INTRODUCTION

- **Brookfield Renewable Ireland and Coillte are jointly exploring the potential for a renewable energy project near the Bottlehill and Glannasack areas in County Cork. This project is exploring the use of wind turbines, solar panels and energy storage technology.**

- **The proposed project is currently in the preliminary design stage. The results of detailed environmental impact assessments and feedback from the local community will inform the design of the project.**

- **The Coom Green Energy Park project team has extensive experience in the design, construction and operation of wind energy projects. The team's overall aim is to deliver a project that brings tangible and long-lasting benefits to the local community which will contribute to the vital task of decarbonising our country.**

THE NEED FOR WIND ENERGY

In June 2018, the Irish government set a new target that 32% of electricity must be sourced from renewable energy by 2030.

The importance of the renewable energy target has been, and continues to be, a stated objective in various Irish energy plans and policies including:

- Public Consultation of the Design of a new Renewable Electricity Support Scheme in Ireland 2017
  Department of Communications, Climate Action & Environment (DCCAE)
- Ireland's Transition to a Low Carbon Energy Future 2015 – 2030
  Department of Communications, Energy & Natural Resources (DCENR)
- The Green Paper on Energy Policy in Ireland 2014
  Department of Communications, Energy & Natural Resources (DCENR)

At present 85% of Ireland's electricity is generated from coal, oil and gas – all of which is imported and subject to international fuel wholesale volatility, the main contributor to rising electricity bills for the consumer. Wind energy is well suited to the Irish climate and can contribute to reducing Ireland's exposure to fossil fuel energy costs.

When operational the Coom Green Energy Park has the potential to generate enough renewable electricity to power up to 100,000 homes.

The project will displace approximately 100,000 tonnes of carbon dioxide annually, helping Ireland to reach its renewable energy targets and obligations.

NOISE

ENVIRONMENTAL NOISE IMPACT ASSESSMENT

Work Done To Date

- Assessment undertaken in accordance with best practice.
- Study Area was defined using computer modelling.
- We first identified potentially affected properties and background noise monitoring locations.
- Noise levels at residences in the vicinity of proposed turbines have been measured.
- This background noise data, and computer modelling, is being used to inform the site layout, to ensure the project is fully compliant with noise guidelines.
- If required, turbines will be moved or omitted in the next draft layout.

WIND TURBINE NOISE

- Noise is generated by wind turbines as they rotate to generate power.
- Noise levels increase through the low wind speed range and plateaus at 7m/s (25km/hr).

NOISE SOURCES

Aerodynamic Noise

- Blades passing through the air.
- Noise spread across the audible frequency range.
- Main source of noise from wind turbines.
- Improved design - designed to minimize noise whilst optimising power.
- Trailing Edge Serrations – reduce aerodynamic noise.

Mechanical Noise

- Gearbox, cooling fans, oil pumps.
- Significant improvements in control of mechanical noise.

TYPES OF NOISE

Infrasound

- Frequencies below 20 Hz.
- No significant infrasound from wind turbines.
- Was a feature of passive yaw “downwind” turbines.
- No longer a significant feature with modern turbines.

Tonal Noise

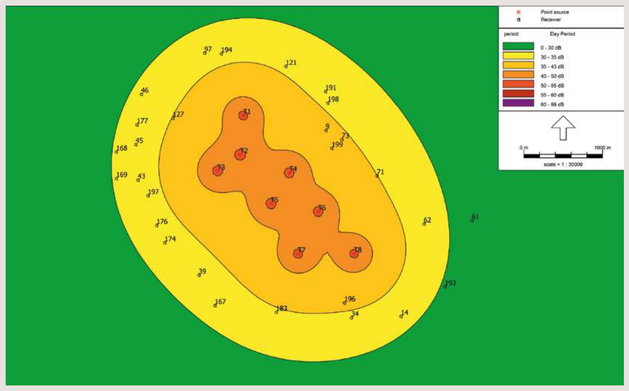
- Can be associated with mechanical or aerodynamic noise.
- Can contain Low Frequency tones.
- Modern turbines incorporate significant improvements in control of mechanical noise.

