

MAKE AGRI- CULTURE PART OF THE SOLUTION



2019 Annual Report



Shake Climate Change helps Entrepreneurs and start-ups who are combating climate change with science or tech-based ideas in the areas of agriculture and food production



What's so special about Shake?

We're not a typical fund. Imagine us more like a family – nurturing collective potential to create something truly amazing, by leveraging world class expertise in science, tech and business.

We have a shared passion and a collective ambition to tackle climate change, and we have the drive, determination and courage to push the boundaries of the food and farming industry.

We support Entrepreneurs and their bright ideas, providing them with care, mentorship and advice well beyond the initial funding to help them turn their ventures into a reality.

ABOUT

The Entrepreneur support programme, Shake Climate Change, was founded in 2019 to help new businesses with innovative ideas develop sustainable solutions to the problem of climate change caused by agriculture.

Virtually every step in the value chain associated with agriculture impacts on climate – from how food is grown or reared, to the way the food is harvested, transported, stored and distributed. In addition, farmers themselves face increasing pressure to deliver sufficient food sustainably, whilst dealing with increasingly unstable climates.

Entrepreneurs have a unique role to play in countering these challenges; they are agile and flexible in their approaches and are unencumbered by the vested interests and legacy investments of larger business and corporates.

As such, they are more likely to generate novel and creative thinking that challenges the norm and generates social benefits.

However, Entrepreneurs face many technical, social, and financial difficulties in converting their ideas into viable businesses, which is why failure rates for start-ups can be as high as 90%.

Shake Climate Change focuses on closing the gap in business development between the early start-up stage and investable businesses through provision of expert care and advice, sourced through the high-profile consortium behind the Programme and its associated network of mentors.

Shake supports Entrepreneurs and start-ups who are combating climate change through development of innovative solutions in agriculture and food production



The Programme is led by Rothamsted Research in a consortium with three leading universities – Cranfield University, the University of Hertfordshire and University College London. Together these four institutions offer excellent technical expertise, in a wide range of sciences relevant to agriculture and climate change – supported by a team of entrepreneur mentors, investment advisors, and experts in areas ranging from business development and finance, to intellectual property and Life Cycle Analysis (LCA).

Shake Climate Change Entrepreneurs are provided with an intensive, tailored programme of mentoring over an initial four-month period followed by the chance to pitch for funding investment and prolonged aftercare.

2019 was a year in which climate change featured prominently in global news. In May, when Shake Climate Change was launched, thousands of people took to the streets in protest in cities across the world, demanding more action from governments to halt climate change.

Conversely, 2020 has been a year dominated by a global pandemic with consequences at scales hitherto unseen. This crisis has identified the need for a radical re-think in how economies are structured and supported, and highlighted the importance of sustainable, agile, and resilient food systems as a key pillar of this.

The need for programmes like Shake Climate Change has never been more urgent.

FOREWORD

EXECUTIVE SUMMARY



The Consortium partners successfully established and delivered the first three phases of the initial cohort run of the Shake Climate Change Programme in 2019.

We were really pleased with the reception Shake Climate Change received in both the establishment of the Programme and its official launch. The anecdotal feedback,

quality of the personnel recruited, and the number and variety of applications received, re-confirmed the view that Shake Climate Change is a relevant, desirable and essential Programme in combatting climate change.

After a positive recruitment stage, 32 expressions of interest were received. The range of ideas and intended climate change outputs were extremely promising. Following an initial selection, 16 ventures were invited to participate in Phase I, comprising an intensive workshop held at Rothamsted Research over four days in August 2019 supported by an expert group of advisors.

32

expressions
of interest

16

ventures invited
to participate in
Phase I

11

ventures selected
for entry into
Phase 2



Following a pitching event at the end of the Phase I workshop, 11 ventures were selected for entry into Phase 2 where they received tailored support to develop their business ideas to investible propositions. In total during Phase 2, ventures received 48 days of mentoring and were involved in 70 meetings with experts

At the end of Phase 2, all the ventures pitched to the Investment Panel. In addition to being able to demonstrate a viable and investible business proposition, an essential criterion was the extent to which the innovation would impact on climate change.

