RHODE GREEN ENERGY PARK

Opportunity Assessment Report

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Rhode Green Energy Park
Opportunity Assessment Report
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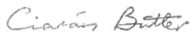
Ciaran Butler  19 November 2020

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EXECUTIVE SUMMARY

Offaly County Council has commissioned this report to carry out a high-level economic opportunity appraisal of the development of a Green Energy Park at the Rhode Business Park. The existing Rhode Business Park, which is situated on the site of the old ESB power station in North County Offaly is ideally located to become a seedbed for enterprise and a regional focal point for the emerging energy sector transformation in Ireland. The core of this transformation lies in effectively and locally integrating renewable energy production with energy storage and transmission systems that are readily accessible to end users. The Rhode Green Energy Park is an innovative concept that represents an opportunity to achieve this integration in Offaly and in doing so address pressing regional and national challenges relating to economic vitality, climate action and energy security.

The Energy Park concept delivers mutual benefits and efficiencies for both energy producers and users by sharing the outputs and by-products of their processes in a reliable, sustainable and cost-effective manner. At the same time, renewable energy can be exported to the national grid. The concept is an opportunity to incorporate emerging green technologies and be an exemplar of an economically viable industry-based site in Ireland for energy efficiency and minimal carbon footprint.

An underpinning objective for the park's evolution will involve attracting industry and energy producers of a highly complementary nature that will integrate with the region's socioeconomics and contribute to the challenges of sustainable employment.

The development of a Green Energy Park at Rhode represents an opportunity for Offaly to remain a regionally strategic source of energy, lead the way in lower carbon and renewable energy generation and demonstrate the effectiveness of co-location of energy users and producers.

Policy Landscape

Inclusion of the Midlands Region in the EU *Platform for Coal and Other Carbon Intensive Regions in Transition,* enables the region to avail of assistance with the development of strategies and projects, focusing in particular on the employment challenges faced by workers affected by decarbonisation.

The Irish Government has established a Just Transition programme and has appointed Mr. Kieran Mulvey as the Just Transition Commissioner. The focus includes training/upskilling, enterprise creation, and assisting communities to transition to a low-carbon society, all of which align with the Rhode initiative. A funding application for the Rhode Green Energy Park has been submitted to the €11m Just Transition Fund 2020, which is concentrated on transition away from carbon intensive activities.

The Offaly County Development Plan is supportive in relation to redevelopment of the existing Rhode Business Park. There is also strong alignment between planning policy at national level (Project Ireland 2040) and regional level (RSES for Midlands and East) for the concept of a green energy park for the Midlands.

The Climate Action Plan 2019 envisages significant investment in modern energy solutions for generation, storage and conversion of energy. In relation to enterprise, the Plan sets an ambition to '*Mobilise clusters regionally and sectorally to become centres of excellence for the adoption of low carbon technologies'*. Rhode Green Energy Park has the potential to fulfil this ambition. The Rhode project aligns in particular with the decarbonisation of electricity (70% renewable target), increase in renewable heat, and potential for transport related fuel innovation.

Key Strengths of Rhode

Rhode is attractive to energy related development due to its: central location and motorway network connectivity; its' excellent national grid connectivity, proximity to gas transmission and fibre optic networks and availability of strategic land banks. The central and well-connected location of the site also enables opportunities for biomass, energy crops, and the bioeconomy. The infrastructure for Rhode Business Park is also at an advanced stage of completion. It is a ready-made venue where enterprise and innovation can flourish at the cutting edge of the transforming energy industry. This is demonstrated by the level of current and proposed green energy developments already clustering around the local Derryiron 110kV substation. There is therefore a very real opportunity to develop the site as Rhode Green Energy Park.

Development Strategy

The following three strategic objectives are emerging as the most promising ways to develop the Rhode Green Energy Park opportunity further.

1. Strand 1: Energy decarbonisation/ innovation hub built around renewable energy, hydrogen and electricity system integration.
2. Strand 2: Eco-Industrial Park model whereby large-scale energy intensive employment – for example data centres, agri-food, horticulture, bio-economy – develops around the electricity and heat resources available.
3. Strand 3: Educational/ Innovation/ Centre of Learning for renewables and electricity grid: to improve awareness within the community of how the energy transition is happening, for collaboration with stakeholders across the Midlands Region and to create partnerships with Third Level Institutions.

In all of these concepts, the Rhode Green Energy Park concept is seen as a regional or national scale initiative, rather than simply a local one. The concepts are complimentary and can be advanced concurrently.

Data Centre Potential

For the Rhode Green Energy Park to be successful it will need to take advantage of the characteristics and opportunities that are unique to Rhode. Following the completion of a technology assessment and review of compatible industries, RPS identified core opportunities that can be brought to fruition through public and private funding. Our assessment of the factors described above have led to the conclusion that a Data Centre would be an ideal anchor industry for the Park.

The ICT industry has been targeted as it is a key player in Ireland's economic development for the foreseeable future. It also has strong potential to become a key industry in the Midlands Region in the vacuum left by peat harvesting and peat generation industries. Project Ireland 2040 states; *'This sector [data centres] underpins Ireland's international position as a location for ICT and creates added benefits in relation to establishing a threshold of demand for sustained development of renewable energy sources. There is also greater scope to recycle waste heat from data centres for productive use, which may be off-site'*. Surplus heat could be utilised by compatible industries such as anaerobic digestion facilities or agri-food greenhouses.

If a connection to the gas grid was made to serve a data centre at Rhode, it would open a number of opportunities for existing and proposed companies in the Park. It could also make investment in hydrogen technology and biomethane very attractive at this location. This potential should be pursued in association with Gas Networks Ireland. A feasibility assessment application to the gas innovation fund could unlock this potential.

Next Steps

A programme of capital works is required to upgrade the park and further improve connectivity and further feasibility work is required to develop the technical opportunities further. Collaboration to develop strategic partners – such as Bord Na Móna and energy companies – will be necessary. Partnerships with the university sector will also be beneficial. This Report identifies a number of funding channels that potentially can be availed of to help advance the project.

Rhode is an area steeped in Ireland's energy history. Until recently, generating electricity from locally harvested peat was a large source of employment and spin-off commercial activity. This local heritage means that the community is familiar with industry and likely to be supportive of developments that build on that past. The Rhode Green Energy Park concept is a fitting mechanism for ensuring that the Region is a leader in Ireland's transformation to a low carbon economy. This requires development of a new identity for the park as a regional focal point of energy transition.

1 INTRODUCTION

1.1 Overview

RPS was appointed by Offaly County Council to prepare an economic opportunity appraisal for the development of a Green Energy Park at Rhode Business Park, Rhode, Co. Offaly. North Offaly has been central to Irelands' energy provision for the last 70 years. With the phasing out of peat powered electricity generation there is an opportunity for Offaly to remain a strategic source of energy and lead the way in low carbon renewable energy generation.

The Rhode Green Energy Park is an innovative concept to develop hybrid renewable energy facilities co-located with industries and enterprise. The concept can deliver mutual benefits and efficiencies for both energy producers and users by sharing outputs and by-products of their processes in a reliable, sustainable and cost competitive way. In addition there is potential to export renewable energy to the national grid to contribute to the transition to a low-carbon and climate resilient society.

A core objective of this report is to identify the types of energy users and producers that have a highly complementary nature while also balancing the needs of the community and addressing the challenges of sustainable employment.

Rhode Business Park and the surrounding area is already home to a number of consented renewable energy generation facility proposals including wind, solar and flywheel battery storage. These existing proposals are already highly complementary to each other. Offaly County Council wishes to further promote the development of complementary industries in a sustainable fashion and identify critical infrastructure needs to facilitate their development and attractiveness.

1.2 Scope of Report

The scope of the report is summarised as follows:

- Identify optimum uses for a Green Energy Park following assessment of technical aspects and initial stakeholder engagement.
- Examine potential for Data Centre development.
- Explore potential funding opportunities.

The content and format of this report was agreed with Offaly County Council's main point of contact for the project, Mr. Mark Mahon, District Engineer, Edenderry Municipal District. Guidance has been received from other members of Offaly County Council Executive team including Ms. Sharon Kennedy, Director of Service, Ms. Orla Martin (Head of Local Enterprise Office), Mr. Andrew Murray Senior Planner, and Mr. James Condron Senior Executive Planner.

1.3 Consultations

In the course of this opportunity assessment, RPS has consulted with a range of organisations to inform the assessment, which are listed in Table 1 and shown in Figure 1. This is in addition to the many contacts already made by Offaly County Council and is a non-exhaustive list.

Figure 1: Consultee List Rhode Green Energy Park

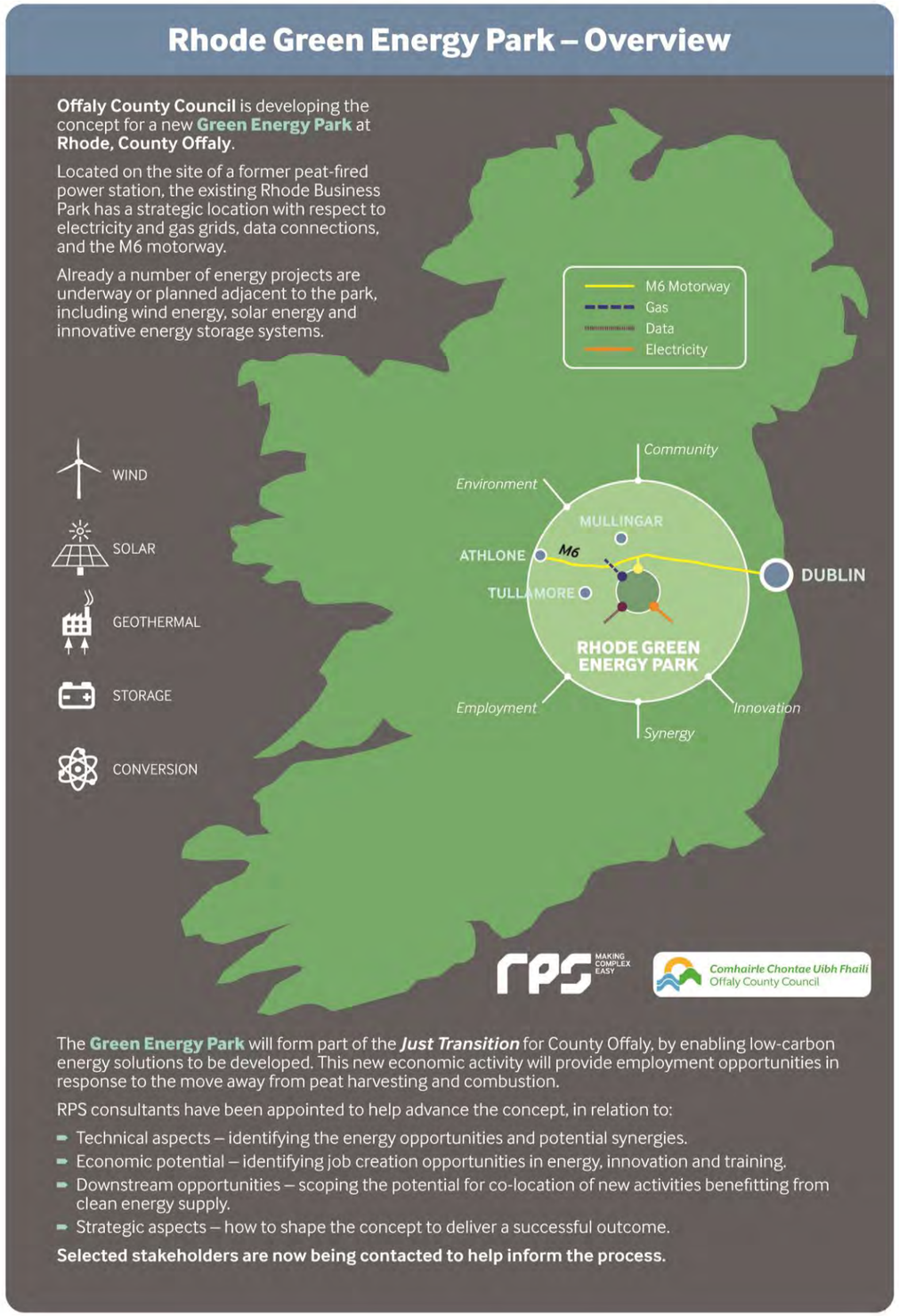

Figure 2: Rhode Green Energy Park Overview

Table 1: Consultee List Rhode Green Energy Park

Body	Topic
OCC Planning Department (forward planning)	Development Planning
OCC Enterprise Development team	Economic/ employment aspects
Rhode Energy Storage Ltd RESL	Proposed Battery Storage / Synchronous Condenser at Rhode
Schwungrad Energy	Energy Research Centre for Hybrid Powered Flywheel Technology
Biotricity	Proposed biomass project at Rhode
Newleaf	Proposed CHP Biomass Gasification / Carbon Capture at Rhode
SDCL Ltd.	Investment & Financial Advisory Firm specializing in Environmental Infrastructure
SSE Airtricity	Existing Peaking Plant in operation at Rhode Proposed Yellow River Wind farm
Bord na Mona (Energy)	Energy Project Potential
Gas Networks Ireland	Gas network connection/ Biogas & Hydrogen Blending
Eirgrid	Electricity Grid
SEAI	Energy Opportunities/ Funding
Aurora Telecom (GNI)	Broadband/ Fibre connectivity
Eircom	Broadband/ Fibre connectivity
Novagen	Broadband/ Fibre connectivity
Prof. Brian O'Gallachóir, MAREI	Academic / research / innovation possibilities
Dr. Rory Monaghan, NUIG	Academic / research / innovation possibilities
UCD Energy Institute (Dr. Ciara O'Connor)	Academic / research / innovation possibilities
ESIPP Energy Systems Integration Partners	Academic / research / innovation possibilities

1.4 Context

1.4.1 Project Ireland 2040

Bringing together the National Planning Framework and the National Development Plan, Project Ireland 2040 defines the development priorities for Ireland for the coming two decades. The Rhode Green Energy Park project is consistent with these priorities as it has the potential to drive innovation and a low-carbon energy system, and to respond to the need for strengthening the economy of the Midlands. Among the key National Strategic Outcomes and Priorities of the National Planning Framework: which the Rhode Green Energy Park will help fulfil are:

- NSO 1 - Compact development (using a brownfield site in Rhode).
- NSO 3 - Strengthened Rural Economies and Communities.
- NSO 5 - A Strong Economy supported by Enterprise, Innovation and Skills.
- NSO 8 - Transition to a Low Carbon and Climate Resilient Society.