Amplitude Modulation (AM)

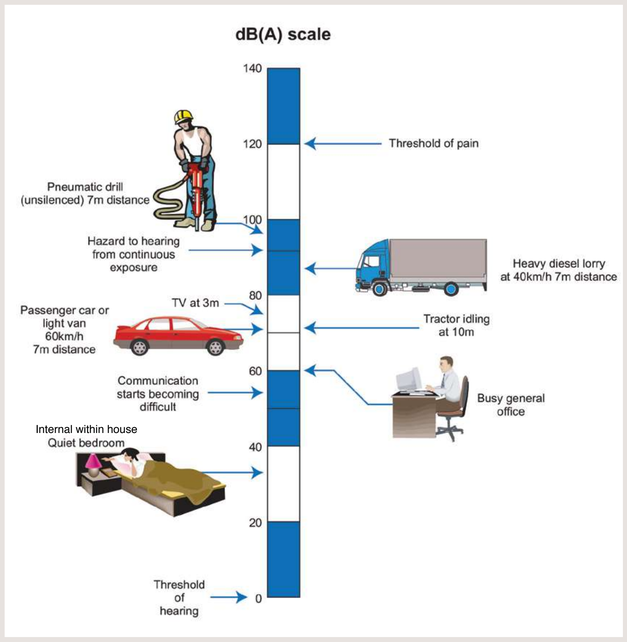
- Fluctuations in audible noise from a wind turbine.
- ‘Blade swish’ observed close to turbine.
  - Typically not an issue at a distance from a wind turbine.
- In some cases, periodic ‘thumping’ or ‘whoomphing’ observed at a distance from a wind turbine.
  - Potentially mitigated by controlling pitch of wind turbine blades or shut downs during specific conditions where AM occurs.

Gearbox vs Direct Drive

- Gearbox design improvements.
  - significant reductions in mechanical noise.
- Direct drive machines do not have gearboxes and so do not produce significant mechanical noise.
- No significant differences in noise between geared and gearless machines:
  - Aerodynamic noise is the dominant source.
  - Improvements in the control of mechanical noise.



Sample Noise Contour Map



The Level of Typical Common Sounds on the dB(A) Scale *(Source: NRA Guidelines for the Treatment of Noise & Vibration in National Road Schemes, 2004)*

WHAT IS LANDSCAPE AND VISUAL ASSESSMENT (LVIA)?

Landscape Impacts and **Visual Impacts** are closely related, but assessed separately

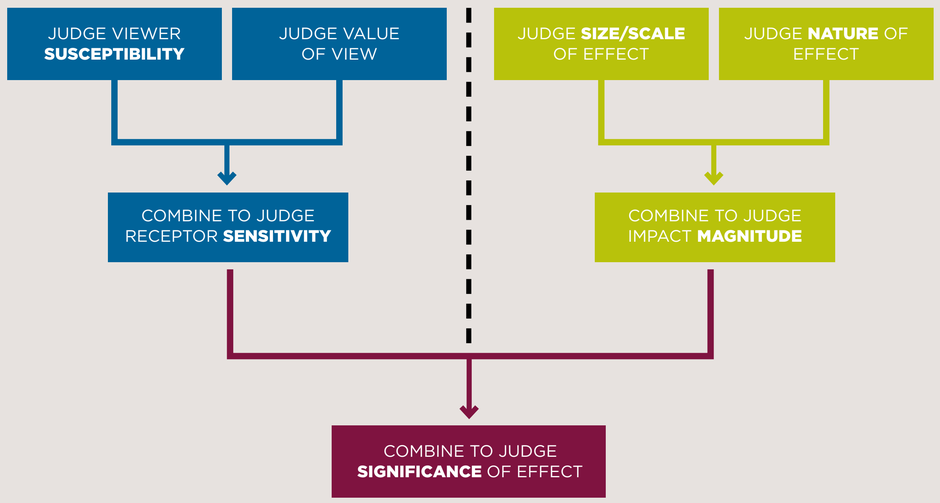
LANDSCAPE IMPACTS

- Deal with 'landscape' as a resource in its own right.
- Physical effects on landscape features and/or land cover.
- Effects on landscape character.
- Wind farms have a stronger potential to influence landscape character than physical landscape fabric.