The five selected ventures all delivered strong proposals in product development, route to market, competitive advantages, scalabilities, and climate change impact.

This report provides an overview of key achievements in 2019.

ANGELA KARP

Shake Climate Change
Programme Director

Shake Climate Change is a consortium-based Programme lead by Rothamsted Research in consortium with Cranfield University, University of Hertfordshire and University College London and funded by Societe Generale UK Foundation.

The Programme Steering Group (PSG) consist of one member from each Consortium Partner with a funder representative. The PSG works closely with all partners, overseeing the whole Programme and strategic direction

In 2019 the PSG held 11 PSG meetings. The PSG's primary focus was to set-up and run the Programme for the first time and to recruit Entrepreneurs and specialist advisors (SA). The members of the PSG are as follows:



ROTHAMSTED
RESEARCH



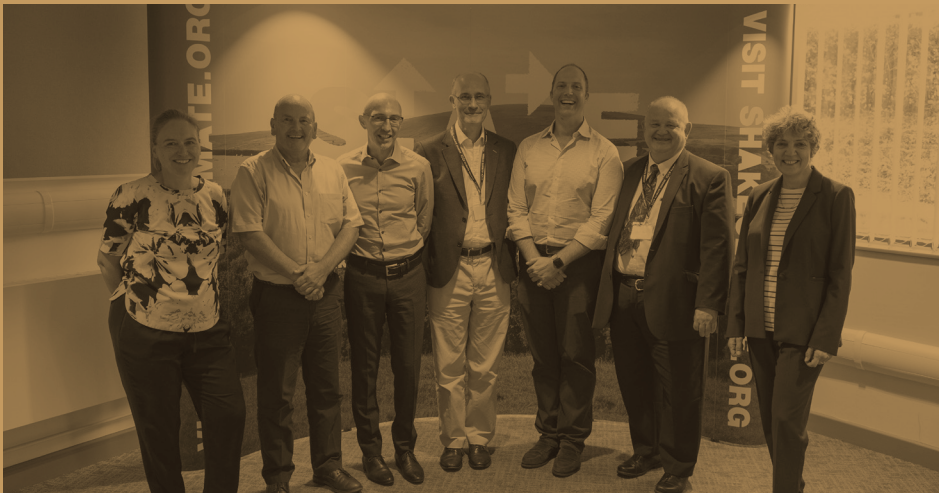
University of
Hertfordshire **UH**



**SOCIETE
GENERALE**
UK FOUNDATION

The Programme Steering Group (R-L),

Programme Director Angela Karp, Professor Jim Harris, Business advisor, Paul Rous, Professor Nigel Titchener-Hooker, Business Advisor Claudio Marinelli, Professor Nigel Culkin and Programme Manager Tinne Midtgaard.

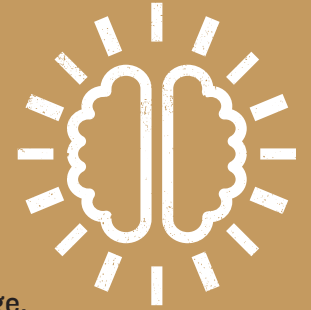


GOVERNANCE

PROGRAMME MANAGEMENT

Programme Director (PD)
Prof. Angela Karp, Director & Chief
Executive Rothamsted Research

Programme Manager (PM)
Tinne Midtgaard, Shake Climate Change,
Rothamsted Research



SCIENCE CHAMPIONS (SC)

Prof. Jim Harris, Chair in Environmental Technology,
Cranfield University

Prof. Nigel Culkin, Past-President, Chair in Enterprise &
Entrepreneurial Development, University of Hertfordshire

Prof. Nigel Titchener-Hooker, Dean of UCL Engineering

BUSINESS ADVISORS AND MENTOR TO ENTREPRENEURS (ME)

