

onward 

An Equation for Change

Working together to solve for a net-zero future



Foreword

Humanity is at a tipping point. Some would deny that it's happening, while others say it's too late to change our trajectory. But enough of us believe inaction is not an option. We have the capacity to address the challenges of our changing planet, and it doesn't have to be at the expense of human progress.

Onward is a community of people who see what science tells us: We can change how the world produces and uses energy. We can correct climate impacts and work toward a more sustainable planet. And we can do it in a just and equitable way.

We're building something different at Onward. The global energy transition requires sustained, collaborative thinking and a multitude of solutions. There isn't a single invention or discovery that's going to change everything, and some people may not yet know that they can help make a difference. In fact, some contributions will seem small — until they're multiplied across an entire population.

Onward is a platform for change. A platform designed to engage creators and thinkers with inspiration, resources, and meaningful connections.

We are curating an interdisciplinary ecosystem where those seeking to make a difference are supported and rewarded — whether it's for a one-time contribution or a once-in-a-lifetime innovation.

Much of the technology we will need to navigate the energy transition hasn't been thought of yet, and only with collective effort can we hope to make progress toward a sustainable energy future. Involvement is needed at every level. Ideas and unique skills have as much value as hard work and financial investments. We know our ambitions are big. This is a call for more people to think big with us.



Jeff Allyn
CEO of Onward

Solving for a sustainable energy future

Onward is an organization dedicated to discovering and nurturing solutions to humanity's biggest problems through a collaborative ecosystem fueled by data, powerful tools, expertise, and a vision of a sustainable and equitable energy future.

Inertia doesn't solve problems

There are a number of paradoxes that can hinder addressing our global climate and energy crisis. We all need to be part of the solution, but individual actions are frustratingly inadequate. Dramatic news gets everyone's attention, yet a persistent state of

fear can leave people disengaged and paralyzed. We want someone to have the answer, but it's not a single problem. Every new temperature record, natural disaster, and extinction event adds a pixel to the picture of an unwell planet. Humanity's biggest challenge is huge, complex, and multifaceted.

But not hopeless.

"The greatest threat to our planet is the belief that someone else will save it."

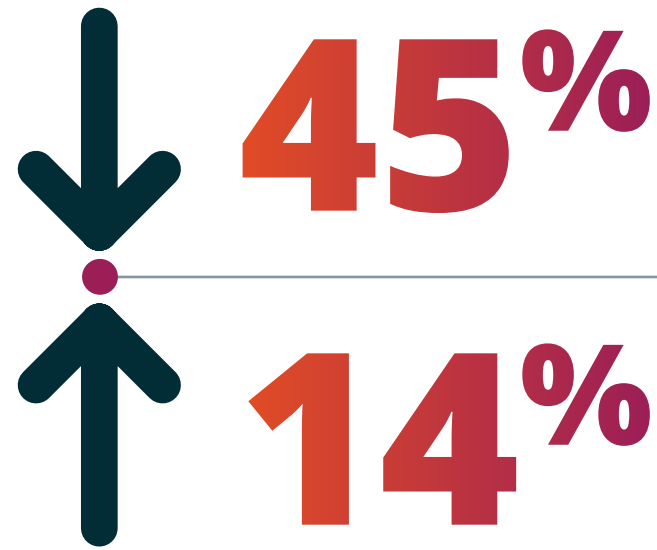
Robert Swan, Explorer



Time is no longer running out to act on climate change; it's up, and **the global economy is at a crossroads**. But, if the world acts now to rapidly achieve net-zero emissions by mid-century, the transformation of the economy would set the world up for stronger economic growth by 2070."¹

Deloitte, Global Turning Point, 2022

There's no debate:



We must **reduce carbon emissions by at least 45%²** in the next decade. Yet the world is on track to **increase emissions 14%³** by 2030.

Populations are experiencing devastating impacts of climate change while still demanding the products and conveniences of a modern society — the stuff it takes energy to produce, transport, and dispose of.

With our eyes open to the problems, the causes, and the impacts, Onward is painting a new vision: a sustainable and equitable energy future that works for everyone. That vision is just as big and complex as the challenges we're facing. But it gives us something to work on.