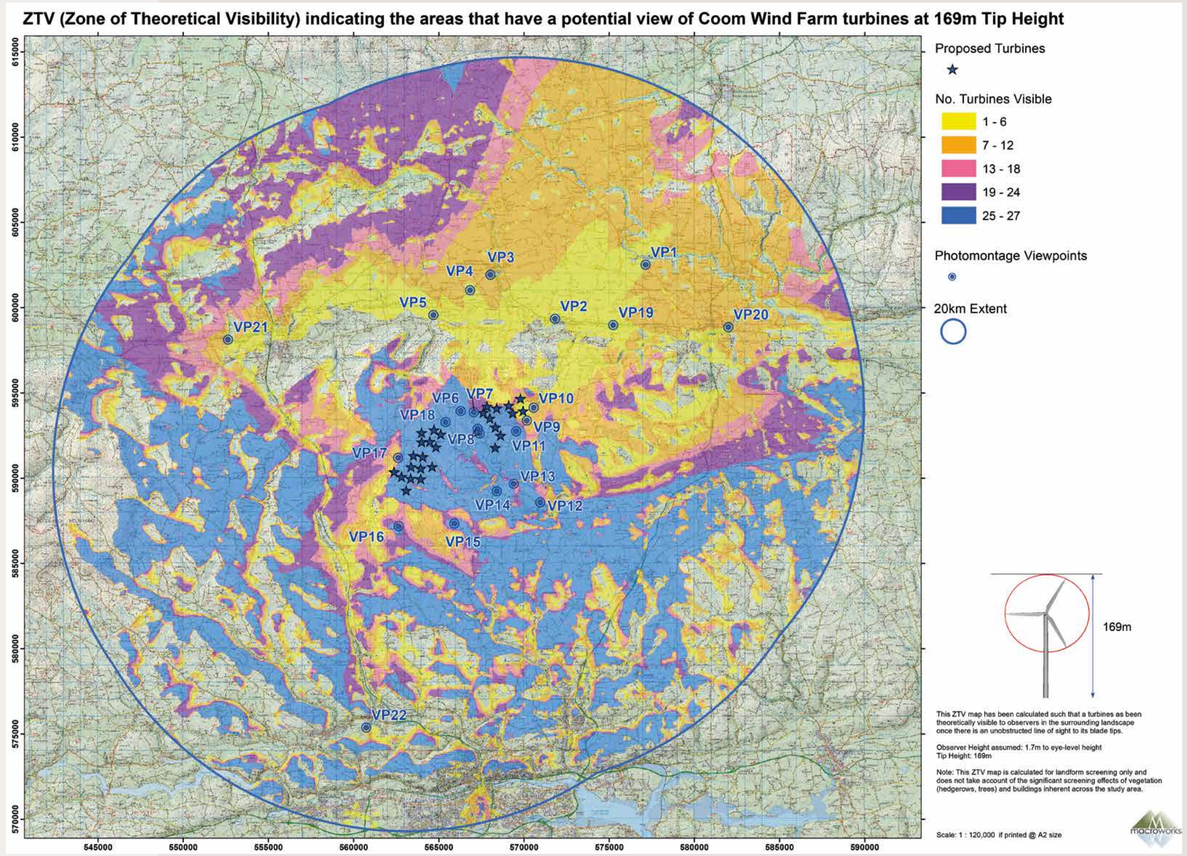
VISUAL IMPACTS

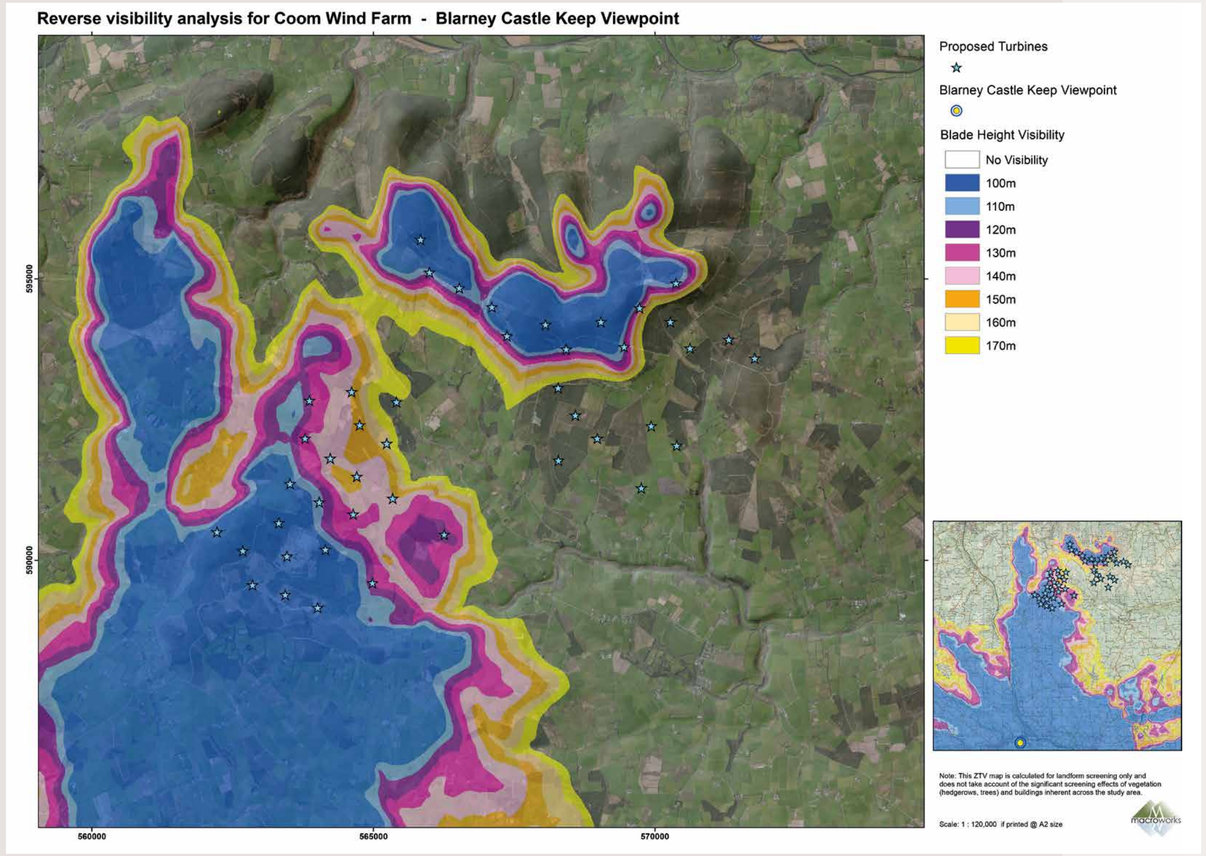
- Visual receptors are people and groups of people in a range of viewing scenarios and that can influence their sensitivity to visual change (i.e. Hill walkers vs motorway commuters).
- Visual change may occur as a result of 'visual obstruction' (blocking of a view), but in the case of wind farms, relates to visual intrusion – the addition of new elements within a view.
- Impacts relate only to visual change and how this might affect 'visual amenity' or the values associated with a particular view.

The overriding guidance document for LVIA in Ireland and the UK is the 'Guidelines for Landscape and Visual Impact Assessment (2013)'. A simplified version of the LVIA process outlined in the guidance is shown below.



WHERE WILL THE PROPOSED WIND FARM BE VISIBLE FROM?





Computer generated Zone of Theoretical Visibility (ZTV) maps are used to determine where the proposed turbines may be visible from in a ‘bare-ground’ scenario i.e. without accounting for screening by the likes of vegetation and buildings.

ZTV maps also aid the selection of representative viewpoints, which are used as the basis of the visual impact assessment.

WHAT WILL THE WIND FARM LOOK LIKE?

Early stage development of photomontage image showing ‘wire-frame’ wind turbine models and ‘bare-ground’ surface from digital terrain model.

Next stage development of photomontage image showing real photography being integrated into the image.
In further stages, the ‘wire-frame’ wind turbine models will be rendered and painted to show what they will look like in real-life.

Wireframe images illustrate the manner in which the turbines will appear from particular viewpoints in a ‘bare-ground’ scenario. These are quick to prepare and aid the wind farm design process. Not only do they indicate the degree of turbine visibility, they also reveal the aesthetic attributes of the scheme such as profile, spacing and overlapping, etc.

