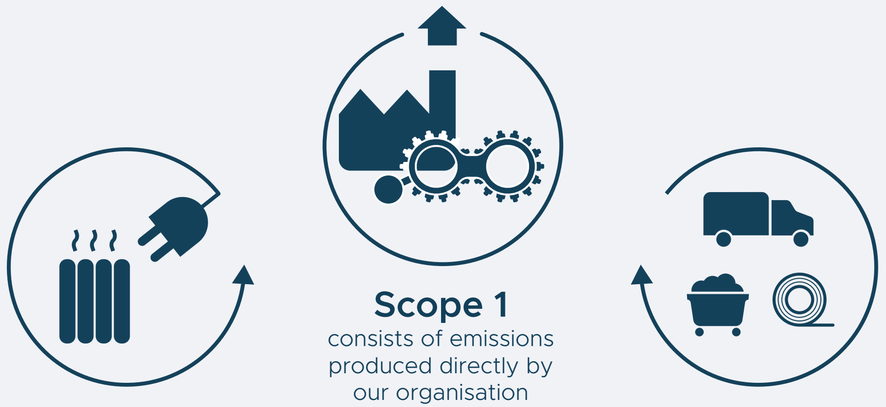
Putting words into action

Midsummer Sustainability Agenda has been formed from the stakeholder dialogues and the materiality assessment, alongside with insights on our total climate impact. These vital components enable us to be in line with the societal changes, sustainability priorities and a systematic approach to the challenge we are facing.

To structure our activities and efforts, three focus areas have been identified: Climate & Biodiversity, People & Fair play and Innovation for Change.

When calculating and analysing the total climate impact of our solar panels, we included both Scope 1, 2 and 3 in the Life Cycle Analysis (LCA). Midsummer doesn't hold control over the production within scope 3, which accounts for the vast majority of the Midsummer total climate emissions.

The EU taxonomy is a classification system that enables the categorisation of economic activities / sectors that play key role in mitigation of the climate change and adaptation, making the climate targets in EU implementable in practice. Midsummer is not currently subject to the taxonomy since the company is not fulfilling any of the current requirements; revenues, CapEx and OpEx. However, our sustainability ambition is such that we see the framework as a great enabler for us to communicate our activities with our stakeholders.



Thanks to the work linked to this report we have gained a confirmation on the relevance of the efforts we have done in the past. Our decisions on focusing on zero waste, material recycling, transportation, water usage, and raw materials have been proven to be precisely the areas where we have the largest impact.

We will continue on our ambitious journey towards a more sustainable future, providing cleaner renewable energy and improved quality of life for all.

Identifying our focus areas

In our yearly stakeholder dialogues, we gain valuable insights that feed into the assessment or our materiality subjects.

Our stakeholder dialogues are managed by the Sustainability Committee focusing on different sustainability topics, the same as the dialogues conducted with the board members to gain a deeper understanding of the specific topics that have the largest impact.

The GRI standards provide us with a structure for materiality topics. The identified topics play a central role in our sustainability work and together with our three focus areas, they structure the content of this impact report.

Our materiality analysis is based upon two parameters; one being the impact that Midsummer has on environmental, social, and economical aspects, while the other being the influence that Midsummer has on its stakeholders' decisions and actions.

The focus of the survey last year was to gain a deeper understanding on the specific sustainability topics that should be prioritised according to our internal organisation. We will conduct a similar survey next year with a wider range of stakeholders, including our suppliers and customers to better identify our materiality subjects.

Materiality Topics

Climate & biodiversity

a. Improved air quality
k. Improved waste management
m. Reduced use of resources
o. Reduced impact on climate