"It's going to take a multitude of solutions for us to solve the energy crisis, but it's critical that we're solving problems that actually have demand."

Max Gray, Director of the Onward Accelerator

2. [For a livable climate: Net-zero commitments must be backed by credible action](#), United Nations, 2023

3. [Emissions Set to Rise 14 Per Cent by 2030: A perfect storm is brewing](#), United Nations, June 2022

4. [How the World Consumer Class Will Grow from 4 Billion to 5 Billion By 2031](#), Brookings, July 2023



More than half of the world's population is now in the consumer class. Without a major economic shock, the world will add another billion consumers in just eight years — the shortest time ever recorded.⁴

This has profound implications for energy demand."

Brookings, 2023

The Onward Equation

If you're reading this, you don't need to be convinced that there's a climate crisis. And you probably agree that humanity is worth saving. Onward is exploring every aspect of a sustainable and resilient energy future; how we're going to adapt to a changing climate while ensuring equitable and secure energy for everyone.

It all comes together in the Onward Equation. We're providing people with the data, tools, opportunities, and rewards to make this happen.

Every piece of the equation works together, and must work together, to achieve a future we don't have to apologize for.

Discover how Onward is changing the way we tackle earth's biggest problems, and ask yourself: How do you see yourself in the equation? What motivates you? What's your plan to save humanity?

Do the math and help us solve for E.



$$e = \left\{ \left[p^3 \times (d + t + o) \right] \times \$ \right\}$$

A sustainable energy future

People Data Tools Opportunities Money

Giving power to climate changemakers

No single person, policy, or breakthrough is going to fix this urgent crisis. That's why Onward is creating an ecosystem of scientists, entrepreneurs, and changemakers who are working on every aspect of the problem. And we're providing the resources and support to develop ideas into products that meet real human needs.

When it comes to changing the way we power our future, no one should have a reason to say, "That's not my job." As it has been throughout history, human ingenuity must drive our ability to adapt and survive. Imagine if everyone with something to contribute became part of the solution.

Changing energy systems for a planet requires collective action and collective intelligence. We need:

Thinkers

Generating big ideas with creativity and an innovator's mindset. Onward collaborators are designing solutions that answer global energy needs in every sector.

Meet Bob:

Professor of mathematics by day, solving Onward challenges after students have left the building. Pocketed \$8,000 for a groundbreaking solution to Future in Charges.

Scientists

Contributing brainpower and expertise in unique ways. Onward presents short-term and longer-term opportunities to puzzle over humanity's most interesting problems.

Meet Audrey:

She's been crunching data since high school and recently discovered that she could make a real difference by participating in crowdsourced energy projects.

"It's a new way of working. I can do projects remotely, be part of a team, and put in as much time as I want."

Sharvnee Raja Mohan,
Recent geoscience graduate

5. [UN Secretary General Speaks on the State of the Planet](#), United Nations, December 2022



Every country, city, financial institution and company should adopt plans for transitioning to net-zero by 2050 and take decisive action now."⁵

António Guterres,
Secretary-General of the United Nations



Founders and entrepreneurs

Turning concepts into reality and bringing them to market. Onward supports those who want to build a business around clean and sustainable energy solutions.

Meet Flexergy:

This member of the Onward accelerator cohort is building technology for a highly efficient hydrogen gas compression, storage, and distribution system. Flexergy has developed a breakthrough in hydrogen compression that reduces energy losses and makes green hydrogen and biomethane projects cheaper and easier to deploy.

“The Onward Accelerator is a founder-friendly environment in every sense. The networking and being part of a cohort is extremely valuable.”

Paul Codd, CEO & Founder at Flexergy

Supporters

Multiplying opportunities and speeding innovations to the world. By making financial investments in climate challenges and energy innovation, supporters demonstrate their commitment and tangibly advance the search for solutions.

“We sponsored a challenge, and I was really impressed with how much effort everyone put into it. People are really passionate about solving these problems.”

Srichand Poludasu, Data Scientist

You

Making a difference in our sustainable energy future. Onward collaborators and contributors include experts and entrepreneurs, students and professionals, retirees and citizen scientists. Already, more than 6,000 geoscientists, data scientists, energy experts, climate tech enthusiasts, and entrepreneurs on six continents have come to the aid of the planet.