Once the design becomes more refined, photo-realistic ‘photomontages’ are prepared from each of the representative viewpoint locations. These are used as the basis of the visual impact assessment. The preparation of photomontages is governed by strict guidance that focusses on achieving a high degree of spatial accuracy (size / location) presented in a format that reflects real-world viewing conditions (size of image / specified viewing distance).

Examples of completed photo-realistic photomontages showing design iteration 1 of Coom Green Energy Park can be viewed in the nearby ‘panopods’ which replicate the way in which the scheme will actually appear in the landscape.

TRAFFIC AND TRANSPORTATION

TRAFFIC IMPACT ASSESSMENT

- The traffic impact assessment will address the traffic impacts on the road network from the construction and operation of the proposed Coom Green Energy Park.
- The assessment will include the supply of materials, plant and equipment, the turbine elements and the components of the sub-station and the construction of the grid connection cable.
- Traffic arising from the construction and operations workforce will also be addressed.

METHODOLOGY

- The methodology will include a review of the traffic volumes and potential impacts which will be generated by the construction and operation of the wind farm.
- The traffic generated by the construction workforce, by the transport of materials and equipment as well as future maintenance-related activities will be predicted.
- The estimated number of trips to and from the site will be determined and these will be reduced where possible.
- Stone may be found on site which can be used within the wind farm and therefore reduce the construction traffic.

ROUTE SURVEYS

- Route surveys will identify potential pinch points and locations that may require off site temporary upgrades to facilitate the safe transport of the turbines to the development site.
- The haul routes will be identified and assessed to determine and reduce the impact on the surrounding roads as much as possible.

TRAFFIC MANAGEMENT PLAN

- Traffic generated during the works will be managed under a Traffic Management Plan, which will be agreed with Cork County Council in advance of construction.
- The Traffic Management Plan will take account of the local environment and ensure that impacts in terms of traffic and safety are minimised.

TURBINE COMPONENT DELIVERY

- The delivery of turbine components will involve in-depth assessment of the delivery routes available, from the nearest suitable port to the wind farm site.
- A route will be chosen which seeks to minimise the impacts to the environment, traffic impacts and disruption.

ABNORMAL LOAD DELIVERIES

Typical Trial Run

Prior to delivery of components to the wind farm site, a dummy run would be completed with an empty trailer.

Blade Delivery

Blades will be delivered on extended trailers. The rear axles can steer to reduce the areas of widening on the public roads.

Turbine tower delivery

Turbine tower sections will be delivered in batches and will be 20-35m long.

Nacelle Delivery

The wind turbine nacelle delivery will be made on a low loader.

Stone Deliveries

Concrete Deliveries

Construction traffic to and from the site during the works will mainly consist of stone and concrete deliveries. The onsite plant will remain on site after being delivered during site establishment and removed on completion.

ECOLOGY

ECOLOGY (BIODIVERSITY) METHODOLOGY

- The Coom Green Energy Park project team have carried out a number of ecological surveys in relation to the project.
- These included a wide range of best practice bird surveys, habitat surveys, aquatic ecology surveys, bat surveys, mammal surveys and invertebrate (insect) surveys.
- All surveys were conducted by experts, using internationally recognised methodologies.

BIODIVERSITY SURVEY RESULTS (TO DATE)

Bird Survey Results

- The Hen Harrier occurs in the vicinity and was recorded during vantage point surveys.
- Other bird of prey species recorded included; Kestrel, Merlin, Peregrine, Buzzard and Sparrowhawk.
- Golden Plover (a wading species) occurs in low numbers during the winter.
- Other species recorded included Skylark, Cuckoo, and the Dipper.

Habitat Survey Results

- The most common habitats recorded were coniferous forestry and improved agricultural grassland.
- Hedgerows were commonly recorded as boundaries to fields, roads and tracks.
- Some semi-natural ‘Wet Grassland’ occurs locally.

Aquatic Ecology Results

- Brown Trout, Eel and Salmon were recorded in streams and rivers on and around the area.
- No Freshwater pearl mussel were recorded within the surveyed rivers or streams.
- Otter are present in some watercourses.

