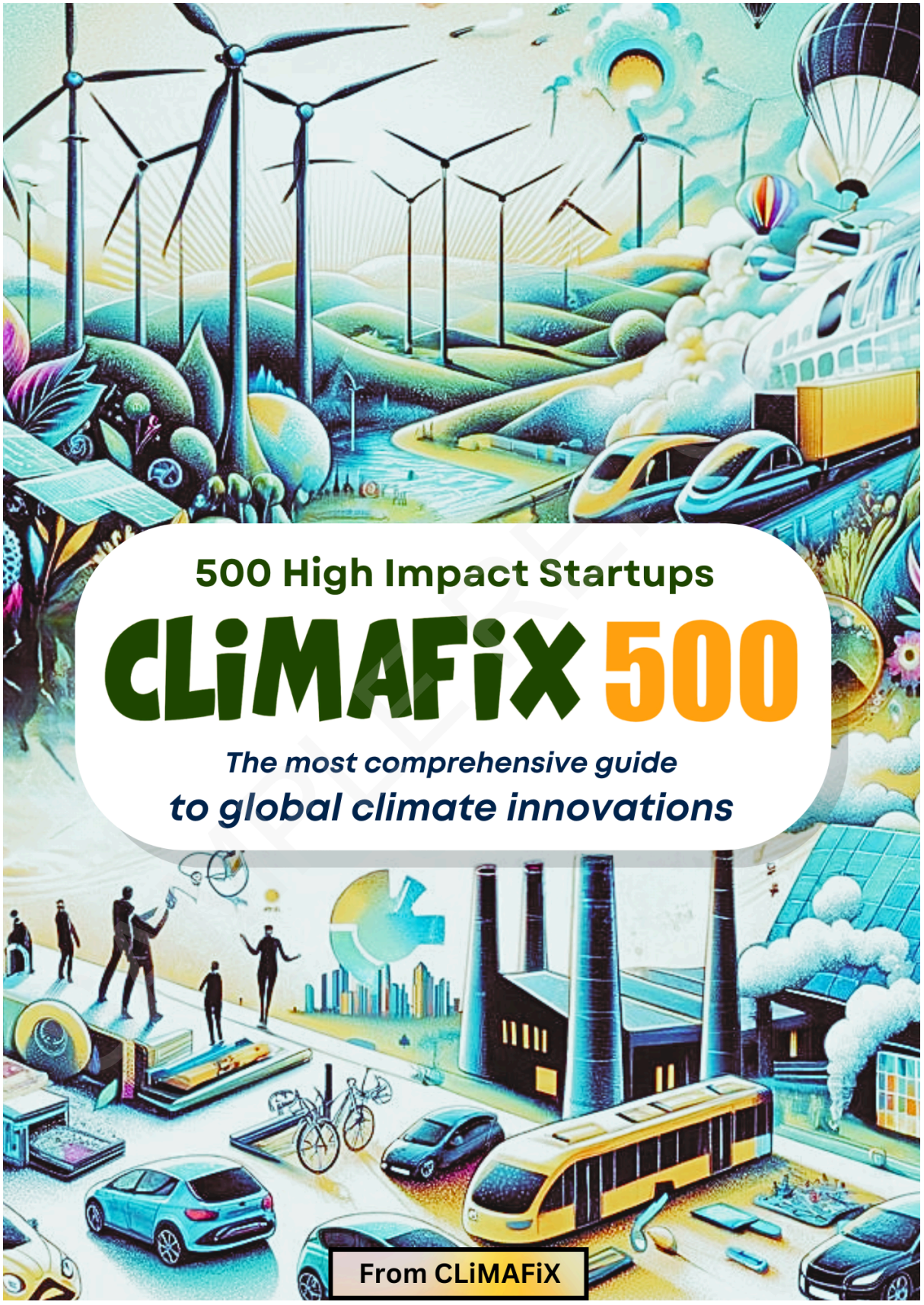

500 High Impact Startups
CLiMAFiX 500
The most comprehensive guide
to global climate innovations
From CLiMAFiX

SAMPLE REPORT

NOT

FOR SALE

Who is CLiMAFiX?

CLiMAFiX is a leading climate intelligence innovation platform. As a dedicated division of EAI (Energy Alternatives India), we focus on empowering climate tech startups and fostering groundbreaking climate innovations. We act as a catalyst to ignite the potential of our nation's vibrant startup and innovator communities, helping them accelerate their innovations and connect seamlessly with the market.

Our Purpose

At CLiMAFiX, our vision is to inspire and drive transformative climate solutions through collaboration and innovation. We aim to be the leading hub for climate tech, paving the way for impactful actions that significantly contribute to global decarbonization and environmental sustainability.

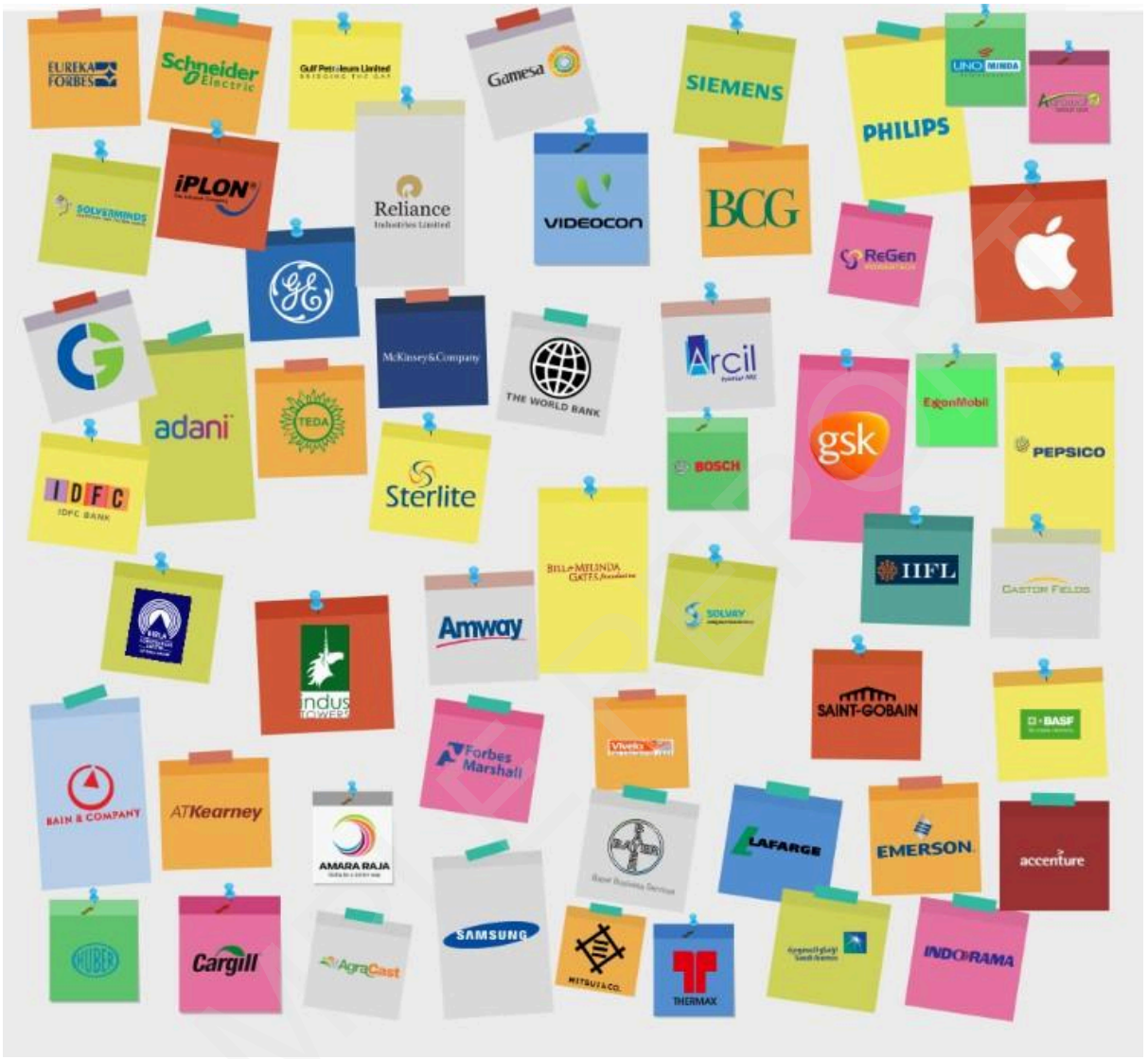
Our Driving Force

Our mission is to empower climate tech startups and innovators with the intelligence, insights, and connections they need to thrive. Through our CLiMAFiX 500 report, we support and accelerate the journey of these startups, fostering an ecosystem that champions innovation and drives meaningful climate action.

Team CLiMAFiX

CLiMAFiX is powered by professionals from IIT Madras and IIM Calcutta, both of them premier institutes respectively in technology and management education in India. Our team cumulatively has over 100 person years of experience providing market intelligence and knowledge support for the climate tech sector.

OUR CLIENTELE



Other divisions within our firm that are dedicated to climate action.

Divisions	*Focus Area*	*Website*
EAI Catalyzing Cleantech & Sustainability	**CONSULTING -** Top management consulting for the Indian climate tech sector.	EAI
CliDemy The Climate Academy	**EDUCATION -** Education, training, and skills for climate action	CliDemy
Chennai Climate Consortium	**GEO-FOCUSSED DECARBONIZATION -** decarbonization for Chennai-based industries through local initiatives	C3
BioBiz India	**BIO-ECONOMY -** Sustainable bioeconomy development leveraging India's biodiversity	BioBiz
Solar Mango #1 Solar Guide	**SOLAR ENERGY -** Expert guidance for solar energy adoption	Solar Mango
EVNext	**E-MOBILITY -** Insights and innovation in the electric mobility sector	EVNext

Hello and a few words …

Why on earth would someone want to buy a report anymore at any price?

Even more so when we are living in the world of search engines, LLMs, and all other fascinating intelligence that technology can provide us.

All I can tell you is that CLiMAFiX 500 is only technically a report. Practically, it is a critical facilitator for any VC keen on getting into climate investing.

Technology alone cannot today provide what CLiMAFiX 500 provides to the climate investor. Because, getting CLiMAFiX 500 to what it is required a serious mix of the following:

- In-depth knowledge of the climate tech sector
- An excellent appreciation of innovations in this sector and their possible impact
- Hands-on knowledge of what climate investors are seeking, and how climate tech startups work
- Deep knowledge of the climate tech end-user segments

It needs a team with decade plus experience in climate tech consulting and publishing sector industry industry intelligence. It needs a set of experts who had worked with dozens of climate startups and climate investors over months and years. It needs a team that had worked with industrial users of decarbonization solutions.

And it needs people who had been witness to both enough moonshine and impactful solutions, to be able to distinguish one from the other.

In short, it needs the CLiMAFiX team.

Do review this sample report for CLiMAFiX 500 to get a dose of why this comprehensive guide to global climate startups and innovations is just what your investment firm needed to leapfrog from where you are to a much higher orbit - very fast.

I will be glad to get your feedback and answer your questions on CLiMAFiX 500.

Narasimhan Santhanam
Co-founder & Director
CLiMAFiX & EAI
narsi@eai.in

WE STOOD ON THE SHOULDERS OF GIANTS

In a letter to Robert Hooke in 1675, Isaac Newton made his most famous statement: “If I have seen further it is by standing on the shoulders of Giants”.