Among the national Policy Objectives set out in the National Planning Framework, the Rhode project has the potential to deliver:

National Policy Objective 21 - Enhance the competitiveness of rural areas by supporting innovation in rural economic development and enterprise through the diversification of the rural economy into new sectors and services, including ICT-based industries and those addressing climate change and sustainability.

National Policy Objective 55 - Promote renewable energy use and generation at appropriate locations within the built and natural environment to meet national objectives towards achieving a low carbon economy by 2050.

In Chapter 3 "effective Regional Development', the National Planning Framework identifies a particular opportunity for the Midlands region *"Harnessing the potential of the Midlands-East region in renewable energy terms across the technological spectrum from wind and solar to biomass …..focusing in particular on the extensive tracts of publicly owned peat extraction areas in order to enable a managed transition of the local economies of such areas in gaining the economic benefits of greener energy."* [1, p.47]

Project Ireland 2040 identifies a number of key locations to target investment and new development. The Midlands has been identified as one of these locations with the plan stating "*Plans advancing in the Midlands to convert former Bord na Móna peat railways and trackways into cross country walking, cycling and peatway routes, coupled with strengthening nearby towns and villages as hubs for tourism activity and local businesses*" [2, p.46]. The Green Energy Park has the potential to be positioned as such a hub for local business in the Midlands.

1.4.2 Climate Action Plan of 2019

The Governments' Climate Action Plan sets ambitious goals for the de-carbonisation of the Irish economy. It envisages significant investment in modern energy solutions for generation, storage and conversion of energy.

In relation to enterprise, the Action Plan sets an ambition to *"Mobilise clusters regionally and sectorally to become centres of excellence for the adoption of low carbon technologies"* [3, p.47]. Rhode Green Energy Park has the potential to fulfil this ambition and specifically responds to the following opportunities set out in the Plan:

- the decarbonisation of electricity (70% renewable target),
- increase in renewable heat, and
- potential for transport related fuel innovation.

1.4.3 Eastern & Midland Regional Assembly Regional Spatial and Economic Strategy 2019-2031

The Regional Spatial and Economic Strategy completed in 2019 translated the national planning policy to regional level. In relation to decarbonising the energy sector, the Strategy identifies that *"The Region will need to shift from its reliance on using fossil fuels and natural gas as its main energy source to a more diverse range of low and zero-carbon sources, including renewable energy and secondary heat sources. Decentralised energy will be critical to the Region's energy supply and will ensure that the Region can become more self-sufficient in relation to its energy needs."* [4, p. 178]

Under regional planning objective 35, the Regional Assembly intends to identify Strategic Energy Zones "*as areas suitable for larger energy generating projects*" [4, p.179]. Rhode could fall into such a category given the underlying characteristics of the area.

In relation to infrastructure, the regional strategy also underlines the importance of enabling grid strengthening in order to facilitate the development of renewable energy assets in the region.

1.4.4 Just Transition Fund 2020

Figure 3: Just Transition Fund Logo

"To fund innovative projects that contribute to the economic, social and environmental sustainability of the Wider Midlands region and which have employment and enterprise potential." [5]

The Wider Midlands is the first region in Ireland experiencing a concentrated transition away from carbon intensive activities. The imminent closure of two ESB peat-fired power plants will affect regional and local employment, particularly for Bord na Móna employees, and local communities.

The Just Transition Fund 2020 is a dedicated fund of €11million, financed by Government through an allocation of €6million from an increase in the carbon tax and an additional €5million committed by ESB. The Fund is administered by the Department of Communications, Climate Action and Environment (DCCAE). Grant funding will be allocated through a competitive process and will support projects that contribute most to achieving a Just Transition to a low carbon, climate resilient economy.

Three priorities are:

- Employment and Enterprise Supports.
- Training Supports.
- Community Transitioning Supports.

Proposals which can demonstrate a direct link with current/former Bord na Móna, ESB employees and affected communities will be favoured. Grant funding for the Rhode Green Energy Park Concept has been applied for to develop the concept and immediately commence implementation.

1.4.5 EU Platform for Coal and Other Carbon Intensive Regions in Transition

In July 2019, the European Commission confirmed its agreement to the inclusion of the Midlands region in the Platform for Coal and Other Carbon Intensive Regions in Transition. Membership enables the Midlands region to avail of assistance with the development of strategies and projects for the region, focusing in particular on the employment challenges faced by workers affected by decarbonisation.

Figure 4: The European Green Deal Logo

Already, the programme is supporting the Midlands Regional Transition Team (MRTT), which is funded under the START programme. The MRTT is playing a lead role in the assessment of Just Transition challenges and opportunities in the Midlands. It is helping to shape and co-ordinate the regional response and will provide guidance to participants. The MRTT is developing a "*Holistic Plan for Just Transition in the Midland Region"* which, among other things, will assist the region in identifying potential investment needs for inclusion in a programme.

The European Green Deal proposed a Just Transition Mechanism (Fund) which will focus on those regions and sectors that are most affected by the transition given their dependence on fossil fuels. While the details of the mechanism are not finalised at EU level, it will consist of three pillars: (1) a Just Transition Fund implemented under shared management, (2) a dedicated scheme under InvestEU, and (3) a public sector loan facility with the European Investment Bank (EIB) Group to mobilise additional investments to regions concerned. The Just Transition Fund will be used primarily to provide grants; the dedicated transition scheme under InvestEU will "crowd in" private investments, and the partnership with the EIB will leverage public financing.

In principle the Rhode Green Energy Park aligns with the goal of the EU Platform and can potentially avail of the significant support that will be made available.

2 ENERGY SECTOR IN RHODE – PAST, PRESENT AND FUTURE

2.1 Rhode Power Station

Rhode Power Station was commissioned in 1960 as part of the peat development programme and was considered to be the most efficient of Ireland's five peat generating stations. It was decommissioned in 2003 and subsequently demolished in 2004.

2.2 North Offaly Development Fund

Due to the closure of the power station in Rhode, Co. Offaly the North Offaly Development Fund (NODF) was established with the objective to benefit the community of Rhode and surrounding area. In particular, NODF is intended to assist enterprise creation and development, with the aim of decreasing unemployment and enhancing the economic and social profile in the area. The company receives its funding from ESB Networks.

The development of the Rhode Business Park was originally initiated by NODF for enterprise development for the benefit of the local economy and local community.

2.3 Rhode Business Park

Redevelopment of the site as a Business Park was approximately 90% complete in 2008 when, due to the on-set of the recession this work stopped. NODF had by this time invested €1.8million developing the park and Offaly County Council had invested €0.9million developing the access infrastructure.

Since the closure of the Rhode Power Station, energy generation at the site continued in the form of backup power from a peaking plant run originally by ESB, followed by Endesa. The plant is currently run by SSE Airtricity. Other energy generation projects have and are establishing themselves in proximity to the Business Park such as the Schwungrad Energie Ltd Flywheel Battery Storage technology, which operated between 2016 and 2018. Permissions have been granted for Clonin North Solar Farm, Yellow River Wind farm, and the Biomass Gasification Plant proposed by Newleaf Energy Limited. The existing Derryiron 100kV electricity substation is a magnet for renewable power generation proposals.

Offaly County Council has recently carried out local improvement works to extend village footpaths to connect with the Business Park. This has enabled a local walking route to emerge, making use of the attractive amenity of the area.

2.4 Green Energy Park Concept

The local community has developed around peat extraction and combustion and has an affinity with energy and industry. With Bord Na Móna winding down operations in the area in the coming years, there will be very significant economic and unemployment impacts felt by the local community. With the significant development of the business park infrastructure(s) in place and various energy related infrastructure and prospective developments nearby, Offaly County Council has identified the potential for a Green Energy Park at this location to mitigate these impacts while also furthering Irelands sustainability objectives.

The project aims to put Offaly and the Midlands at the centre of a new era of sustainable energy exploitation. Low-carbon energy and material supplies are attractive to companies looking to reduce their carbon footprint. The Green Energy Park will aim to demonstrate the benefit of a planned approach to energy and industry co-location. It has the potential to become a leader in Ireland's transition from its historical dependency on fossil fuels, especially peat, to sustainable energy and energy innovation.

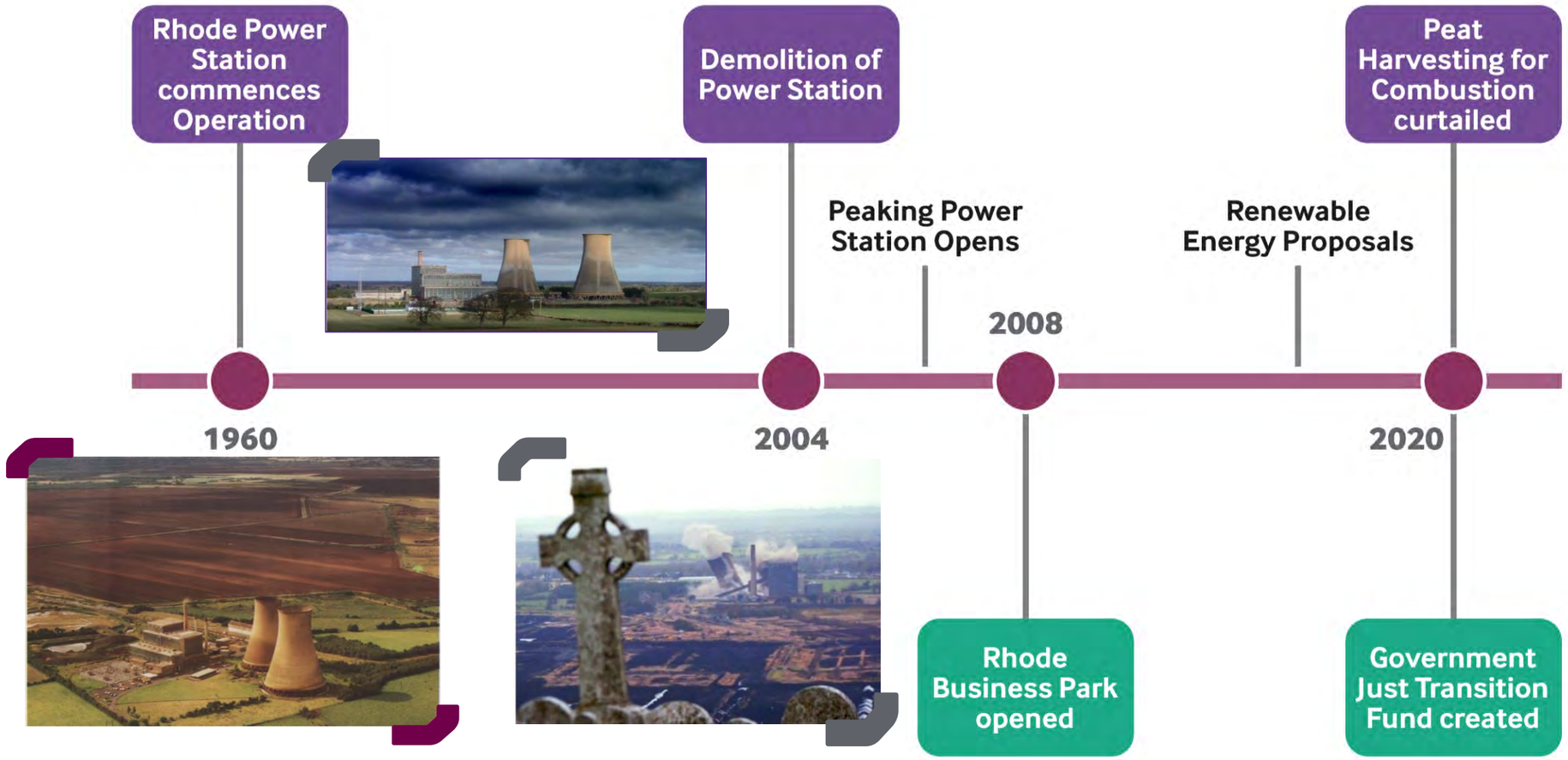

Figure 5: Timeline of Energy Sector at Rhode

3 RHODE BUSINESS PARK

Rhode Business Park is a one-hour drive from Dublin City, located 7.5 km off the M6 Dublin to Galway Motorway in North County Offaly. The site is located on the north western side of Rhode Village, approximately 1 kilometre outside the village on the site of the former Rhode Power Station. The site is now developed as the Rhode Business Park and the SSE Generation Ireland Ltd. power station. The site is close to existing electrical infrastructure and the current grid connection point is the Derryiron 110kV substation local to the site.