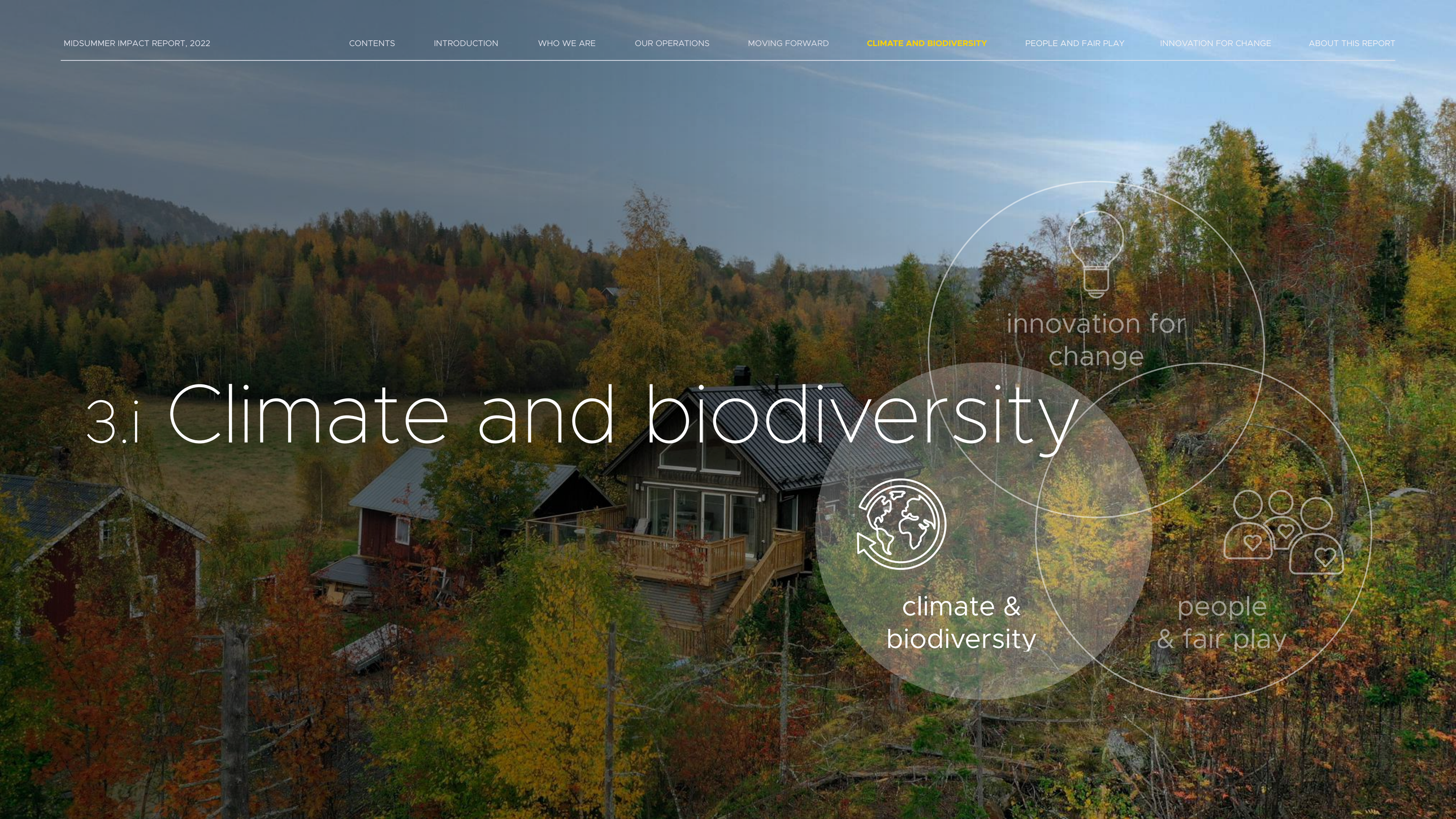
People & fair play

c. Increased diversity
d. Anti-corruption
e. Improved work environment
h. Increased health and well-being
i. Increased equality
j. Economic growth
l. Human rights

Innovation for change

b. Increased green bonds
f. Local collaborations
g. Global collaborations
n. Sustainable innovations

3.i Climate and biodiversity



Manufacturing considering climate & biodiversity

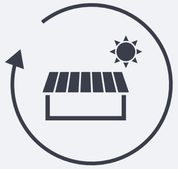
As mentioned earlier in the introduction of this chapter, our actions cover a variety of areas: zero waste, material recycling, transportation, water usage, and raw materials.

Within the focus of Climate & Biodiversity, we identified five general parameters which we believe all improvements should somewhat include and be followed up against.

Minimum use of raw materials

Lower production emissions through lower energy use per m^2 panel produced

Lower transport emissions enabled by optimised production methods and lightweight panels



Extended product life-cycle

Lower impact on the ecological system and optimised use of water

It all starts with a flexible solar cell substrate

1.The base

Our journey starts with a very thin stainless steel substrate. The substrates are laser marked with an individual QR code and then cleaned through the acetone auto wiper process.

Using steel as a base for our solar cells allows us to produce robust lightweight flexible solar panels, instead of having to use CO_2-demanding materials such as glass and aluminum to protect our solar cells.

2. Solar materials

We use a unique blend of raw materials such as copper, indium, gallium, and selenium. These materials are used to create the entire thin-film stack which is the key to making a functional solar cell.

The raw materials come from both mined ore and recycled products, and our suppliers refine these materials with various techniques.

The product that we receive is called sputtering targets, which can be seen as the ink cartridge for our solar cell “printer”.

3. Solar cell production

The clean substrates are fed into Midsummer’s in-house developed production system, known as the DUO.

At this stage, the raw materials are sputtered (applied in multiple thin layers) onto the steel in a certain sequence. The steel transforms from a single piece of steel, to a fully functional solar cell, capable of converting solar rays to electricity.

A thin grid of silver is applied to the top of the solar cell to collect the electricity.

4. Module assembly, testing, and certification

Multiple solar cells are connected and placed in between polymer sheets. The sheets and placement are tailored for each different type of product that we manufacture, such as Bold, Slim, and Wave.

The sheets and cells are then laminated together using a vacuum lamination process.

Before being shipped out to our customers, each solar panel undergoes multiple tests to get power rated and safety certified according to multiple international standards for photovoltaic products.

5. Product life cycle testing

We conduct regular quality checks to test the panel resistance to accelerated aging in standardised climate chamber tests.

Our extensive test methods make us confident to offer a 25-year efficiency warranty.