The domain of climate tech is massive, and going massive-er as climate and decarbonization starts touching every aspect of our industry and lifestyle.

How can a small team of climate tech industry researchers put together a guide that can assist global investors make high impact investments?

It is certainly not possible if we tried to learn everything on our own.

No, my friend. That won’t do.

Thankfully, our consulting and research for over 15 years in the climate tech sector had taught us the following:

- There are exceptional experts for almost every climate tech domain if only one knew where to look
- A large portion of these experts’ insights and perspectives are accessible, if one knows how to synthesise them.

Our team went through inputs, presentations and insights from over 500 climate tech industry and innovation experts during the CLiMAFiX 500 preparation.

In addition, we were fortunate to be referred to some exceptional material on the subject from domain experts such as Paul Hawken and global investors such as Bill Gates.

Our list of references for CLiMAFiX 500 can go on for pages. Rather, we will leave you with this thought :

What if you could have the distillation of innovation and startup insights from 500 international climate experts and investors in one place?

You have the sample of such a guide in your hands.

25 REASONS WHY CLiMAFiX 500 SHOULD BE ON YOUR TABLE

Here we present 25 powerful reasons why, as a climate tech investor, you should use and re-use the CLiMAFiX 500 Report!

WHY?	*Details*
There isn't any like this	No exaggeration. There is no runner up. We are the only ones in the entire world with such a comprehensive intelligence guide on climate innovation & startups.
1000+ pages of value	You get 1200 pages of rich value on climate tech innovations & startups
It is the latest	The report was last updated on June 2024, so you get intelligence on the latest innovations and startups
Global coverage	The innovation and startup coverage in CLiMAFiX 500 is truly global. While certain regions such as North America do have higher representations for startups, we have ensured that we have looked into every country of relevance while identifying high quality startups.
70+ countries are represented by startups & innovations	• North America - 3 • Europe - 30 (20 in the EU) • Asia - 25 • South America - 5 • MENA - 10
Developed with a special focus on venture capital investors	We know the precise aspirations and motivations venture capital firms & investors around the world have today for climate startup investing. We ought to, as we interact with over 100 VCs regularly on climate tech. CLiMAFiX 500 is tailor-made for VCs. Don't be surprised to find all the familiar questions you have - and more - being answered in the guide.

Developed by climate tech super specialists	CLiMAFiX was developed by senior professionals who started India's first climate tech consulting firm way back in 2008. The guide thus comprises expertise from experts: • Who have been in the business of climate tech for over 15 years, • Who have consulted for over 250 prominent firms, and • Who have written acclaimed climate tech industry reports used by over 2500 business and industry professionals worldwide.
A real bargain	Imagine that you have to compile such a guide yourself. It will take a team of 3 to 5 high quality research analysts a year or more. Compare the costs for the above with the price of CLiMAFiX 500.
1000+ climate startups highlighted	• Snapshots of 500 high impact startups • Highlights of 650 additional startups
150+ startups in each of the four domains	• **Low Carbon Energy**: 230 Startups • **Low Carbon Resources**: 175 Startups • **Low Carbon Industry & Transport**: 175 Startups • **Low Carbon Facilitators**: 160 Startups
1000+ relevant, curated videos and news articles	In addition to core content, CLiMAFiX 500 also provides references to over 1000 high-quality resources, for the following categories: • Product videos • Technology videos • Founder interviews • Latest news articles • Case studies • Market potential
1000+ climate startups highlighted	• Snapshots of 500 high impact startups • Highlights of 650 additional startups

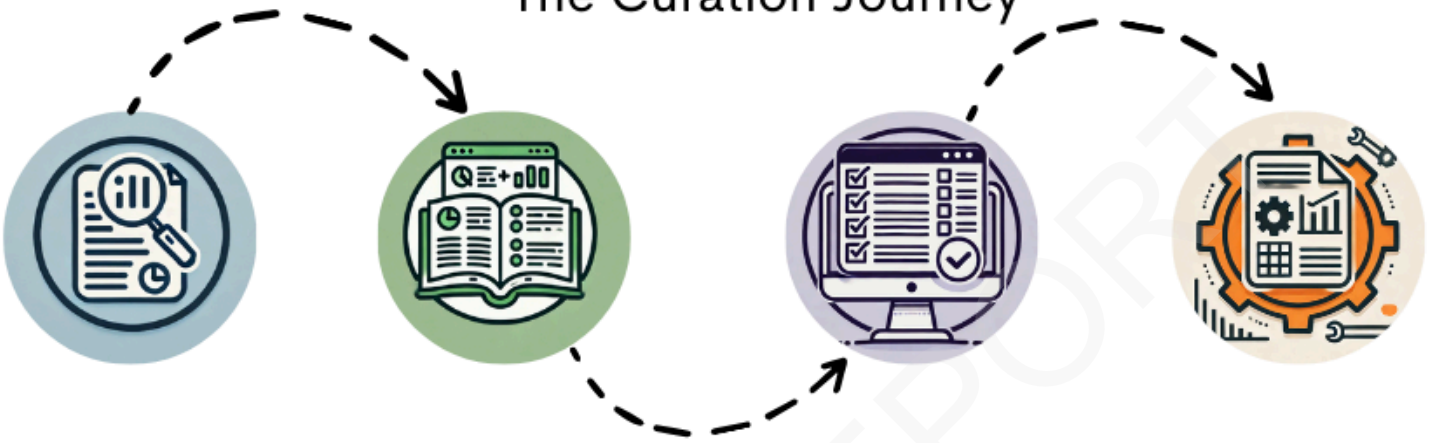
10+ Decarbonization avenues and 75+ innovation themes that are little known by most investors	**Less understood decarbonization avenues** • Low carbon thermal power • Energy efficient industrial equipment • Thermal & mechanical storage • Industrial waste heat recovery • Industrial resource efficiency • Advanced materials • Low carbon ICE vehicles • Reducing non-CO_2 greenhouse gases • Managing large carbon sinks
Easy access to funding data	Snapshots for the 500 startups contain quick links to let you access their latest funding & investment updates
Multi stage curation	Every startup and every innovation has gone through deep curation: • For decarbonization impact • For uniqueness • For scalability of solutions
Built over 15 months with a diverse team	• Started: December 2022 • Ended: February 2024 As this was a report in a new genre, we had taken it through multiple design stages before starting work on the content. It took us about 2 months to design the report, 2 months to get the draft/pilot version, and almost a year to get the final report done. But huge satisfaction!
Excellent balance of secondary and primary research	While our expert research team reviewed thousands of innovations and startups from around the world, the senior executives and project leads also interacted with many innovation stakeholders during this exercise to integrate their primary inputs. Besides, CLiMAFiX also organises India's largest and popular climate startup summit, the CLiMAFiX Summit, attended by over 500 startups and 100+ VC investors. This event provided us with immense opportunities to

	understand the needs of the investing community, many of which have been incorporated into the guide.
High emphasis on validation and presentation	• **Data Validation**: Sector expert reviews of all critical data. • **Presentation**: Intuitive design all across the report for effective communication
Developed with inputs from top-tier universities and research organisations	Our industry research team is regularly in touch with global universities and research organisations to understand their latest innovation efforts. CLiMAFiX 500 incorporates the continuous learning we have from these enriching learnings we have from the innovator & researcher communities
Comprehensive coverage of all decarbonization pathways	Our team, during CLiMAFiX 500 preparation, was able to come up with perhaps the first comprehensive listing of all global decarbonization avenues. We have identified 50 such avenues, which will constitute over 95% of all climate innovations, actions and investments globally over the next few decades.
All major decarbonization categories covered	The innovation and startup intelligence covers 13 broad decarbonization categories, across Energy, Resources, Industries and Facilitators.
Critical highlights of 500 startups across 50 decarbonization avenues	Get to learn for 500 startups, in a concise and powerful template: • Key value added to the decarbonization ecosystem • Uniqueness of their solutions • Perspectives from founders and other stakeholders
Deep analyses of five critical innovation dimensions for each	Innovations and innovation spectrum for each decarbonization avenue are analysed on the following dimensions: • Multi-dimensional analysis of the innovation ecosystem • Highlights of innovation spectrum covering-

decarbonization avenue	urgency of the avenue, commercialization potential, scalability, emerging trends and uniqueness of prominent startups, • Actionable inputs on 10 high impact startups
A special section on Moonshots	A unique sector highlights moonshot ideas for decarbonization, including: • CO_2 to fuels, chemicals & diamonds • Novel engines to utilize industrial waste heat • Nuclear fusion • Giant kelps for CO_2 sequestration • Ocean storage of carbon • Ocean-based and offshore solar power • Scalable wave power
Easy access to founder & leader profiles	Snapshots for the 500 startups contain quick links to profiles of founders and senior management

How did we curate CLiMAFiX 500?

The Curation Journey



Primary Research

Leveraged our 15 + years climate tech expertise and network

Secondary Research

Benefited from our existing industry resources and analysis methodologies

Data Validation

Senior executives spent quality time on validation and evaluation

Compilation

Our in-house design team played a role in making everything look cool

EXCERPTS FROM THE REPORT

TABLE OF CONTENTS

(As in Actual Report)

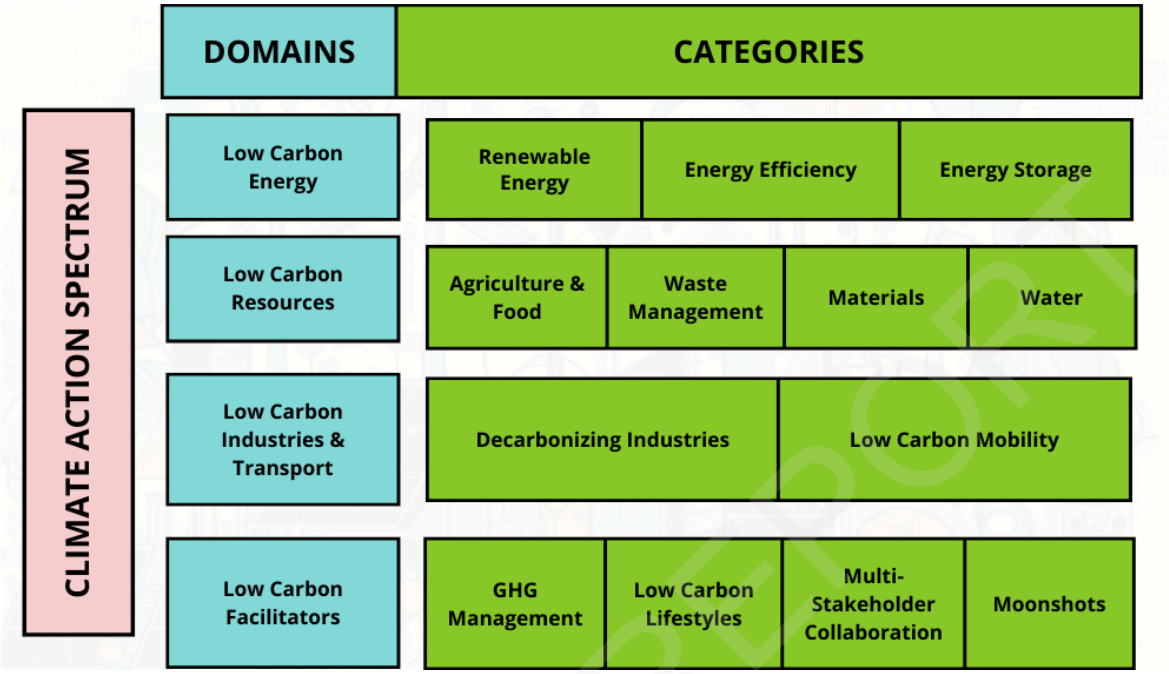
1. Foreword ……
2. Executive Summary ……
3. Innovations & Startups Across Climate Tech……
   3.1. Low Carbon Energy ……
      3.1.1 Renewable Energy ……
         Utility-Scale Solar PV ……
         Distributed Solar PV Startups Showcase ……
         Solar Thermal ……
         Wind Power ……
         Biomass For Heating & Power ……
         Biofuels ……
         Hydro Power ……
         Geothermal Energy ……
      3.1.2. Energy Efficiency ……
         Energy Efficient Buildings ……
         Industrial Waste Heat Recovery ……
         Low Carbon Thermal Power ……
         Energy Efficient Industrial Equipment ……
         Smart Grids ……
         Heat Pumps ……
         Digital For Decarbonization……
      3.1.3. Energy Storage ……
         Green Hydrogen ……
         Battery Storage ……
         Thermal & Mechanical Storage ……
   3.2. Low Carbon Resources ……
      3.2.1. Agriculture & Food ……
         Sustainable Forestry ……
         Regenerative Agriculture ……
         Smart Farming ……
         Low Carbon Food ……
         Agro Waste Management ……
      3.2.2. Waste Management ……
         Reducing Food Waste ……
         Solid Waste Management ……
      3.2.3. Materials ……

