Outback Based Sustainable Agriculture

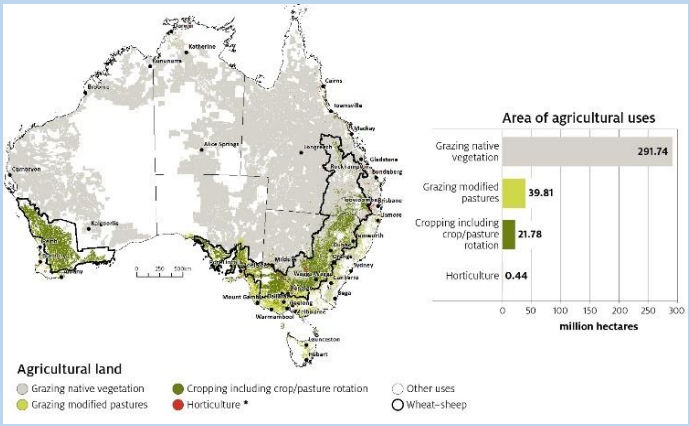
Delivering real sustainable growth

Australia's agriculture industry is one of the most diverse and competitive in the world, with 65% of Australia's total agricultural production sent overseas. The industry is already worth around $71.2 billion. However, with the integration of sustainable infrastructure and energies, as well as increased diversification (the reallocation of a farm's resources) we could soon be on track to achieving our Ag2030 goals. The Department of Agriculture, Water and the Environment has stated that 'if all broadacre farms had the same output per hectare as the top performing 20% of farms, the value of broadacre agriculture would be around 24% higher than current levels, and cash income would see a 46% increase.' The slowed growth of recent years has been a consequence of 'deteriorating seasonal conditions', which has caused much variation and uncertainty in output.

One of the most pressing issues that face the agriculture sector in Australia is climate volatility. Farming has been determined by climate, weather availability, and soil type; especially in the last few decades which has seen a shift towards higher temperatures and lower rainfall.

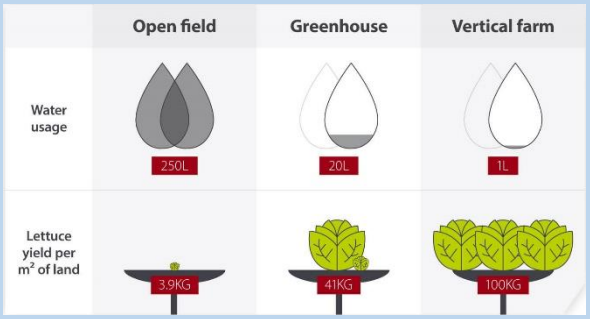
The Outback Based Sustainable Agriculture project (project OBSA) addresses the myriad of challenges posed by climate change, uncontrollable and extreme weather patterns, soil degradation, and pests and diseases. And offers solutions for water conservation, energy efficiency, and low emission technology. This will be a driving factor towards achieving not only our Ag2030 production goals, but to increase employment in the agriculture sector (which has fallen by 25% in the last 3 decades), and to advance our progress towards a low-to-no carbon future.

We currently depend heavily on livestock, with high prices being our main driver of growth in exports. However, due to this overwhelming number of cows, pigs, sheep, and chickens cluttering our land, there is an overwhelming amount of methane released. In fact, Australia's agriculture sector accounts for about 15% of the country's total greenhouse gas emissions. And as only certain areas of land are able to accommodate for livestock, we are quickly running out of room. Project OBSA will allow for other areas of production, such as horticulture, to rise in a sustainable way.



Controlled Environment Agriculture (CEA)

CEA (also referred to as vertical farming) encompasses a variety of systems, all of which offer a technology-based approach to farming. A mix of greenhouses, hydroponics (growing crops without soil by using mineral nutrient solutions on the exposed roots), aeroponics (roots are misted) and soilless cultivation, CEA systems are designed to provide the optimal growing environment for crops regardless of the weather. As well as preventing pests and diseases, conserving water and nutrients, and removing the dependency of crops on degraded soil, vertical farming can contain 4-6 acres within a single acre. Thus, offering solutions to increasing produce within the same land size.