6. Optimised transportation

Our thin and lightweight solar panels consume less space and weight during transportation to the installation site than the conventional panels, enabling more solar panels on the same truck or train or even allowing co-shipping with other goods.

7. Installation & customer use

At the installation site our installers unpack and install the solar panels according to the technical drawings and local building standards.

The low weight of the panels eliminates heavy lifting, reducing the strain on our employees, both installers and production personnel.

Finally installed, our customers can sit back and enjoy clean and self-sustaining energy with a record low 6 grams CO_2e per produced kWh for many years ahead.

8. Recycling

As for any product, solar panels degrade over time. Therefore, we are taking responsibility to ensure that our products can be recycled in a proper way.

The benefit of using steel as a base becomes very apparent at this stage, as each solar cell can be recycled just like any other type of steel product.

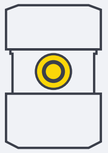
The polymer sheets can be used to decrease the energy needed to melt the steel and the thin-film materials can end up in the conventional slug product from steel manufacturing.

Removed toxics for a better environment

At Midsummer we value the well-being of our employees and the planet. Ever since we were founded in 2004, our focus has been the production of thin-film solar cells with great responsibilities for the people and the planet.

We made an active decision to exclude toxic cadmium sulfide, which is used to dope solar cells, in order to provide a safe work environment for our staff.

We also acknowledge that we do not know the long-term effects of the materials that we currently use and are known as safe today.



All vacuum production process

Conventional thin-film solar cell production includes wet processes, such as chemical baths or chemical sprays, in order to keep the costs down. However, it comes with a great risk of emissions of substances that inflict harm to the people working in production and the environment.

Our entire solar cell process is designed to take place inside a contained vacuum chamber, keeping the materials intact, and protecting our staff from chemical exposure during the production process.

Cadmium-free solar cell

One of the most common thin-film solar cell materials is cadmium, a highly toxic metal, used as the main material together with tellurium [Te], it forms cadmium telluride [CdTe]. Additionally, CIGS solar cells can contain cadmium in the form of cadmium sulfide [CdS], then serve as a performance booster.

We have excluded cadmium sulfide [CdS] in our production due to its high toxicity, which means that our solar cells are absolutely cadmium free.

Implemented improvements for raw materials and production emissions

Solar cell substrate

We transitioned the substrates for our solar cells from glass, which is fragile and fossil fuel consumption, to stainless steel which is thin and robust. This transition was carried out in 2008 and allowed us to use alternative encapsulation materials, rather than energy-inefficient glass and aluminum.

Optimised cell production process

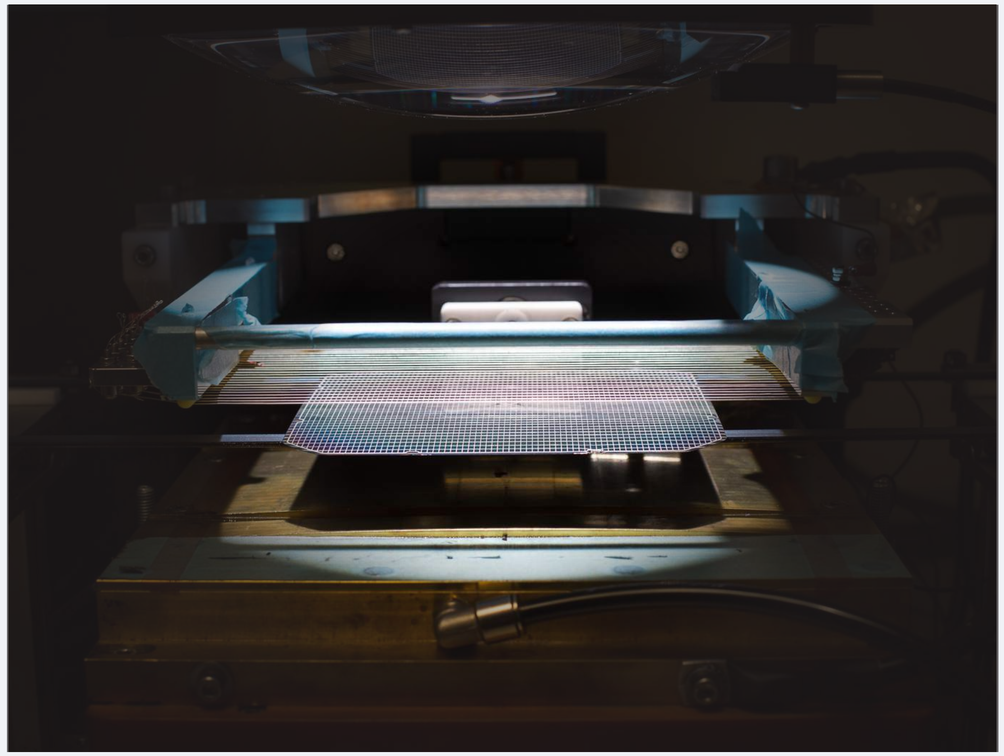
Through modifications to our processes, we have pushed the boundaries of productivity in our solar cell manufacturing process. As a result, we improved the energy output of our DUO production tools by 20%, while reducing the key material use by 20% per solar cell.

