

# A solution from the future: vertical farming with Intelligent Growth Solutions

A stable means of food production is needed more than ever with global supply chains volatile, the cost of living rising, and climate change an existential threat. Intelligent Growth Solutions are offering one solution: vertical farming towers that simulate a range of micro climates to grow produce at a fraction of the cost.

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The past two years have shone a light on the instability of global supply chains. Globalisation has allowed countries to specialise in the production and export of certain goods; however, a global pandemic, a land-based war, and interrupted trade links have highlighted the risk of being overly reliant on imported goods.

The issues with this system can be best seen in the UK's agricultural industry. Supermarket shelves are stacked with produce grown in far-away countries and flown to the UK to be sold at cheap prices, until they are not.

Empty supermarket shelves were one of the defining images of 2020.

Encouraging a greater uptake of on-shore and near-shore agricultural production is a necessity from a sustainability and stability perspective. One company leading the global charge to a more efficient agricultural supply chain is IGS, or Intelligent Growth Solutions.

Maddyness recently spoke to their CEO, David Farquhar, about their innovative towers, how they can augment conventional farming methods, and the dexterity of their cloud-based software.

## How did your previous roles as a chef and as a Captain in the British Army prepare you for senior leadership positions in the business world?

I didn't really ever practise properly as a chef, but I went to catering school and did a year in industry. And the one thing I took from that industry was dealing with very high pressure situations for an extended period, and then having to go back and do the same thing the next day.

The cultural differences between the modern tech sector and the British army of the 1980s are reasonably extreme. I think the camaraderie, the building up of a culture of teamwork, support, and interrelations between disciplines in a tech company like IGS is just phenomenally important. Everything from marketing to accounting to engineering to sales to data science. That collaborative, interdisciplinary teamwork is an aspect I found incredibly useful.

Another is clarity of mission. Understanding what our mission is, and being able to communicate that extremely clearly. Every single person at IGS – and we were 25 at the beginning of lockdown, and we're now 175 – could tell you what the mission is for this year and how they contribute to it and who around them is going to contribute to it.

I have this phrase, it takes 15 players to score a try and you've got to be willing to pass the ball and you've got to be willing to receive the ball. It's the coming together of all of those things, that is how we achieve what we need to as an organisation.

## What is the IGS development story?

It was founded by an Aberdeenshire farmer who grew veg in polytunnels and glasshouses for Michelin star restaurants. He wanted to do this 12 months of the year, but in Aberdeen we get long, sunny, though not very warm summer

days, and the opposite in winter. So he clearly needed an alternative light source to the sun.

He got together with John Allen, a physics professor at St Andrew's University, who was an early pioneer of L.E.D lighting. They found they could apply L.E.D lighting to the germination, propagation, growth, and fruiting of plants. They were introduced to Dave Scott, who is co-founder of IGS, to get their labour costs down. Dave's expertise is in a number of disciplines, including automation. He's built automated warehouses all around the world. So he's a sparky as well as a mechanic. Dave brought the technology from these automated warehouses onboard.

They did that for five years. Then I was asked if I wanted to see the project in a little town called Invergowrie by Dundee. Out of sheer curiosity, I jumped on the train and had a beautiful train ride past Gleneagles, Perth, up towards Dundee. I'm a mountaineer by habit, and my wife is a practising chef, so the environment is really important to our family.

*This vertical farm technology is able to help, not solve, the two huge issues of feeding a massively growing population and tackling climate change.*

I came on board at the end of 2017 and found that there was a unique strategic position available to us in the world, which we adopted. We promised the farmers of the world that we'd never compete with them, and that we would focus entirely on building the best tech and supplying it to them. That stood us in really good stead and under lockdown we have gone from no sales to well over £100M in sales, mainly exports.

## How would you describe the vertical farms?

We think of them as towers and modular systems. The footprint of a tower is 42 square metres, six by seven, and they come six, nine, or twelve metres high. Apart from that we productise them. On the inside, they're all the same, they're just different volumes of growing space. We're building well over 200 towers across four continents in about 30 different city regions for all of our

customers. And the size of the farms varies from two towers to one hundred, and the larger ones will be visible from space.

£100M worth of sales have been achieved, which is a fantastic achievement under lockdown when you're selling such a sensory and physical product.

If you want to have your socks knocked off, come up and see the real thing. We're doing a lot of VR and AR at conferences, and it is proving really popular because you can stand there with a headset on and crane your head upwards and feel like you're standing in a twelve metre tower. But it is still not the same. You don't get the smells, you don't get all the sounds, you can't taste the produce.