Dr Claudio Marinelli, CEO (PhD, MBA),
Cambridge Photon Technology, Cambridge

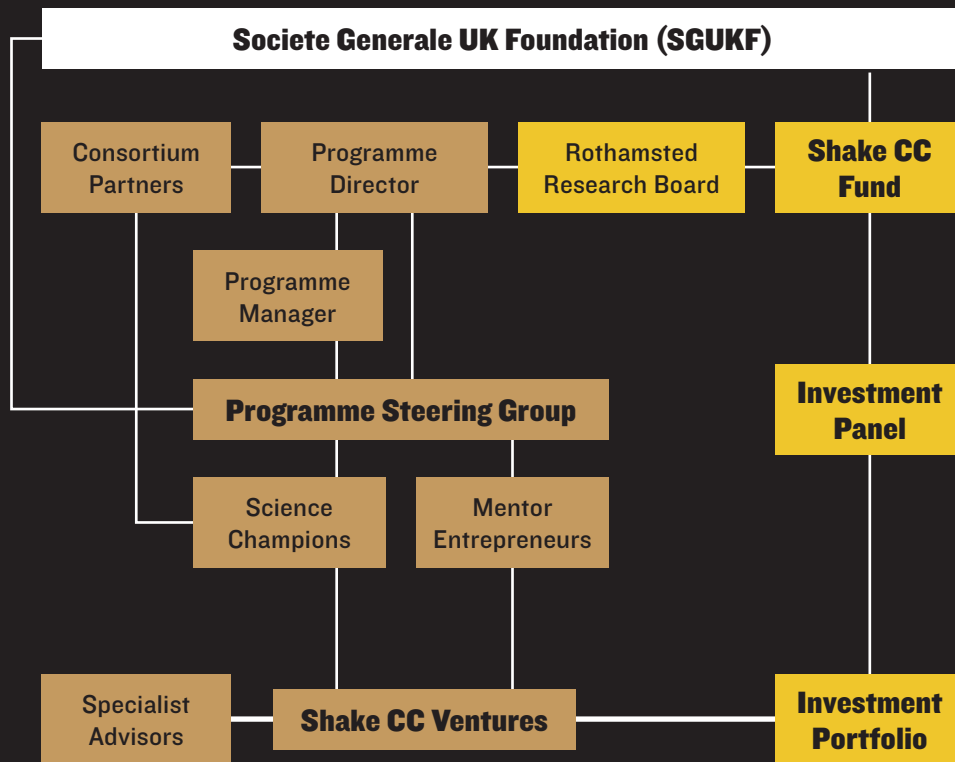
Paul Rous (MBA, PhD Candidate), Director Yara
International, Investment and Venture Funds

SOCIETE GENERALE UK FOUNDATION REPRESENTATIVE

Kate Ashworth, Societe Generale UK
Foundation Manager

Shake Climate Change is established with a strong governance framework drawing on structures laid out in a grant agreement between Societe Generale UK Foundation (SGUKF) and Rothamsted Research (RRes) and between RRes and the Consortium Partners. This includes regular meetings and check-ins to ensure progress is being managed. Furthermore, there is structured reporting and meetings between the Trustees at SGUKF and the Programme management team.

Shake Climate Change operates dual management, so that management of Entrepreneur support is separated from decisions on the investments of the Fund.



GOVERNANCE OF THE PROGRAMME AND SERVICES

- The Programme Steering Group (PSG) is chaired by the PD and is comprised of the PM, SCs, MEs and a representative of SGUKF
- The PSG manages and reviews progress of Entrepreneurs supported through the Programme according to their terms of reference
- The PM maintains all records and, working with the PD and PSG, submit reports to SGUKF.
- The PSG has most knowledge on the Entrepreneurs and is responsible for making the initial selections of entry into the Programme and from Phase 1 to Phase 2 (see Highlights of the Programme, Section 3).

GOVERNANCE OF THE FUND

- Funds paid over to Rothamsted Research Ltd are held by the charity in the form of a restricted fund to be used solely for the purposes of Shake Climate Change.
- The Investment Panel (IVP) determines which projects should be supported, according to terms of reference, as set out in the agreement and reviews progress of the ventures.