Bio-Based Materials ……
Advanced Materials ……
Product Use Efficiency ……
Industrial Resource Efficiency ……
3.2.4. Water ……
Water Use Efficiency ……
3.3. Low Carbon Industry & Transport ……
3.3.1. Decarbonizing Industries ……
Low Carbon Metals ……
Low Carbon Chemicals & Fertilizers ……
Low Carbon Construction Materials ……
Low Carbon Textiles & Fashion……
Corporate Carbon Management……
Decarbonizing Oil & Gas Sector……
3.3.2. Low Carbon Mobility……
Electric Mobility……
Low Carbon Trucking……
Low Carbon Marine Transport……
Low Carbon Aviation……
Low Carbon Ice Vehicles……
Mass Transit……
3.4 Low Carbon Facilitators……
3.4.1 GHG Management……
C2v-Co2 Value……
Co2 Capture & Storage……
Reducing Emissions from Livestock……
Reducing Non- Co2 Industrial & Agricultural Emissions……
Managing Large Carbon Sinks……
3.4.2 Low Carbon Lifestyles……
3.4.3. Multi-Stakeholder Collaboration……
3.4.4. Moonshots……
Moonshots……
4. Highlights……
4.1 Global Startups……
4.2. Startups With Woman Founders……
4.3. Startups From Developing Countries ……
4.3.1 Startups in Asia……
4.3.2 Startups in East Europe……
4.3.3 Startups in Africa……
4.3.3 Startups in South America……
4.4. Startups Funded by Large Corporates……

4.5. Climate Startup Incubators Region-Wise……..……..…….
4.5.1 Incubators in North & South America……..……
4.5.2 Incubators in Europe……..……..……..
4.5.3 Incubators in Asia & Oceania……..……..…
5. Conclusion……..……

INNOVATIONS & STARTUPS ACROSS CLIMATE TECH

This flowchart outlines how our report is organised, showcasing the various landscapes of innovations and startups within the climate tech sector:



Each of the categories has been further classified into decarbonization avenues. There are 50 decarbonization avenues in total for the above-mentioned categories.

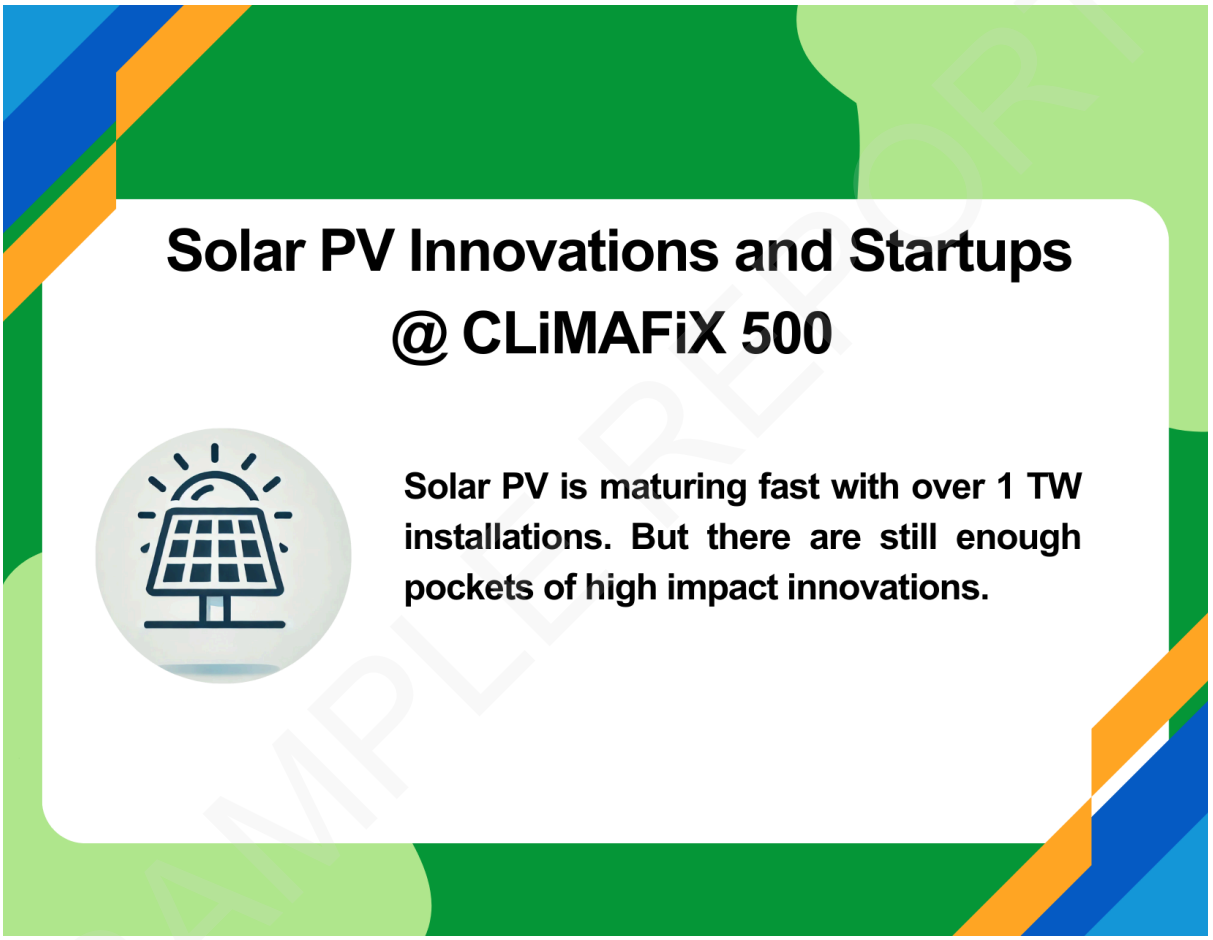
And for each of the 50 decarbonization avenues we have provided the following :

- Analysis of the innovation ecosystem
- Highlights of the innovation and startup
- Inputs on 10 high-impact startups in that domain.

We have provided the complete content for 2 (out of the 50) decarbonization avenues. The decarbonization avenues provided are:

1. ***Utility scale solar PV***
2. ***Reducing non CO_2 emissions***

DECARBONISATION AVENUE: UTILITY SCALE SOLAR PV



INTRODUCTION

Utility solar PV refers to large-scale ground-mounted solar power plants. The power from these power plants is exported to the grid from where it is bundled with power from the rest of the sources.

Globally, utility solar PV power plants have seen some of the most aggressive growths in the energy sector in the recent past. From insignificant capacities until about 2010, the global utility solar power plant capacity reached over 775 GW by the end of 2023. This is a stunning growth that has made it overtake the global installed capacity of wind power whose commercialization had started much earlier. This strong growth can be attributed mainly to the dramatic fall in the price of solar PV panels as well as in the key balance of system components such as the inverters.

As of 2023, utility solar power plants represent quite a relatively mature segment with robust technology and support solutions.

Utility solar power plants can be deployed in most regions of the world that have reasonable sunlight. Even countries like Germany that receive solar radiation half that of exceptionally bright places (such as the Middle East, India, and so on) have been successful in implementing utility-scale solar PV projects.

The key challenge for solar PV is its intermittency - it can work only when the sun is up. This necessitates the use of energy storage solutions such as batteries, which can significantly increase the cost of solar power for utility-scale solar power generation.

Key innovations in the utility-scale solar PV domain for the 2020-2030 period can be expected in improving the economics of battery storage, agro Voltaics (agriculture combined with photovoltaics), floating solar power plants, use of digital solutions to enhance many components of the value chain (especially in maintenance & asset management) and effective grid integration of solar power.

Decarbonization Potential

About 1,73,000 TW of sunlight constantly strikes the earth, compared to the total global electricity installed capacity of about 6.8 TW in 2023 - that's a factor of over 25,000! This comparison alone shows the immense potential solar PV holds for powering the Earth with clean energy, even under very conservative assumptions.

The lifecycle carbon footprint of solar PV is quite low. While solar power generation in itself does not generate any CO_2 emissions, CO_2 emissions happen from the rest of the value chain (such as PV cells manufacturing) but these emissions are a fraction of

those for thermal power plants - about 40 g/kWh compared to about 900 g/kWh for coal and about 450 g/kWh for natural gas power plants.

About 800 GW of utility-scale solar power plant capacity has been installed globally by the end of 2023, already saving about 425 million tons of CO_2 emissions per year. Going by the current global installation trends, one can conservatively expect at least 1.5 TW of utility-scale solar power installed globally by the end of 2030. That would equate to almost 1 billion tons of annual CO_2 emissions savings.

Utility solar thus represents one of the most attractive decarbonization avenues, providing significant decarbonization of power at scale.

Current & Emerging Technologies in the Avenue

- Drone-based construction monitoring and topography mapping
- Asset Monitoring through Thermography & Ultra High Definition RGB aerial imagery
- Translucent solar modules which are an agro voltaic solution catering to solar energy production as well as crop protection
- Offshore floating solar panels & plants
- Cloud-based solar energy modelling to predict energy estimates
- GIS platform for constraint mapping and grid capacity prediction to assist in site selection for new large-scale solar installations
- SaaS for the entire Solar lifecycle including API integration featuring digital twin of the plant and inspection analytics.

Innovation & Startup Analysis

Utility-scale solar PV has emerged as a dominant player in the renewable energy market. In 2023, the U.S. solar market is expected to add a record-breaking **29.1 GW** of new capacity, with significant contributions from states like Texas and California. This growth is fueled by incentives from the federal Inflation Reduction Act and statewide renewable energy proposals.