Optimised cell size with increased radius

The surface area of our solar cells is increased by 6% by changing the substrate radius from 90 to 100, resulting in further efficient use of raw material and less production waste.

In-house bonding

In 2020 we implemented a raw material assembly process, which was previously outsourced to multiple suppliers. By conducting this operation in-house, we avoid unnecessary shipments to and from the suppliers. We also gain better control of indium recycling, which is a key material in our solar cells.



Power mesh technology (PMT)

With PMT, we decreased the amount of silver paste used per cell in the screen-printing process which accounts for the current collecting pattern on the top of the cells. Application of PMT resulted in a reduction of silver usage by 75%, and an increase in cell efficiency by 10%.

Changed substrate cleaning method

A hot water cleaning process was replaced by an automatic wiping process in 2017. The wiping process consumes 96% less energy and eliminates the use of washing water in production.

Future improvements in our emissions

Thinner filler sheet

We aim to use a thinner filler sheet in the modules, and target 25% reduced material consumption of affected polymers until 2025.

Thinner steel substrate

We are aiming to use 33% less steel to produce even thinner steel substrate in 2030, which will further reduce our emissions from steel production and transport.

Improved solar cell efficiency

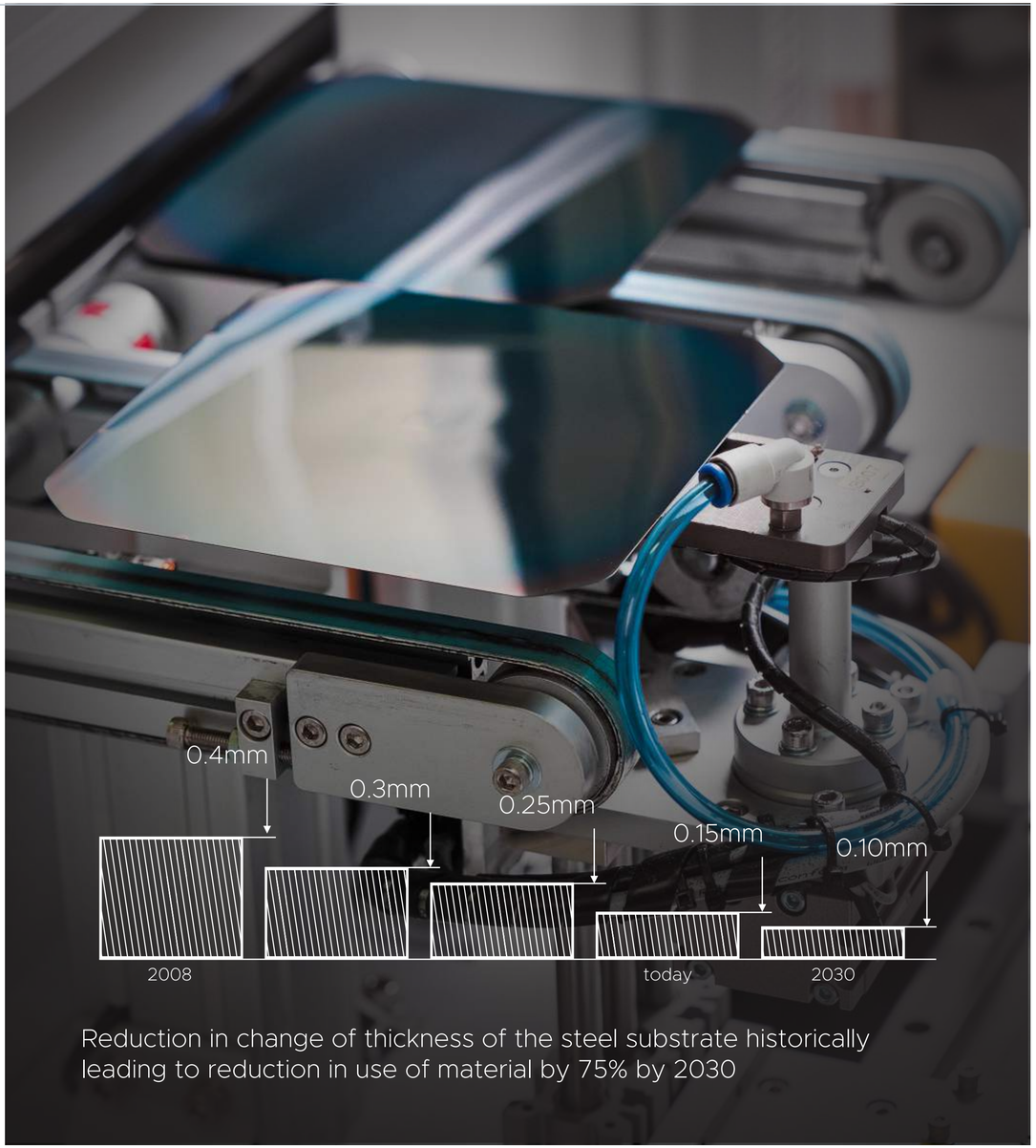
We continuously improve the efficiency of our panels. Our target is 25% increased cell efficiency by 2030, which will result in a significant decrease in product life cycle emissions.