3.1 Key Information;

- Area: Circa 5 hectares – Potential for up to 14 business plots.
- Distance from M6: 7.5 km
- Existing Occupants
  - SSE (Peaking Power Station)
  - Schwungrad Energie (Battery flywheel installation)
- Adjacent Infrastructure;
  - Derryiron Substation (110kV)
  - Irish water pumping station, and nearby wastewater treatment plant
- Ownership: North Offaly Development Fund.
- Adjacent: some strategic landbanks owned by Bord Na Móna and privately as shown in Figure 6 below.

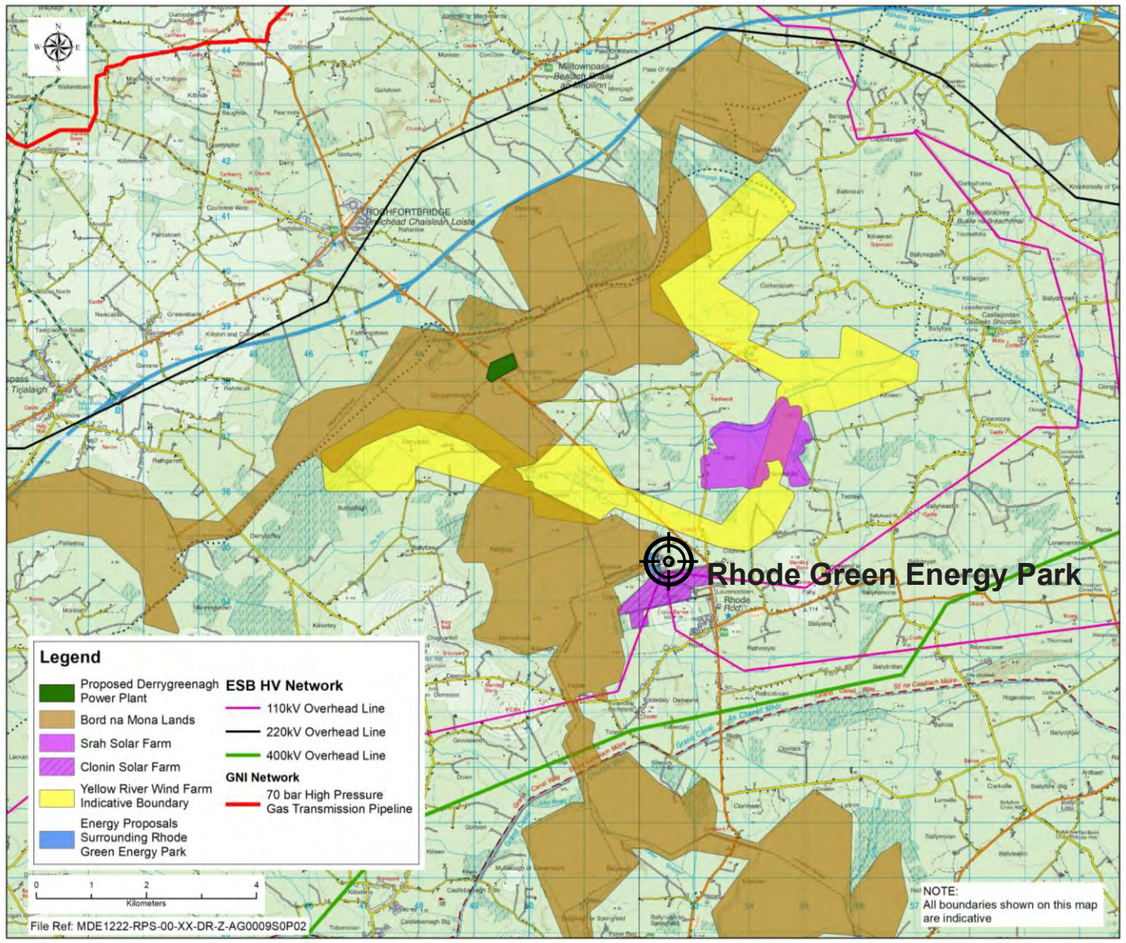

Figure 6: Developments and Landbanks Surrounding Rhode Green Energy Park (Drawing in Appendix A)

3.2 Current Conditions

The site consists of relatively low lying, level ground with average ground levels varying between 81.00m and 83.00m OD Main Head. The Business Park is accessed from the R400 regional road via a main access road and link road with footpaths and services partially constructed. These are 80-90% complete and require further investment to improve access roads by maintaining or laying new surface dressing and address vegetation/ landscaping.

Internal roads and roundabouts have been installed which consist of 7.0m wide carriageways (each lane 3.5m wide), with a 1.2m grass verge and a 1.8m wide concrete footpath both sides. Foul and surface water drainage and water mains are currently in place within the business park. Public lighting, fencing, landscaping and other ancillary services are also partially complete. There are mature trees dotted around the perimeter of the business park.

Figure 7: Entrance to the Rhode Business Park

The following attributes have made the Rhode Business Park attractive to energy development companies in the past decade:

- **Energy sector experience in the midlands means there is a diverse and talented workforce with skills potentially adaptable to energy sector opportunities.**
- **Renewable energy potential**
  - Wind and solar resource and favourable settlement pattern.
  - Deep geothermal resource in north Midlands with high potential as a renewable heat source.
- **Proximity to Dublin** – creates accessibility and connectivity to the main population and energy load on the energy grid. There is further untapped potential that the project can stimulate, by seeking new high voltage grid strengthening.
- **Excellent connectivity to the motorway network.**
- **National Grid connectivity**: electricity grid access available through the Derryiron substation.
- **Gas grid and fibre connectivity potential**
- **Wider agricultural hinterland** – the central and well-connected nature of the site enables opportunities for biomass, energy crops, and bioeconomy.

Next Steps: An upgrade the physical environment within the park by investment in road surfacing, landscaping and signage would forward the opportunity to attract park tenants

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3.3 Existing Occupants & Current Energy Proposals

Biomass Gasification Plant
Applicant: Newleaf Energy Limited
Development Address: Coolcor, Rhode, Co. Offaly
Development Description: A combined heat and power generating biomass gasification plant with integrated carbon capture and utilisation technology to provide renewable energy and electrical grid support services on a 2.45 ha site.
Energy Capacity: 2.5MW to 15MW
Area of Development: 2.45 ha.

PA0032 Yellow River Windfarm
Applicant Greenwind Energy (Wexford) Ltd
Development Address Site straddles the R400 Regional road linking Rochfortbridge in Co. Westmeath with Rhode in Co. Offaly.
Development Description Planning permission for development comprising of:

- 32 no. turbines
- Electrical compound, 33kV underground cables linking the compound to the turbines and a 110kV underground cable linking the electrical compound to Derryiron 110kV substation.

Energy Capacity: 100MW
Area of Development: 20.6 ha.

SSE Peaking Power Plant
Existing Occupant: SSE
Development Address: Coolcor, Rhode, Co. Offaly
Development Description: Two 52MW gas/oil fired open cycle unit turbines, responding to peaks in energy demand.
Energy Capacity: 104MW
Area of Development: 1.64 ha.

Flywheel Battery Storage
Existing Occupant: Schwungrad Energie Limited
Development Address Coolcor, Rhode, Co. Offaly
Development Description An energy research centre for the development and testing of hybrid powered flywheel.
Energy Capacity: 20MW
Area of Development: 1.55 ha.

Battery Storage Facility
Applicant: RESL
Development Address: Coolcor, Rhode, Co. Offaly
Development Description: A energy storage facility to provide a 20MW of system support services to the electricity grid on a 0.95 ha site. The development will comprise of an open area battery storage system will a compound containing 8 no. battery and control system enclosures. A bunded transformer will electrically connect the development via overhead cables to the existing 110kV Derryiron Substation.
Energy Capacity: 20MW
Area of Development: 7.6 ha.

Derryiron 110kV Substation
Existing Occupant: ESB
Development Address: Clonin, Rhode, Co. Offaly
Development Description: Existing Derryiron 110kV Substation System Capacity: ~70-120 MVA. Connection Study required to determine the available capacity and connection arrangements.
Area of Development: 0.5 ha.

Clonin North Solar Farm
Applicant: Highfield Solar Limited
Development Address: Clonin, Rhode, Co. Offaly
Development Description: A Solar PV energy farm with a total site area of c. 96.6 ha.
Energy Capacity: 35MW
Area of Development: 96.6 ha.

4 PLANNING CONTEXT

4.1 National Planning Framework

As set out in Chapter 1, there is strong alignment between planning policy at national and regional level and the concept of a green energy park for the Midlands, driving forward a low-carbon energy opportunity. This chapter looks at planning policy and opportunities at County and local level.

4.2 County Development Plan to 2020

Under the current Offaly County Development Plan (2014 -2020) the Rhode Business Park lies outside the identified Rhode Village Settlement Plan area, and so is on unzoned or '*white lands'*. There is a favourable policy in relation to redevelopment of Brownfield lands (section 2.3.3) including those relating to former peat activities "*to favourably consider and promote the redevelopment of these sites for industrial or energy-related uses*" [16, p.48]. The site lies in an area with low landscape sensitivity.

4.3 Draft Development Plan 2021 - 2027

The next iteration of the Development Plan is at stage two draft, with a view to being completed in early 2021. The strategic potential of Rhode Green Energy Park to contribute to economic development and energy/ climate change improvements in the region is underlined.

The park is included in the Rhode Village Plan settlement, with a land use zoning of "Industrial and Warehousing". Uses envisaged for the park include "*Green Energy as well as other complementary uses such as Green Enterprise, Food Processing, Manufacturing, Logistics, Engineering and Research and Development (R&D)" [17, p.155].*

The Draft Plan supports the efforts of the Midland Transition team to pursue funding opportunities and actions to mitigate the impact of the Bord na Móna job losses on the individuals concerned and on the local and regional economy. The Midlands Transition Team aim to position the region to develop alternative forms of employment, attract investment and maximise existing employment opportunities and resources.

The Draft Plan also includes support for the bio-economy. The principle of the bio-economy involves maintaining the value of bio-materials (from production of bio-products to end of use waste streams). Offaly County Council has targeted this as a means of developing a sustainable low carbon economy, specifically the bio-energy industry including bio-gas. The proposed development of the Rhode Green Energy Park, would, if successful feed into these objectives.

4.4 Planning Potential

Planning Potential for energy related developments at Rhode Green Energy Park

Table 2: Potential Planning Opportunities

Planning Aspect	Comment
Land Use Zoning/ Principle	In place (Draft CDP)
Road Access/ transport	Very good. Planned R400 upgrade will further improve access. Footpath connectivity to Rhode Village centre.
Ecology/ Biodiversity	No designated sites in close proximity. Drainage catchment of Yellow River, which connects with River Boyne and River Blackwater SAC 002299 and River Boyne and River Blackwater SPA 04232, albeit circa 20km downstream. Largely brownfield land within Business Park, although local biodiversity features possible.
Local amenity / Landscape	Land is flat and reasonably well screened. Good separation distance from dwellings. The site lies in an area with low landscape sensitivity. Clonin Hill is a nearby landscape feature to the west (medium sensitivity). Croghan Hill (about 4.5 km west) is a landscape, geological and heritage feature (high sensitivity).
Water Supply	Local municipal supply (Irish Water) available ('6 inch' mains). Potential to use groundwater as a water supply for any major demand (the former Rhode power station was fed by a groundwater borehole).
Wastewater treatment	Existing municipal wastewater plant (Irish Water) has a capacity of 1,000PE, but limited remaining capacity available. Potential to expand subject to assessment.