The North American segment, particularly the United States, is expected to witness substantial growth in the utility-scale solar power market from **2023 to 2028**. This growth is driven by the need for continuous renewable power and various initiatives such as the **Solar Energy Technologies Office (SETO)** funding research and development projects in **Concentrated Solar Power (CSP) technologies**. Asia-Pacific, especially China, and India, is also seeing rapid growth due to several active solar projects and factors like rapid urbanisation, rising disposable income, and increasing demand for renewable energy.

Urgency of Decarbonisation Avenue

Based on the analysis of urgency in addressing industry needs, the following startups stand out, ranked according to the factors such as target segment urgency, size of user segment, market and economic urgency, performance-related urgency, solutions to pain points, and market mandates:

In the utility-scale solar power industry, the most urgent needs include addressing land scarcity, efficient solar asset management, and sustainable end-of-life solutions for solar panels.

- **Land Scarcity:** A major challenge, particularly in densely populated and coastal areas. Startups like **SolarDuck** are addressing this with their offshore floating solar technology, utilising water bodies for solar installations. Their offshore floating solar technology is not just innovative but also essential in these high-demand areas, making them highly relevant. Potentially large number of people, as many urban and industrial areas are near coastlines and market urgency is High, due to increasing land scarcity for solar installations.
- **Solar Panel Recycling:** With growing environmental concerns and regulations, the need for sustainable disposal and recycling of solar panels is critical. Startups like **Solar Cycle** are focusing on this area, offering end-of-life management solutions for solar panels to the entire solar industry, focusing on end-of-life panel management.
- **Efficient Solar Asset Management:** As solar installations grow, managing these assets efficiently becomes crucial. Startups like **Raptor Maps** are utilising

AI-driven solutions to improve the operation and maintenance of solar assets, catering to both commercial and residential sectors. This is a growing demand in the sector, reflecting both market and performance-related urgencies.

Unique Solutions Derived from Startups

Some unique & innovative trends observed in the Utility scale solar power plant domain.

- **Drone-based solar power plant monitoring & inspections** can significantly enhance both the scalability and effectiveness of solar power plant monitoring, resulting in significantly higher yields. An example of a startup that provides this is **Above**. It specialises in drone-based solar plant inspections. Their unique selling proposition (USP) lies in aerial mapping and thermographic inspection, some of which are covered under specific patents or proprietary technologies.
- **Translucent solar modules** offer a dual-purpose solution for both agriculture and solar energy generation, effectively addressing land use constraints providing a hybrid solution. In the agri-voltaics segment, **Insolight** stands out with its patented translucent solar modules. This technology is valuable, especially in regions with limited land availability.
- **Offshore floating solar technology** is a unique and an emerging trend which can be disruptive since it enables use of agricultural land, a niche currently unoccupied by most startups in the solar energy space. One example is **SolarDuck**, a patent-protected solution addressing the critical need for space-efficient solar energy generation.

Commercialization Potential

Considering the factors necessary for successful commercialization—such as the necessity of the solution, familiarity with the system, market penetration ability, solution awareness, hybrid or ready-to-plug-in products, economic and pricing factors, as well as potential for monetization and profitability—the top startups from the list with the best commercialization potential are:

Startups offering solutions addressing these key areas, particularly those tapping into emerging trends like decentralised energy generation, AI-driven asset management, and eco-friendly technologies, are likely to see higher scalability and commercial success. The focus is on technologies that are adaptable, cost-efficient, and meet urgent market needs while also being environmentally sustainable.

- **RatedPower**: Their pvDesign software addresses a widespread need in the solar industry for efficient and scalable design tools. The software's ease of use and its ability to reduce design time and costs,significantly enhance its market

penetration capabilities. Its economic model is straightforward, making monetization and profitability highly feasible.

- **Raptor Maps**: Their AI-driven solar asset management platform is aligned with the rising trend towards digitalization and data-driven decision-making in solar energy. The solution's adaptability across different solar projects and its role in optimising operational efficiency make it a valuable tool for a wide range of customers, enhancing its commercial viability.
- **Terabase Energy:** Their suite of digital and automation tools for solar project development meets the growing demand for technological efficiency in the sector. As these tools can significantly reduce project development time and costs, they have strong potential for market penetration and profitability.
- **Solar Cycle**: Addressing the emerging need for solar panel recycling, Solar Cycle has a significant advantage in a market that is becoming increasingly concerned with sustainability. Their solution is essential for the long-term viability of solar energy, and as regulations around solar panel disposal become more stringent, their services will likely see increased demand.
- **SmartHelio:** Offering diagnostics and analytics for solar plants, they cater to the need for continuous performance optimization in solar operations. This solution is crucial for maintaining the high efficiency of solar installations, suggesting a strong potential for market adoption and profitability

Scalability

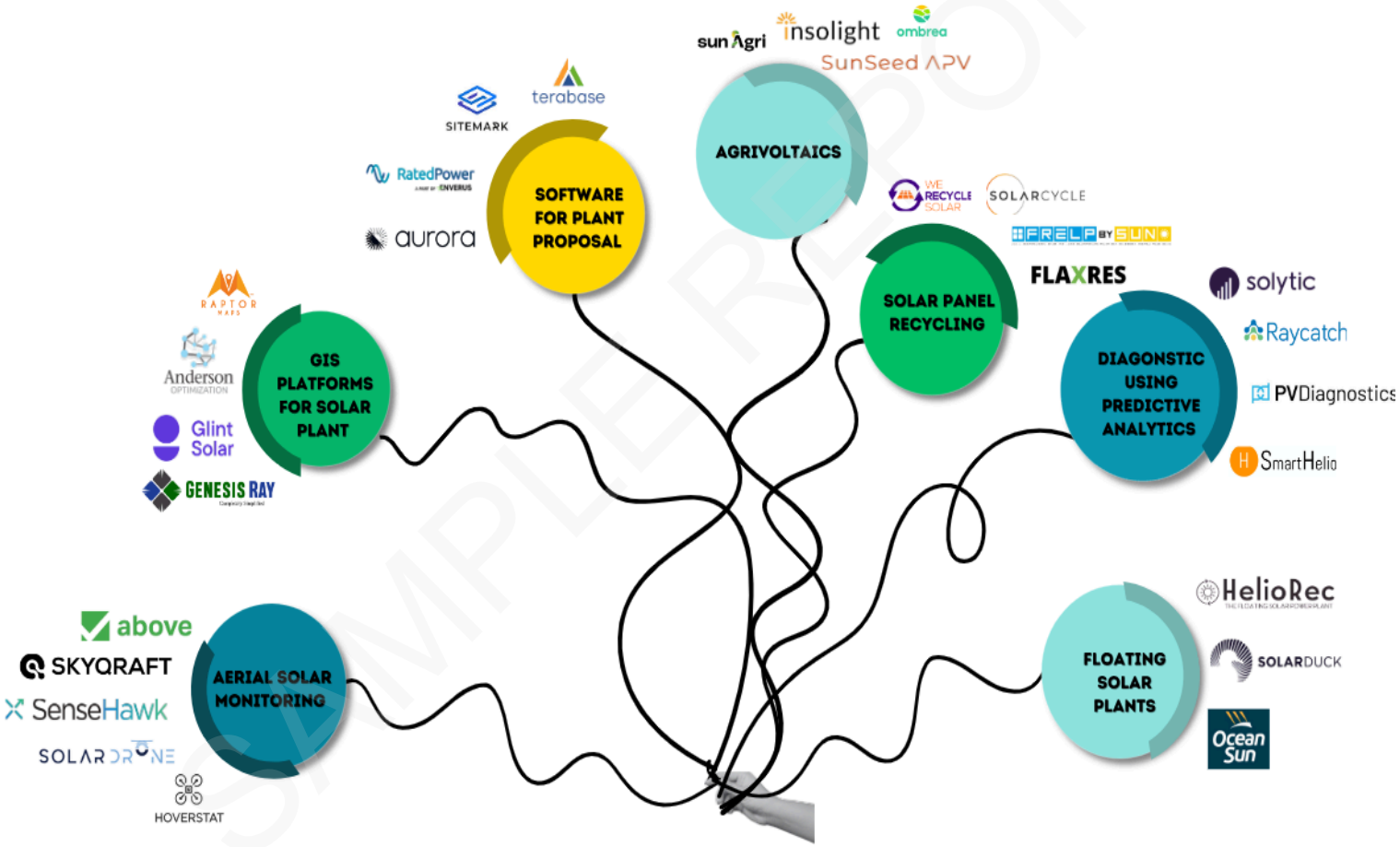
Most solutions in this domain have high scalability potential. As many of the offerings have a high digital component, they have inherent scalability advantages. Many of these solutions are ***cloud-based*** (eg: RatedPower's pvDesign software), ***integrate seamlessly*** with other power plant systems (Eg: Raptor Maps' AI driven asset management solution, SmartHelio's diagnostic tools for solar power plants), and have a strong ***B2B focus*** with focus on utility scale solar power plants. All these factors set them up to scale rapidly.

HIGHLIGHTS OF INNOVATIONS & STARTUPS

Opportunity	Startups	Innovation/ Technology	Link
Aerial Solar Monitoring	SenseHawk	SenseHawk accelerates solar projects with its cloud-based platform that streamlines site surveys, design, and asset management using AI and drone data.	https//sensehawk.com/
	Above	Solar drone inspection and digital software solutions for solar PV power plants	https://www.abovesurveying.com/
	Skyqraft	Skyqraft provides unmanned aircraft system (UAS) services for efficient and safe inspection of power lines and infrastructure using advanced data analytics.	https//www.skyqraft.com/
	Hoverstat	Hoverstat specializes in drone-based thermal imaging and analytics to optimize the performance and maintenance of solar installations.	https//www.hoverstat.com/
	Solar Drone LTD	Solar Drone LTD develops drones equipped with thermal imaging for precise and efficient inspection of solar farms, reducing downtime and maximizing output.	https//www.solardrones.net/
GIS Platforms for Solar Plant	Genesis Ray	Genesis Ray uses GIS and AI to offer insights and predictive analytics for the renewable energy sector, focusing on site identification and project feasibility.	www.genesisray.com
	Raptor Maps	Raptor Solar is an advanced software-as-a-service platform for the entire solar lifecycle — from financing and construction through operations.	https//raptormaps.com/
	Anderson Optimization	Power system modelling and optimization software for renewable integration.	https//andersonoptimization.com/
	Glint Solar	Glint Solar harnesses AI and satellite data to streamline the solar farm site selection process by evaluating land suitability and solar potential.	www.glintsolar.com
Agrivoltaics	SunSeed APV	SunSeed APV integrates agri voltaics technology, combining solar energy generation with agriculture to enhance land use efficiency and crop production.	https://www.sunseedapv.com/about
	Ombrea	Ombrea develops a dynamic shading system to protect crops from extreme weather, using solar panels that also generate renewable energy.	https://www.ombrea.fr/
	Sun'Agri	Sun'Agri utilizes agrivoltaic technology to combine solar energy production with sustainable agriculture, optimizing land use and increasing crop resilience.	https://www.sunagri.fr/
	Insolight	Agrivoltaics solution - solar photovoltaics combined with agriculture	https://insolight.ch/
Software for	SiteMark	SiteMark leverages drone technology and	www.sitemark.com

Plant Proposal		AI-powered analytics to provide precision surveying and data analysis for solar energy projects.	
	Terrabase Energy	Terabase platform is a utility-scale solar project development software	https://www.terabase.energy/
	Rated Power	Cloud-based design software for utility-scale solar PV plants.	https//ratedpower.com/

UTILITY - SCALE SOLAR PV: INNOVATION SPECTRUM & STARTUPS



List of 10 High Impact Startups for Utility-Scale Solar PV

- Above
- Anderson Optimization
- Insolight
- Raptor Maps
- RatedPower
- Smart Helio
- Solar cycle
- SolarDuck
- Solytic
- Terabase Energy

Utility-Scale Solar PV Startups Showcase

ABOVE

PRODUCT
Solar drone inspection and digital software solutions for solar PV power plants

TECHNOLOGY/ PROCESS
Aerial & thermographic mapping and inspection

VALUES
Solar plant inspection and software enable more efficient design, construction, operations & maintenance for solar PV power plants

TEAM
Will Hitchock

COUNTRY OF ORIGIN
United Kingdom

HIGHLIGHTS
Aerial topographic mapping
Thermographic & HD inspection
UHD visual inspection

ONLINE RESOURCES
Website | LinkedIn | YouTube | | Twitter
Crunchbase

KEYWORDS
Solar PV power plant inspection | Aerial mapping of solar power plant

VIDEOS
Above Ultra-High-Definition Inspection

MORE ABOUT ABOVE FROM THE WEB

- Ground-Breaking Aerial Electroluminescence Inspection Service - Link
- A Solar Energy Industry Outlook From Above's CEO: Navigating the Path to Net Zero - Link

Anderson Optimization

ANDERSON OPTIMIZATION

PRODUCT
Power system modelling and optimization software for renewable integration.