“If we assign a single subject matter expert to work on a problem, we get a narrow set of solutions. We can get more people involved with more abstract questions.”

Nate Suurmeyer, Director of Challenges

Building a platform for change

Onward's community is innovating solutions for every energy sector. We're also getting creative with new opportunities to get as many people involved as possible.

Some people may be planning to dedicate a career to energy technology, but not everyone is going to make that commitment. We offer a wide range of opportunities for short-term engagements and fascinating puzzles that can be worked on individually or as part of a team.

Companies and investors are also choosing the level at which they want to engage. The Onward Platform is being used to present complex problems as well as quick

tasks, asking for collective insights to generate solutions more quickly. Investors looking to support viable energy innovations are discovering vetted products built under the guidance of Onward advisors. Here are the types of opportunities that get people involved:

Challenges

Collaborate on solutions to some of the world's most vexing energy problems. It's a place to test skills, have fun, and get paid for winning ideas. So far, more than \$375,000 in prizes have been awarded in over 30 challenges. And there's something for everyone, with challenges that use more than 24 data types, formats, and applications.

Example challenge

Two birds, one neural network

A chef has only maple syrup and celery to create a meal. A cab driver has to get across town during rush hour with only a quarter tank of gas. A football coach is down one player and it's starting to snow on the field.

Humans excel at finding different solutions to problems, especially when their options are limited. The excitement around generative AI is bringing that level of solution-finding to algorithms.

Goal of challenge:

To develop a generative neural network that maximizes the diversity of generated outputs that meet two complex conditions.

Background to the challenge:

The original concept for this challenge comes from the difficulties of understanding the Earth using only a limited number of data sources. Earlier this year, Onward ran a challenge called "From One to Many," which looked at the fundamentals of this approach by optimizing the McAliley and Li (2021) CVAE algorithm for a simplified scenario. This challenge ups the ante with a second condition, the equivalent of adding a second geophysical measurement to constrain the subsurface scenarios and sinusoidal functions.

Who is the challenge aimed at?

Individuals or teams of data scientists or geoscientists.

What tools and resources are provided?

Everyone gets the same data and tools:

- A starter notebook
- A submission sample so you understand what we need

What are the benefits of taking part?

Each challenge is a competition and Onward believes in rewarding innovation.

- First prize: \$19,500
- Second prize: \$11,700
- Third prize: \$7,800
- The challenge judges will award two \$500 Honorable Mention prizes to submissions that show novel approaches or new insights.

Accelerator

Where startups and innovators get the support of global talent, expertise, and resources to bring product ideas to life. Already more than \$3.2 million has been invested by Onward in 18 startups. More than 200 applications have been received from founders eager to participate.

Onvol, a participant in the 2023 Onward Accelerator cohort, identified a market need and took their kinetic power harvester from drawing board to prototype in just six months. They are on target to hit \$1M in revenue within their first year.

“Onward is good for startups that are trying to enter the energy sector. They help with traction and adoption and connecting with industry professionals.”

Sidd Gupta, Founder at Nesh

Bounties

Fast, exciting puzzles that challenge individuals to unleash their inner adventurer, uncover new sources of data, or write code to win prizes worth from \$500 to \$5,000. Bounties are designed to crowdsource quick solutions to issues in emissions geolocation, distribution, optimization, electricity, satellites, and the environment.

Projects

Organizations in search of specialized expertise can tap into our global talent pool to help get answers to sticky problems. Onward has already delivered \$100 million in return on investment to participating companies.

Onward projects have so far saved companies an estimated 100 years of labor while delivering innovative solutions in a fraction of the time it would have taken in-house.

“It can be isolating to work independently and consult, and it was so nice to interact with other geoscientists and see other people’s interpretations and approaches. I have always found the experience to be positive, and to be an opportunity for growth.”

Jessica F, Geologist and project participant

Example bounty

Finders seekers: Optimize RAM usage for 3D labeling

- This bounty was one in a series of quick tasks that helped unblock a project that had been frustrating a corporate team for months.
- In just four days, three teams generated code that could be put to work improving processing time and accuracy.
- Five out of 24 participants were awarded cash prizes ranging from \$500 to \$2,000.