STRUCTURE

PEOPLE

Shake Climate Change is delivered by a network of leading scientists and experts sourced from within the Consortium Partners and occasionally through external contacts.

INVESTMENT PANEL (IVP) MEMBERS

Jackie Hunter, (Chair), Board director BenevolentAI

Prof. Leon Terry, Director of Environment and Agrifood, Cranfield University. Consortium Partner representative

Martin Carr, Hertfordshire University. Consortium Partner representative

Prof. Eli Keshavarz-Moore, Bioprocess Science & Enterprise, Dept of Biochemical Engineering, UCL. Consortium Partner representative

Ben Higgins, Head of HR for the United Kingdom and Ireland, Societe Generale and Societe Generale UK Foundation (SGUKF) Trustee

Dr. Andrew (Andy) Muir, Director, Midven

Tom Ritchie, Investment Director, Rabo Food and Agri Innovation Fund, Rabobank

Prof. Angela Karp (PD), (non-voting), Director & Chief Executive Rothamsted Research

Louise Warren (secretary) (non-voting), Company Secretary Rothamsted Research

TEAM OF MENTORS WORKING TO SUPPORT THE ENTREPRENEURS

David Priseman, Business Mentor, Business School, University of Hertfordshire (Phase I, 2 and 3)

Claudio Marinelli, CEO Cambridge Photon Technology Ltd (Phase I, 2 and 3)

Paul Rous (MBA, PhD Candidate), Director Yara International, Investment and Venture Funds (Phase I, 2 and 3)

Rob Hill, Business and Social Enterprise investor and mentor (Phase I, 2 and 3)

Rob Procter, Business Mentor and CEO (Phase I)

Yuri Andersson, Founder and CEO of Nabra Ventures (Phase I, 2 and 3)

SPECIALIST ADVISORS WORKING WITH SHAKE CLIMATE CHANGE

Prof. Adie Collins, Head of Department, Sustainable Agriculture Sciences, Rothamsted Research

Dr. Adrian Williams, Reader in Environmental Systems, Centre for Environmental Systems and Agricultural Informatics, Cranfield University

Dr. Ali Nabavi, Lecture in Energy Systems, Centre for Climate and Environmental Protection, Cranfield University

Alun Williams, Investment Director, Parkwalk Advisors

Prof. Andrew Thompson, Professor of Molecular Plant Science, Head of Cranfield Soil and Agrifood Institute, Cranfield Soil and Agrifood Institute, Cranfield University

Dr. Andrew (Andy) Muir, Director, Midven

Dr. Chamu Kuppaswamy, Hertfordshire Law School, Centre for Climate Change Research, University of Hertfordshire

Prof. Christine Onrengo, Professor of Bioinformatics, Structural & Molecular Biology, div. of Biosciences, UCL

Dr. Christopher (Chris) Brown, Hertfordshire Business School, University of Hertfordshire

Prof. Dan Bracewell, Professor of Bioprocess Analysis, Department of Biochemical Engineering, UCL

Prof. Dan Brett, Professor of Electrochemical Engineering, Department of Chemical Engineering, UCL

Prof. David Barber, Professor of Machine Learning Data Science, UCL

David Stevens, Science Writer and Editor, Communications, Rothamsted Research

Feodora Rayner, Programme Director (AgriTech and Innovation), Industry Engagement, Faculty of Engineering Sciences, UCL

Fiona Gilzean, Interim Head of Horticultural and Controlled Environments, Rothamsted Research

Dr. Goetz Richter, Sustainable Agricultural Sciences, Rothamsted Research

Ian Clark, Senior Scientist, Sustainable Sciences, Rothamsted Research

Dr. Ian Shield, Senior Scientific Manager, Agriculture Sciences, Rothamsted Research

Prof. Johnathan Napier, Flagship leader, Plant Sciences, Rothamsted Research

Prof. Jos Houdijk, Professor in Animal Nutrition and Health, Head of Monogastric Science Research Centre, Scotland's Rural College

Prof. Kathy Lewis, Professor of Agricultural Chemistry and Research Leader Research Leader, Agriculture & Environment Research Unit, University of Hertfordshire

Dr. Keith Davies, Department of Biological and Environmental Sciences, Agriculture, Veterinary and Food Sciences, University of Hertfordshire

Lourdes Velez, Research Facility Contracts Manager, research and facilities, Department of Biochemical Engineering, UCL.