TECHNOLOGY/ PROCESS
Mixed-Integer Programming, Cloud

VALUES
Automate time-consuming analysis to accelerate renewable energy development and maximise returns.

TEAM
Eric Anderson Ph.D.
Jake Anderson

COUNTRY OF ORIGIN
USA

HIGHLIGHTS
Accelerate timelines and maximise returns on energy and storage development projects.

ONLINE RESOURCES
Website | LinkedIn | YouTube
Crunchbase

KEYWORDS
Smarter siting for renewable energy power plants | Renewable energy system modelling software | System modelling software for renewable energy storage

VIDEOS
Anderson Optimization Overview

MORE ABOUT ANDERSON OPTIMIZATION FROM THE WEB
- Explore Enhanced Features with AO Prospect's Latest Update - Link
- Unlocking the Potential of Premium GIS Data: Why Public Flood Data Can Be Risky Business- Link

INSOLIGHT

PRODUCT
Agrivoltaics solution - solar photovoltaics combined with agriculture

TECHNOLOGY/ PROCESS
THEIA PV modules, tracking algorithm

VALUES
A solution that protects crops while generating electricity
Translucent solar modules replace the plastic tunnels used in agriculture

TEAM
Laurent Coulot

COUNTRY OF ORIGIN
France

HIGHLIGHTS
Enables dynamic light adjustment to optimise crop growth for season and climate changes.

ONLINE RESOURCES
Website | LinkedIn | YouTube | | Twitter
Crunchbase

KEYWORDS
Solar for crop protection

VIDEOS
insolagrin in motion

MORE ABOUT INSOLIGHT FROM THE WEB
- Insolight completes agrivoltaic plant at raspberry farm - Link
- Switzerland: 2600 m² agrivoltaic installation is now fully operational - Link

RAPTOR MAPS

PRODUCT
Raptor Solar is an advanced software-as-a-service platform for the entire solar lifecycle — from financing and construction through operations.

TECHNOLOGY/ PROCESS
Machine Learning, Geospatial Technology, API Integration

VALUES
Advanced software platform to standardise data, analyse insights and collaborate across solar

TEAM
Eddie Obropta
Nikhil Vadhavkar

COUNTRY OF ORIGIN
USA

HIGHLIGHTS
An auditable system of record for your solar assets.
Scan module serial numbers into a geospatial data model.

ONLINE RESOURCES
Website | LinkedIn | YouTube | | Twitter
Crunchbase

KEYWORDS
SaaS platform for entire solar lifecycle

VIDEOS
How to use the DJI M2EA to inspect Solar PV systems with Mapping Mission Flights

MORE ABOUT RAPTOR MAPS FROM THE WEB

1. Luminace Selects Raptor Maps' Instant Inspections AI Solution for Solar Fleet - Link
2. Raptor Maps Named on the 2024 Global Cleantech 100 - Link

RATEDPOWER

PRODUCT
Cloud-based design software for utility-scale solar PV plants.

TECHNOLOGY/ PROCESS
Cloud-based software

VALUES
Streamline the design and planning processes of PV plants to reduce the number of hours engineering teams spend by 85%.

TEAM
Andrea Barber

COUNTRY OF ORIGIN
Spain

HIGHLIGHTS
Automate and optimizes the feasibility study, analysis, design, and engineering of photovoltaic plants in all its stages.

ONLINE RESOURCES
Website | LinkedIn | YouTube | | Twitter
Crunchbase

KEYWORDS
Solar PV power plant design software | Automating solar power plant planning and design

VIDEOS
RatedPower - an Intro to pvDesign

MORE ABOUT RATEDPOWER FROM THE WEB
- Power factor resolution algorithm - Link
- Burns & McDonnell: Evaluating more and larger projects with agility - Link

SMART HELIO

PRODUCT
Provides software, hardware, and analytics for utility-scale solar power plants.

TECHNOLOGY/ PROCESS
Analytics, Sensors, and IoT

VALUES
Real-time and automated diagnostic and prescriptive solutions make solar power plants more reliable and generate higher yields.

TEAM
Govinda Upadhyay

COUNTRY OF ORIGIN
Switzerland

HIGHLIGHTS
Their solution can easily plug into an existing monitoring platform to sustainably maintain a developer's solar assets.

ONLINE RESOURCES
Website | LinkedIn | YouTube | | Twitter
Crunchbase

KEYWORDS
Solar power plant analytics | Solar power plant diagnostics

VIDEOS
Meet SmartHelio Team: Maxine Cronier

MORE ABOUT SMARTHELIO FROM THE WEB

- SmartHelio supports Verbund's portfolio growth using predictive analytics - Link
- SmartHelio now partners with EPCs - Link

SOLAR CYCLE

PRODUCT
Technology to recycle end-of-life solar panels for solar asset owners.

TECHNOLOGY/ PROCESS
Recycling process for solar assets.

VALUES
95% of the valuable materials extracted from each panel can be returned to the solar panel supply chain.

TEAM
Suvi Sharma
Jesse Simons

COUNTRY OF ORIGIN
USA

HIGHLIGHTS
Offers services in construction breakage, O&M, and repowering old systems.

ONLINE RESOURCES
Website | LinkedIn | YouTube | | Twitter
Crunchbase

KEYWORDS
Circular solar economy | Solar panel recycling

VIDEOS
State of the art solar panel recycling facility

MORE ABOUT SOLAR CYCLE FROM THE WEB

- In Texas, Solarcycle mines old solar panels for their materials. In Georgia, it's building a factory to turn recycled solar glass into glass for new panels. - Link
- SOLARCYCLE Receives Clean Energy Investments from Biden Administration's Inflation Reduction Act - Link

SOLARDUCK

PRODUCT
Delivery of turnkey and profitable offshore floating solar solutions.

TECHNOLOGY/ PROCESS
Offshore floating solar

VALUES
Enabling large-scale solar power plant installations for coastal regions with land scarcity.

TEAM
Koen Burgers

COUNTRY OF ORIGIN
Netherlands

HIGHLIGHTS
Fully scalable to match specific local requirements worldwide
Extremely robust, able to handle high waves and wind speeds, very scalable to meet specific energy requirements and low operations and maintenance costs.

ONLINE RESOURCES
Website | LinkedIn | YouTube
Crunchbase

KEYWORDS
Turnkey offshore floating solar solution

VIDEOS
SolarDuck introduction koen burgers

MORE ABOUT SOLARDUCK FROM THE WEB

- The installation of Japan's first offshore floating solar photovoltaic (OFPV) power plant is completed - Link
- Bureau Veritas Awards World's First Prototype Certification for SolarDuck's Floating Offshore Solar Solution - Link

SOLYTIC

PRODUCT
PV monitoring software

TECHNOLOGY/ PROCESS
AI

VALUES
- Find issues, save time and cut costs with the best price-performance ratio on the market
- Uses AI to automate processes to optimise production and cut costs throughout the entire life cycle of assets.

TEAM
Johannes Burgard
Steffen Mangold

COUNTRY OF ORIGIN
Germany

HIGHLIGHTS
No special hardware is necessary. Up to 87% cheaper than other solutions

ONLINE RESOURCES
Website | LinkedIn | YouTube | | Twitter
Crunchbase

KEYWORDS
PV monitoring | Optimization of PV assets

VIDEOS
CEO Johannes Burgard pitches Solytic

MORE ABOUT SOLYTIC FROM THE WEB
- The energy transition can only succeed with digital SMEs - Link
- Turning the current crisis into an opportunity for the future: The pivotal role of service offerings for installation companies. - Link

TERABASE ENERGY

PRODUCT
Terabase platform - utility-scale solar project development software

TECHNOLOGY/ PROCESS
SCADA, Digital twin

VALUES
Enhances solar project development via a Single Source Of Truth, collaborative environment for site assessment, project development, design, and optimization.

TEAM
Matt Campbell

COUNTRY OF ORIGIN
USA

HIGHLIGHTS
GIS-enabled virtual site assessment and surveying for developers.
Optimised 3D project design with automated energy prediction.

ONLINE RESOURCES
Website | LinkedIn | YouTube | Twitter | Crunchbase

KEYWORDS
utility-scale solar project | GIS-based solar project

VIDEOS
Terabase platform Platform - Basic

MORE ABOUT TERABASE ENERGY FROM THE WEB
- Terabase Energy recognized as a Global Cleantech 100 company - Link
- Terafab construction automation wins GOLD at 2024 Edison Awards - Link

DECARBONISATION AVENUE : REDUCING NON-CO_2 EMISSIONS

INTRODUCTION

Human activities globally emit about 35 billion tons of CO_2 every year.

An additional 15 billion tons of CO_2 equivalent emissions happen from sources outside of CO_2 - mainly from methane & N_2O, some from refrigerant gases, and gases such as SF_6 used in applications such as sealants.

Methane emissions happen from cattle & livestock emissions, landfills, and leaks of methane from natural gas production and distribution infrastructure (natural gas flaring is another source of emissions, but the methane gets converted to CO_2 in this process).

About three-quarters of all global N_2O emissions mainly occur from agricultural fields where the nitrogen in the excess fertiliser that had not been absorbed by the crops gets converted into N_2O.

R-22, the common refrigerant in use today, has a global warming potential that is about 2000 times that of CO_2. Thus, even relatively small amounts of leaks of this refrigerant could mean significant enhancements to global warming. Similar is the case with SF_6, which has a potential that is 22,000 times that of CO_2 over a hundred years.

Given the diverse nature and sources of these emissions, it will be quite challenging to mitigate all of them quickly. Some of these sources - landfill emissions, for instance - could see significant successful abatement efforts during the 2020-2030 period, while others - for instance, controlling N_2O emissions from agriculture - could prove far more challenging.