My proposal involves broadening our agricultural zone through the combination of sustainable infrastructure, controlled environmental agriculture, and renewable energies to achieve our Ag2030 goals and a low-to-no emission future. Which will be done by using eco-friendly materials in production, and renewable energies in operation.

Ethylene Tetrafluoroethylene (ETFE)

Developed over 40 years ago, ETFE is a fluorine based plastic polymer which offers a lightweight alternative to glass (weighing approximately 1% the weight of glass) (Structureflex, n.d.). Due to its light weight, it will in turn reduce the amount of required structural steel support, resulting in easier installation and a more cost-effective alternative. ETFE is unaffected by atmospheric pollution, resistant to corrosion, chemicals, and UV (the ability to withstand the degradation which can be caused by ultraviolet exposure (Corrosionpedia, 2017)) and provides excellent insulation and ventilation (Tuflite, 2018) as the material can be treated in various ways to alter its transmittance to control the internal environment (Fabritecture, 2017). ETFE has a low energy manufacturing and transportation process (due to its lightweight). It performs well in earthquakes due to its elasticity and does not allow flames to spread in the event of a fire due to its ventilation and self-extinguishing qualities (Lynch, 2019).

Green Steel

To manufacture steel, oxygen must first be stripped from the iron ore to produce pure iron. This is traditionally done using processed coal (coke) (a sedimentary rock formed by decaying vegetation and organic matter) or natural gas (a fossil energy source which forms below the earth's surface consisting mainly of methane (CH_4)) in a process which releases CO_2. For every tonne of steel produced, almost 2 tonnes of CO_2 are emitted into the atmosphere.

However, green steel offers a replacement to traditional steel and falls in line with the Federal government's policies to prioritise technology led investments to lower emissions.

Green steel uses hydrogen created from renewable energies rather than coal. Australia would be making a switch to a low-carbon future in tandem with increasing our sustainable steel production and revenue.

Green steel would assist in offsetting job losses in the fossil fuel industry. The Grattan Institute has already estimated the investment into green steel would create over 25,000 manufacturing jobs alone (Grattan Institute, 2020). Australia's abundant solar and wind resources will also allow us to meet the requirements to produce the hydrogen green steel industries would need.

Renewable Energy

The concentration of solar radiation per square metre in Australia remains the highest on Earth, making it ecologically optimal for photovoltaics in powering this project. In addition to this, wind energy also poses a renewable solution by using wind turbines to catch the winds energy and spin an electric generator. As wind is not a constant, researchers have developed ways to maintain a reliable supply of energy by pairing wind farms with solar farms or storage batteries. These two energy types are the two sources of new electricity supply in Australia of lowest cost (Australian Renewable Energy agency, 2018).

Advantages of Project OBSA

Project OBSA offers a sustainable solution to the numerous challenges the agriculture sector faces. By addressing climate change, water conservation, efficiency, and new innovative technology, project OBSA aims to broaden the agriculture sector by expanding Australia's CEA sustainably. Companies such as the Green Camel are already leading the charge to upturn the traditional production of horticulture, however we need to broaden our horizon sustainably should we wish to achieve our Ag2030 goals.

We can increase yield with the same land size by implementing these on pre-existing pastures, using the solar panels as shade for livestock, however this is also an opportunity to use land unable to facilitate grazing or harvesting as well as urbanised areas (thus removing transportation majorly). Given the right investment and vision, these technologies could also be used for interplanetary colonisation to help sustain life on other planets such as Mars.

As Dr Karl himself said, 'The good thing about renewables is that they create loads of jobs.' It will require scientists, architects, engineers, computer system operators, researchers, project managers, etc, and embrace new technologies. We will be producing food at higher qualities without consequences that befall us due to climate volatility and drought. Project OBSA. Delivering real sustainable growth.

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