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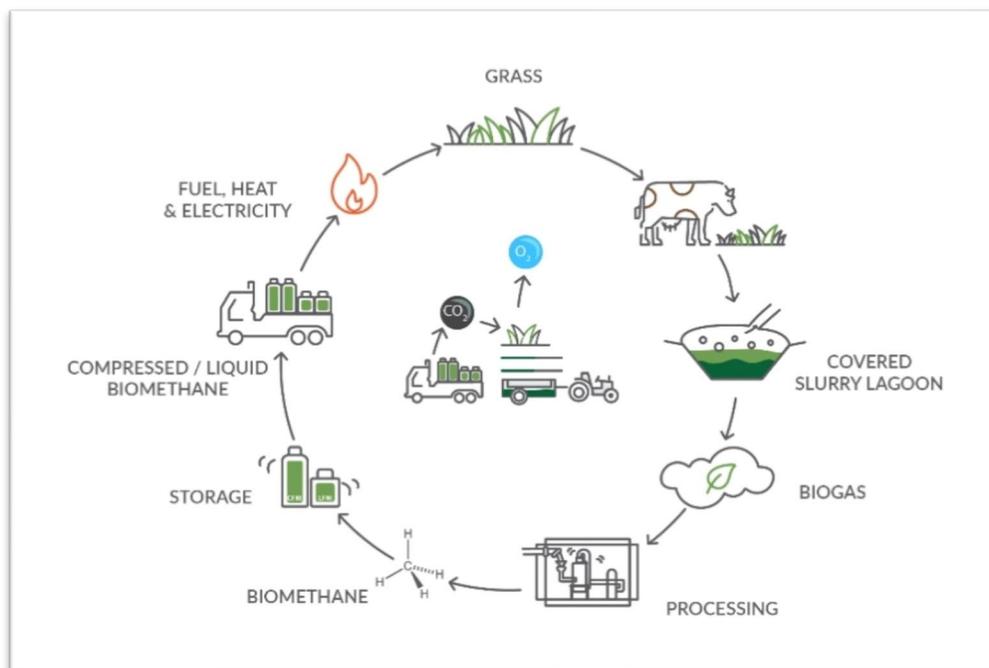
## Energy independent sustainable farming

I've lived, studied and worked all over the world during my long journey from Falmouth School to internationally recognised [independent consultant](#) on clean energy, sustainable food systems and climate change adaptation, but I have to say that here in my birth county of Cornwall some of the most exciting initiatives I have ever been involved in are taking place right now. Cornwall has set itself the highly ambitious goal of reaching net zero carbon by 2030, a full 20 years ahead of the UK overall, and as a largely rural based economy the county's agricultural sector has a significant role to play in helping to successfully meet that target. Indeed, the Council's recently completed greenhouse gas (GHG) inventory reported that around 19% of the CO<sub>2</sub>e emissions for Cornwall and the Isles of Scilly (CloS) are derived directly from agriculture, a significant proportion, with the majority coming from livestock farming. So, the question is, how can we dramatically reduce this figure in just 20 years, as well as simultaneously tackle a myriad of economic, environmental, and social challenges that the sector faces? It may surprise you to know that many of the technologies, processes and approaches that will be needed to do just that, are being developed right here in our county, today!

A good example is [Bennamann](#), a small, highly innovative Cornish company located on two sites, one at the Aerohub Business Park near Newquay, and the other on a working livestock farm just to the west of Truro. The company's story is told in this [animated video](#) I recently put together with help from another successful local enterprise, [Aztek](#). Briefly, Bennamann was established in 2011 by two local entrepreneurs who were surfing buddies and shared a

vision to transform the economics of renewable energy. They wanted to set renewable energy free from a dependence on government subsidy, make it commercially viable from day one and, in short, start a local clean energy revolution that would reduce greenhouse emissions and tackle a whole raft of sustainability issues along the way. Today, Bennamann employs a highly skilled and creative team of more than 35 people with a growing reputation as leading-edge sustainability focussed innovators and has global plans to make a worldwide difference.