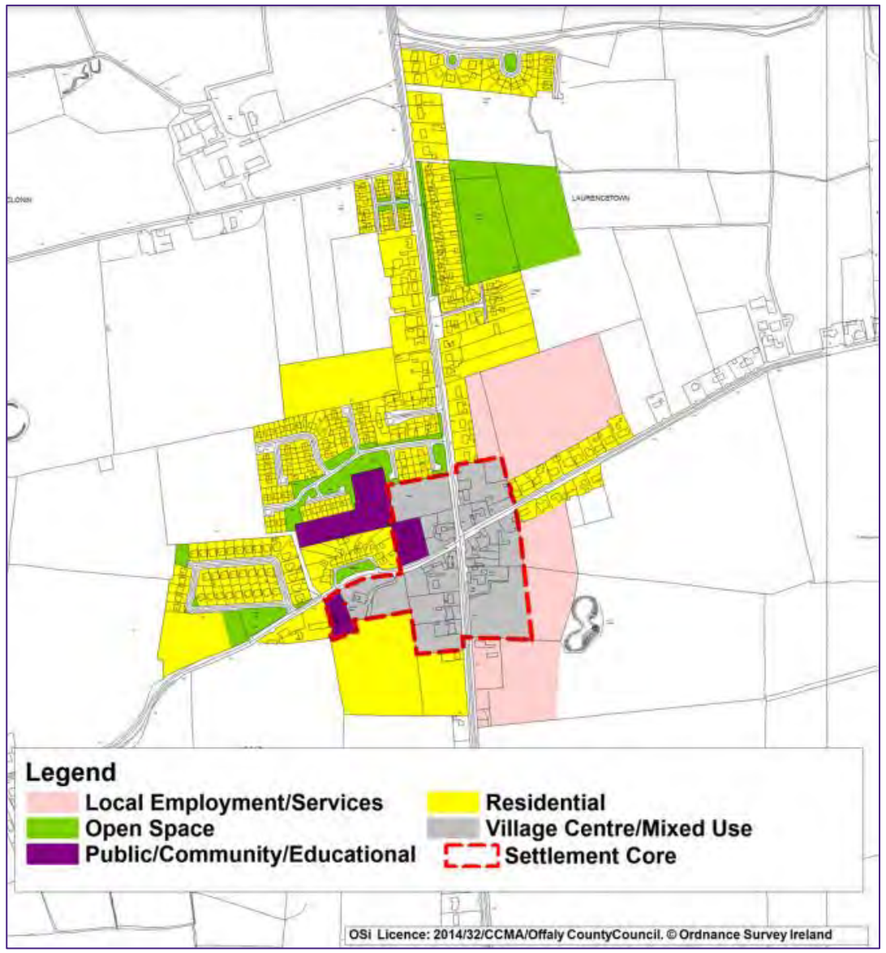


Figure 8: Rhode Village Plan Settlement

4.5 Guiding Future Development of the Rhode Green Energy Park

Planning policy should create a clear picture of the shape of what is envisaged for the Rhode Green Energy Park, including the preferred type of uses (and what is not desirable), and how the park is planned to develop physically over time. The following principles should apply to the future planning of the Rhode Green Energy Park, in order to realise its potential.

4.5.1 Integration/ Interconnectivity of units/ enterprises.

Rather than conceiving each proposal as a stand-alone unit, developers should plan for future integration with other facilities in the park, following an eco-park model (refer to section 7). This means interconnection of electricity, a local heat network, and physical connections for transfer of other materials (circular economy co-operation). This translates as a services corridor concept within the park. This can take into account potential for future connection of external services and utilities.

4.5.2 Shared Approach – Wastewater, SUDS, offices/meeting room

A more coherent and efficient park will develop if some aspects are shared; for example a central sustainable drainage pond will avoid each plot needing its own system, a central wastewater treatment plant is preferable to several smaller units. A shared hub for office space and meeting rooms will help create co-operation and synergy between tenant companies. Offaly County Council can take a lead in this regard.

4.5.3 Design Approach/ Coherence

The attractiveness and coherence of the park will benefit from a specific design guide to inform the approach on individual plots. This will suggest the preferred approach to materials, colours, boundary treatment, signage etc. as a guide to each architect. Individual developments will still have freedom meet their own design requirements but following overarching guidance.

4.5.4 Community Integration – Recreation, Connections

At the moment, the Park forms part of an informal walking loop popular with the local community. This can be strengthened and expanded, for example with planned cycleway networks and connections to Croghan Hill. Local familiarity will improve the sense of ownership. Access should be protected during construction work where possible.

4.5.5 Sustainable Design Approach

As part of the energy transition, the park should be developed as an exemplar of sustainability. For example, by using low-carbon materials, encouraging sustainable transport, incorporating biodiversity gain, reducing impacts from lighting, and so on. One avenue to deliver on such aspiration is to implement a sustainability standard such as CEEQUAL (for park infrastructure) or a community approach under BREEAM or LEED (see section 7.6). Achieving independent certification would send a strong signal about the future of the project.

4.5.6 Technology/ WiFi zone

As a landmark, pioneering energy efficient, low carbon centre of industry, the Green Energy Park would benefit from a Wi-Fi zone to facilitate collaboration spaces in the park and any academic / research ties that the park will develop.

4.5.7 Future Expansion/ Phased Growth

This report is primarily concerned with the existing Business Park lands. Some potential enterprises (e.g. a large Data Centre, or major industry) might require additional or adjacent land. This might come as a result of growth in the years ahead, or at an earlier stage. The Park concept should enable other complimentary and connecting development, so long as the design ethos and coherence of the park is respected. The layout should be planned to enable future connections to adjacent land. The possible need to expand infrastructure such as the electricity substation and wastewater treatment installation should also be borne in mind.

Next Steps:

1. Provide further input to the completion of the County Development Plan process, to guide future development of the Green Energy Park.
2. Assess planning applications in the area against the Guiding Principles set out in this chapter.
3. Develop design guidance for the future physical development of the park in a coherent manner, to include:
   - Interconnections/ services corridor, and future connections to adjoining land.
   - Sustainability Plan, including community and biodiversity aspects.
   - Building design and landscaping guide.
4. Develop a governance model for future park operation that engages with enterprises, the community and enables collaboration to develop.

Figure 9: Future Expansion and Planned Growth Opportunities

5 CONNECTIVITY AND ENABLING INFRASTRUCTURE

5.1 Reliable Electricity Grid Capability

Ireland has one of the most robust, reliable and stable grid systems in Europe. It also has a predictable repeatable load profile for a developed country, showing a reduction by night and peaks during the working day. In addition, Ireland has an abundance of renewable energy sources including wind energy, to meet energy demands of large ICT sector energy users which are increasingly looking to renewable energy sources for their operations.

Ireland is an attractive business location and continues to attract world-class investments. Industrial Development Authority (IDA) Ireland has cited access to a high-quality electricity grid as critically important for attracting new investment [6 p.14]. This is particularly important in the ICT and high-tech manufacturing sectors.

The area of Rhode is served by large transmission level electricity infrastructure. Due to the legacy of the now demolished peat fired power plant and the Open Cycle Thermal Generation facility in place in Rhode, the area is served by the 110kV Derryiron ESB substation connecting to three 110kV transmission network lines to Maynooth, Kinnegad and Thornberry which can be seen in Figure 10 below.

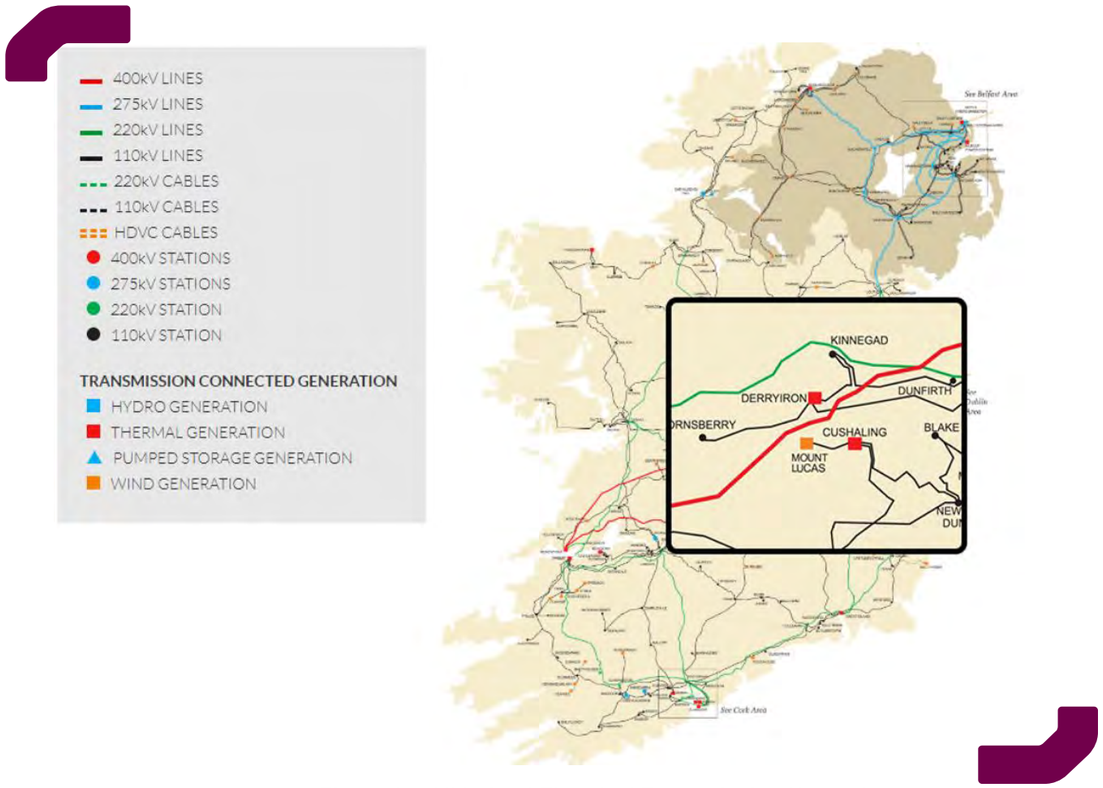


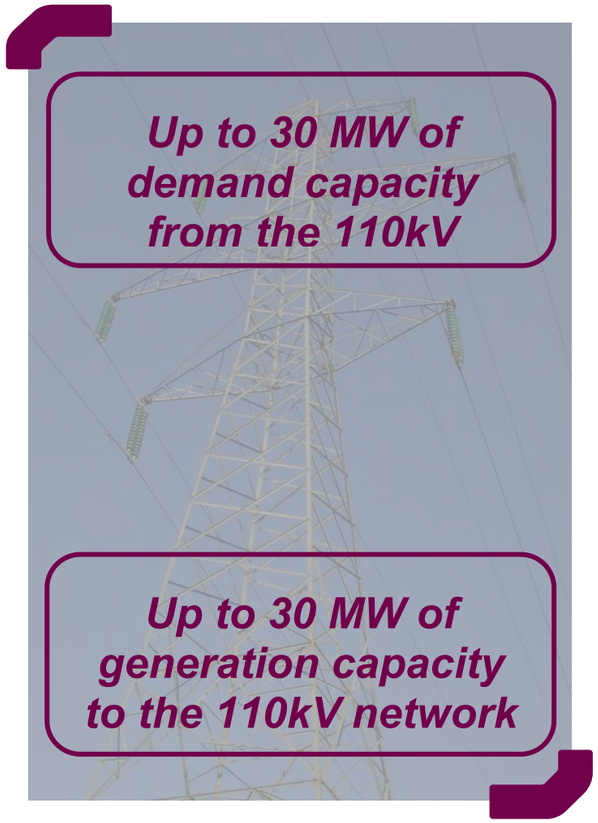
Figure 10: All Ireland Electrical Transmission Network

5.1.1 Generation Capacity

Eirgrid's All-Island Ten Year Transmission Forecast Statement 2019 highlights in Table B-2 that there is currently a combined flow of 335 MVA from the Derryiron Substation node out to the existing 110kV transmission circuits during winter and 272 MVA during summer. [7, p. 134]

In the All-Island-Ten-Year-Transmission-Forecast-Statement-2019, produced by Eirgrid,110kV stations throughout the country were analysed for generation opportunity. The stations closest to the Derryiron 110kV station analysed were Portlaoise and Mullingar. There is no opportunity for added generation at the Mullingar station however, the Portlaoise station has an availability of up to 30 MW. The capacities stated are relevant to the station tested, but also provide an indication of the opportunities available at neighbouring stations, including Derryiron. The lack of potential at the Mullingar station is not encouraging however, the extension of the 110 kV line from Thornsberry to Cushaling, links Derryiorn to Portlaoise, potentially allowing for further generation capacity at Derryiron.

Determining the exact generation capacity at Derryiron substation would require engagement with Eirgrid to carry out a detailed network analysis. However, it appears from an initial review, which has included discussion with EirGrid, that Derryiron could have up to 30MW capacity available for new generation. Early consultation with Eirgrid is recommended so that options relating to any potential proposals can be explored and timely decision-making processes can be instigated.