For the 2020-2030 period, innovations for this domain will be around leakage detection systems, alternative refrigerants, landfill gas management, and solutions for farmers to decrease N_2O emissions through alternative fertilisers or better fertiliser application systems.

Decarbonization potential

N_2O comprises about 6.5% of total GHG emissions or about 3.3 billion tons of CO_2 equivalent per year. 75% of these emissions come from agricultural operations.

85 million tons of methane emissions - equivalent to about 1.85 billion tons of CO_2 - occurred from oil and gas operations in 2022, split into roughly equal parts between the two. These emissions came from a wide variety of sources along the oil and gas

value chains, from conventional and unconventional production, from the collection and processing of gas, as well as from its transmission and distribution to end-use consumers. Some emissions are accidental, for example, because of a faulty seal or leaking valve, while others are deliberate, often carried out for safety reasons or due to the design of the facility or equipment.

The HFC gases, used mainly as refrigerants, contribute about 1.1 billion tons of CO_2 equivalent emissions per year. HFC-134a and HFC-152a account for the majority of emissions from all HFC variants.

About 300 million tons of CO_2 equivalent emissions happen from SF_6,and PFC together. About 8000 tons of SF_6, are emitted per year, mainly from its use in gas-insulated switchgear. As SF_6 has a very high GWP potential (about 23500 times that of CO_2), SF_6 contributes to almost 200 million tons of CO_2 equivalent emissions per year. PFCs are used in the electronics industry for semiconductor production and contribute to about 100 million tons of CO_2 equivalent per year.

Current & Emerging Technologies in the Avenue

- Landfill gas management technology for autotuning and remote monitoring of wellfields
- Methane emission sensing technology using satellites
- SF_6 free switch gears for medium voltage applications
- Commercialising of Landfill gas into Renewable natural gas through mid-sized facilities
- Cloud-Based platform for tracking and managing oil and gas emissions data
- Laser technology for real-time tracking of methane emission in Oil and gas sector
- Laser dispersion spectroscopy for high sensitivity real-time gas sensing
- Drone based Methane detecting sensor for offshore emissions measurement
- Upgradation facility for landfill gas into biomethane

Innovation & Startup Analysis

Urgency of Decarbonisation Avenue

Methane Emission Reduction in Oil and Gas Operations

- Methane is a potent greenhouse gas with a global warming potential significantly higher than CO_2. The oil and gas industry is a major emitter of methane, primarily through leaks and flaring. Rapid detection and reduction of these emissions are crucial for mitigating climate change.
- **Catering Startup: GHGSAT** specialises in monitoring emissions using satellite technology, providing a comprehensive and effective solution for tracking and reducing methane emissions on a global scale.

SF6-Free Solutions in Electrical Switchgear

- Sulphur hexafluoride (SF_6) is used extensively in electrical switchgear but has a global warming potential nearly 24,000 times greater than CO_2. As electricity usage grows worldwide, replacing SF_6 with more sustainable alternatives becomes increasingly urgent.
- **Catering Startup: nuventura** offers innovative SF_6-free switchgear, aligning with global trends to reduce the use of this harmful gas.

Conversion of Landfill Gas to Renewable Natural Gas (RNG)

- Landfills are significant sources of methane emissions. Converting landfill gas to RNG can reduce these emissions while producing sustainable energy. This conversion aligns with the global shift towards renewable energy sources and the reduction of waste.
- **Catering Startup: VisionRNG** offers technologies and services to capture, process, and commercialise landfill gas at mid-sized sites, turning a pollution source into a clean energy resource.

High-Precision, Real-Time Methane Detection

- Quick and accurate detection of methane emissions is crucial for rapid response and mitigation, especially in remote or difficult-to-monitor locations. Advanced technologies are needed to address this effectively.
- **Catering Startup: MIRICO** Ltd uses Laser Dispersion Spectroscopy (LDS) technology for high-resolution chemical analysis, allowing for precise and timely detection of methane emissions.

Unique Ideas derived from startups

- **Apis Innovations:** Develop an AI-driven predictive maintenance system for landfill gas collection equipment to optimise efficiency and reduce emissions further.

- **Arolytics:** Integration of AI and machine learning to enhance emissions management software, enabling predictive analytics for emission hotspots and regulatory compliance.
- **GHGSAT:** Expand satellite monitoring to include real-time alert systems for sudden emission spikes, providing immediate data to industries for rapid response.
- **LongPath Technologies, Inc:** Use of advanced AI algorithms for analysing data from long-range laser networks to predict potential emission leakages in the oil and gas sector.
- **MIRICO Ltd:** Partner with drone technology firms to create mobile methane detection units, allowing for rapid deployment in remote or difficult-to-access areas.
- **Nuventura:** Develop a modular SF6-free switchgear design, enabling easier and cost-effective upgrades from existing infrastructure for a broader range of customers.
- **SEEKOPS:** Incorporate advanced image processing and AI for enhanced accuracy in methane leak detection from drone footage, especially in offshore environments.
- **VisionRNG:** Explore partnerships with municipal waste management services to convert more landfill gas into RNG, aligning with the circular economy trend.
- **WAGA ENERGY:** Implement blockchain technology for tracking and certifying the origin of biomethane, enhancing transparency and market value for renewable natural gas.
- **Windfall Bio:** Collaborate with agricultural tech companies to integrate methane-eating microbes into smart farming solutions, promoting sustainable agriculture practices

Commercialisation Potential

- **GHGSAT:** GHGSAT's unique satellite-based approach to monitoring greenhouse gas emissions, especially methane, offers a highly scalable and globally applicable solution. This technology is particularly relevant given the increasing worldwide emphasis on reducing greenhouse gas emissions and the need for accurate, large-scale monitoring capabilities.
- **Arolytics:** Specialising in emissions management software, Arolytics aligns well with the growing demand for regulatory compliance tools across a wide

range of industries. Their software solutions are adaptable, easy to integrate with existing systems, and meet the urgent need for efficient and accurate emissions tracking and reporting, making them highly marketable.

- **MIRICO Ltd:** MIRICO Ltd stands out with its high-precision, real-time methane detection technology. Given the critical importance of rapidly detecting and managing methane leaks to mitigate climate impact, their technology is highly relevant for a variety of industries, from oil and gas to waste management, enhancing their commercial viability

Scalability

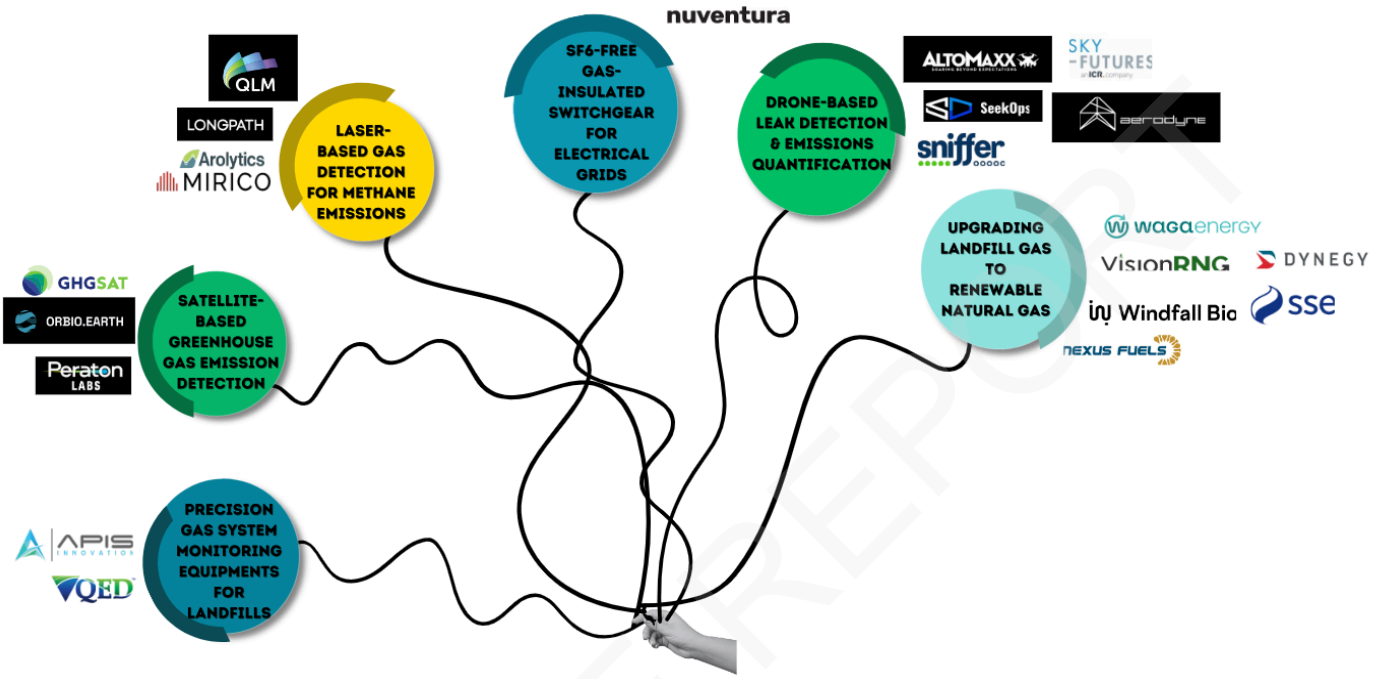
- **GHGSAT:** GHGSAT's satellite technology allows for global monitoring of greenhouse gas emissions with relatively few physical constraints. The ability to monitor emissions from space eliminates many logistical challenges associated with ground-level monitoring, making it highly scalable across various geographic regions and industries.
- **Arolytics:** As a software-based solution, Arolytics offers emissions management software that can easily be scaled across different industries and regions. Software solutions typically have high scalability due to low marginal costs for additional users and the ease of deploying updates and new features.
- **MIRICO Ltd:** While MIRICO Ltd's technology involves hardware (Laser Dispersion Spectroscopy), it is designed for portability and adaptability across various industrial settings. The growing need for accurate, real-time methane detection across multiple sectors positions it as a scalable solution, especially as awareness and regulation of methane emissions increase globally

HIGHLIGHTS OF INNOVATIONS & STARTUPS

Opportunity	Startups	Innovation/ Technology	Links
Precision gas system monitoring equipments for landfills	Geosphere	Geosphere offers a comprehensive suite of landfill gas management services, including gas monitoring, extraction, and utilisation. Their solutions likely involve precise monitoring equipment and techniques to ensure efficient and safe gas management.	https://www.gedenv.com/en-us/
	Apis Innovations	Precision gas system monitoring equipments for landfills	https://www.apisinnovation.com/
Satellite-based greenhouse gas emission detection.	Orbio Earth	Orbio Earth leverages satellite data and data fusion algorithms to provide insights into methane emissions. They focus on pinpointing and quantifying emissions from various sources, including agriculture, waste, and energy production.	https://www.orbio.earth/
	Peraton Labs	Peraton Labs utilises a constellation of small satellites equipped with advanced sensors to detect and measure methane emissions from various sources.	https://www.peratonlabs.com/index.html
	GHGSAT	Monitoring emissions with satellite data	https://www.ghgsat.com/en/
Advanced laser-based gas detection for methane emissions.	QLM Technology	QLM Technology develops compact, high-sensitivity, and low-power TDL-based gas detection and imaging systems. Their solutions cater to various applications, including methane leak detection in the oil and gas, waste management, and environmental monitoring sectors.	https://qlmtec.com/
	LongPath Technologies, Inc	Methane leak detection & quantification	https://www.longpathtech.com/
	Arolytics	Emissions management software and modelling solutions	https://www.arolytics.com/
	MIRICO Ltd	High precision, real-time methane detection	https://mirico.co.uk/
SF6-free gas-insulated switchgear for electrical grids.	nuventura	SF6 free switchgear.	https://www.nuventura.com/
	Altomaxx Technologies	A Canadian company that provides drone-based methane detection solutions for the natural gas industry. Their sensor uses Tunable Diode Laser Absorption Spectroscopy (TDLAS) to detect methane leaks with a low detection limit.	https://www.altomaxx.com/