Bat Survey Results

- The most common bat species recorded was the Common Pipistrelle.
- Bats were recorded using a number of buildings, both modern and old. Some buildings were used throughout the year by a bat species called the Natterer’s Bat, whilst other Bat species used these buildings seasonally.
- Other species recorded include; Soprano Pipistrelle, Brown Long-eared Bat and Leisler’s Bat.

Mammal Survey Results

- Mammal foot prints, droppings and pathways were recorded.
- A number of species including; Otter, Badger, Hare, Fallow Deer, Fox and Red Squirrel utilise the habitats present where suitable.

Female Hen Harrier

Typical roadside verge with agricultural grassland in the background

Typical Coniferous forestry

Typical track lined with Hawthorn hedgerows

Red Fox photographed on remote camera

Red Squirrel photographed on remote camera

ENERGY STORAGE & ELECTRICAL

HOW COOM GREEN ENERGY PARK WILL CONNECT TO THE NATIONAL GRID

- Two grid connection options under consideration
  1. Connection to the existing Barrymore 110kV substation near Rathcormac via a 110kV underground cable in public roads and private lands.
  2. A 'loop-in' connection to an existing 220kV overhead line near Knockroura via a 220kV underground cable in public roads and private lands.

WHY ENERGY STORAGE IS IMPORTANT

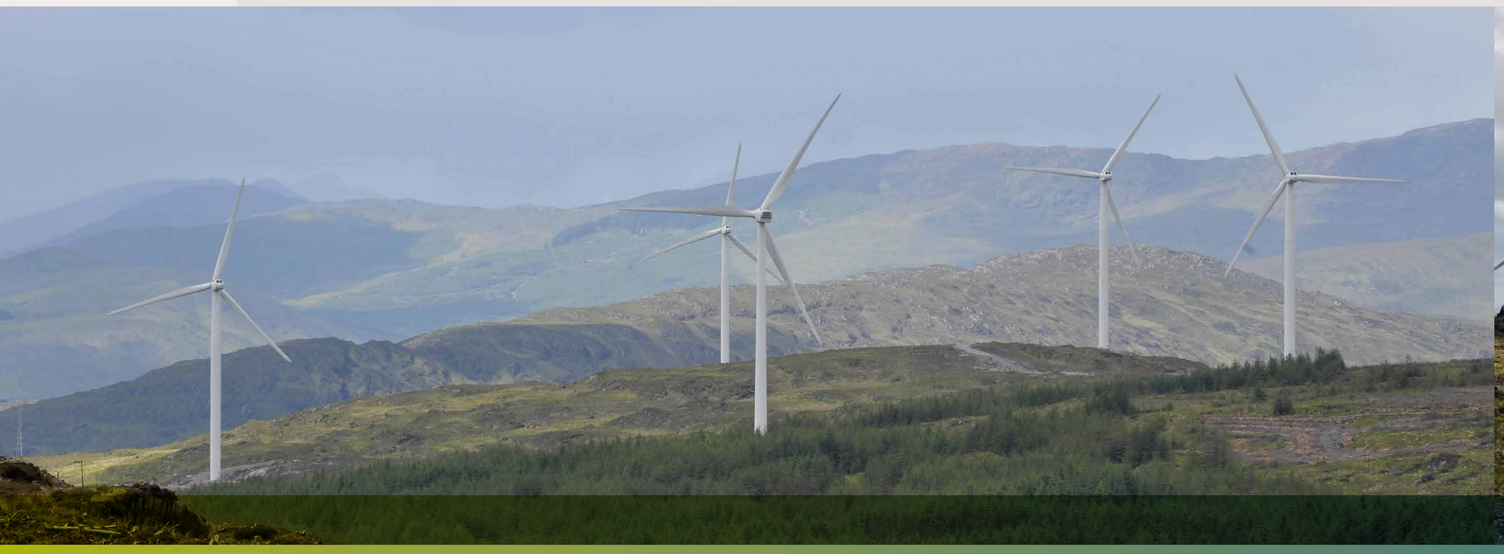
- Patterns of energy supply and consumption are changing rapidly.
- The main factors contributing to this evolution are a fast increasing penetration of renewable energy sources and distributed generation, a sustained increase in fossil fuel prices, changing market regulations and stringent environmental targets.