5.1.2 Demand Capacity

In Eirgrid's All-Island-Ten-Year-Transmission-Forecast-Statement-2019, 110kV stations throughout the country were analysed for increased demand opportunity. The 110kV stations nearest the Derryiron station included in the analysis were Mullingar, Thornsberry and Portlaoise. The 3 stations were found to have available demand capacities of 40 MW, 30 MW and 80 MW respectively. This would suggest that there is ample capacity at the Derryiron 110 kV station to see an increase in demand, facilitating transmission level consumer connections at the site of the proposed Green Energy Park. The capacities stated are relevant to the station tested, but also provide an indication of the opportunities available at neighbouring stations, including Derryiron which appears to have capacity for another 30MW of demand. Again, determining the exact generation capacity at the station would require engagement with Eirgrid to carry out a detailed network analysis. Customers considering connecting to the transmission system are advised to contact Eirgrid as early as possible in the project development process.

Next Steps: Two options exist for utilisation of the transmission network at this location;

1. Utilise the estimated 30MW of generation and demand capacity within the 110kV transmission network at Derryiron, indicated by Eirgrid's All-Island-Ten-Year-Transmission-Forecast-Statement-2019, by attracting tenants with suitable energy demands and generation potential. For example, a 20MW scale Data Centre and 10MW scale hydrogen electrolyser generator to utilise forecasted demand capacity. This option can be scaled overtime to option 2 below.
2. Target larger energy user tenants such as a 100MW scale Data Centre and/or a 100MW Mega Green Hydrogen Electrolyser. These would require major enhancements to the 110kV network and Derryiron Substation or the development of a 220kV network extension to the Green Energy Park. This option would allow further potential for additional energy generation capacity at Rhode and have the likely dual benefit of incentivising a gas pipeline and dark fibre ducts to serve the Data Centre and Green Hydrogen Injection.

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"GNI's long-term commitment to greening the gas through blending natural gas with hydrogen, Biogas, Syngas and the exploitation of carbon capture technology makes gas a highly flexible energy product for the future."

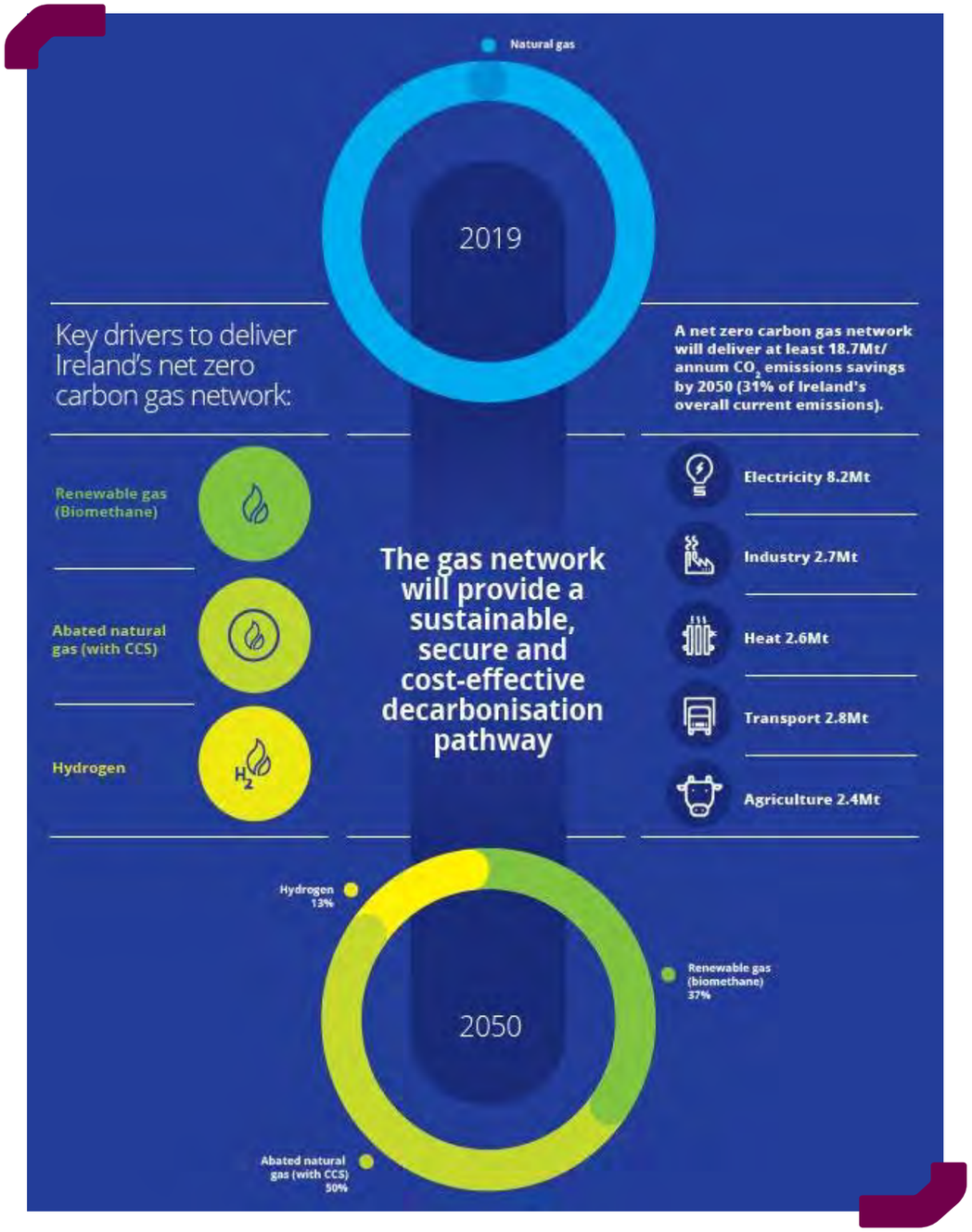

Figure 11: GNI Vision 2050 Roadmap

(Source: GNI's 'Vision 2050')

5.2 Connectivity to the Gas Network

The nearest gas infrastructure connection to Rhode is 15 kilometres away at Gaybrook Demesne 70-4 barg AGI which supplies a 315mm PE 4bar branch to Mullingar. The high pressure gas transmission pipeline that operates at 70bar and supplies the AGI, crosses the R400 north of Rochfortbridge 12km northwest of the Business Park.

Rhode's proximity to the gas network facilitates the potential for a secure energy supply. This is often a key driver for location of large energy users. With grid connection proving increasingly challenging, many data centres are seeking connection to the gas network to allow on-site generation from natural gas and renewable gas as a Uninterrupted Power Supply (UPS) backup. As large industry is increasingly seeking out more sustainable renewable energy supplies, "*GNI offers a long-term commitment to greening the gas through blending natural gas with hydrogen, Biogas, Syngas and the exploitation of carbon capture technology. [as illustrated in Figure 11] This makes gas a highly flexible energy product for the future*". [8]

Large Gas Customers & Producers that could incentivise a gas network extension to Rhode Green Energy Park and North Offaly include;

- **AD & Biomethane Injection**
- **CCGT Power Plants**
- **Data Centre CHP Plants**
- **Hydrogen Electrolysers Injection**
- **Biomass Gasification Injection**
- **Heat Intensive Industries**

GNI defines Large Industrial and Commercial (I&C) Customers as those with a peak hourly demand greater than 50MW thermal input and a connection pressure of 16 barg or above. Most ICT and high-tech manufacturing enterprises fit within this classification. Connecting Large I&C Customers to the network typically involves significant costs. Collaborative engagement of energy users and producers to demonstrate opportunities for gas usage and injection could facilitate cost sharing for the development the gas network to Rhode and North Offaly County.

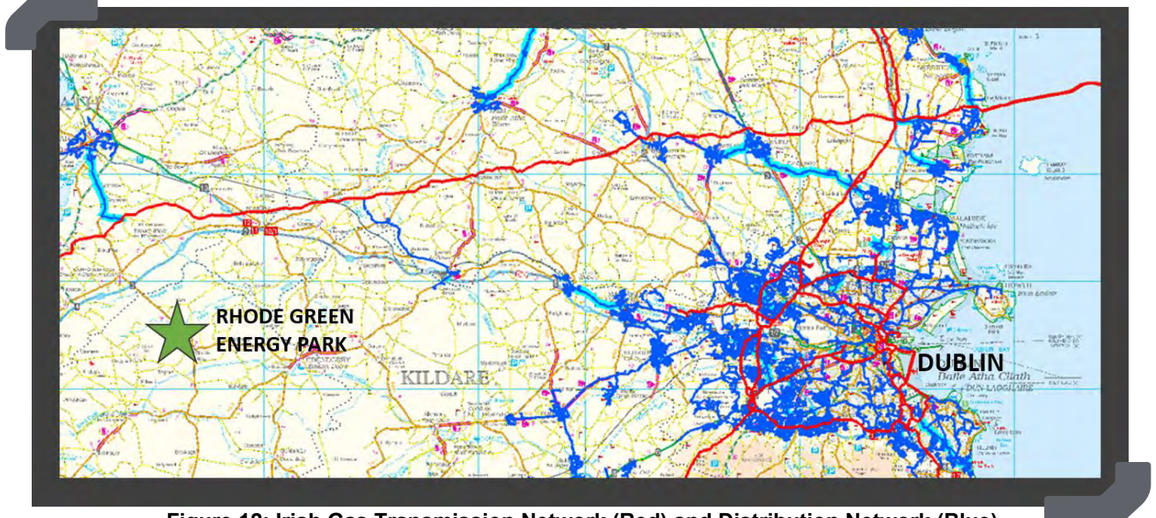

Figure 12: Irish Gas Transmission Network (Red) and Distribution Network (Blue)

Next Steps: Apply to the Gas Networks Ireland Innovation Fund with a concept proposal to decarbonisation the region through enabling of the Green Energy Park as a commercially viable central hub for green hydrogen and biomethane generation and injection into a proposed gas network for the North Offaly Area. This could be achieved through partnership and integration with the wider energy sector and could unlock potential for the transition of nearby Combined Cycle Gas Turbine (CCGT) Power Plants to burning biomethane and hydrogen. It could also facilitate the use of excess renewable energy from wind farms and solar farms for hydrogen generation at scale and open opportunities for renewable Compressed Natural Gas (CNG) filling stations for transport and agriculture in the region.

5.3 Dark Fibre Backhaul Telecoms

A Modern Interface (MI) Wholesale High Quality Access (WHQA) to fibre-optic communication is essential to attracting modern enterprises and in particular ICT sector enterprises. Several companies operate the Irish WHQA fibre optic network backbone offering fixed and wireless lease line (LL) infrastructure containing both a variety of technological infrastructure such as Analogue, Ethernet, Time Division Multiplexing (TDM) and Wavelength Division Multiplexing (xWDM). Based on a recent non exhaustive list of all authorised operators of LL services in Ireland provided by ComReg, the list of operators that offer fixed LL utilising xWDM technology nationally includes Enet, Eir, ESB Group, BT Ireland, Viatel and Vodafone amongst some others on a quasi-national basis [9, p.39].

The existing fibre broadband network in Rhode is operated by Eir. Fibre Technology from Eir along these routes enable speeds of up to 1000Mb/s which meets the needs of most enterprises.

"circuits based on technologies such as xWDM are capable of delivering very high bandwidth capacity in excess of 10 Gb/s" [9, p.55]

5.3.1 Enet

Figure 9 shows the Fibre Backhaul connection in Edenderry. Rhode's close proximity to Edenderry's backhaul is favourable in developing quality connection speeds. The Metropolitan Area Networks (MANs) are State-owned telecoms networks which consist of carrier-neutral telecoms duct and fibre optic cable rings linking the main commercial and public buildings to "co-location centres". Telecommunications operators locate their equipment in these co-location centres and access the MANs network. The MANs are independently managed, maintained and operated for the State by a Management Services Entity (MSE), 'Enet' and provide certainty to the telecoms market [10].

5.3.2 Eir

The Eir national fibre backbone is the most extensive in Ireland at over 13,000 route kms connecting over 500 cities, towns and villages across the island. National Point-to-Point Connectivity offers high bandwidth, with dedicated 1-10Gbit/s connections between nodes. For international carriers requiring wholesale transport to and from Ireland, Eir has partnered with Tier 1 carriers to enable their national Ethernet network to reach out to European and US destinations. Greater than 10GB WDM technology overlays Eir's NGN Core Fibre Network. The 100Gb Wholesale Ethernet Interconnection Line (WEIL) can be provided as a Data Centre Handover. However, the Data Centre Handover (DCH) option will only be used in specific Data Centres where there is an open eir SR12-e node deployed (Border Router) or a node that has 100G capabilities [10, p.28].