Shorter lamination time

We are working on shortening the lamination time by 20% per cell by 2025, which will reduce the energy consumption of production of each cell

Resized screen-printer

We aim to introduce a new screen-printer which will handle up to 4 times more substrate per time unit in the oven, by 2023. This will result in lower energy consumption per cell in production.



Reduction in change of thickness of the steel substrate historically leading to reduction in use of material by 75% by 2030

3.ii People & fair play

Our employees

We are part of a rapidly expanding industry, which places high demands on attracting and retaining employees with the right skills. Being as passionate as we are about supplying renewable, clean energy to our customers, we believe in having a strong corporate culture. Clear communication and coaching leadership, alongside striving for engaged employees and fruitful co-operations are all vital parts of achieving this.

To evolve as a company and continue producing high technological solar cells we need different skills and experiences and in that our employees are a critical success factor. The diversity shown in our numerous nationalities and spoken languages is a sign of how Midsummer wants to act as an employer. Midsummer is a workplace where all employees are welcome independently of their background. The same ambition is found in gender equality and the areas of health, safety, and inclusiveness.

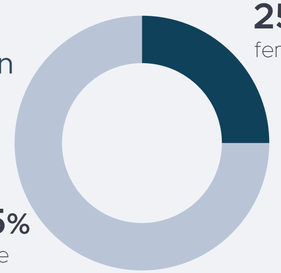
Working proactively to prevent accidents, ensuring good working balance, offering physiotherapy services, and facilitating the opportunity to exercise during working hours are all examples of how Midsummer actively works for the employee's well-being and safety.

101
employees

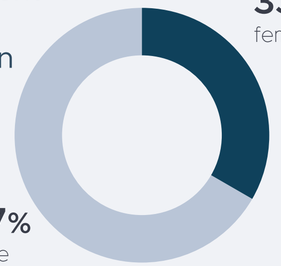
23
nationalities

19
languages

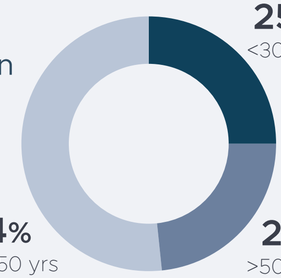
employee gender distribution



management gender distribution



employee age distribution



Note: figures from December 2021

Health & safety

Already in 2004, when Midsummer was founded, decisions were taken to exclude toxic material from production. One such material is cadmium, commonly used in the solar energy industry. Despite, or perhaps precisely thanks to, this clear framework, Midsummer solar cells have developed significantly with noticeablly increased efficiency.

This approach has followed Midsummer until today, making production and employee safety a top priority alongside with minimal climate impact. The removal of a chemical bath is another example that has a significant impact on the employee's working environment.

In 2022 we have planned for a review of processes within Environment, Health and Safety in order to even further develop our work within the field.

Social impact and human rights

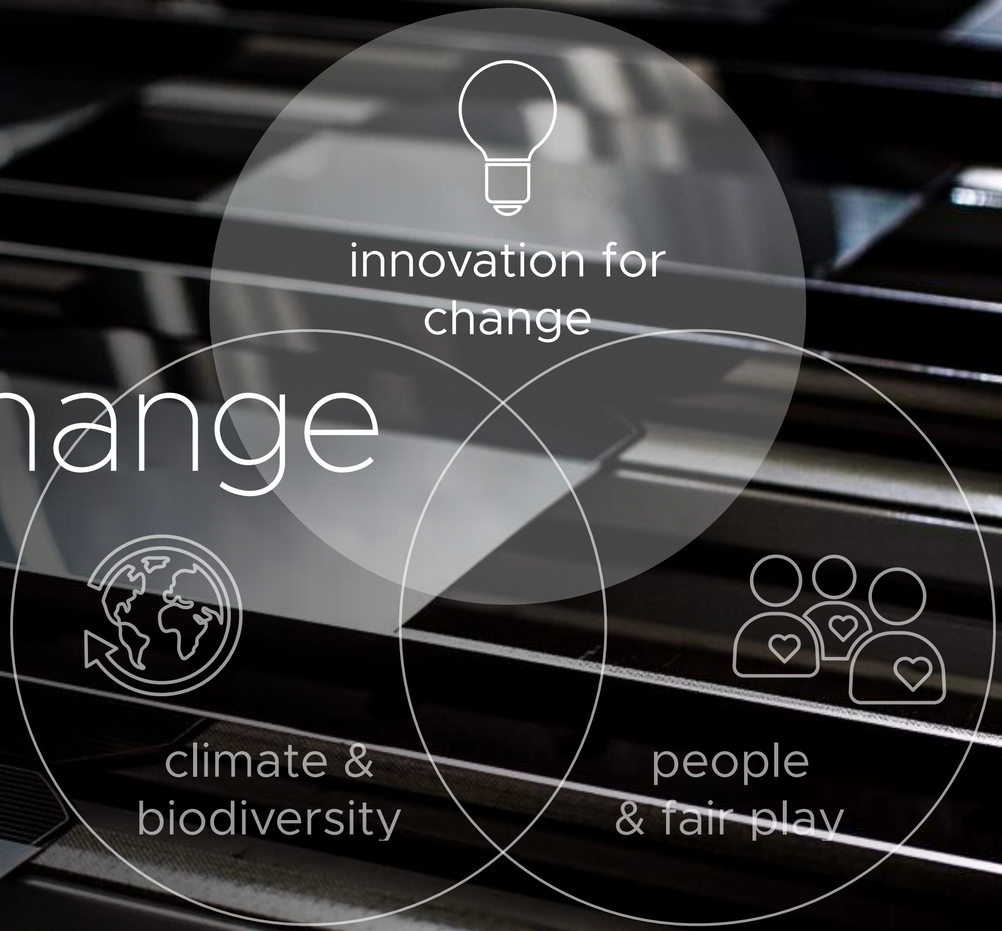
By actively and constantly working on improvements in our value chain and having close partnerships with our suppliers, we ensure that human rights are not violated. As for the emissions, the challenge in this area is tied to the supplier and raw material stage. In ensuring that we make the least climate footprint possible, we work intensively in evaluating new suppliers. Advanced technology expertise, level of collaborativeness and ease of communication are all preferred qualities. All our suppliers are required to sign a code of conduct before reaching an agreement.