Drone-based leak detection and emissions quantification.	Sniffer Robotics	A US-based company that offers the SnifferDRONE™ technology for surface emission monitoring (SEM) at landfills. This technology is approved by the US EPA as Other Test Method 51 (OTM-51) and helps automate the process of detecting and locating fugitive methane emissions.	https://www.snifferrobotics.com/
	Sky-Futures	A Swiss company that offers drone-based solutions for various industries, including leak detection and emissions monitoring. They use a combination of sensors and AI to identify and quantify emissions from various sources, such as oil and gas facilities, landfills, and power plants.	https://www.icr-world.com/solutions/inspection/sky-futures-uas-inspection/
	Aerodyne Group	A Singapore-based company that provides drone-based solutions for environmental monitoring, including leak detection and emissions quantification. They offer a variety of services, such as pipeline inspections, flare stack monitoring, and emissions mapping.	https://aerodyne.group/
	SEEkOps	End-to-end gas emissions inspection operations	https://seekops.com/
Upgrading landfill gas to renewable natural gas.	Nexus Fuels	A US-based company that uses a proprietary thermal conversion process to upgrade landfill gas to RNG. Their process is highly efficient and can produce RNG with a lower carbon footprint than other methods.	https://nexusfuels.co.za/
	Airtricity	A US-based renewable energy company that owns and operates several RNG facilities, including those that upgrade landfill gas. They are committed to expanding their RNG portfolio and helping to reduce greenhouse gas emissions.	https://www.sse.com/
	Dynegy	A large US energy company that is investing in RNG production from various sources, including landfills. They are developing and deploying new technologies to capture and upgrade landfill gas into clean, renewable energy.	https://www.dynegy.com/
	WAGA ENERGY	Biomethane from landfill gas	https://waga-energy.com/en/
	VisionRNG	Landfill gas to RNG project development services	https://visionrng.com/
	Windfall Bio	Methane eating microbes to make organic soil nutrients on-site	https://www.windfall.bio/

REDUCING NON - CO2 INDUSTRIAL & AGRICULTURAL EMISSIONS : INNOVATION SPECTRUM & STARTUPS



List of 10 High Impact Startups for Reducing Non-CO_2 Industrial & Agricultural Emissions

- Apis Innovations
- Arolytics
- GHGSAT
- LongPath Technologies, Inc.
- MIRICO Ltd
- nuventura
- SEEkOps
- VisionRNG
- WAGA ENERGY
- Windfall Bio

Reducing Non-CO_2 Industrial & Agricultural Emissions Startups Showcase

APIS INNOVATIONS

PRODUCT
Precision gas system monitoring equipments for landfills

TECHNOLOGY / PROCESS
Precision gas system

VALUES
Enables landfills to have control of gas collection
Algorithm pinpoints failures and problematic operational conditions - allowing for immediate corrective action.

TEAM
Gregory Chrin

COUNTRY OF ORIGIN
USA

HIGHLIGHTS
The device can also operate autonomously, constantly calculating ideal valve control parameters based on current sensor readings and gas well history.

ONLINE RESOURCES
Website | LinkedIn | | Twitter
Crunchbase

KEYWORDS
Precision gas system monitoring

MORE ABOUT APIS INNOVATIONS FROM THE WEB

- This device captures a greenhouse gas, and just won a tech-startup competition - Link
- The API Innovation Center, Apertus Pharmaceuticals Form Partnership - Link

AROLYTICS

PRODUCT
Emissions management software and modelling solutions

TECHNOLOGY / PROCESS
LDAR Software and modelling solutions

VALUES
- Enable clients to design, manage, and track the most efficient emission reduction programs
- Provides third-party data transparency while aligning with regulatory and corporate ESG objectives.

TEAM
Liz O'Connell

COUNTRY OF ORIGIN
Canada

HIGHLIGHTS
They work with oil & gas producers, support service providers, consultants, regulators & governments.

ONLINE RESOURCES
Website | LinkedIn | | Twitter
Crunchbase

KEYWORDS
Software and modelling solutions | Methane detection and quantification

VIDEOS
One-on-one with Emmaline Atherton from Arolytics

MORE ABOUT AROLYTICS FROM THE WEB
- Arolytics secures seed financing - Link
- Canada's new greenhouse gas rules set stage for startup software battle - Link
- Arolytics Recognized as One of Canada's Best Startup Employers by Forbes, 2024 - Link

GHGSAT

PRODUCT
Monitoring emissions with satellite data

TECHNOLOGY / PROCESS
Satellite technology.

VALUES
Provide greenhouse gas emissions monitoring data and services globally, with better accuracy, at a fraction of the cost of comparable alternatives.

TEAM
Stephane Germain

COUNTRY OF ORIGIN
Canada

HIGHLIGHTS
Industrial facilities are now able to monitor all of their facilities, local or remote, anywhere in the world, with common technology, in near-real-time.

ONLINE RESOURCES
Website | LinkedIn | YouTube | | Twitter
Crunchbase

KEYWORDS
GHG emissions monitoring

VIDEOS
Greenhouse gas emissions monitoring from Space - GHGSat

MORE ABOUT GHGSAT FROM THE WEB
- GHGSat launches pulse - a free and unique high-resolution methane map - Link
- Canadian start-up GHGSat to make global methane map - Link
- GHGSat's new research to track offshore methane emissions by satellite - Link
- GHGSat: Commercial satellite will see CO_2 super-emitters - Link
- Four years in a row, GHGSat has been named one of Fast Company's Most Innovative Companies of 2024 in the sustainability category - Link

LONGPATH TECHNOLOGIES, INC.

PRODUCT
Methane leak detection & quantification

TECHNOLOGY / PROCESS
Long-range laser networks

VALUES
Uses patented, long-range laser networks to provide the lowest cost detection and quantification of specific emissions sources across large areas.

TEAM
Ian Dickinson

COUNTRY OF ORIGIN
USA

HIGHLIGHTS
- Minimise Emissions.
- Maximise Returns.
- Execute ESG & RSG goals.

ONLINE RESOURCES
Website | LinkedIn | YouTube | | Twitter
Crunchbase

KEYWORDS
Methane leak detection | Emission quantification system

VIDEOS
LongPath Technologies methane leak detection

MORE ABOUT LONGPATH TECHNOLOGIES, INC. FROM THE WEB
- LongPath seeks to commercialise frequency comb-based tech for methane leak detection - Link
- Can a new wave of laser and aerial imagery technologies slash methane emissions? - Link
- LongPath Technologies Raises $22 Million Series A to Meet Accelerating Demand for its Patented Methane Monitoring Network - Link
- Longpath Technologies Secures Up To $189m Conditional Loan Commitment From U.S. Department Of Energy For Usa Methane Emissions Monitoring Network - Link

MIRICO LTD

PRODUCT
High precision, real-time methane detection

TECHNOLOGY / PROCESS
Laser Dispersion Spectroscopy (LDS) technology

VALUES
Combining the use of advanced mid-infrared lasers with the patented Laser Dispersion Spectroscopy technique for high-resolution chemical analysis

TEAM
Bob Flint

COUNTRY OF ORIGIN
United Kingdom

HIGHLIGHTS
Actively designing and developing LDS to set new standards for gas sensing in challenging measurement conditions for targeted applications in the oil and gas and environmental science.

ONLINE RESOURCES
Website | LinkedIn | | Twitter
Crunchbase

KEYWORDS
High precision methane detection | Laser Dispersion Spectroscopy

VIDEOS
High precision, real-time methane detection

MORE ABOUT MIRICO LTD FROM THE WEB

- Mirico Cloud identifies emission changes - Link
- MIRICO LIBRA™ enables the collection of high sensitivity, real-time gas concentration data even in challenging environments - Link
- MIRICO announces release of MIRICO CLOUD for oil and gas industry - Link
- Mirico Joins Global Initiative to Cut Methane Emissions - Link

NUVENTURA

PRODUCT
SF6 free switchgear.

TECHNOLOGY / PROCESS
Replacing SF6 with dry air for medium voltage gas insulated switchgear

VALUES
Eliminates emissions of SF_6, a potent greenhouse gas that has a global warming potential that is almost 24,000 times that of CO_2

TEAM
Manjunath Ramesh
Fabian Lemke

COUNTRY OF ORIGIN
Germany

HIGHLIGHTS
- For medium voltage applications
- As compact as an SF6 switchgear
- Offers real-time monitoring and quick and predictive uptime

ONLINE RESOURCES
Website | LinkedIn | YouTube | | Twitter
Crunchbase

KEYWORDS
Gas insulated switchgear | SF6 free switchgear

VIDEOS
The story of NUVENTURA

MORE ABOUT NUVENTURA FROM THE WEB
- Nuventura raises new funding to support global expansion of SF6-free gas insulated switchgear - Link
- Nuventura : Switching it Up a Gear - Link
- Nuventura's SF_6-free GIS installed in Austrian Grid - Link

SEEKOPS

PRODUCT
End-to-end gas emissions inspection operations

TECHNOLOGY / PROCESS
Drone-agnostic SeekIR system

VALUES
Source detection, localization, and quantification provides unique commercial capabilities for rapid and efficient leak detection with an efficiency five times greater than existing methods

TEAM
Iain Cooper

COUNTRY OF ORIGIN
USA

HIGHLIGHTS
Provides effective solutions for natural gas detection needs to benefit both large and small companies.

ONLINE RESOURCES
Website | LinkedIn | YouTube
Crunchbase

KEYWORDS
Software and modelling solutions | methane detection and quantification

VIDEOS
SeekOps Advanced Sensor Technology

MORE ABOUT SEEKOPS FROM THE WEB

- SeekOps secures venture funding to scale drone-based emissions systems - Link
- Sky-Futures partners with SeekOps to support global expansion of drone-based fugitive emissions detection service - Link
- Flylogix, SeekOps combine for offshore UK methane detection - Link
- SeekOps Announces Closing of $14M Series B Financing - Link

VisionRNG VISIONRNG

PRODUCT
Landfill gas to RNG project development services

TECHNOLOGY / PROCESS
LFG technologies

VALUES
Capture, process, and commercialise Landfill Gas at mid-sized sites previously considered too small for viable projects.

TEAM
Bill Johnson

COUNTRY OF ORIGIN
USA

HIGHLIGHTS
Developed numerous biogas, conventional natural gas, and other infrastructure projects, including over 70 LFG beneficial use projects.