5.3.3 Aurora Telecom

Aurora's bespoke dark fibre network is located within 11km of Rhode Business Park northwest of Rochfortbridge. The Aurora network ducts and cable are laid adjacent to the GNI gas main pipelines. As such they are more physically diverse, deeper and more secure than other networks infrastructure. Aurora offers carriers different types of networks potentials from basic point-to-point Ethernet to Carrier Backbone Dense WDM (DWDM) networks on their infrastructure. The fibre and joints are best-in-class with a technique, unique to the aurora network, called fibre blowing utilised during construction [12]. This results in a high performing and low latency network. Aurora's carrier grade network is tested and engineered to meet or exceed "five nines" high availability standards (99.999%) [12].

5.3.4 BT Ireland

BT is the second largest provider of retail and wholesale services in Ireland. It owns and operates a national core DWDM network overlaid on fibre which it uses to connect-up its national Ethernet and TDM platforms. Its core network is based on a national duct network leased from Córas Iompair Éireann ('CIÉ') with fibre laid along the railway lines and with transmission access points at towns located along the routes [9, 43]. The nearest access to the BT network in Portarlington is 23km south of Rhode Business Park.

5.3.5 ESB Group Telecom

The Dublin to Limerick fibre optic infrastructure of ESB Group Telecoms network is most distant from Rhode with the nearest access point located in Portlaoise.

Figure 13: Enet Optic Fibre Network

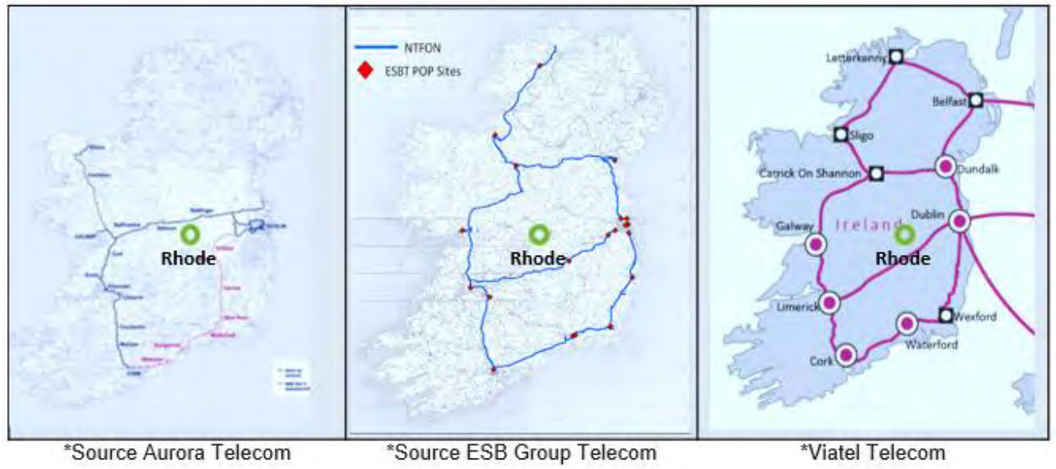

Figure 14: Aurora, ESB and Viatel Optic Fibre Networks

Next Steps: Enabling higher bandwidth speeds through consultation with owners and operators of adjacent networks to assess potential upgrade options. Hyperscale data centres necessitate speeds of TB/s in magnitude and this demand will increase in the future with scaling up of the Internet of Things. R400 upgrade works would present opportunities to extending gas and fibre networks to the Energy Park.

5.4 Road Transport

The proposed location of the Green Energy Park is just 8 minutes from the M6 (Dublin-Galway Motorway) and 38 minutes from the M7 (Dublin to Limerick / Cork Motorway). This gives the Rhode area a high level of accessibility from the 4 major cities in the Republic of Ireland.

5.4.1 Facilitating Construction

This proximity to high quality road networks will facilitate any and all construction works associated with the Park. Heavy plant, equipment and construction materials can be transported to the site with relative ease.

5.4.2 Access to the Park

Furthermore, these quality road links also give easy access to large population centres such as, Athlone, Tullamore, Newbridge, Kildare, Naas and Portlaoise. Rhode is accessible from Mullingar predominantly by a national primary road (N52). Smaller regional roads in the area give access of a lesser quality to other significant near-by population centres. Rhode is linked directly to Edenderry by the R441 and Portarlington by the R400. Easy access to the park from these population centres should prove an attractive prospect for potential tenants of the park, providing ample potential work-force living at easily commutable distances from the park.

5.4.3 R400 Upgrade

There are plans to upgrade the R400 highlighted red in Figure 13. This road is a key regional artery and sees heavy HGV usage. However, it is in poor condition in places. New access roads off the R400 are planned as part of the Yellow River Windfarm development. The accessibility of the park by road will be important for the transport of material goods to and from the park. As the park develops, any product generating industry will be well served by this road network, facilitating rapid transport of produce to Ireland's major cities and to means of export.

5.5 Water Supplies

5.5.1 River Shannon to Dublin Pipeline

The proposed alignment of the Shannon to Dublin Pipeline shown in Figure 13 below (light blue) will open up further opportunities for water intensive industries. The proposed Eastern and Midlands Water Supply Project will involve the abstraction of water from the River Shannon at the Parteen Basin. This scheme will deliver the wide benefits to the East -Midland Region will provide a long-term and sustainable water supply to allow for future growth of industry and local communities.

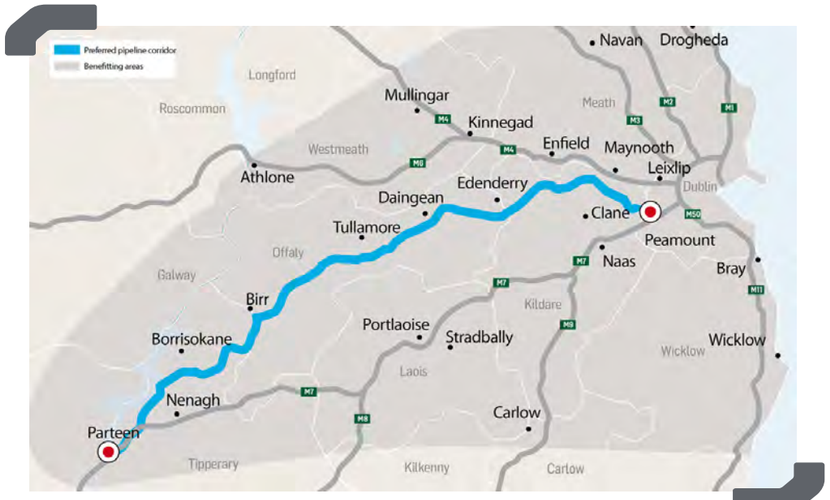

Figure 15: Water Supply Project – Eastern Midlands Region

5.5.2 Accessible Groundwater Sources

In general, the water table is close to the surface. In the immediate vicinity of Rhode Business Park, Mount Well was used by the E.S.B to supply water to the nearby power station at Rhode. This supply has been replaced by a bored well at the old power station site and is no longer in use. Test pumping at this site has not been carried out but it is expected to be able to support an increased yield potential. Any proposed industrial development utilising the groundwater would necessitate a consideration of potential impacts on neighbouring springs.

Figure 16: Motorways and National Primary Road Network servicing the Rhode area

Next Steps: There is opportunity during this upgrade, to extend both the gas and fibre networks toward the site of the proposed Green Energy Park which would bolster development opportunities for the park.

6 ENERGY PARK MODELS

As part of the Rhode Green Energy Park opportunity assessment, similar developments in Europe have been studied to gain insights into what are the unique characteristics and how Rhode Green Energy Park can take advantage of its own opportune Characteristics. It has been found that energy parks typically evolve around a large energy producer such as at Kalundberg Eco Park in Germany. The potential for connections to the electrical grid through the Derryiron 110kV station has already resulted in clusters of green energy developments at Rhode. The Sustainable Energy Park at Appeldorne in the Netherlands demonstrated that park management and policy defines the ethos and goals for the park tenants. Offaly County Council can define these for the Rhode Green Energy Park.

Other Energy Parks studied such as the City of Lathi Model in Finland and the Granville Eco Park in Tyrone, Northern Ireland demonstrated the flexibility in the scale of implementation and more importantly that an energy park model can achieve symbiosis with industry through alignment with the region's existing economic activities and resources. In principle 'Industrial Symbiosis' takes the by-products of one company to serve as a resource for another e.g. Heat, Biogas, Compost, Hydrogen, Recyclables etc.

Establishing an anchor tenant in the Park which possesses a synergy with one or more of the energy technologies already operating in the area is a key step in establishing resource flow into the park. Offaly Co. Co. can support engagement between the existing energy companies and local stakeholders with prospective tenants to explore potential for 'industrial symbiosis'. Establishing a relationship founded in the principles of 'Industrial Symbiosis' would instil a culture of Inter-Firm Cooperation in the area with benefits to all.

RPS has looked at international practice from both ACE classifications and UNIDO (United Nations Industrial Development Organisation). Case studies of different types of parks have been examined to identify and learn how such parks develop, are governed and how successful operation is achieved.

6.1 UNIDO - United Nations Industrial Development Organization

UNIDO have produced a report based on Resource Efficient Cleaner Production (RECP) program of 2012-2018. The report looks at the uptake and effectiveness of Eco-Industrial Parks (EIPs). UNIDO definition of an EIP is:

"A community of manufacturing and service businesses located together on a common property. Member businesses seek enhanced environmental, economic, and social performance through collaboration in managing environmental and resource issues." [13, p.12]

The report discusses some key principles and components for the implementation of Eco-Industrial Parks and are shown in Table 3. They are worthwhile points of reference during the development of the Rhode Green Energy Park.

Table 3: Key Components of Eco-Industrial Parks

Park Management Performance	Environmental Performance	Social Performance	Economic Performance
Park Management Services	Environmental management and monitoring	Social management and monitoring	Employment Generation
Monitoring	Energy management	Social infrastructure	Local Business and SME promotion
Planning and Zoning	Water Management	Community outreach and dialogue	Economic value creation
	Waste and material use		
	Natural environment and climate resilience		

The report states that;

"Holistic methodologies, ranging from approaching companies on an individual level over industrial synergy concepts and the inclusion of infrastructural, management and zoning considerations were applied as part of the EIP Pilot Projects". [14, p.9]

The objective of the program's approach involves;

"upscaling and expanding resource efficient and cleaner production activities in order to move beyond the borders of EIPs and incorporate them into sustainable cities". [14, p.9]

UNIDO have provided support to the RECP in numerous ways, however most applicable to the Green Energy Park is in the area of management and governance models. A good governance model must align the park to best take advantage of synergies, local integration, spatial planning and zoning regulations and establishing park level infrastructure and utilities. There is no 'one size fits all' model for management of such parks, however, the above-mentioned aspects should be at the core of developing a management model.

Key Take-away: Existing industries were approached during the UNIDO RECP programme and engaged in exploring potential synergies and developing a park around them.

6.2 Answers to The Carbon Economy (ACE)

As part of this opportunity assessment, RPS has also consulted the ACE Low Carbon Classifications to assess the principles behind "Green Energy" parks which could be applied to the proposed park in Rhode.

Table 4 sets out a summary of most relevant Park types / models and examples which can inform the decision making of Offaly County Council in establishing the Green Energy Park.

Table 4 : Energy Park Models

Park Type	Characteristics
Sustainable	Inter-firm cooperation
	Collective use of equipment and facilities
	Exchange of material or energy streams between companies or to a surrounding region
	Key concept of **Voluntary Engagement** between firms on key areas such as facility and utility management infrastructure and industrial processes
Eco	Exploits Synergies in Supply Chains of Energy / Material Water / Services
	"Industrial Symbiosis" – by-products of one company serve as a resource for another e.g. Heat
	Clustering of complementary companies is important
	Integration into the industry of a region is key
Green	Collection of companies independently employing green technologies and process
Low Carbon	A Low Carbon Park is effectively a Green Park that also embraces the principles of an "Eco Park". Companies are still independently employing green technologies and processes to suit their needs while also looking to make use of synergies in Supply Chains of Energy / Material / Water / Services.
	Involves integration into region's industry

The examples chosen than follow best display the principles of "Sustainable" and "Eco" Parks which can inform decision making when applying these principles to the Rhode Green Energy Park.

6.3 Sustainable Park - Ecofactorij Appeldoorne Netherlands

6.3.1 Ethos of Park

- Companies make an "extra effort" in the field of sustainability.
- Meeting sustainability standards will reward tenants with discounted land price.
- Tenants are automatically members of a cooperative park management.
- Park Management looks after park-wide initiatives.
- Park Management has installed a private electricity network – on site solar generation.
- Tenants lease plots and construct their own premises.
- Premises must align to Park Management criteria and Appeldoorne zoning plans.

6.3.2 Governance, Economy and Timeline

- Companies self-govern the park.
- Appeldoorne Planning Zoning policy applies. No further governance responsibilities lay with Appeldoorne.
- Energy related performance of tenants ultimately results in cheaper rates.
- Reasonable diversity of tenants. Large Scale Logistics bases appear to thrive in the park.