The selection of suppliers also includes wise geographical distribution, geopolitical aspects, and value chain sensibility to consider.

We are a transparent company and we run a fair and good business throughout our value chain, distancing ourselves from all forms of corruption, bribery, and unauthorised collaborations. International & national regulations constitute the guidelines of our work, and we apply The code of conduct and the supplier code of conduct in our operations.

In 2022 we will extend our stakeholder dialogue to include suppliers and customers, with the ambition of increasing our knowledge and insight on sustainability challenges throughout the value chain.

3.iii Innovation for change



Striving towards net-zero manufacturing

In the coming years Midsummer will establish large-scale production facilities for European production of solar panels. From years of development of our facility in Järfälla, Sweden, we can now implement new and wanted improvements directly from the start. The focus will be on resource optimisation, all aiming for net-zero manufacturing, including waste.

The capacity of the factory in Italy will be 50 MW per year, and when it is up and running, it will make Midsummer the largest producer of thin-film solar cells in Europe. This gives us the muscles to contribute to Europe's net-zero commitment.

Implemented improvements

Large batches in production

We always plan for the production of large batches in local production facilities in order to lower the footprint on transportation.

Optimised cycle time on laminator

We have optimised the cycle time to apply less heat per module and reduce the cycle time by 10%.

Waste handling from production

Today we oversee and ensure that the waste we produce is either reused internally or recycled externally. Our existing waste handling process is integrated to recycle stainless steel constitutes 99% of the material in our solar cells.

Auto wiper

The existing auto wiper process for substrate cleaning is used, in order to save energy and remove water consumption.

Future improvements

Optimised production for zero waste

Our production in future facilities is designed to handle larger panels. The impact of increased panel size is a reduction in energy consumption, critical components, and raw materials per cell produced.

Optimised utilisation

Production is designed to optimise usage of production equipment together with sizes of our solar panels to enable higher utilisation of all production equipment.

Improved packaging

The existing packaging strategy of moving away from wood packaging to cardboard packaging, and from standard EU pall to INCA pall (recycled compressed wood).

Innovating for change

As much as the energy issue is of great scale, we have more than ever realised in 2022 that the future energy solutions need to be equally integrated into society networks as much as being autonomous and locally produced. Solar energy is a perfect example of an energy solution that meets both requirements. The flexible property in our solar cells is another driving parameter that is opening up for many new promising applications.

Ever since the start, we have strongly believed that the key success factor to accelerate the transition to renewable energy is collaboration. These collaborations have enabled us to find new areas of implementation, acquire pioneering material knowledge, further increase our efficiency and decrease our material use and waste. We are devoted to making PV the norm on any suitable surface. One significant part of this is to share our knowledge, within the industry and publicly, through different lectures, events, and networks.

In partnering up with a variety of institutions and organisations, we can gain insight and create synergy effects that never would have been possible to achieve if it was not for the partnerships.

As they say, partnership is the new leadership.

Application project

Solar panels on trucks - reducing the impact

We are collaborating on a development project to power commercial vehicles with solar energy. The objective of the project, partially financed by Sweden's innovation agency Vinnova, is to make land transport more sustainable by using solar panel electricity to power the truck. The energy produced by the Midsummer modules will potentially reduce the fuel consumption of a truck trailer by 5-10% every year in Sweden (and up to 20% in sunnier regions).

Our solar cells will reduce fuel usage in the transportation sector by up to 20% and show what is possible with solar energy within the transportation sector.

