

BUSINESS ANALYST REPORT

RENEWABLE ENERGY STORAGE

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SECTOR OF CHOICE: - RENEWABLE ENERGY

In order to alleviate the climate change and offset the greenhouse gases emission renewable energy is now an inherent part of the European Union's energy portfolio. This report primarily underlines the growing demand for renewable energy and challenges encountered by the energy storage sector in Ireland. Ireland being an island nation has limited fossil fuel resources and approximately spends €4 billion every year on the imports of oil and its products. Renewable energy forms the backbone of Ireland's climate action plan in achieving a complete decarbonized environment by 2050. According to reports, the energy demand in Ireland will continue to grow between 22% now to 53% in 2030, obligating an enormous amount of investment in the renewable infrastructure (KPMG, 2018). The energy infrastructure is undergoing a massive transformation to a renewable focused grid and becoming increasingly dependent on wind energy. The amount of electricity generated from renewables increased from 7% in 2007 to 33% in 2018 with wind providing 85% of Ireland's renewable electricity thus contributing 30% to the total electricity demand making it the largest contributor of renewable energy resource after natural gas in Ireland (Wind Energy, 2018).

STAKEHOLDERS AND ENGAGEMENT STRATEGY

One of the best platforms used to engage with stakeholders was LinkedIn and WIP (Washington Ireland Program) Forum. Through LinkedIn, professionals from the renewable energy industry were approached and had a conversation regarding the present scenario and scope of the renewable energy. The first person interviewed through LinkedIn was "Jonathon Wallace" who is Energy & Commodities Trader at Brookfield Renewable. Second, "Tim Dorrington" who is a Project Manager and Energy Consultant at Energy Services Ltd. Third "David Tobin" who is Renewable Energy and Sustainability Director at Beauparc Utilities. The second platform utilized for stakeholder engagement was the Washington Ireland Program (WIP) Forum. Being a forum fellow I got the opportunity to have a conversation with one of the fellow members "Alex Murray" who is a postgraduate student in Renewable Energy and Environmental Finance at UCD. All of these stakeholders hold a common view regarding the renewable energy in Ireland and challenges it faces in energy storage which are discussed in detail in the following sections.

SECTORAL CHALLENGES

Over the coming years Ireland's dependency on renewable energy sources is expected to increase, however this transition is not a simple process and leaves the energy sector exposed to a number of challenges. Ireland has invested a huge amount in the development of wind energy infrastructure making it one of the cheapest forms of renewable energy resources present right now (Wallace, 2021). However if the wind does not blow the prices for the power can be very expensive (Wallace, 2021). Therefore, Ireland needs to invest in means to store this incredible wind energy. There is a lot of wind energy in the night time but the energy requirement is low as compared to day so it gets wasted. Since renewable energy sources are unpredictable, for Ireland to achieve full dependency on renewables a high quality standard energy storage infrastructure has to be developed and made available at an affordable cost (Dorrington, 2021). This is important to maintain a balance between the supply and demand. There are a number of ways present today to store energy one of them are batteries that can store energy to be utilised later, but they can store energy for a certain period of time and they tend to lose their charge when the charging source is removed(Rathi, 2021)(Wallace,2021). Other main issue with batteries is that if one wants to run a small house with the batteries it would require a large number of batteries to be put together which can add a lot to the electricity bill. Also, the energy demand varies highly according to seasons for instance a person in London would require more natural gas to heat their homes during winters while a person in India would require an air conditioner during peak summer season (Rathi, 2021). This peak energy demand can be 20 times more the average energy consumed on an average day for heating or cooling (Rathi, 2021). So, government might be sceptical in investing on something which has utility only during the peak times. One another way to store energy is underground-thermal energy storage that can store the heat for months but it is expensive to build and secondly it requires the towns and cities to have a well-planned underground reservoir which most cities don't have(Rathi, 2021). Also, this is applicable on a local scale only and as the distance from storage site increases the transport costs adds up making it less feasible solution (Rathi, 2021).