6.3.3 Park Tenants

- Logistics.
- Cold Storage.
- Volvo / Renault Commercial Garage
- Data Centre.
- Delivery service.
- Chemical Distribution

Key Take-away: The Sustainable Energy Park at Appeldorne in the Netherlands demonstrated that park management and policy defines the ethos and goals for the park tenants. Offaly County Council can define these for the Rhode Green Energy Park

6.4 Eco-Industrial Park – Kalundberg Germany

6.4.1 Industrial Symbiosis within the Park

- 1500 MW Coal Fired Power Plant. Surplus heat contributes to DH network.
- Nearby fish farm on DH network uses heat in processing sludge to a fertilizer.
- Biomass generator also makes use of sludges in Anaerobic Digestion Processes.
- Nearby Pharmaceutical plant and oil refinery make use of steam from powerplant.
- Sulphur dioxide scrubber in Flu Stack of plant captures Gypsum sold to wallboard manufacturer.
- Flue Ash and clinker from the power plant used in cement production.

Figure 17: Kalundberg Eco-Industrial Park, Germany

6.4.2 Governance, Economy and Timeline

- Developed over 20 years.
- Sale of by-products and links in system were established as independent business deals.
- Managed by a board of directors, with each participating company providing a board member.
- DH network was put in place by the municipality of Kalundberg.

Key Take-away: A large scale energy producer was the cornerstone of the park's natural development. There were no incentives / grants in place to promote the development of industrial symbiosis of the park. It demonstrates the scalable nature of Eco-Industrial Parks over time.

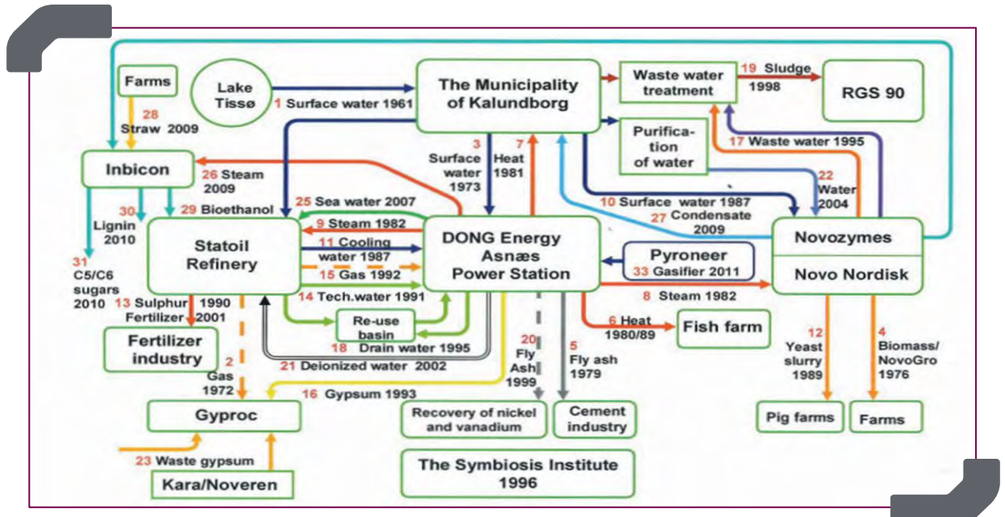

Figure 19: Development of Kalundberg's Industrial Symbiosis

6.5 Granville Eco-Park Co. Tyrone

Granville Eco-Park has positioned itself at the centre of the Waste Management industry in Co. Tyrone. The plant collects up to 300 tonnes of food waste per day. This waste is treated and put through an Anaerobic Digestion process, producing a gas and digestate. The gas is partially used on site in a CHP facility and the rest is treated to be sold as biogas to nearby Industrial CHP customers and is suitable for grid-injection. The digestate produced is a nitrogen rich fertiliser and soil conditioner, PAS110 certified and sold to farmers in the area.

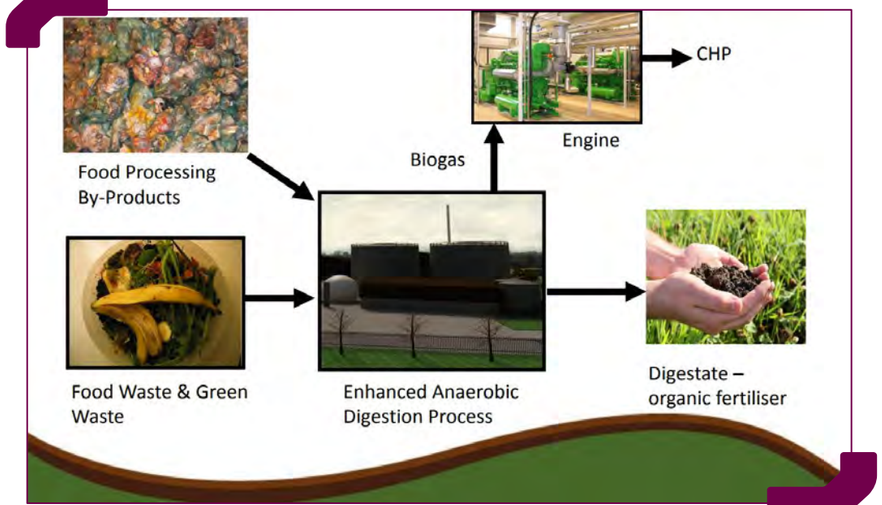

Figure 18: Granville Eco Park Bioenergy Products

The site produces 26million m^3 of gas per year, with nearly half used on site in a CHP plant. The plant can convert 1 tonne of Food Waste to 500kWh of electricity with the facility exporting approximately 5MW of power to the grid.

Key Take-away: The park employs many of the principles of an "Eco Park" despite being a single entity. Taking resource streams from the local community and making use of it, providing valuable output to the community, in electricity, biogas and fertilizer products.

6.6 City of Lahti, Finland

The city of Lahti, Finland has implemented the principles of industrial symbiosis in its city-wide waste treatment philosophy. In principle, ecological systems are mimicked throughout the waste treatment process. The environmental footprints of the industries operating in the system are greatly reduced, with little to no waste required to go to landfill and energy production serves as a final core output along with products produced by the participating industries.

6.6.1 Implementation at Kujala Waste Management Facility

The majority of recyclable waste is refined and used in the production of new material which can be used by industries which are networked to the facility. Organic material is used for biogas generation and in a composting plant. Raw biogas is produced from bio-waste, garden waste and wastewater sludge. This is then upgraded to produce high quality biogas which is injected into the natural gas network. The remaining material is composted for use in agriculture and growing media. Gas produced from waste which is deposited in landfill is reclaimed and directed to a heating station where it is used to generate steam used in soft drinks manufacture. Remaining landfill gas is used to generate energy at the Kujala site. Leachate from the landfills and dirty water from the facility is treated at Lahti Aqua Ltd´s Ali-Juhakkala wastewater treatment facility. Contaminated soil is stabilised and compacted into a non-toxic form at the Kujala site and used in embankments or as preliminary landfill cover.

Similar to the Kalundberg Park explored above, the success of the Lathi project came from expanding past the bounds of the park and incorporating the local municipality. This made the park a cornerstone in the development of a sustainable region.

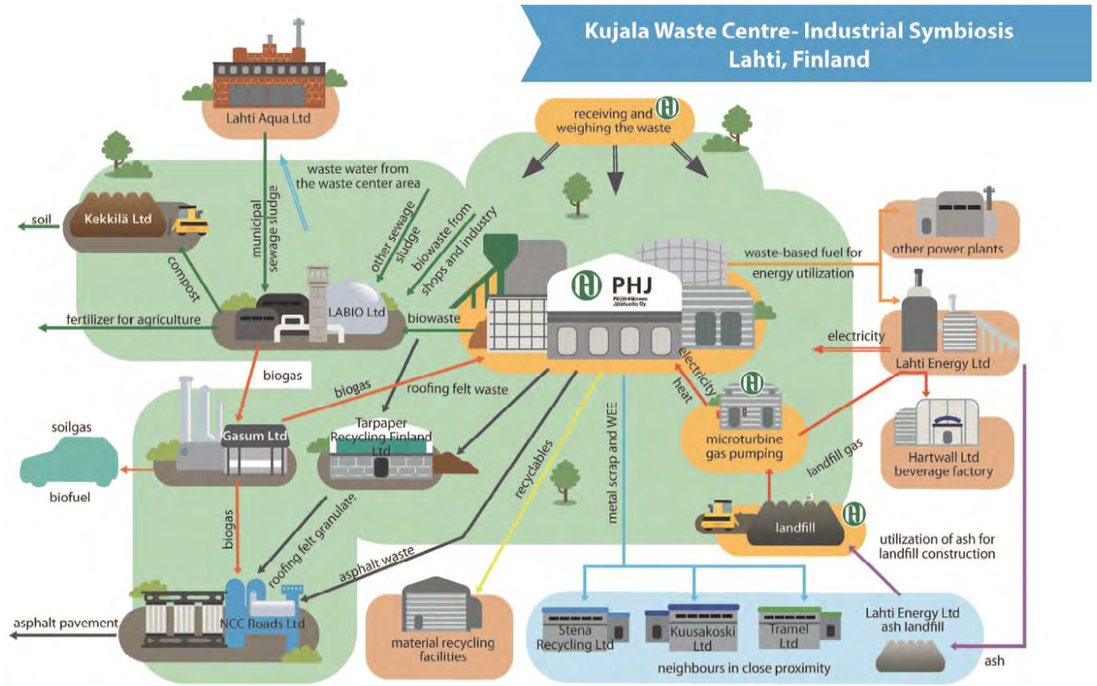

Figure 20: Kujala Waste Centre-Industrial Symbiosis, Lahti, Finland

Key Take-away: Demonstrates the flexibility in the scale of implementation and more importantly that an energy park model can achieve symbiosis with industry through alignment with the region's existing economic activities and resources beyond the confines of the park.

6.7 Energy Park Study Findings

From the review of energy parks we found that the range of industries and commodities traded in achieving industrial symbiosis can be diverse. We also found that successful Energy Park, take advantage of characteristics and opportunities that are unique to their surroundings. However notable industries and facilities that repetitively appear with the parks studied include;

- Power Stations & Renewable Energy Generation
- Biogas Generation through Anaerobic Digestion for network injection, CHP and virtual pipelines
- Waste Management from agricultural, industrial and municipal streams
- Transport Sector Industries, Commercial Sales and Maintenance, Logistics, Fuelling Stations
- Wastewater Management Facilities
- Large Energy Users e.g. Data Centre, Cement Industry, Pharmaceuticals
- District Heating
- Fertilizer Production

6.7.1 Key findings about how sustainable development of energy parks occur

Energy Parks typically evolve around large energy producers. Establishing an anchor tenant in the park which possesses a synergy with one or more of the Energy technology(s) operating in the area is a key step in establishing a resource flow for the park. Offaly County Council can look to engage the existing energy technology companies with the anchor tenant, establish a relationship founded in the principles of "Industrial Symbiosis" and look to instil a culture of **Inter-Firm Cooperation**.

Having in place an anchor tenant with established links to the energy technologies surrounding it, can be a bedrock to allow the park to develop around it. This tenant may itself, produce by-products which would be considered a valuable resource by compatible industries.

Established Parks characteristically have a culture and formal governance structure ensuring a sustainable eco / low carbon type park can grow, further attracting industries that see value in the philosophy of the park and see compatibility with established industries in the park.

Next Steps:

1. Influence the development of the park through strategic planning, which will facilitate and promote the principles of "Eco" and "Sustainable" parks as applicable.
2. Identify industries and emerging technologies that are complimentary to each other have opportunity to integrate with existing energy developments adjacent the park.
3. Examine prominent industry in the region and look for opportunities for resource streams from the park to be utilised as resources to these surrounding industries (and vice versa) and examine the infrastructure needed to facilitate the transfer of these resources.

7 EVALUATION OF INDUSTRIAL SYMBIOSIS & EMERGING TECHNOLOGY OPTIONS FOR RHODE GREEN ENERGY PARK

Energy parks like those outlined in Section 6 depend on commercial activity and there being synergies among the various component parts of the overall park 'ecosystem'.

The Rhode Green Energy Park and its hinterland offer a number of features that can facilitate commercial activity and industry. These include the existing business park, public roads and electrical grid infrastructure, the nearby water, gas and data infrastructure, and the availability of space and proximity to Dublin.

RPS has considered what types of industry could wish to locate adjacent to the Green Energy Park and that could develop mutually beneficial synergies with the nearby energy related industry, existing and planned.

In order to illustrate the synergies between various industries and energy facilities, RPS have developed an Industry vs Resource matrix as shown in Table 5 below. The matrix also offers a graphical map of industry compatibilities and potential flows of resource streams between industries that can be referenced as the park starts to develop.

Industries identified in the case studies in section 6 and prominent industries already present in the region were evaluated and listed in Table 5 below. RPS also identified other industries defined within the classification of Economic Activities in the European Community, "*European Industrial Activity Classification*" (NACE. Rev 2). The prevalence of those relevant industries in the Offaly and Leinster Region was taken into account.