Luke Halsey, Head & Programme Manager, Farm49I

Dr. Marco Margues, Lecturer in Biochemical Engineering Department of Biochemical Engineering, UCL

Martin Glen, Investment Director, Parkwalk Advisors

Matthew Rose, Head of Knowledge Exchange and Commercialisation, Rothamsted Research

Prof. Michael Hoare, Professor of Biochemical Engineering Department of Biochemical Engineering, UCL

Dr. Michael Sulu, Research Associate, Department of Biochemical Engineering, UCL

Prof. Naresh Magan, Professor of Applied Mycology Cranfield Soil and Agrifood Institute, Cranfield University

Nick Vincent, Creative Director and designer, Vincent Design

Dr. Paul Burgess, Reader in Crop Ecology and Management, Cranfield Soil and Agrifood, Cranfield University

Dr. Ruben Sakrabani, Senior lecture in Soil Chemistry, Cranfield Soil and Agrifood Institute, Cranfield University

Dr. Taro Takahashi, Honorary Research Scientist, Sustainable Agriculture Sciences, Rothamsted Research

Tom Ritchie, Investment Director, Rabo Food and Agri Innovation Fund, Rabobank

Dr. Vasilije Manovic, Professor of Carbon System Engineering, Centre for Climate and Environmental Protection

William Macalpine, Knowledge Exchange Manager, Sustainable Agriculture Sciences, Rothamsted Research



SHAKE
CLIMATE CHANGE

In 2019 Shake Climate Change have invested in four ventures:

**SELECTED
ENTREPRE-
NEURS**

BIG CHALLENGE WITH A SMALL SOLUTION

Idea: EcoNomad's proprietary technology is bringing biogases to the masses.

The economy of scale has always limited the financial opportunities to be had from farm waste to just the big players. Which is a shame, because apart from the much-needed savings it brings, this waste could be turned into renewable energy and fertilisers.

In the EU alone, 1.4 billion tonnes of farmyard manure are produced each year and only 8% of that amount is being processed – which by anyone's standards, is a lot of potential.

EcoNomad's biogas and nutrient recovery systems are especially designed for small farms and whilst bio-digestion is nothing new, the reason SHAKE Climate Change has funded EcoNomad is because their proprietary technology has cracked the scale issue – offering a viable option for smaller businesses looking to cut both their carbon footprint, and their running costs.

By EcoNomad's own estimates, a farmer with 50 cows – or equivalent – could save around £4-5k per annum by using their solution.

Founders: Dr. Ilan Adler and Alexander Demenko

economad.co.uk

ECONOMAD

G L A I A



GREATER RETURNS

Idea: Rather than tackle greenhouse gases head on, Glaia have found a clever way to get more crop from the same carbon.

Many climate friendly technologies tackle the issue of emissions directly – but Bristol based duo Imke and David decided to approach the problem from the other direction: what if we could improve current productivity without increasing the carbon footprint?

Glaia's clever carbon-based nanotech improves the efficiency of photosynthesis – the energy producing process by which plants use carbon dioxide, water, and energy from the sun to fuel their growth. You might think billions of years of evolution had fine-tuned this to the max – but in fact, less than 1% of the sun's rays absorbed by plants are commonly turned into biomass.

By increasing a crop's potential, it will produce the same yield with less inputs, which also means less emissions – in their case, a whopping 20% less.

Adding Glaia's water soluble 'sugar dots' to the roots or leaves gives photosynthesis a much-needed boost. The technology could revolutionise the production of staple and horticultural crops, but for now the team is focusing on hydroponic tomatoes and strawberries, where they estimate the added value could initially result in a fivefold return on investment.