Energy storage can facilitate the transition to a low-carbon economy in many ways. For example:

- Enabling higher shares of Renewable Energy Systems in the energy mix.
- Supporting electrification of the heating, cooling, and transport sectors.
- Supporting the secure, cost-effective, and efficient operation of the grid by providing key services at all levels of the energy system.
- Ensuring security of supply: avoiding wind curtailment avoids importing fuels.

BATTERY ENERGY STORAGE SOLUTIONS (BESS)

- Battery Energy Storage Solutions (BESS) is a system that stores electrical energy via the use of battery technology for it to be used at a later time.
- Battery storage can help to balance generation and demand on the electricity grid.
- BESS will facilitate on site energy storage and provide additional control services to the electricity grid.
- It is an economic imperative that Ireland maximises the potential of its indigenous renewable resources. BESS will help Ireland achieve this goal.
- The technology is used across the UK, Europe, the United States and Australia.



ENERGY STORAGE & ELECTRICAL

PROJECTS IN IRELAND

- There have been several battery storage facility planning applications in recent years in the Republic of Ireland. They have consisted of battery storage as part of renewable energy schemes but also as standalone facilities.
- Two examples of standalone facilities that have recently received planning permission in 2017 are Lumcloon battery storage facility and Cloniffeen battery storage facility, both in Co. Offaly and designed to provide 100MW of system support service to the electricity grid.

INDUSTRY DEVELOPMENTS

- According to market research firm IHS, the global energy storage market is growing exponentially to an annual installation size of 6 gigawatts (GW) in 2017 and over 40 GW by 2022 – from an initial base of only 0.34 GW installed in 2012 and 2013.
- Battery energy storage systems are operating today in the competitive ancillary services power market – providing fast and more accurate response to a power dispatcher's signals compared to power turbine generators.

WHAT BESS LOOKS LIKE

- High quality galvanised metal containers situated next to onsite substation compound locations.
- The battery containers proposed in this development will be approximately 16m long x 2.6m wide x 3m high.
- They are fitted out inside with racks of battery modules and control systems, as well as internal electrical cabling and a fire suppression system.
- No waste will be produced during the operational phase of the battery facility.

- Battery racks are typically sealed within containers where they are monitored and controlled for performance, temperature and other safety factors.
- Containers are sealed, fireproof and house all the necessary control and safety systems and each container comprises an individual fire suppression system.
- Measures for fire detection and warning systems will be implemented as part of the facility's construction and operational design.

WHAT IS THE IMPACT OF ENERGY STORAGE ON THE ENVIRONMENT?

- Reducing CO^2 emissions while ensuring security of energy supply is at the forefront of the EU integrated approach to fight climate change.
- The share of intermittent wind and solar energy in our electricity supplies has already become increasingly important and will be expanded significantly in the coming years.
- In 2011, the European Commission published its Energy Roadmap 2050 exploring pathways toward a low carbon economy with a CO^2 emission reduction of 85-90% compared to 1990 levels.
- Energy storage is especially well suited to respond to this challenge and ensure a continued security of energy supply at any time.
- Energy storage is one of the enabling technologies to deploy renewable energy generation at large scale and reach a high percentage of renewable energy on our electricity mix.

COMMUNITY BENEFIT

- We will offer a community benefit programme for this project to support community development in line with industry best practice principles and policy.
- Local communities form a key part of the government's new Renewable Electricity Support Scheme (RESS).
- The RESS currently proposes a mandatory standardised community benefit fund and register. Contribution is currently proposed at €2/MWh annually for the first 15 years of Operation.
- RESS also seeks increased community participation in, and ownership of, renewable electricity projects.

We have included a table estimating the value of the potential Community Benefit Fund. The estimate is based on the current proposed layout of 27 turbines and is subject to change, depending on the final number.

4.8 x 27 x 365 x 24 x 0.33 x 2	**€ 749,295.36**
Turbine (MW)	4.8
Number of turbines (draft layout)	27
Days per year	365
Hours per day	24
Assumed capacity factor (33%)	0.33
Payment (€2/WMHr)	2

Please share your ideas for how the Community Benefit fund could assist local development: