



Transformative energy technologies, using natural gas to produce sustainable food, feed and biodegradable polymers at industrial scale

CIRCE°

Circe's Vortex Energy transformation Plants Will Take Markets By Storm

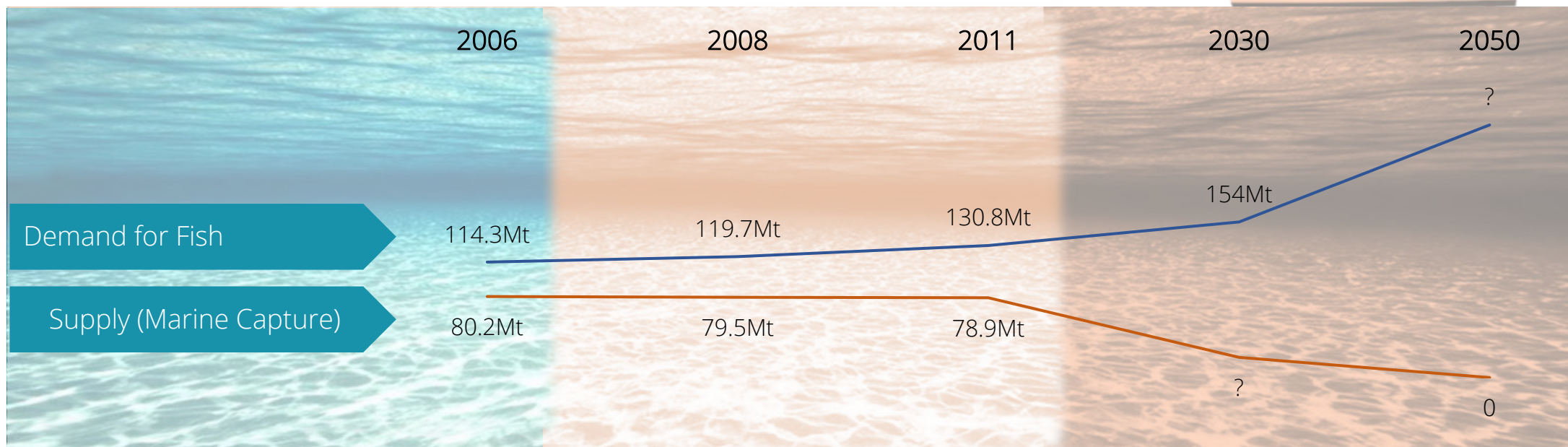


- ⚡ Industrial alternative to fishmeal in animal feed market for **volume**
- ⚡ Human meat replacement products for **margin**
- ⚡ Biodegradable plastic alternatives for green and tech **revolution**
- ⚡ **\$3.5m invested** from to March 2022 by founder shareholders
- ⚡ Proof of concept, mid-scaling, client trials, and team build **completed**
- ⚡ Seeking **Series A** funds for preindustrial scale up
- ⚡ **\$15m** raise to build the **Pre Deployment Plant** and finalise EPC contract
- ⚡ 2023 Series B planned \$150m raise to fund 2 **mega facility** builds
- ⚡ **17 factories** in 10 years processing 75 billion m³ of gas per year

Half of the fish taken each year from our oceans is processed into fishmeal, animal feed

2050

"The year fisheries may collapse"



300,000

Whales, Dolphins and turtles are killed each year as by-catch!



57%

Of the world's fisheries are already fully exploited!



90%

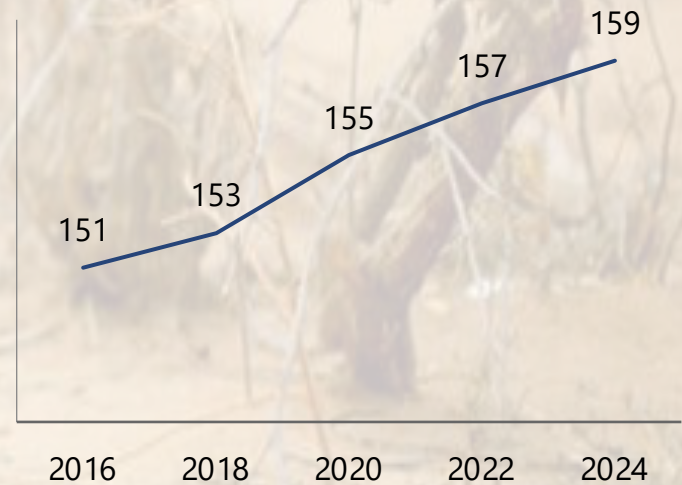
Of predatory fish: Tuna, Sharks, Swordfish, Cod and Halibut are gone!

And food crops face competition with livestock feed production

2.2bn

People would receive food security if land used for soybean meal was diverted to human food production”

Land for Soybean Meal Production* (Mha)



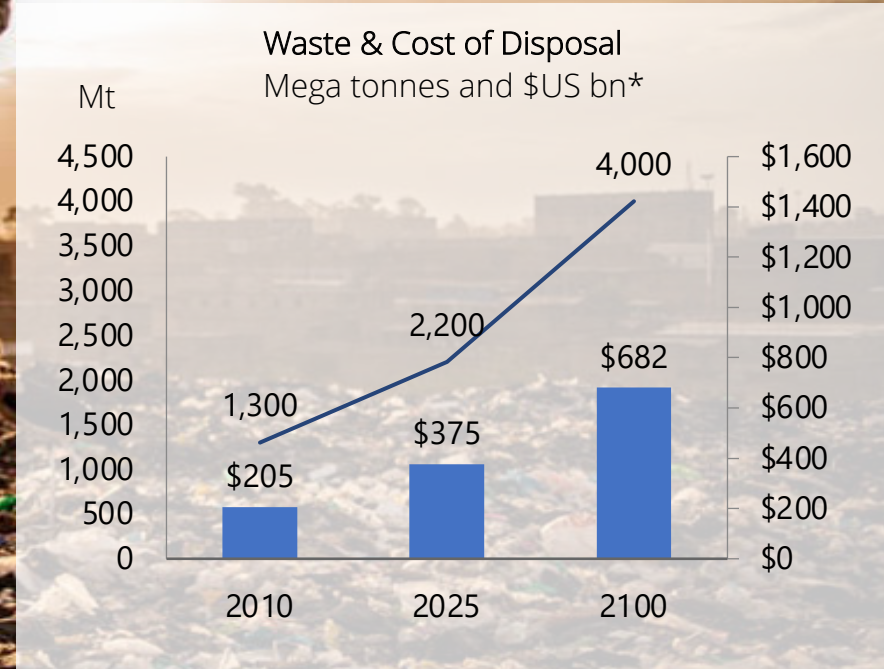
+100m

“People may lose food security due to further land diversion for soybean meal production by 2024

Source: Estimated based on calorie requirement, World bank data on land for oilseeds (assumed mainly as soybean);
*75% soybean used for soymeal production, base data from World Bank

The plastic packaging Issue is out of control

One third of landfill is made up of former packaging materials



And plastics that don't make it to landfill swirl around our oceans

*What A Waste: UN report, D-waste Atlas, D-waste landfill area calculator

7+ billion today, 8.5 billion of us by 2030:

We need MORE nutrition, MORE agriculture, MORE consumables, & MORE power
All delivered using LESS natural resources with LESS emissions – **NOW**



We need huge scale solutions, not laboratory concepts and neat ideas but
industrial volume, sustainable food, feed and packaging - **mega-facilities**



Nothing comes from nothing

All solutions require inputs

Natural gas, is clean burning, abundant and when not on pipeline, very low cost

Circe transforms natural gas into valuable proteins and biodegradable plastics using patented fermentation technologies

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Circular, sustainable fermentation



Fermentation is the chemical breakdown and transformation of a substance by bacteria, yeasts, or other microorganisms into new compounds.

Natural Fermentation occurs throughout nature.

In lakes, leaves and dead fish sink to the floor, decompose, and release methane, which combines with oxygen and minerals. Bacteria consume this mix and grow rapidly into rich clumps of protein which provide nutrition for the lake's aquatic life and fish.

In athletes, lactic acid is fermented, when sports bodies demand fast acting energy to fuel muscles.

Traditional Fermentation in food and beverages is commonplace. It is how wine, and beer have been made for millennia and is the traditional process behind many super foods such as miso and kombucha. Dietary staples such as yoghurt and sourdough breads are also the result of basic fermentation.

CIRCE Fermentation is a controlled biological process in which our natural bacteria, feed on gas deposits to create a rich protein sludge. When dried, with no need for additives, the nutritious protein is a perfect base for human and animal nutrition.

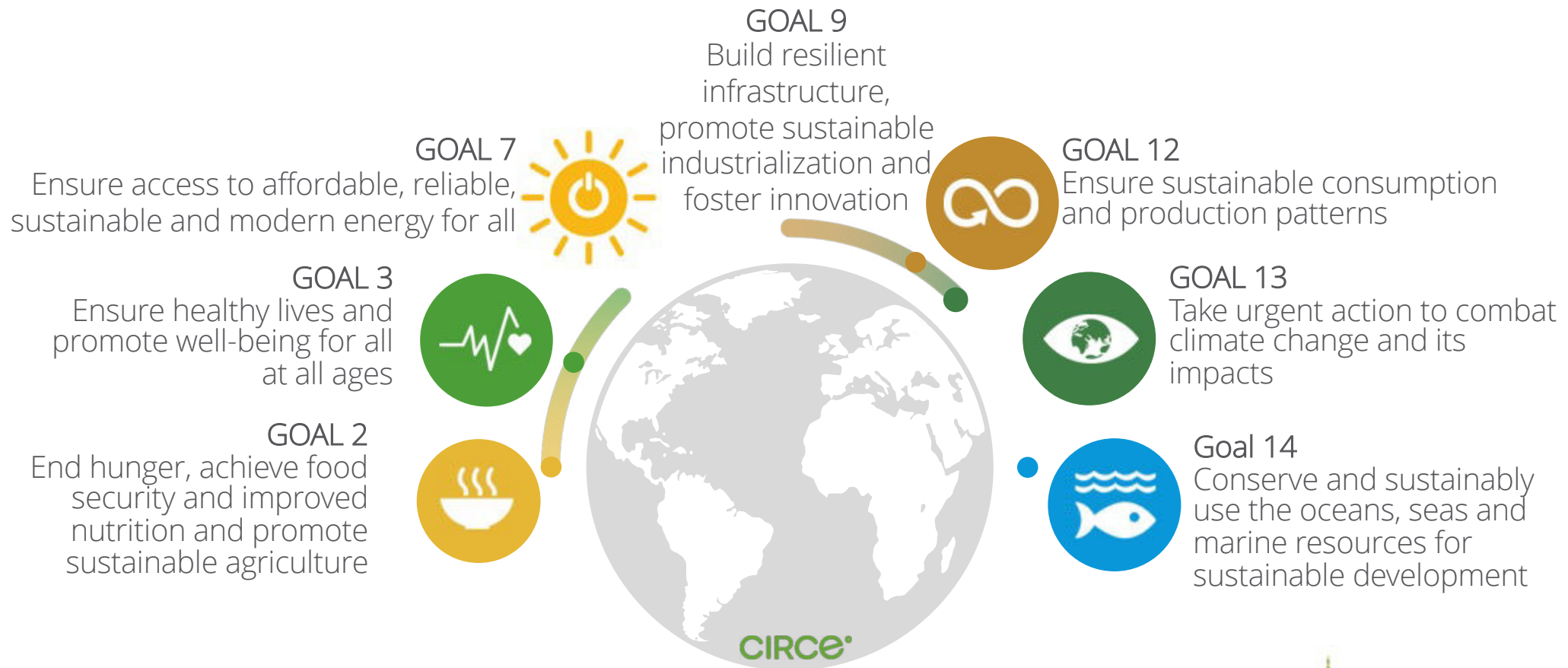
Advanced technology and chemistry allow us to intervene in the process, suppress protein growth and force the secretion of "bio-plastics". A polymer, which nature uses as an energy store just like humans use fat.

Zymology is the study of biochemical process of fermentation and its practical uses. Fermentation is such a huge field it even has its own separate discipline within the broad spectrum of chemistry, zymology

Biomimicry

Is the the copying and industrialization of natural cycles to create dependable outcomes from biological processes.

CIRCE° supports 7 of the 17 United Nations Sustainable Development Goals and underpins all the core packages of the Paris Climate Agreement



CIRCE° POLYMERS

CIRCE° FEED

CIRCE° FOOD

We grow bacteria perpetually and from their biomass produce **Single Cell Protein**, (SCP) and **Biodegradable Polymers** (PHA & PHB) for global trials. With almost 70% protein and a perfect blend of amino acids, our core animal feed ingredient leads our market development. Our partnership with www.boku.ac.at guides our food strategy and with www.tuwien.at we develop our polymer product ranges

Core Products are highly valued in their segments



Single Cell Protein

FEED

Naturally fermented bacteria makes a wonderful 70% protein animal feed with a perfect balance of key amino acids.

Circe feed ingredients are a complete substitute for fishmeal and ideal for farmed animals, aquaculture and pet formulations.

Sustainable, natural and organic

Single Cell Protein

FOOD

Circe sustainable, natural and organic food is a powerful food source. Especially beneficial where high nutrition is required in small meal sizes such as the elderly, soldiers and athletes.

Circe food enables lifestyle end products such as vegan "fish" fillets and "meat" steaks.

Circe foods are easily textured and provide ideal bulk as well as proteins and energy in prepared meals like ready made lasagne

Biodegradable Polymers

PHA & PHB

polyhydroxyalkanoates, a complex word, but easy enough product – polyesters - basically plastics.

Circe fermentation makes bulk pellets which are melted at point of manufacture to make light plastics like cutlery. When stretched, a film is made, the type which makes paper coffee cups waterproof.

As it is made from nature, it can return to nature – unlike forever floating plastics in our seas, our biopolymers simply degrade back to their elements

Vast markets – huge demand

The animal feed market is vast, \$0.5 trillion p.a. and still booming, fish feed alone is almost \$100 billion

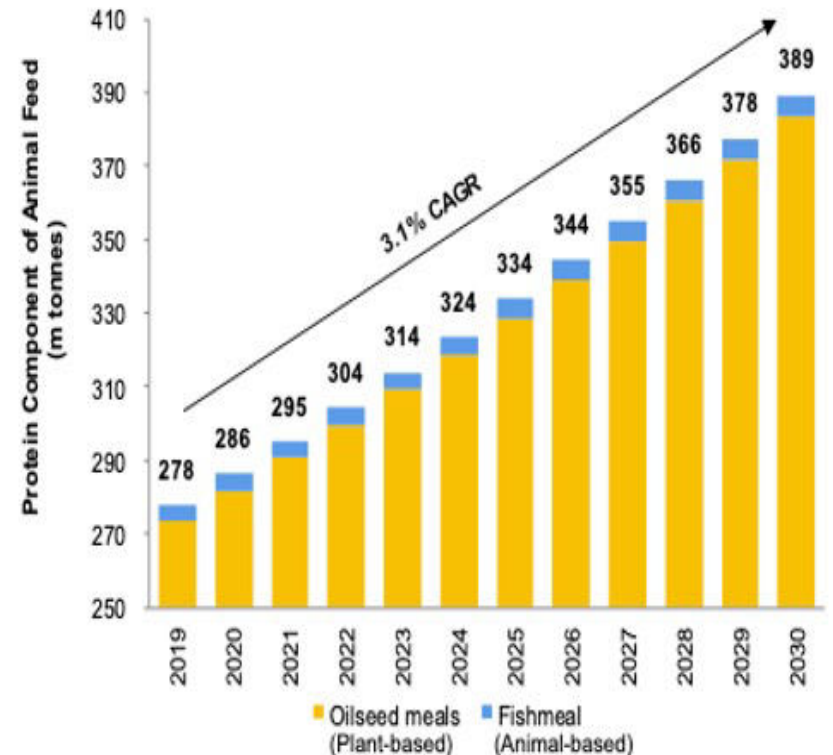
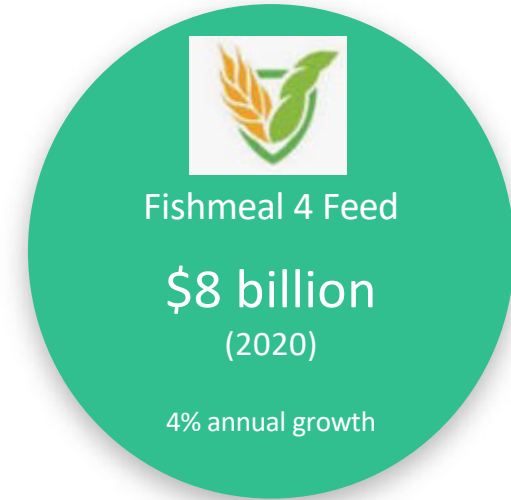
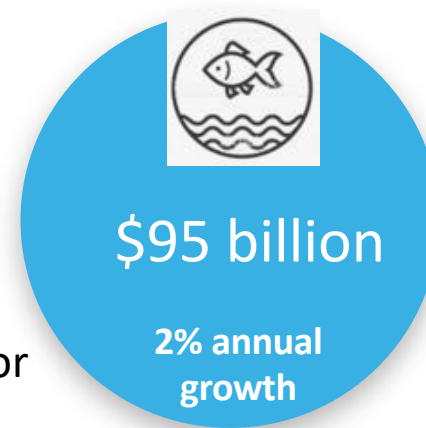
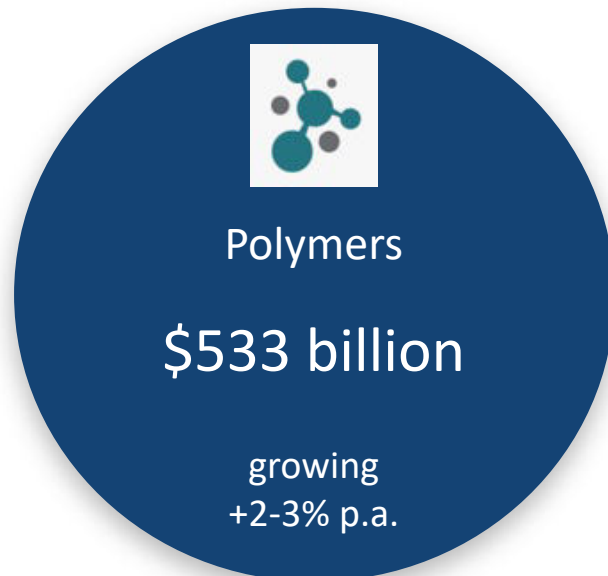
Circe's first and primary market is fishmeal an \$8b market, with a further \$8b of underserved demand due to low production (simply not enough fish in the sea)

We spend 10 trillion dollars on food each year underpinned by our need for nutrition from protein

Circe is working with food scientists on high protein meatless food alternatives. Focus is below Impossible Foods and Beyond Meat burgers, processed preparations – sausage roll etc.

The global polymer market is vast, \$0.6 trillion p.a. and growing, the nascent biodegradable packaging industry alone is worth \$87 billion each year

Post SCP market entry, Circe will target the lowest barrier to entry market segments, like plastic cutlery – alone worth \$2.6 billion



How we got here

A maturing opportunity

Early days

CIRCE^o

FEB 2018

Project kick off

Concatenation of historical & current Russian gas2value programmes

JUNE 2019

First test rig

Built and demonstrated "Kordon's bioreactor" for protein production.
First patent drawn & filed

MARCH 2020

Commissioning

Stand alone manual testing of the bioreactor

MAY – JUNE 2020

IBPM Agreement

Signed with Inst. Of Biochem.& Physiology of Microorganisms

JUNE 2020

1st bacterial strains

Official handover of specific bacterial strains, Strain library & store completed

JULY 2020

1st Automation

Machine test in automatic mode.

JULY – SEP 2020

New site

Open scaling facility @ Russian Academy of Sciences

JAN – APR 2021

Pilot proteins

Regular protein production with Certificates of Analysis

JUNE 2021

Academic JVs

Finalise R&D with University of Vienna and human food development programme with BOKU

OCT – DEC 2021

Construction docs.

Prepare designs for scaling plant construction & contractor selection

Science with Scale is at our core

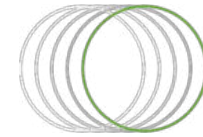


Circe has programmes with two Austrian universities and two Russian academies as well as industry specialists in the UK and USA. This simultaneously allows focus and speed through parallel track progression



Deep and applied science is led out of Austria through world class, (AGES/IFS), food laboratories and our local staff and academic partners.

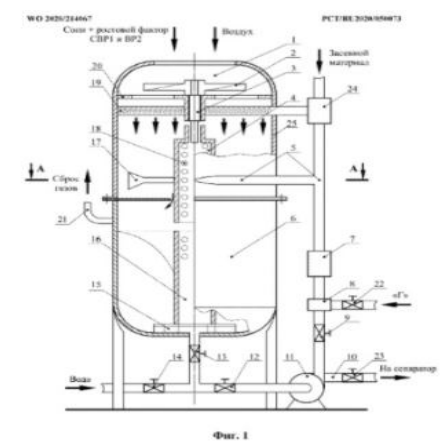
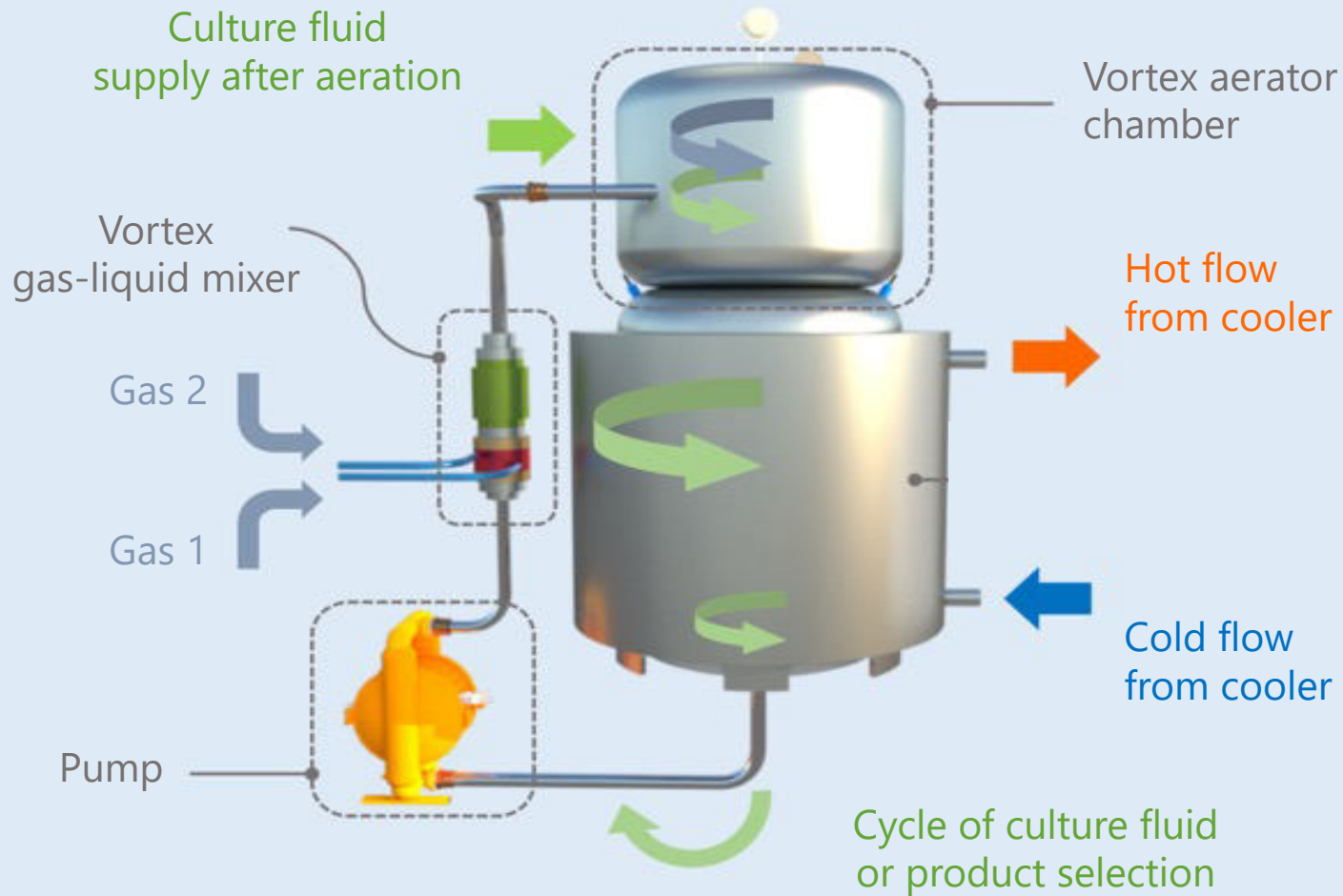
Vienna's role in our progression is low scale refinement and detailing



Scale happens in Puschino, 100km south of Moscow in a town purpose built 100 years ago to lead global bio molecular research. Our flexible and scalable facilities, great scientists and scale minded engineers are all about pushing size and efficiencies



Patented bioreactor



Low energy

Designed for continuous operation

Swirling physics & software control reduces residence time

3x more productive than standard bioreactors

Meshed cameras through IOT give "eyes" inside the reactor

Next step Pre Deployment Plant - PDP



December 2021 - 35l to 500l leap
Pivot from lab to small scale ✓

Final site selection ✓

Leverage cost effective .ru build & staff ✓

Break ground Feb 2022 - \$3m capex

PDP on line July 2022 – 5,000l - 125 kg p/day
PDP Phase 2 Dec 2022 – 50,000l – 1t+ p/day

1:20 scale of F1

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Circe – Has scaled from laboratory through phase one Pre-Deployment-Plant, (PDP), from the 10-litre bioreactor to current 500l

Circe – Is raising Series A funds to install the 5,000l and final 50,000l unit on the existing demo-site

Circe – Use of funds is 75% capex and includes Opex to take the business through blueprints & EPC designs for the first full scale mega-site, (CMS)

Circe – Series B in 2023 will fund 2 CMSs

Circe – Is currently fully funded, and keen to explore investment in the PDP phase 2 and beyond

Circe has spent five years perfecting laboratory technologies, upscaling to evaluation bioreactors and is now running 24x7 meaningful scale production and shipping product

This last investor phase pre large scale project financed deployments has been scientifically de-risked yet still offers exciting upside

Business Plan Highlights

› 2030 Total Circe Revenues of **\$350 million**

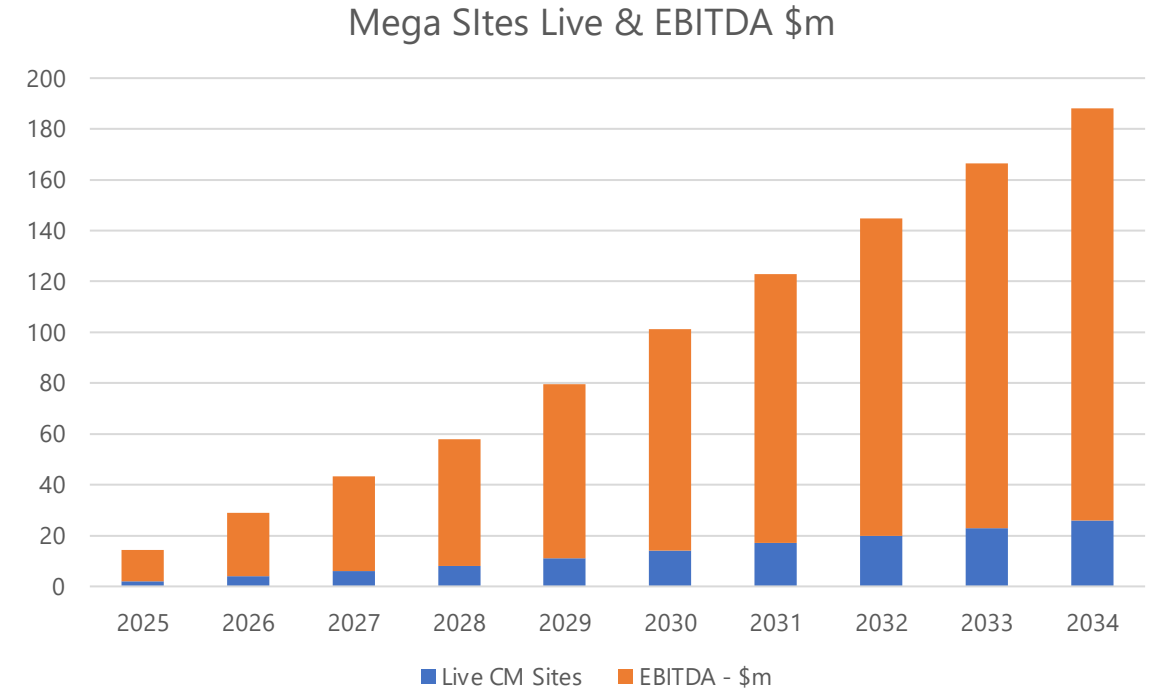
- › **Mega Site** stand alone feed revenues of **\$25m**
- › **40%** gross margin with upside potential through efficiencies
- › **17** mega site roll outs within first 10 years
- › **2025** Stand Alone Factory revenues of **\$Xm**

› R&D, Labs, mid-scale funds raised to date **\$3.5m**

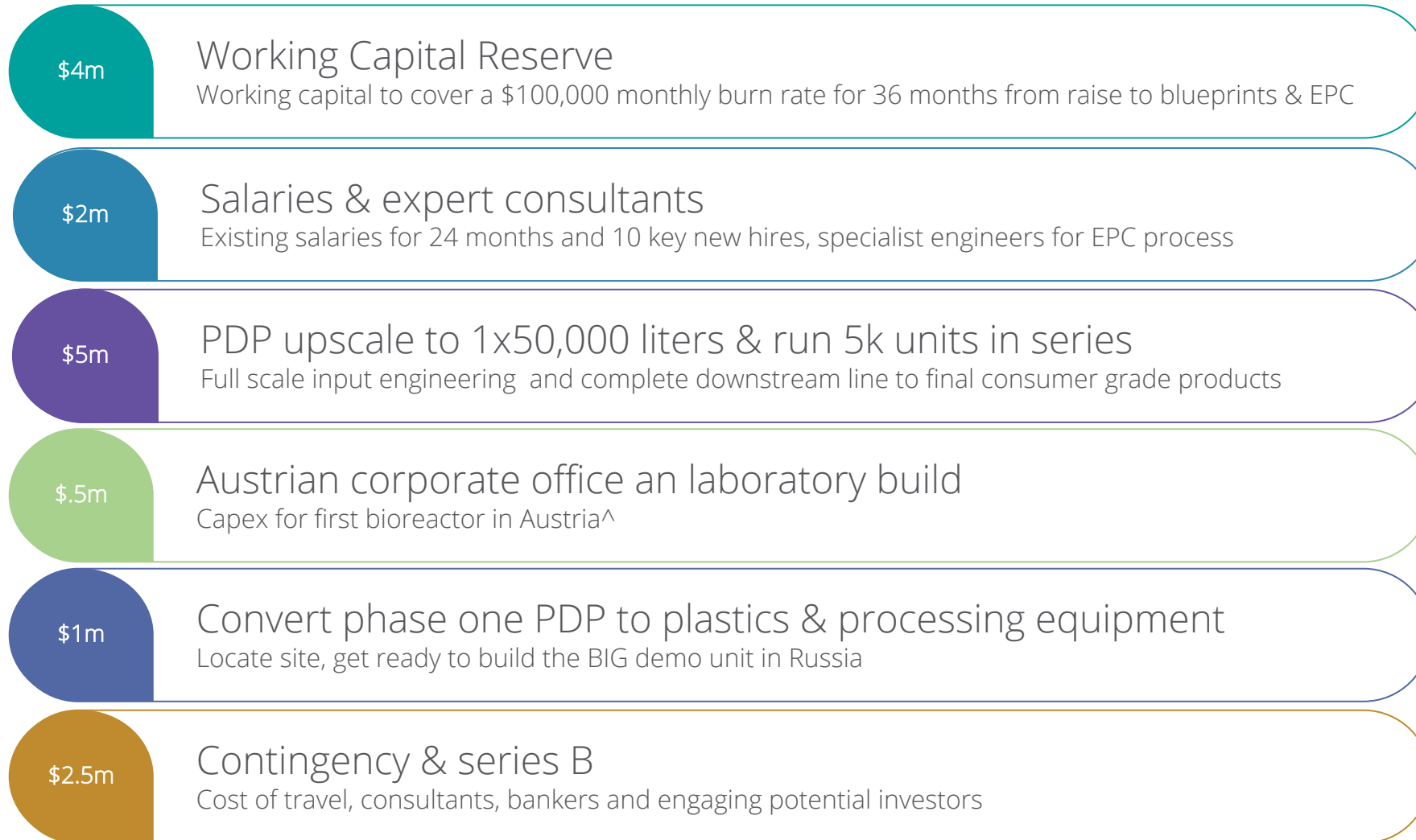
› Single Mega Site Capex **\$75m**

› Three differentiated revenue streams; base proteins, green premium plastics & high margin food

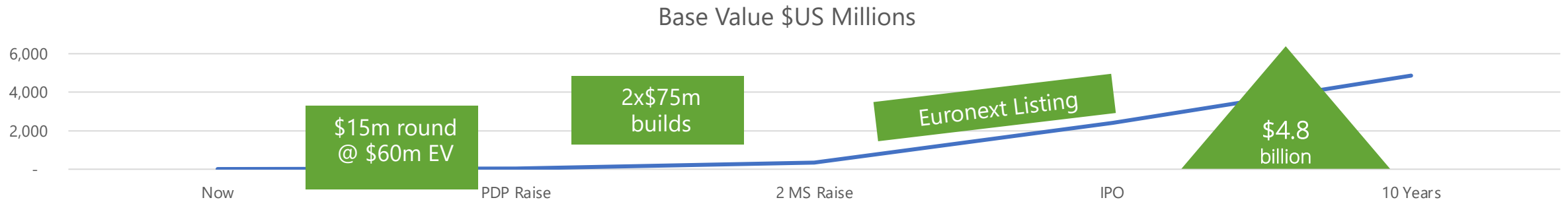
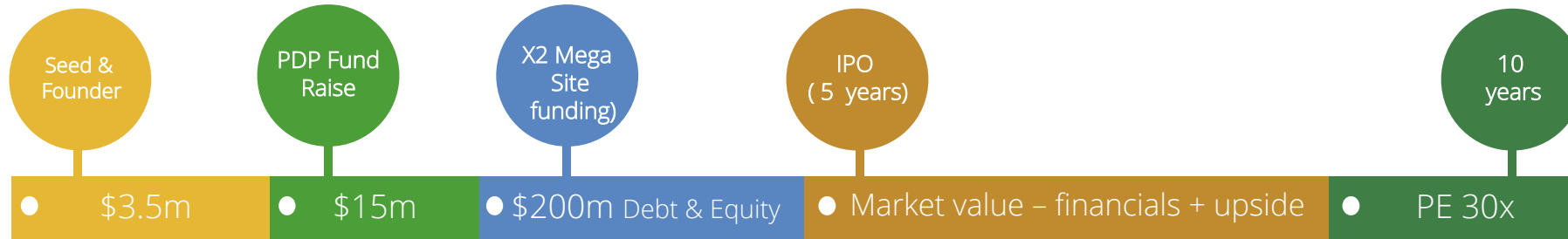
› Raising **\$15 million** to take Circe from phase one PDP through to ready to deploy Mega Site 1



Series A, use of \$15m of funds ...



Key Investment Stages, Corporate Milestones & Valuations



Corporate Milestones

Proof of concept, science & engineering team builds. Scale up and Russia plant. Stage one technology choices	Proof of industrial scale 20:1 End to end continuous production. EPC contracts	Select partners and build first two Circe Mega Sites Binding offtake agreements . Agree next 10 site locations	Pivot from R&D to factory efficiency teams - microbiology & Capex & Opex reductions Plan first biopolymer Mega Site and high value derivative product development	Value chain up to new biogas sources, down to new markets i.e. jet fuels
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Valuation Drivers

Size of potential market , demand from industry, proven microbiology. Technical de-risk	Engineering & tech 100% proven. Ready to execute EPC with experienced player	Proof of industrial deployment capability & Capex model. Environmental planning, right team & partners for business growth	Proven build of Circe Mega Sites, regular sales and tested market size and price points. Proof of stand alone facility EBITDA & Capex modelling. Meaningful scale forest and ocean protection	26 sites deployed, established protein and biopolymer markets. Vertical integration
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Business Investment Support



Our sector can make material impact on land usage and over fishing



Award winning technology and outstanding global partners



Vast existing market of farm, fish and pet feeds



Superb in-house engineering team – high-tech low cost solutions



Sector pioneer with real scale up experience not just laboratories



Best in class management team, deep entrepreneurial and scale up skills blended with superb science and engineering



Fast scale deployment, immediate gross margins and modular builds reduce risk. Low cost country manufacture with high value products



Clear scale up plan, continual de-risking through Pre Deployment Plant to first full scale site

Our Team

@ HQ in Austria, Dr. Max oversees our science and academic partners in Vienna, while David, up the road in Frankfurt scans the product and capital markets.

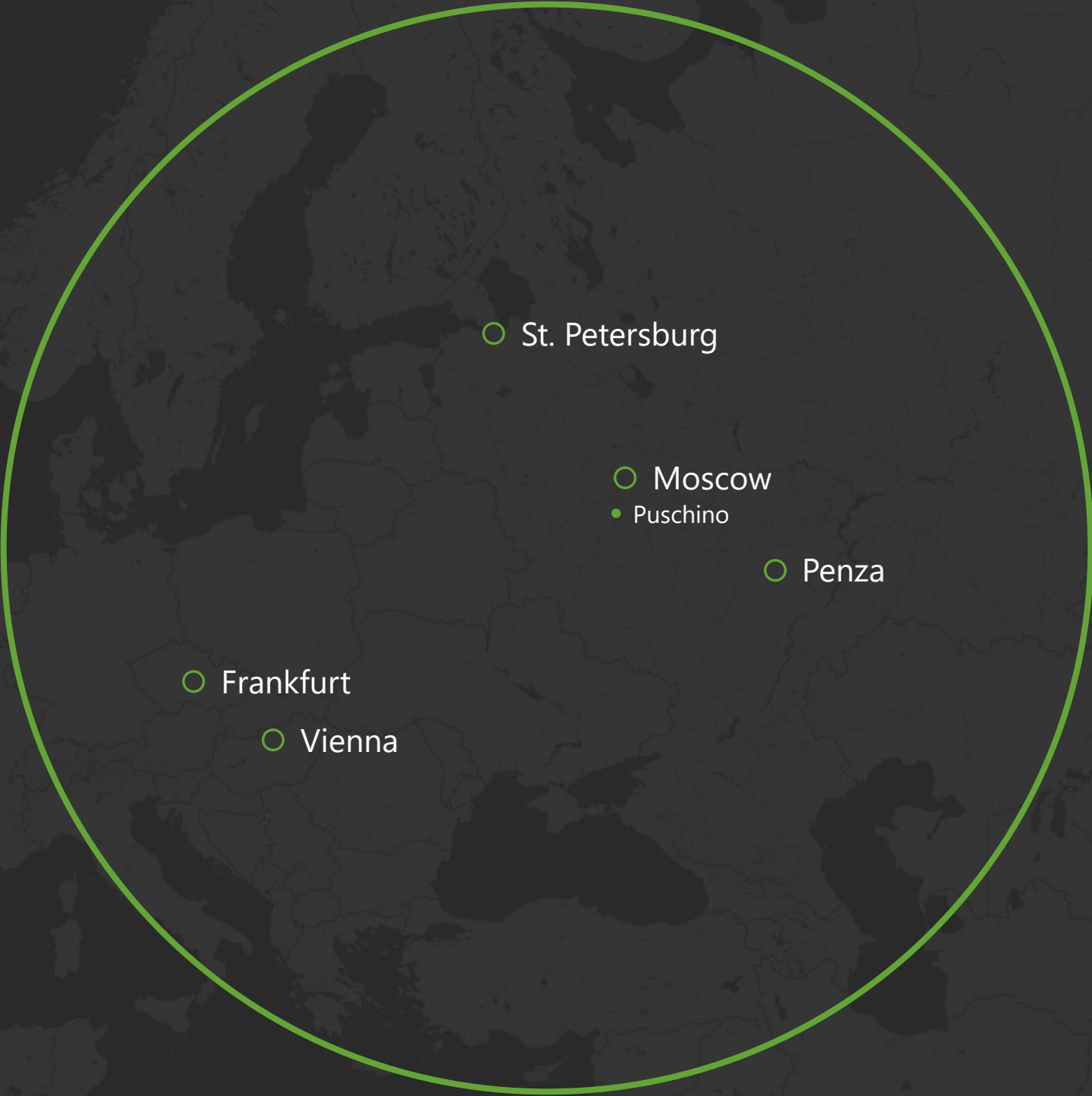
Corporate functions are predominantly in Moscow, where our CFO Artem Vasilyev sits with project manager Mikhail and Natalia.

Ildar & Ivan oversee microbiology and engineering scale-up in Puschino while Georgiy, our Managing Director provides the glue that binds us all



Our multi-disciplinary team consists of (mainly) scientists, engineers, project managers, an accountant or 2, plus the odd guru, wizard and savant !





○ St. Petersburg

○ Moscow

● Puschino

○ Penza

○ Frankfurt

○ Vienna

HQ Vienna Austria

Team of 20 scientists and engineers
across Russia and EU

Deep & broad natural gas & downstream
processing experience

Proven lab to market scaling

Please get in touch to find out more !

Info@circe.bio