Founders: Dr. David Benito-Alifonso and Dr. Imke Sittle

glaia.co.uk

PHEROSYN



FATAL ATTRACTION

Idea: Sex, death and food are all in play when it comes to cutting the climate footprint of pest management

Of the oft-cited concerns over pesticides, climate change isn't usually high on the list. However, when you factor in fossil fuel consumption during its manufacture and application, its considerable – the annual fuel used spraying pesticides on UK wheat farms is the same as about 80,000 cars.

Scale that up globally, and less pesticide use is clearly a desirable outcome – but we need alternatives.

Insect pheromones – the information rich, chemical scents that warn, inform, or attract other members of the same species – have been targeted as crucial tools for use in the next generation of pest management strategies to minimise pesticide use.

If these new strategies can hijack pheromone communication channels, they can either attract insect pests somewhere else with the promise of sex, or can literally scare the pests out of a field – resulting in a sticky end in a pheromone scented trap.

PheroSyn Ltd comprises a world-leading team of scientists with over 40 years' collective experience of researching and developing insect pheromone baits.

By focusing initially on destructive midge pests that are not currently catered for by the other market players, the spin-out hopes to have sales of their market ready pheromones at the £10 million mark within five years.

Founders: Mike Birkett, John Caulfield, David Withall and Daniel Bahia

pherosyn.com



A TASTY NEST EGG?

Idea: Profits from this newly hatched idea certainly won't be chicken feed

Soya beans have become a battleground of sorts in the ongoing war over the climate impacts of our food, given that – directly and indirectly – it feeds vegan and meat eater alike.

Soya cultivation is responsible for mass deforestation, particularly in places like Brazil and every year the EU imports 39 million tonnes of soya, of which 35 million is destined for animal feed.

TV pictures of pristine tropical forest being destroyed provides a very graphic illustration of how our eating habits are impacting the planet, and it's just such images that drove Scottish poultry farmer Gordon Whiteford to come up with a completely new way to feed his own free-range hens.

As a Nuffield scholar, Gordon studied animal welfare across the world and saw the potential to develop a different system of feeding hens to reduce the reliance on soya.

The HE Feed system will be perfect for free range and organic systems, where about 23 million free range hens are reared every year.

Founders: Gordon Whiteford

HE FEEDS

ACHIEVEMENTS OUTCOMES AND IMPACT



We've recruited a range of top experts who we can call on.

73%

PSG Attendance in 2019

95%

Mentor attendance in 2019

100%

IVP attendance in 2019

6

mentors recruited

36

specialist experts recruited

By investing in brilliant ideas, we hope to attract others to do the same.

