**Introduction**

Water is one of the most vital sources of life. The conservation and reliability of water systems are crucial for our survival and the long term health of communities around the world. In collaboration with Acciona, a leading Spanish infrastructure company, our team has taken on the challenge of creating a powerful model to predict water consumption by sector in the Spanish town of Villarubia De Los Ojos, and a preemptive strategy of anomaly detection with the goal of introducing a prevention plan to optimise the management of water resources, reduce the environmental impact of water loss, and place Acciona as a leading pioneer in the emerging world of carbon farming.

This paper focuses on identifying a multifaceted business use case to address the challenges regarding water resource and supply management that plagues the town of Villarubia. We will thoroughly identify, explore, and tackle anomalous events that could cause the disruption of water allocation, and present a sustainable and profitable business plan for Acciona to implement in Villarubia, and expand nationally in the future. Furthermore, we will recommend some cost-saving measures like investing in smart water infrastructure that will allow us to minimise the need for costly emergency repairs and ensure the availability of clean and efficient water supply systems in the town. We will also present Acciona with a sustainability opportunity based in the booming carbon farming industry. We will begin by examining the size of the carbon farming market within Spain, and present a unique value proposition that is supported by a sound business plan. We will identify opportunities specific to Villarubia, and explain how they can be aligned with many of the United Nations Sustainable Development Goals. This strategy will help Acciona reduce water loss, predict water allocation, and help Acciona minimise carbon emissions, thus reducing its impacts on the environment.

**SWOT Analysis**

**Strengths**

In regard to Acciona’s strength, the company is a leader in the renewable energy space with a powerful portfolio of solar and wind projects. They also operate in several different sectors such as sustainable infrastructure, water, transport, and more. Such diversification aids in risk mitigation. Moreover, it holds sustainability and corporate responsibility as pillars of their day-to-day work, which contributes to Acciona’s positive image and reputation.

**Weaknesses**

The most prominent weakness Acciona has is the need for heavy capital investment. Renewable energy project development and infrastructure require large investments which could put a strain on the company's financial resources. In combination with that, Acciona has high levels of existing debt which, if not managed effectively, can pose a risk to the development of new projects. Lastly, when operating in many different sectors, some operations may suffer due to the cyclicality of the segment during times of financial downturn.

**Opportunities**

One of the biggest opportunities for Acciona is the worldwide shift toward green and sustainable energy, which presents a huge potential for growth. On the same topic of renewable energy, Acciona can take advantage of the technological advancements in their field to improve efficiency, reduce costs, and extend opportunities for collaborations with tech companies. This strategy would open new avenues for growth and innovation.

**Threats**

A major threat in this industry is technological obsolescence. As technology changes rapidly, existing infrastructure and projects may be rendered obsolete. Additionally, geopolitical instability not only poses a threat to their operations in certain regions, but also creates price volatility in commodities such as oil and gas which could negatively impact Acciona’s profits.

**Business Case Challenges**

Water supply companies encounter several challenges in their operations. One significant challenge is the identification of anomalous events in the water distribution system. These events can include pipe breakages, water leaks, instances of fraud, and weather disruptions. Detecting and addressing these events promptly is crucial to minimising water loss, ensuring equitable access of water for the community, and preventing costly emergency repairs.

Another challenge is efficient water allocation. It is essential to predict and allocate water resources effectively to meet the varying demands of different sectors in Villarubia De Los Ojos. Failure to do so can result in water shortages, which would impact the community and industries within Villarubia’s different sectors that rely on a consistent water supply.

**Solutions**

**Eliminating Water Shortages**

Our prevention plan eliminates water shortages in the community by efficiently allocating water resources based on the results of our predictive machine learning model. Ensuring equitable access to water for all residents of Villarubia is of the utmost importance and, with our model, Acciona can guarantee water access for the community while preventing disruptions in supply. Predicting water consumption in the community, and allocating the water supply accordingly, will also reduce the cost of treating and pumping additional water. Reduced energy consumption for water treatment will not only contribute to Acciona’s environmental sustainability commitment, but also result in lower operational costs. To scale this strategy in the future, we propose doing a multivariate analysis with more robust data to predict water allocation in the other locations Acciona is operating in.

**Investing in Smart Water Infrastructure**

Another crucial component of our business use case is the recommendation to invest in smart water infrastructure. Smart water infrastructure integrates advanced technologies, data analytics, and real time monitoring systems into traditional water supply and distribution systems. The goal is to respond to the needs of the community quickly by ensuring efficient and sustainable water management practices. This includes installing sensors, real-time monitoring, and control systems to enable remote management of water.

Smart water technology facilitates the early detection of anomalous events, such as pipe breakages and leaks by identifying changes in water pressure and flow patterns. Acciona can then dispatch response teams promptly, minimising water loss and avoiding costly emergency repairs and replacements. Additionally, sensors can continuously monitor water quality parameters such as pH and chlorine levels and will trigger alerts when there is any deviation from safe water standards, ensuring the protection of the public health of Villarubia. Data from smart water infrastructure can also be analysed to predict when components of the water system, such as pumps or valves, are likely to fail. This proactive monitoring approach will minimise disruptions in Acciona’s water supply delivery and will significantly reduce maintenance costs.

By implementing smart water infrastructure, Acciona will be able to decrease water loss and optimise distribution while reducing the environmental impact of wasted water supply and treatment. This includes lowering energy consumption and carbon emissions for a more sustainable and long lasting system. Additionally, the ability to predict anomalous events, such as pipe breakages, optimises maintenance and will allow Acciona to avoid costly emergency repairs.