At the core of the company's market disrupting proposition is technology and business models that enable the commercially viable local production, marketing and distribution of biomethane. The latter is a naturally occurring gas that is produced when organic matter such as farmyard manure and cut grass breaks down and is a harmful greenhouse gas that contributes to climate change. However, by capturing biomethane from the decaying material before it is emitted to the atmosphere, it can be used as an affordable, versatile renewable zero carbon, or in the case of manure better than zero carbon, energy source instead. Bennamann does just that and provides biomethane produced from manure slurry and cut grass as compressed gas and liquid fuel that can be used as a commercially viable, affordable replacement for fossil fuels, to power vehicles like lorries and tractors, heat homes and businesses, provide hot water and gas for cooking, and even charge electric vehicles off-grid. In doing so, in the case of manure, the company has established a business model that can not only reduce the carbon footprint of livestock farming in the county, but also deliver circular economy-based agriculture through adoption of 'The Bennamann Cycle'.



*The 'Bennamann Cycle'*

Amongst a range of projects the company is currently working on is a £1.2 million research and development initiative, part-funded by the European Regional Development Fund (ERDF), to establish a ground-breaking example of [energy Independent Farming](#) in Cornwall. In collaboration with a team on the Penryn campus of Exeter University and St Allen-based Chynoweth Farm Partners, Bennamann is taking a revolutionary approach to maximise the use of on-site renewable energy resources, in combination with livestock manure, to supply all the energy needed for a farm. Thereby taking the site off-grid, improving productivity and dramatically reducing the operational costs for the business. The project will also demonstrate how biomethane surplus to the farm's own needs can be made available in gas and liquid form for local sale to create an additional income stream for the farmer, as well as how the company's process can improve the sustainability of land management through the replacement of manufactured fertiliser inputs with digestate.



*Chynoweth Farm, St Allen, near Truro with Bennamann site top left*

Bennamann takes a fundamentally different approach to that traditionally adopted for the use of digestate, recognising that how farmers and growers view the role of nutrient cycling must change in order to achieve a system which regenerates the productive capacity of soils. That is a holistic, transparent system that replaces what is exported off the farm (i.e. the nutrition and energy embedded in food products) with what is locally available from natural resources - the sun, rain and nutrients accessible in the local natural environment. To help achieve this, through applying learning acquired from the sustainable farming related workstreams of the [Energy Independent Farming](#) project, the collaboration is developing a secondary process which uses digestate as a growth medium and food source for a diverse range of beneficial microorganisms. When deposited in the ground these communities

form the basis of the soil food web and provide the starting blocks for the natural processes that carry out the extraction and mobilisation of minerals and nutrients, in turn making them readily available to the surface plant life (grass, crops and other vegetation). By applying a better understanding of soil biology to land management, this approach results in healthier, higher quality produce that increasingly food aware local consumers will want to buy, reducing food miles as well as air quality degrading emissions of ammonia from slurry handling operations.

The project aims to provide a proven business model for a roll-out of this radical new approach across the county, the UK and beyond, putting Cornwall at the centre of a local clean energy revolution worldwide. In terms of scalability, there are circa 600 dairy farmers alone in the rural county of Cornwall (131,000 dairy cattle – 6% of the national herd) and of these there are an estimated 120 farmers in a position to participate in the short-term, including the 58 dairy farms in Cornwall Council's own Farm Estate. Indeed, in the case of the latter, the Council has already committed in principle to a pilot installation of Bennamann's farm-scale biogas sourcing, processing and distribution technology on 6 of the dairy farms in their Estate. Across the UK, Bennamann's technologies and business models would enable 71% of the UK's circa 29,000 dairy farms to become economically viable local zero-carbon energy producers. This would potentially result in a GHG emissions saving of around 34 Million tonnes CO<sub>2</sub>e annually for the UK, just from the mitigation of the manure slurry fugitive emissions, before accounting for the emissions savings that will accrue through the use of the derived biomethane in decarbonising the transport and heat energy sectors!

Bennamann's game-changing energy independent farming project not only aligns perfectly with Cornwall Council's ambitions for a net zero carbon county by 2030 (and helps the county meet a wide range of economic, environmental and social goals too), as I highlighted in my recent 'lockdown thoughts' [video](#) for the CloS Local Enterprise Partnership (CloS LEP), it also helps us realise the post COVID-19 'new normal' world that many of us say we [want](#). It could not have come at a better time!