4

Ventures chosen

15

Venture jobs

£1,180,000

Target funding

£540,000

Shake funding

£620,000

Target co-investment

2.1x

Shake leverage

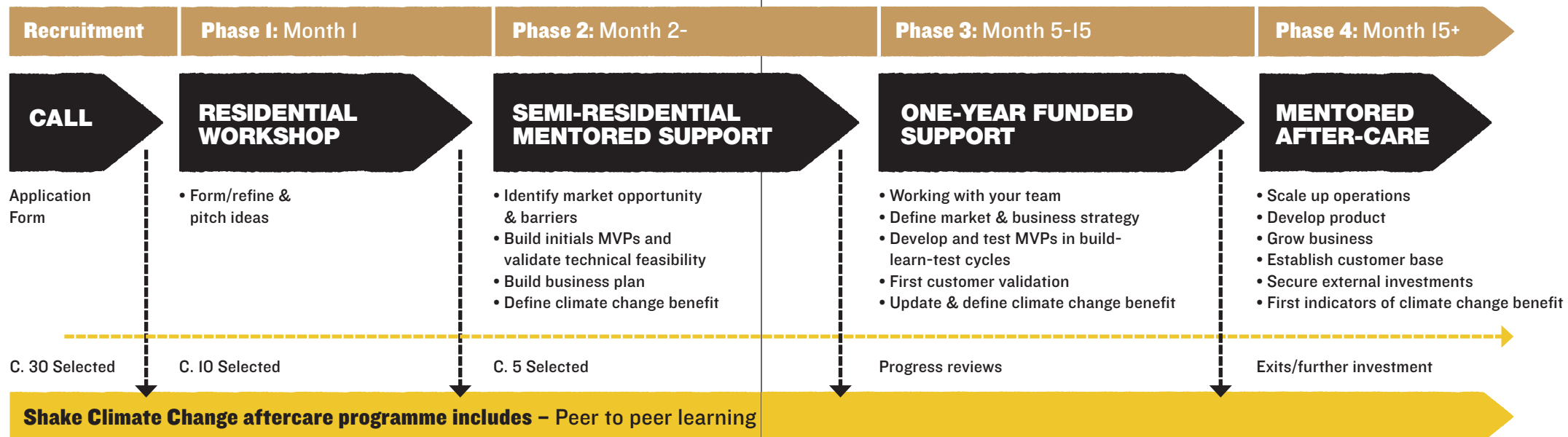
2019 HIGHLIGHTS

- ✓ The launch and application process were completed successfully, despite the restricted time available. Out of 33 initial expressions of interest, 21 full applications were received. The PSG selected 17 ventures to enter Phase 1, but one subsequently pulled out due to time constraints.
- ✓ Phase 1 of the Programme was successfully completed, following which 11 ventures were selected to enter Phase 2.
- ✓ The Programme was successful in delivering tailored support during Phase 2. A matrix of technical and business needs was composed for each venture and all needs met through the Science Champions sourcing technical experts and the Mentors providing business support.

- ✓ All 11 ventures significantly improved their business proposition during Phase 2, with some pivoting during this time frame. Climate change impact was also rigorously developed, with support of life cycle experts.
- ✓ At the end of Phase 3, the IVP selected five ventures for consideration of the convertible loan funding. The IVP were very impressed by the high standard of all the pitches presented. The due diligence steps took longer than expected. Finalising completion of investment into Cohort 1 was delayed into 2020. The investment into the fifth venture, has been put on hold. due to changes in the company structure. The Investment Panel (IVP) decided to ask them to re-apply to prove they are good enough for investment.
- ✓ The Programme has invested in four ventures in 2019 (funds received by the ventures in 2020).

HOW IT WORKS

Whether its business advice, technical support or coaching in how to pitch our aim is that all Entrepreneurs will gain value from being involved in Shake – even if they don't progress through each phase.



OUR IMPACT

The launch of Shake Climate Change attracted a sufficient number of applicants for selection of high quality early stage ventures into Phase I.

10,140
social media views

66% conversion rate from interest to application
21 full applications received

Programme delivery was well received

104 workshop days
100% Entrepreneur attendance

100% of the Entrepreneurs participating in Shake CC programme 2019, have answered: "They will recommend Shake Climate Change to others"

Shake participants felt they gained a lot and our Mentors adding real value.

"An excellent programme, probably the best I have attended. The quality of the mentors was excellent, incisive targeted and knowledgeable; I learned something new from each. This programme provides an opportunity to accelerate your business, and it is a great networking opportunity."

"Each mentor helped improve our pitch, but most importantly, our business planning"

"During the programme the mentors, as well as the other Entrepreneurs, challenged me every day to look at my project from different angles which has helped me. I will definitely recommend Shake Climate Change to others"

"It's really helped me to me to think through how to structure the business and to see it through an investor lens"

"It has been very helpful to get away from the daily work and consider strategic issues with experienced mentors"



We expect positive climate change impact from the investments

ECONOMAD

Potential climate change impact estimation is that a typical smallholder farm of about 50 cows will save around 0.5m tonnes of CO2 equivalent per year converting their manure with Economad's bio generator. Further impact and benefits are:

- Reduction in CH4 and N2O emissions from manure treatment and conversion into bioenergy and fertilizers
- Reduction of energy and emission associated with nitrogen and fertilizer manufacture process
- Improvements in long-term soil health from biofertilizer application