## How hard is it to build the towers?

For us, now, it's not that hard. We've built enough of them and the team gets slicker each time. We have manufacturing partners who run our supply chain under our management, and they do some of the manufacturing and put the kits together. And then we ship them out and get a local contractor to build the superstructure and we put the technology in.

## How do IGS outperform their rivals in terms of labour and energy requirements?

A lot of it depends on where you are in the world and what you're growing. So there are large variances between crop types and, to some extent, locations. If you look at the major areas of efficiency, you can run one of these farms with one, maximum two, people. So in labour terms, they're very efficient. In terms of energy, we've managed to half the energy consumption requirement over the course of the last four or five years. That's getting us down to levels where an increasing number of crops are economically viable.

We've got around 200 or so crops, from roots and fruits, to leafy greens, trees, flowers, potatoes, brassicas, broccolis. About 40% of them are now fully economically viable and the farmgate cost of production gives the farmer a profit when selling to retail. So that's really encouraging.

In terms of water use, if you grow a kilo of flour in a field, you need 250 litres of water, in a greenhouse its 20 litres, in our system its 1 litre. That's not mega important in the UK, but in other parts of the world it absolutely is.

*In terms of land use, our 42 square metre system will grow the equivalent of 4 hectares in a greenfield. So you're talking about 1000 times the land use efficiency and that allows you to put land from arable use back into its natural state.*

## What is the cost of produce farmed using the towers as opposed to using traditional agricultural land farming?

Well again, it depends. "It depends" is the phrase we use the most when we speak to investors because they want a single slick answer and there isn't one. When you're growing 200 different things in four continents, it varies a lot.

Let's take one of the most common crops in a controlled environment, which is basil, which accounts for about 40% of the world's herb production.

Traditionally grown in fields in Tuscany and so on. If I were to go to a supermarket and buy a 30g pack, it would equate to around £30-£35 per kilo. If I went to Spitalfields market in London, I'd pay a little over £25 for organic, about £20 for non-organic. Our farm production is around £3.

## What is your relationship with farmers?

When I joined IGS, I decided that our strategy would be to not compete with farmers. We would not grow and sell our own crops as that would need far too much investment. This is a way for farmers to diversify their business, make their business more green, and keep more of the family on the family farm. And it might not just be diversifying away other plant-based crops, you could be diversifying away from dairy, using the slurry from cattle to generate cheap energy that would get the cost of production down even more.

## To what extent is a farmer needed in the

## process?

To understand farming, you need to understand that yes they're looking after a patch of the earth, they're looking after soil, they're looking after the machinery. They're having to plant the seed, get it to germinate, get it to propagate, get it to flower, etc. They don't just grow food for its own sake, they grow it to sell it to someone. And so it's a rather more multi-disciplinary business than a lot of people realise. And so you've got all the skills. It's not just about sticking a seed in some substrate and hoping for the best.

## How easy is it to train a farmer on the IGS technology?

Very. So the recipes are up in the clouds, excuse the pun. So the sun, the wind, and the rain, illumination, ventilation, and irrigation, and the management of the growing life cycle is done through the cloud, through our software. And so it's really a case of applying what you already know and adapting it to these new environmental conditions.

Compared to most pieces of agricultural machinery, the way you access our software, what you can get access to, how easy it is to change things, it is night and day.

## Do you think there is a future in which the majority of farm produce is grown using IGS towers, as opposed to conventional agricultural fields?

No, no I don't. I think in some categories it could become very significant, but we're never going to grow wheat field or banana plantations or fruit trees. Although we do grow some very small fruit trees, our chili bushes are extremely successful.

I would say that maybe 20-25% of the diet, taking into account global variations, could be grown in vertical farms at some point in the future.

I think that the industry has a role to play and the important thing is to not think of this as an either or. We see it as a hybrid. The wastage rate on growing strawberry and tomato starter plants, and shipping them from one country to another country, is almost 50%. How can that be sustainable in any way? So if

you can bring the production of the early stage plants to the locality where you're growing them to full fruiting and harvesting, you'll cut down air miles and wastage.

And it's not just about economics. It's about whether we can actually develop the right policy to feed ourselves in a nutritious way.

## What's left to improve?

I'd say that the crop range, the economics of parts of the crop range, and continuing to reduce the energy load are the three biggest areas of focus for us as a business. So we have a product roadmap and a crop roadmap as well.

We're humble enough to know that whilst we do believe we're the best, and we're certainly the biggest vertical farm company on the planet following our huge growth in sales, we are humble enough to know that we haven't got it all right yet. And so we continue to invest millions every year in R&D.

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