Partners

Scania /Vinnova / Uppsala University / Ernsts Express /MT Eksjö / Dalakraft

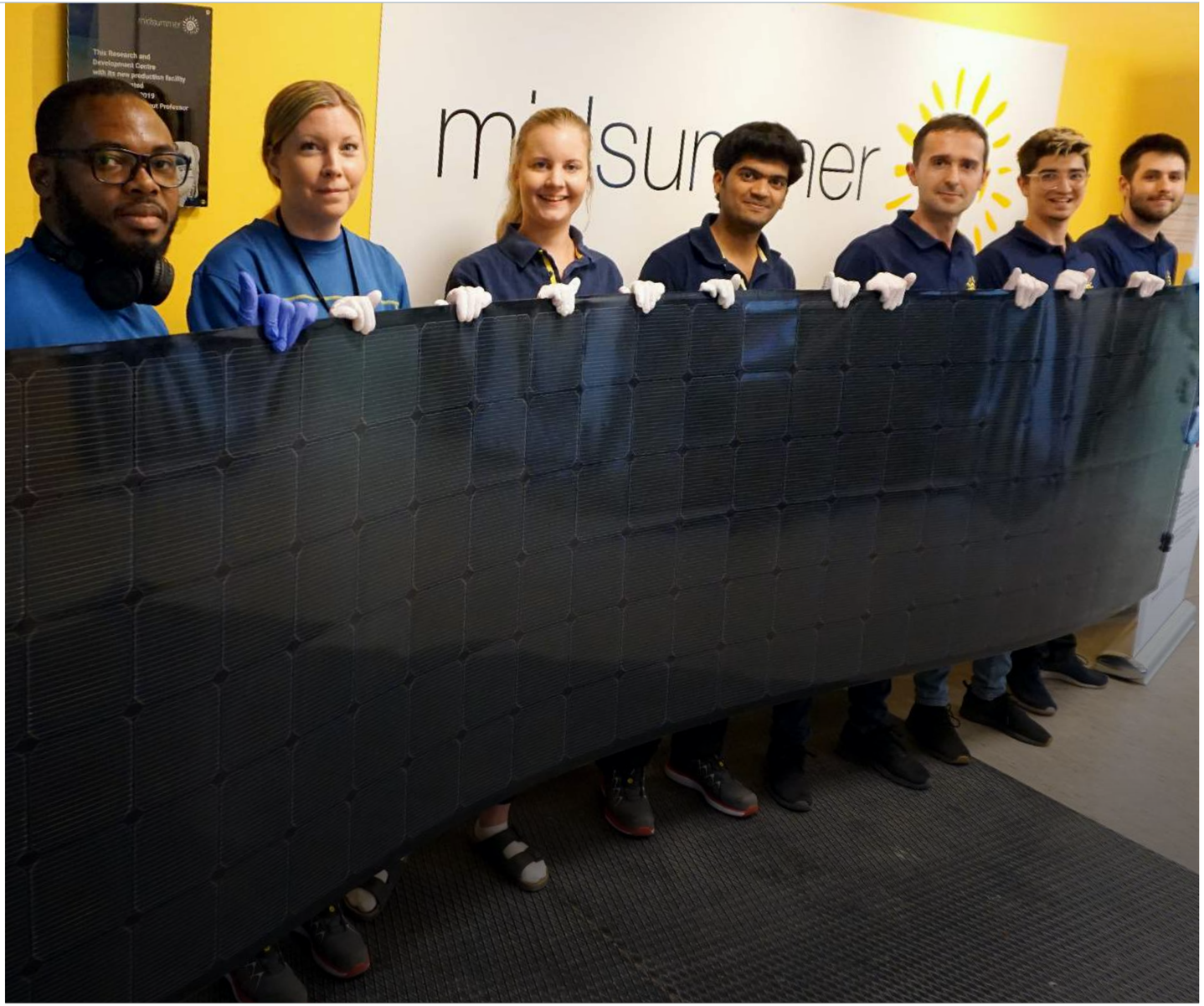
Innovating for change

Research projects	Partners
Making space sustainable We provide Hypatia, the Italian Research Consortium, with state-of-the-art thin-film solar cells for space applications. Our solar cells will decrease the weight of space equipment and increase the durability of solar cells used in space.	Hypatia, Italy
Metal recycling from waste solar cells and reuse We provide materials for a research project at Chalmers University, which aims to develop the technology and the know-how for recycling silver and indium from waste solar cells. Metal recycling from waste solar cells and reuse is crucial in manufacturing, as we aim to reach the International Energy Agency's target, which counts on solar cells meeting 20% of the global energy demand, which requires the use of half of the estimated silver reserve in the earth's crust.	Chalmers University
Solar Research Center in Sweden We are collaborating on a transformative development project for the application of solar cells in transportation. The use of solar cells on trucks would contribute to a significant reduction in CO_2 emissions, and solar cells on ships would enable great productivity due to the light reflections on the water that provide more light to the solar cells.	Energy agency sweden / RISE / Uppsala University / SLU / Högskolan Dalarna / Mälardalens universitet / Karlstads universitet

Application project	Partners
Solar ships Midsummer solar panels will be used in the exploration of utilisation of solar cells in transport systems reducing CO_2 emissions. Our cells will be placed on car ferries on the Swedish West Coast Archipelago.	Uppsala / SSPA Sweden / ÅF
Solar@Sea II We deliver ultra-light solar panels to develop Solar@Sea II, an offshore solar energy extraction concept based on lightweight flexible panels on floating rafts at sea. The project installs a 20 kWp pilot system on Lake Oostvoornse Meer near Rotterdam.	TNO, The Dutch Organisation for Applied Scientific Research is the coordinator of the, funded by the Dutch government