GLAIA

Potential climate change impact estimation is about 50,000 tons CO2 per year from tomato production due to yield increases from using Glaia's sugar dots. Potential yield increase will have an impact on Climate Change by:

- Decreasing pressure on natural resources and land
- Reducing food miles.
- Decreasing greenhouse gas output per ton of produce

HE FEEDS:

Potential climate change impact using the optimized HE Feeds system and the reduction of using imported soy will have impact by:

- Reducing energy and emissions associated with transportation
- Decreasing deforestation for soy production in other parts of the world
- Adaptation to more localized animal feed

PHEROSYN

Potential climate change impact from using pheromones will have impact on GHGs by:

- Reduction in energy and emissions associated with pesticide manufacturing, transportation and application on farms

WHAT WE'VE LEARNT

- ✓ Social media and word of mouth were vital in attracting applicants, and we have our wider network to thank for that success. We'll be calling on them again in future.
- ✓ Our two- step application process is unnecessary – meaning applying to Shake Climate Change will be even easier and swifter in future.
- ✓ Being available to answer questions from applicants is crucial – which is why we've added a contact form on the website.
- ✓ Earlier incorporation of life cycle analysis to support the Entrepreneurs will help tease out the full impact of their ideas.
- ✓ One size doesn't fit all – tailoring the approach to each Entrepreneur is a real strength of this programme

GETTING THE WORD OUT

The start of the programme saw a coordinated launch of the website, LinkedIn page, promotional video and a press release. Rothamsted Research coordinated this through its own social and traditional media channels.

shakeclimate.org

[Linkedin page](#)

2,634 **106**

LinkedIn views

LinkedIn followers



It wasn't all online though

Programme Manager, Professor Angela Karp was invited to highlight Shake at the conference "Net Zero by 2050 – A Policy Response" hosted by MP Bim Afolami and chaired by Chris Stark, CEO of the Committee on Climate Change, alongside Baroness Brown of Cambridge, Deputy Chair of the Committee on Climate Change.

OUR IMPACT



PSG Member Nigel Culkin was invited to give a Shake presentation at the inaugural meeting of a INTERREG project in Norway called GRES (Green Start Up Support). Later in 2019 he was invited on a speaking tour in Vietnam, where he also presented on Shake Climate Change.

FINANCE

The 2019 budget for Shake Climate Change was £ 1,121,740 and spending was £ 978,627, meaning a balance of £ 143,11 will be carried into 2020.

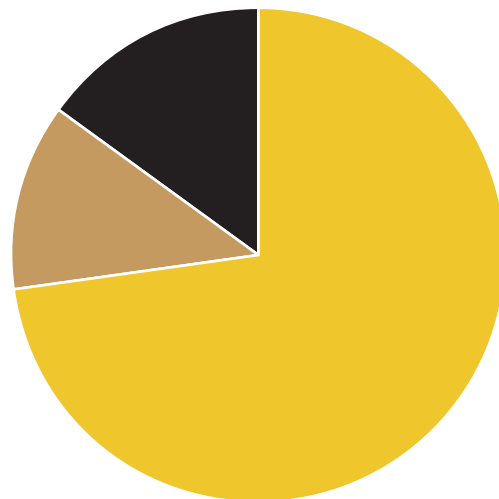
Despite first year set-up and management costs, 73% of the budget was used to support the Entrepreneurs.

Percentages of programme cost used to support the Entrepreneurs

73%
Support to entrepreneurs

12%
Programme set-up

15%
Programme management



2020 STRATEGY



✓ **Increased communication about Shake Climate Change to attract the best ideas and applicants to Cohort 2 of the programme.**

✓ **Increased engagement with investors through investors showcases.**



✓ **Continue to build our Shake Climate Change community including identifying additional mentors to Entrepreneurs and specialist advisors to work with the Entrepreneurs.**

✓ **Focusing on delivering an exceptional experience for Entrepreneurs, improving the programme content where possible and maintaining a key focus on the climate change impact of Shake.**