Innovation moonshots

The Onward Innovation Lab is a collaborative space where we tackle the most pressing energy and climate challenges. In this dedicated environment, we take calculated risks to achieve breakthroughs that benefit the planet.

The goal is to use data to move from discovery to the marketplace quickly and confidently.

Forums

Everyone who's part of the Onward ecosystem has access to conversations with like-minded people who are sharing their experiences, challenges, and expertise.

The moonshot process

Innovation

Mission statement: Ethical Energy transition and planet management by solving moonshots through community



Money makes the world go around

No one should feel uncomfortable with the idea that helping save the planet can be profitable. Sure, working on a problem that benefits all of humanity should be its own reward, but we know people are hard-wired to seek tangible personal benefits. And the most obvious reward is money.

Financial incentives apply at the macroeconomic level:

“Collaborative and coordinated climate action in pursuit of Net Zero could increase the size of the world economy by \$43 trillion in net present-value terms by 2070.”⁶

Deloitte, 2022

So why not at a personal level?

6. The Turning Point, Deloitte, June, 2022

7. Net Zero By 2050, IEA, 2021



If we want to get to global net zero by 2050, we will need to have invested \$4 trillion by 2030. **This is almost three times current investment levels.**⁷

United Nations, 2022



Be part of the Onward Equation

$$e = \left\{ \left[p^3 \times (d + t + o) \right] \times \$ \right\}$$

e Solving for a sustainable **ENERGY** future

p **PEOPLE**
Giving power to climate change makers

d + t + o **DATA, TOOLS, AND OPPORTUNITIES**
Building a platform for change

\$ **MONEY**
makes the world go round

“

We are rare and precious because we are alive, because we can think as well as we can. We are privileged to influence and perhaps control our future. **I believe we have an obligation to fight for life on Earth** — not just for ourselves, but for all those, humans and others, who came before us, and to whom we are beholden, and for all those who, if we are wise enough, will come after.”⁸

Carl Sagan

Energy

Solving for E means doing everything in our power to work toward a sustainable energy future that benefits all. By turning ideas into practical discoveries, we can engage citizens around the world and make this vision a reality.

People

The Onward Equation relies on the collaboration of innovators, scientists, and changemakers who are inclined to convert their passion into commercially viable energy and climate technologies. Each person contributes what they can and what they're capable of.

Data, tools, and opportunities

Onward pushes partners and collaborators to liberate data so it can be shared freely for faster discoveries. We're building and providing access to powerful machine learning tools and AI for examining big datasets with speed, confidence, and precision. Most important, the Onward Platform is an ecosystem of opportunities for those with the skills, ideas, and passion to do something that makes an impact.

Money is the multiplier

As with most everything in modern life, money sparks the innovation engine and makes it run. It's money that motivates, rewards, and grabs people's attention. And it's money that turns ideas into prototypes and startups into life-changing products.

The Onward Equation adds up to an ecosystem supporting simultaneous innovation in every energy sector as well as infrastructure, policy, products, and technology adoption. We're looking for ways to optimize traditional, renewable, and new energy sources in order to ensure an equitable transition with worldwide benefits.

In the Onward Equation, every variable is an additive part of the formula. We're not just an ecosystem of ideas and energy expertise. Onward is people and organizations doing what they can to identify problems, generate solutions, and move ideas from concept to prototype to reality. Only the combined efforts of many will result in meaningful progress.

Complete the equation

The Onward Equation doesn't have a single solution. But the work is motivated by a focused vision of a just and sustainable energy future. To get there, we're building an ecosystem of smart, creative people and giving them access to tools, data, and opportunities that will speed the pace of discovery.

Onward is a platform for collaboration that rewards individuals as well as teams, encouraging openness over the ownership of ideas. The problems are serious, but many of the challenges can be serious fun for the people who are coming together to help lead us to a better, more sustainable future.

That's the Onward Equation.

onward 

Be part of the community that will transform our energy future.

Learn more at ThinkOnward.com