4. About this report

About the report

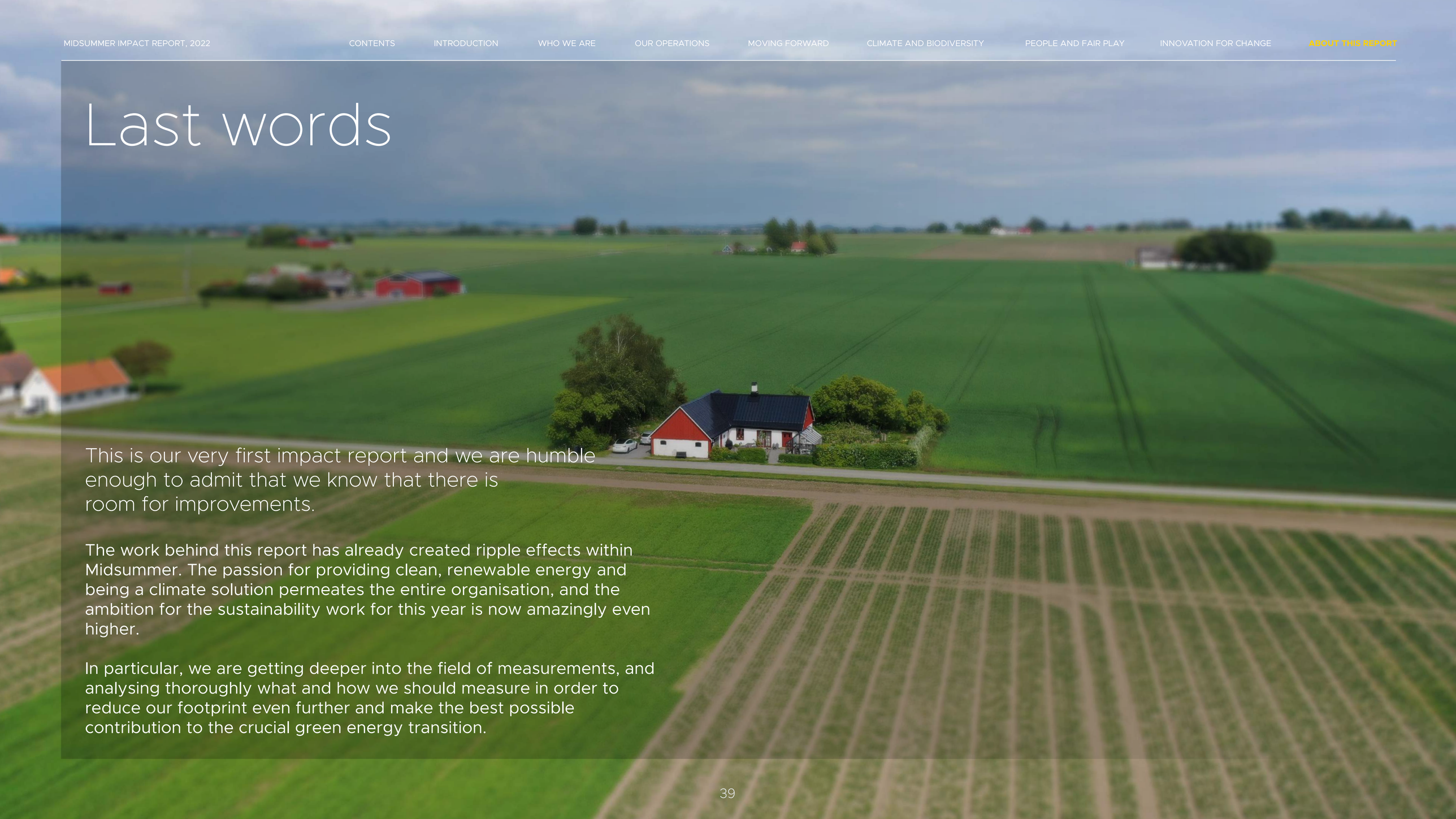


In this report, we have chosen to account for our sustainability work according to the GRI's international standards, and inspired by the framework of the SSD (strategic sustainability development), also known as the Natural Step.

In the holistic world view of Midsummer and the position of a front runner in the energy transition, we want to actively contribute to the achievement of the UN's 17 Sustainable Development Goals (SDG's). Each focus area and its respective activities and targets are linked and coordinated with the 17 SDG's. Our aim is to be able to not only adopt and address climate targets in line with the Science-Based Targets but also commit officially to them and communicate them regularly to our stakeholders.

Midsummer Sustainability work is complying and is linked to the major and commonly used standards within the ESG reporting.

Last words



This is our very first impact report and we are humble enough to admit that we know that there is room for improvements.

The work behind this report has already created ripple effects within Midsummer. The passion for providing clean, renewable energy and being a climate solution permeates the entire organisation, and the ambition for the sustainability work for this year is now amazingly even higher.

In particular, we are getting deeper into the field of measurements, and analysing thoroughly what and how we should measure in order to reduce our footprint even further and make the best possible contribution to the crucial green energy transition.


midsummer