ONLINE RESOURCES
Website | LinkedIn
Crunchbase

KEYWORDS
Operating LFG-to-RNG facilities | Conventional natural gas

MORE ABOUT VISIONRNG FROM THE WEB

- Colorado company invests $100 million in startup collecting renewable natural gas from landfills - Link
- Vision RNG Brings on Industry Veteran COO and New General Counsel - Link
- BCCK partners with Vision RNG to pave pathway to carbon neutrality in Ohio landfills - Link
- Vision RNG Enters Into Agreement for Three Landfill Gas to Renewable Natural Gas Facilities - Link

WAGA ENERGY

PRODUCT
Biomethane from landfill gas

TECHNOLOGY / PROCESS
Membrane filtration

VALUES
Recovers the methane emitted by landfills and thus reduces landfill emissions to atmosphere

TEAM
Guénaël Prince
Mathieu Lefebvre

COUNTRY OF ORIGIN
Germany

HIGHLIGHTS
Purchases landfill gas from landfill site operators, funds the construction and operation of WAGABOX® units, and sells biomethane to energy utilities.

ONLINE RESOURCES
Website | LinkedIn | YouTube | | Twitter
Crunchbase

KEYWORDS
Grid-compliant RNG | Biomethane

VIDEOS
From landfill gas to grid compliant Renewable Natural Gas (RNG)

MORE ABOUT WAGA ENERGY FROM THE WEB

- Producing grid-compliant renewable natural gas from landfill gas - Link
- Waga Energy to deploy its break-through landfill renewable natural gas technology in Quebec - Link
- Waga Energy and Arcavi start up a WAGABOX unit - Link
- USD $60M to finance Waga Energy's first projects in the United States - Link

WINDFALL BIO

PRODUCT
Methane eating microbes to make organic soil nutrients on site

TECHNOLOGY / PROCESS
Microbial conversion of GHG gases

VALUES
Improves soil health with organic bio compost and reduces reliance on synthetic fertilisers.

TEAM
Josh Silverman
Carla Risso
Louis Stenmark

COUNTRY OF ORIGIN
USA

HIGHLIGHTS
Management software to overlook the methane to soil resource stream.
Ability to prepare low GHG food products and access to carbon credits

ONLINE RESOURCES
Website | LinkedIn | | Twitter
Crunchbase

KEYWORDS
Climate positive agriculture | Sustainable farming

MORE ABOUT WINDFALL BIO FROM THE WEB

- Meet the 'methane man' with a mission: Using microbes to eat up the greenhouse gas - Link
- Windfall Bio raises seed funding to launch the world's first fertiliser made from methane. - Link

The sample content from the highlights section are provided for:

1. ***High impact startups and their latest funding***
2. ***Startups with women founders***

HIGH IMPACT STARTUPS AND THEIR LATEST FUNDINGS - GLOBAL DATA

Here is a curated list of prominent climate startups with high solution impact and funding.

Apeel Sciences

- **Product:** Plant-based coating, to reduce oxidation & wastage.
- **Funding:** Raised a total of 720 M funding, with 11 rounds latest being in May 2024.
- **Website – Apeel Sciences**

Canoo

- **Product:** Varied types of EV manufacturing including, Lifestyle vehicles, pickup vehicles, and delivery vehicles.
- **Funding:** Raised a total of 595 M in 3 funding rounds, the latest being in Oct 2023.
- **Website:** Canoo

Stem

- **Product:** AI with energy storage to automate energy cost savings.
- **Funding:** Raised a total of 583 M in 18 rounds of funding, latest being in April 2021.
- **Website:** Stem

Celsius Energy

- **Product:** Geothermal energy systems for buildings
- **Funding:** Raised a total of 488 M in 3 rounds of funding, latest being in June 2021.
- **Website:** Celsius Energy

Ola Electric Mobility

- **Product:** Electric vehicle manufacturer and ride-hailing services
- **Funding:** Raised a total of 430 M in 13 rounds, latest being in October 2023.
- **Website:** Ola Electric Mobility\

Natron Energy

- **Product:** Manufacturer of sodium-ion batteries
- **Funding:** Raised a total of 298 M in 7 rounds of funding, latest being in Jan 2024.
- **Website:** Natron Energy

Energy Dome

- **Product:** CO_2 battery technology
- **Funding:** Raised a total of 167 M in 10 rounds, latest being in Dec 2023.
- **Website:** Energy Dome

Sonnen

- **Product:** Intelligent home battery storage systems
- **Funding:** Raised a total of 162 M in 7 rounds, latest being in May 2018.
- **Website:** Sonnen

EnerVenue

- **Product:** Metal-hydrogen batteries
- **Funding:** Raised a total of 112 M in 2 rounds, latest being on Sep 2021
- **Website:** EnerVenue

Eavor

- **Product:** A scalable form of clean, baseload, and dispatchable power from a geothermal source.
- **Funding:** Raised 504 M in 15 rounds, latest being on May 2024
- **Website:** Eavor

Fervo Energy

- **Product:** Geothermal power projects developer
- **Funding:** Raised a total of 423 M in 12 rounds, latest being on June 2023
- **Website:** Fervo Energy

Infinitum Electric

- **Product:** Lighter-weight and less expensive electric motors with PCB stator
- **Funding:** Raised a total of 352 M in 8 rounds, latest being on Nov 2023
- **Website:** Infinitum Electric

Aerofarms

- **Product:** Indoor vertical farming solution
- **Funding:** Raised a total of 256 M in 14 rounds, latest being on Apr 2024
- **Website:** Aerofarms

Climeworks

- **Product:** Direct Air Capture machines to capture CO_2
- **Funding:** Raised a total of 815 M in 9 rounds, latest being on Apr 2024
- **Website:** Climeworks

Pivot Bio

- **Product:** Nitrogen innovator providing farmers and the world with better nitrogen for improved productivity and sustainability.
- **Funding:** Raised a total of 616 M in 7 rounds, latest being on July 2021
- **Website:** Pivot Bio

Crusoe Energy

- **Product:** Digital Flare Mitigation systems
- **Funding:** Raised a total of 1.14 B in 10 rounds, latest being on Dec 2023
- **Website:** Crusoe Energy

STARTUPS WITH WOMEN FOUNDERS - GLOBAL DATA

Here is a curated list of prominent women founded climate startups with high solution impact and amount funded.

Twelve

- **Product:** Manufacturing materials and fuels from CO_2, offering a sustainable alternative to fossil fuels.
- **Funding:** Raised a total of 200 M in 8 rounds latest being on June 2022
- Etosha Cave - Co-Founder
- **Website:** Twelve

Air Protein

- **Product:** Meat alternative technology designed to create protein out of ordinary carbon dioxide.
- **Funding:** Raised a total of 107 M in 2 rounds, latest being in May 2023.
- Lisa Dyson - CEO & Founder
- **Website:** Air Protein

Aclima

- **Product:** Measures air quality and greenhouse gases at a hyperlocal level through a network of sensors.
- **Funding:** Raised a total of 64 M in 3 rounds, latest being on June 2023
- Davida Herzl - CEO & Co-Founder
- **Website:** Aclima

GreyParrot

- **Product:** AI to enhance waste sorting and management
- **Funding:** Raised a total of 31 M in 4 rounds, latest being on Feb 2024
- Mikela Druckman - CEO & Co-Founder
- Website: Greyparrot

Camus Energy

- **Product:** Grid management technology that supports the integration of renewable energy sources
- **Funding:** raised a total of 30 M in 3 rounds, latest being Feb 2023
- Astrid Atkinson - CEO & Co-Founder
- **Website:** Camus Energy

Plan A

- **Product:** Automated carbon accounting and decarbonization.
- **Funding:** Raised a total of 27 M in 1 round, latest being on Sept 2023
- Lubomila Jordanova - Co-Founder
- **Website:** Plan A

ChargerHelp

- **Product:** Repair and maintenance of electric vehicle charging stations
- **Funding:** Raised a total of 20 M in 1 round, latest being on Jan 2023
- Kameale C. Terry - CEO & Co-Founder
- **Website:** ChargeHelp

Power Ledger

- **Product:** Renewable energy tracking and trading using blockchain technology
- **Funding:** Raised a total of 35 M in 3 rounds, latest being in June 2023.
- Jemma Green - Co-Founder
- **Website:** Power Ledger

Keel Labs

- **Product:** Sustainable materials that mimic the efficiency of marine ecosystems, focusing on sustainable textile solutions. One of their flagship products is Kelsun™ fibre.
- **Funding:** Raised a total of 17.6 M in 4 rounds, latest being on April 2022
- Tessa Callaghan - CEO & Co-Founder; Aleksandra Gosiewski - COO
- **Website:** Keel Labs

Huue

- **Product:** Reinventing the way sustainable dyes, particularly for denim, are produced
- **Funding:** Raised a total of 18.4 M in 8 rounds, latest being on June 2022
- Michelle Zhu - CEO & Co-Founder
- **Website:** Huue

Abatable

- **Product:** Carbon offsetting procurement platform.
- **Funding:** Raised a total of 16.6 M in 3 rounds, latest being on Aug 2021
- Maria Eugenia Filmanovic - CEO & Co-Founder
- Website: Abatable

Rated Power

- **Product:** Cloud-based design software for utility-scale solar PV plant
- **Funding:** Raised a total of 6.1 M in 6 rounds, latest being on Oct 2021
- Andrea Barber **–** Co-Founder & CEO
- **Website:** Rated Power

Emrgy

- **Product:** Modular hydro-turbines
- **Funding:** Raised a total of 68 M in 11 rounds, latest being on Apr 2023
- Emily Morris – Founder & CEO
- **Website:** Energy

Enerdrape

- **Product:** Modular geothermal panel-like technology
- **Funding:** Raised a total of 25 M in rounds 14 rounds, latest being on Jan 2024
- **Margaux Peltier –** Co-Founder
- **Website:** Enerdrape

Dandelion Energy

- **Product:** The Dandelion geothermal system replaces residential AC and heating equipment with a heat pump
- **Funding:** Raised a total of 135 in 7 rounds, latest being on Nov 2022
- Kathy (Cooper) Hannun **–** Founder & President
- **Website:** Dandelion Energy

SINAI Technologies

- **Product:** Decarbonization software platform to measure, analyse, price, and reduce emissions.
- Maria Carolina Fujihara **–** Founder & CEO
- **Funding:** Raised a total of 36 in 4 rounds, latest being on Sept 2022
- **Website:** SINAI Technology

Agreena

- **Product**: Carbon trading platform for agricultural commodities
- Ida Boesen **–** Co-Founder
- **Funding:** Raised a total of 77.4 in 3 rounds, latest being on Mar 2023
- **Website:** Agreena

Shiok Meats

- **Product:** Cultivated meat and seafood
- **Funding:** Raised a total of 30 in 6 rounds, latest being on Jul 2021
- Sandhya Sriram – Co-Founder & CEO
- **Website:** Shiok Meats

Strella Biotechnology

- **Product:** Agricultural biotech startup building biosensors that can predict the ripeness of fruit
- **Funding:** Raised a total of 12 M in 5 rounds, latest Mar 2023
- Katherine Sizov – Co-Founder & CEO
- **Website:** Strella Biotechnology

Grey Parrot

- **Product:** Grey Parrot AI Waste Recognition System
- **Funding:** Raised a total of 31 M in 7 rounds, latest being on Feb 2024
- Mikela Druckman – Co-Founder & CEO
- **Website:** Grey parrot

Evo Foods

- **Product:** Plant-based liquid egg
- **Funding:** Raised a total of 4.3 M in 5 rounds, latest being in Apr 2021.
- Shraddha Bhansali – Co-Founder
- **Website:** Evo Foods

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