EVIDENCE OF IMPACT OF ISSUE

With huge investment in the renewable energy sector government has come up with a mechanism known as "Feed in Tariff", so any electricity that is generated is subsidised by the state (Dorrington, 2021).The extent to which storage facilities can be developed can have a direct impact on the country shifting to renewables. All electricity generated from cannot be

stored in its original form it has to be converted to other forms of energy to be stored. The demand for energy storage does not stick to storing it on a weekly or monthly basis rather it is needed to supply in times of low production and high demand days. The excess energy generated is not getting wasted; it can be stored and supplied to other countries like UK and France with the help of an interconnector. Currently a celtic interconnector link has been allowed for exchange of electricity between Ireland and France which is due for completion in 2026(Group, 2021). However with the renewables sources can be replenished any number of times the cost utilised to generate it again and again can add up to a huge amount. On the other aspect it is not certain that renewable energy can't be stored but there is a huge investment cost involved for example for the setup of hydro pump storage it can take approximately 10 years and there are huge chances that government might not be willing to invest in such a long term project.

OPPORTUNITIES TO USE DATA IN ADDRESSING CHALLENGES

Due to high uncertainty associated with the complexity related to renewable energy systems big data and analytics has a huge potential for improving the efficiency and cost of energy systems .To utilize the technology to full potential studying the human energy consumer behaviour from different perspectives namely behavioural and psychological factors, experimental and ecological economics is of significant importance (Murray, 2021). Different humans having different houses at different geographical locations differ in their energy consumption behaviour and show a great randomness at different times of the day. All this data can be collected by smart meters in real time from the demand side of grid(Zhou, 2016).With these smart meters deployed at the user side electricity consumption can tracked and useful patterns can be drawn on a daily or monthly basis(Zhou, 2016). The real time data collected from smart meters combined with weather data and market information can be used to optimize the energy consumption(Ma *et al.*, no date). This can benefit both the consumer and supplier, consumer having an opportunity for real-time interaction with the power supply company and optimize their energy usage accordingly (Zhou, 2016). On the other hand giving the power company a chance to understand the energy requirements in a specific residential area will give them a picture of the energy trends for the area , understand the crest and troughs of in the data(Zhou, 2016) . An Intelligent Energy Network (IEN) has to be build up in order to realise the full potential of data analysis methods which includes pattern recognition and machine learning models to identify locations of faults and predict future favourable locations(Ma *et al.*, no date).With more data centres being set up in the coming

future, the energy demand is expected to increase, for this the energy sector needs to have an estimation for which area the data centre set up is planned, understand the current energy trends in the area and predict the future energy demands to support the development of data centre.

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APPENDIX I

- **Feed in Tariff:** A feed in Tariff is a mechanism developed to encourage the investment in the renewable energy sector. It pays you for the extra electricity generated by the grid that is not utilised at the home and can be sent back to the grid.
- **Washington-Ireland Forum:** A global platform providing opportunities for showcasing debating and leadership skills. People from different background join this join this forum to have an open discussion on numerous topics, one of the last discussion held was sustainability.
- **Smart meters:** This is an alternative and a better solution to the conventional meters and captures real-time information such as voltage levels, current, power threshold and communicate it to the consumer for better clarity of the energy consumption.

APPENDIX II - STAKEHOLDER ENGAGEMENTS

- (Dorrington, 2021) interview with Project Manager and Energy Consultant at Energy Services Ltd, 27 Feb 2021.
- (Wallace, 2021) interview with Energy & Commodities Trader at Brookfield Renewable, 28 Feb 2021
- (Tobin, 2021) interview with Renewable Energy and Sustainability Director at Beauparc Utilities, 19 Feb 2021.
- (Murray, 2021) interview with postgraduate student in Renewable Energy and Environmental Finance at UCD, 22 Feb 2021.