**Value proposition**

Following the implementation of our water loss prevention plan, the last proposal of the business use case is to invest in a Carbon Farming platform.

Carbon Farming, or regenerative agriculture, is an innovative farm approach that promotes optimising carbon capture on working landscapes. This optimization is achieved by the implementation of practices that are known to improve the rate at which CO2 is extracted from the atmosphere and stored in plant material or soil organic matter. Therefore, farmers and land managers have a key role in promoting sustainable land stewardship by actively engaging in Carbon removal from the atmosphere and storing it in the soil.

This innovative and sustainable platform will allow farmers to implement, measure and monetize carbon captured in their fields. It will be able to calculate the carbon potential of the field, measure and report the result of the practices, and provide farmers with access to the carbon market. That way, they will have the opportunity to trade Carbon reductions, avoidance, or sequestration in the form of certificates or credits. Therefore, once the platform measures the baseline capacity of a certain land, sustainable farming practices must be adopted to ensure the long-term accumulation of soil Carbon.

The use of this platform, starting in Villarrubia de los Ojos, will allow farmers and companies to have a new revenue stream. In fact, they will be able to earn 183€ per hectare annually plus cost reductions. Therefore, Carbon Farming will provide a new income source, diversifying the economic base beyond the normal traditional practices.

Not only will this benefit the economy of the town, where agriculture is a large economic activity, but it will also make a valuable contribution to promoting sustainability education in agriculture. The platform also offers resources and training on regenerative agriculture, helping farmers throughout the process.

The added value of regenerative agriculture is the improvement of the soil quality. Healthy soil is the foundation of productive, sustainable agriculture. First, it maximises biodiversity. It also has the capacity to break disease cycles, stimulate plant growth, and provide habitats for pollinators and organisms living in the soil. Furthermore, effective soil management practices lead to higher crop yields. Healthy soil is rich in organic matter, nutrients, and microorganisms, providing the ideal growing environment for crops.

However, the key benefit of Carbon Farming is its deep impact on soil water retention. As of now, agriculture accounts for 70 percent of all freshwater withdrawals globally (World Bank). By enhancing water soil retention, farmers ensure that water is held within the soil, making it more available to crops over an extended period. This enhancement is critical for Villarrubia de los Ojos, where efficient water use is vital for sustaining agriculture.

This improved water retention empowers farmers to allocate water resources with precision, avoiding water loss and ensuring that every drop of water is maximised. It also addresses the consumptive water use problem, mitigating the impact of its use.

Carbon Farming serves as a key contributor to sustainability, directly tackling issues outlined in the Sustainable Development Goals (SDGs):

o SDG 2 (Zero hunger): By improving crop resilience and soil quality, the platform will increase agricultural productivity, supporting food security.

o SDG 3 (Good health and well-being): The platform promotes the reduction in the use of chemical inputs, which leads to healthier produce and ecosystems. This will positively impact human health.

o SDG 6 (Clean water and sanitation): The improvement of soil structure will improve water retention of the fields, leading to a significant reduction of irrigation. This will result in a drastic reduction of water consumption in agriculture, which will promote a better allocation of water.

o SDG 9 (Industry, innovation and infrastructure): The platform is an innovative approach of farming and contributes to sustainable agriculture.

o SDG 11 (sustainable cities and communities): Carbon Farming contributes to creating more sustainable rural communities.

o SDG 12 (responsible consumption and production): By improving the quality of soil, Carbon Farming promotes more sustainable agricultural practices. This encourages responsible consumption and production patterns.

o SDG 13 (Climate action): The main goal of Carbon Farming is climate change mitigation through Carbon sequestration.

The platform adopts a hybrid B2B B2C SaaS business model, charging a setup fee of 200€ plus a fee of 1€ per hectare. This approach enables equitable access, with big players paying proportionally more based on their extensive land holdings, while a single farmer with a small amount of field can also engage with the platform. Additionally, the company will charge a commission to intermediaries in verification and selling processes.

Now is an advantageous time to penetrate this industry because the market size of Carbon Farming is exponentially growing over time, and it is expected to have a 30.6% compounded average growth rate by 2027. The total addressable market is $60B, while the serviceable addressable market is $10.5B and the serviceable obtainable market (in Spain) is $40M.

Not only is the market size huge, but the competitive landscape is not very broad right now. While there are some big players in the USA and Australia, they don’t have a presence in Spain. This means that Acciona will be a first mover, creating an opportunity to shape the narrative around Carbon Farming in Spain. This early entry will position Acciona as an even greater leader in sustainability.

**Conclusion**

Our comprehensive business case strategy for Villarubia De Los Ojos integrates sustainable water management practices and innovative solutions, positioning Acciona as a pioneer in both water conservation and carbon farming. By leveraging advanced machine learning techniques for predictive water consumption modelling, we address challenges in anomaly detection, efficient water allocation, and the promotion of responsible water use. The adoption of smart water infrastructure further strengthens our approach, ensuring real-time monitoring, early anomaly detection, and the optimization of distribution systems.

Moreover, our strategy extends beyond water management to the promising field of Carbon Farming. This innovative approach not only creates a new revenue stream for farmers and companies but also aligns with sustainability goals outlined in the United Nations Sustainable Development Goals.

The value proposition extends to economic diversification in Villarubia de los Ojos, promoting sustainability education in agriculture, and providing resources and training for regenerative practices.