Prominent industries already present in the region included in the matrix are highlighted in grey. Current and proposed enterprises already present within and surrounding the park are highlighted in blue in the matrix. Highlighted in green are emerging energy technology industries such as biomethane producing anaerobic digestors and hydrogen producing electrolyser plant. Also included in the table and highlighted in green are Data centres and the Horticultural industry which are potentially highly compatible with each other.

In the matrix below industries were ranked in order of those having the least number of inputs and outputs. This provided insight into which industries were most resource dependent and which could offer the opportunity to have a resource stream to develop an eco-industrial park around.

Key Take-away: Our assessment has led to the conclusion that a Data Centre would be an ideal anchor industry for the formation of an Eco-Industrial Park. Other compatible tenants include Hydrogen Electrolysers and Storage, Horticulture Greenhouses, Anaerobic Digesters.

Table 5: Industry vs Resource Matrix

Key	
O	Output
I	Input
A	Alternative

Where more than one possible input is available to meet an industry's particular input requirement, alternative inputs are recorded as "A"

		Resource/Commodity / Industry	Electrical Energy	SynGas	Natural/Bio Gas	Green Hydrogen	Blue Hydrogen	Biomass Waste	Heat	Carbon Dioxide	Oxygen	Biodiesel/Ethanol	Water	Ground water	Organic Matter	Methanol	Oil	Waste Water	Sludge/Slurry	Ash	Glycerin	Black Bin Waste	Inputs & Outputs	Inputs vs Outputs
Industry / Technologies	Current / Proposed Developments	Yellow River Wind Farm	O																				1	1
		Clonin Solar Farm	O																				1	1
		Biomass Gasification (SynGas)	O	O	O			I	O	I	I		I			O		O	O				11	3
		Flywheel Battery Storage	I/O																				1	0
		SSE Oil fired Peaking Power Plant	O						O	O			I				I	O					6	2
	Emerging Industry	**Hydrogen Electrolyser & Storage**	I			O					O		I										4	0
		Carbon Capture Peaking Plant	O		I	A	A					A	I					O					4	0
		Data Centres	I		A	A	A		O			A	I				A	O					4	0
		Geothermal Heat Pumps	I						O				O	I									4	0
		Horticulture/Agrifood (Greenhouses)	I		I	A	A	O	I	A			I	A	O								6	2
		Biofuel Production	I					I				O	I			I					O		6	2
		Steam Reformation Plant	I	O	I		O		O	O	I		I					O					9	1
		Anaerobic Digester (Biogas)	O		O			I	O			O	I		I			O	I	I		I	11	1
	Prevalent Industry and Facilities in the Wider Midlands Region.	Forestry						O															1	1
		Wastewater Treatment	I															I	O				3	1
		Meat Processing Factories	I		I	A	A						I		O			O					5	1
		Tillage Farming						O				I	I	I	O		I		O				7	1
		Brewery	I		I	A	A	O	I/O	I			I		O			O	O		I		9	1
		Cement Industry			I	A	A		O	O										O			4	2
		Livestock Farming									I	I	I		O		I		O				6	2
		Food Processing	I	I	I	A	A		I/O	I			I	I	O			O	O		I	O	11	3
		Transport Road Haulage (Warehouse)	I		I	A	A					I					I						4	4
		Waste Management Industry						O							O				O	O		O	5	5
		Pharmaceutical Industry	I	I	I	I	A		I/O	I	I		I			I		O			I		10	8

7.1 Geothermal Hotspot

Rhode is located centrally above a geothermal hotspot as can be seen in Figure 20 below. There is notable potential for the development of the technology in the vicinity of the Green Energy Park to exploit;

- Space heating includes heating greenhouses, businesses, swimming pools and homes.
- Hot water for commercial and domestic properties.
- Electricity generation.

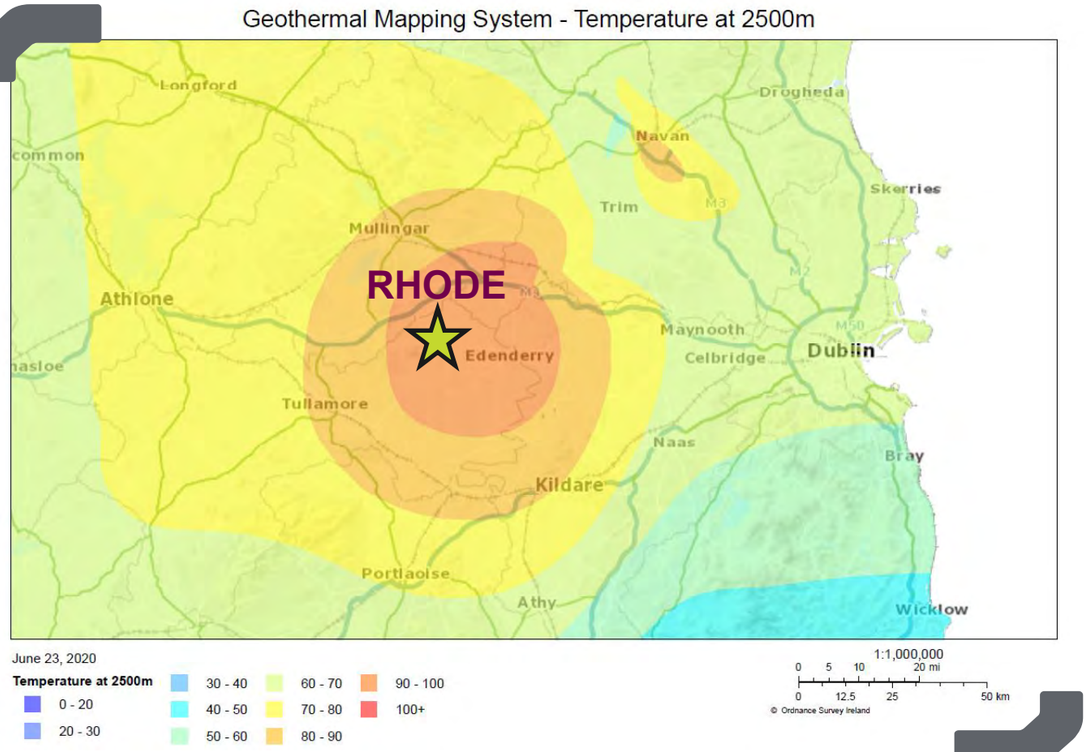

Figure 21: SEAI Geothermal Mapping – Temperature at 2500m (Drawing in Appendix A)

7.1.1 Shallow Geothermal Energy

There are elevated groundwater temperatures due to deep discharges from the underlying bedrock at Rhode. Average groundwater temperatures are normally between 9-12 °C approximately 2° C above the expected. A heat pump employed would require less electrical energy and operate at a better COP (Coefficient of Performance) as the difference in temperature between the heat sink and the desired temperature of circulating fluid will be reduced. Sub-terranean temperatures do not experience the same seasonal variations as air temperatures and as such, these systems can perform year-round. This could be attractive to industries seeking efficient thermal space heating.

7.1.2 Deep Geothermal Energy

Deep Geothermal energy power generation harnesses high temperatures deeper underground caused by the heat from the earth's core. The technology involves drilling deep wells (3 – 5km deep) where hot water under pressure exists naturally or where water injected from the surface can be heated within fissures in the rock and recovered. The temperatures and pressures reached can be used to produce high pressure steam for generation of electricity.

Key Take-away: Shallow Geothermal Energy could be attractive to industries seeking efficient year-round thermal space heating. Further studies are required to establish what opportunities there are for the exploitation of Deep Geothermal Energy at Rhode.

7.2 Hydrogen Electrolysers

Following completion of the technology assessment, hydrogen generation emerged as a strong candidate which is highly compatible with existing green energy developments surrounding the park.

The European long term decarbonisation strategy “A Clean Planet for All” published by the European Commission in November 2018 refers to the potential key role of hydrogen in decarbonising hard-to-abate sectors, such as industry, cement, steel, and also contributing to decarbonisation of heavy duty and long distance transport. Hydrogen, if produced from renewable electricity through electrolysis, can also be a basis for Power to X (power to multiple end use applications), and Power to Liquids (synthetic and drop in fuels based on hydrogen).

In July 2020, the Commission issued “A hydrogen strategy for a climate-neutral Europe” which sets out a high level roadmap for Hydrogen deployment across Member States. It states that “*The priority for the EU is to develop renewable hydrogen, produced using mainly wind and solar energy. Renewable hydrogen is the most compatible option with the EU’s climate neutrality and zero pollution goal in the long term and the most coherent with an integrated energy system. The choice for renewable hydrogen builds on European industrial strength in electrolyser production, will create new jobs and economic growth within the EU and support a cost-effective integrated energy system. On the way to 2050, renewable hydrogen should progressively be deployed at large scale alongside the roll-out of new renewable power generation, as technology matures and the costs of its production technologies decrease. This process must be initiated now*.” [15, p.5].

Energy System Integration, as currently developed by the European Commission aims at reinforcing synergies between economy sectors to make them work more efficiently, reduce overall CO2 footprint and dependence on fossil fuels, and integrate renewables into the energy system, so as to contribute to achieve climate neutrality by 2050. To contribute to the climate neutrality objective, hydrogen needs to be produced at large scale, mainly through electrolysis powered by renewable electricity. Today the technology is available at multi-MW scale, but larger scale plants are being planned. The challenge hydrogen generation faces is to develop larger modules than the demonstration modules, with reduced balance of plant, managing efficiently the input power, the output hydrogen and oxygen streams, as well as the heat flows, while ensuring the reliability of the system and reducing the footprint through a more compact design. It is expected that the development of bigger modules will help create economies of scale, thus leading to further cost reductions.

7.2.1 Electrolyser Demonstration at Rhode

Given the components already available at Rhode – renewable energy, land, grid connectivity and energy innovation companies – it is potentially an ideal location to develop hydrogen technology.

Rhode could be a unique location to test and demonstrate an electrolyser system, operating flexibly to harvest maximum renewable power. The system will provide grid-balancing services as well as supplying renewable hydrogen to a commercial/industrial application. One avenue to explore hydrogen feasibility is in relation to injection to the gas grid.

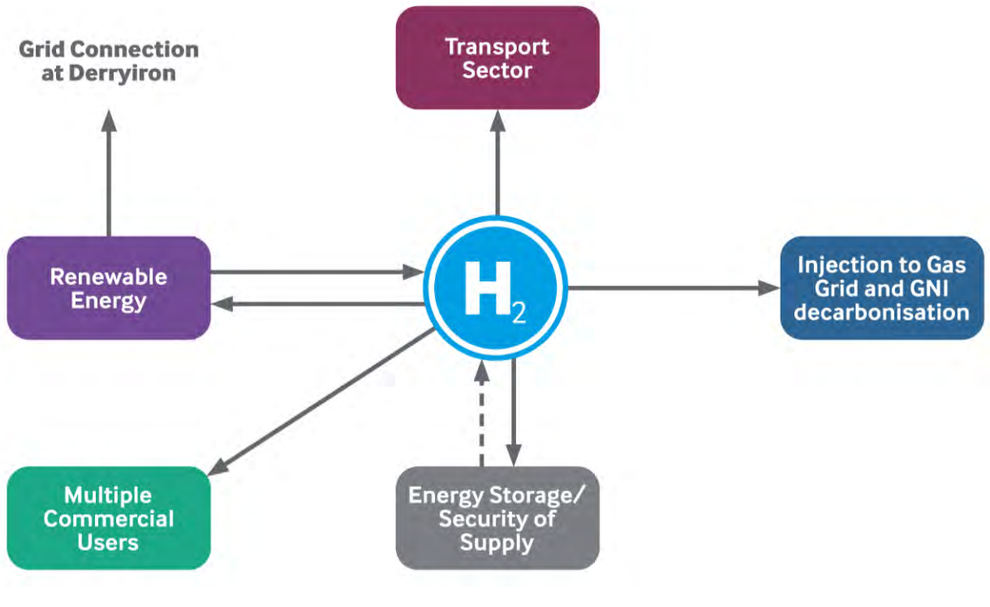

Figure 22: Exploring Hydrogen Opportunities at Rhode

Next Steps:

1. Identify partners through the Energy System Integration Partnership Programme to prepare a proposal to develop and demonstrate a hydrogen electrolyser linking renewables and commercial/industrial applications and submit to the Horizon 2020 Framework Programme.

2. A connection between the gas grid and Rhode would open a number of opportunities for existing and proposed companies in the Park, and could make investment in hydrogen technology and biomethane very attractive at this location. This potential should be pursued in association with Gas Networks Ireland. A feasibility assessment application to the gas innovation fund could unlock this potential.

7.2.2 Hydrogen Injection to the Gas Network

Gas Networks Ireland is committed to the decarbonisation of Ireland's energy system. They are actively investigating key transformational technologies to decarbonise the energy sector by 2050 which includes hydrogen as well as renewable gases like biomethane and syngas. Figure 22 shows Green Hydrogen's role in the Energy System.

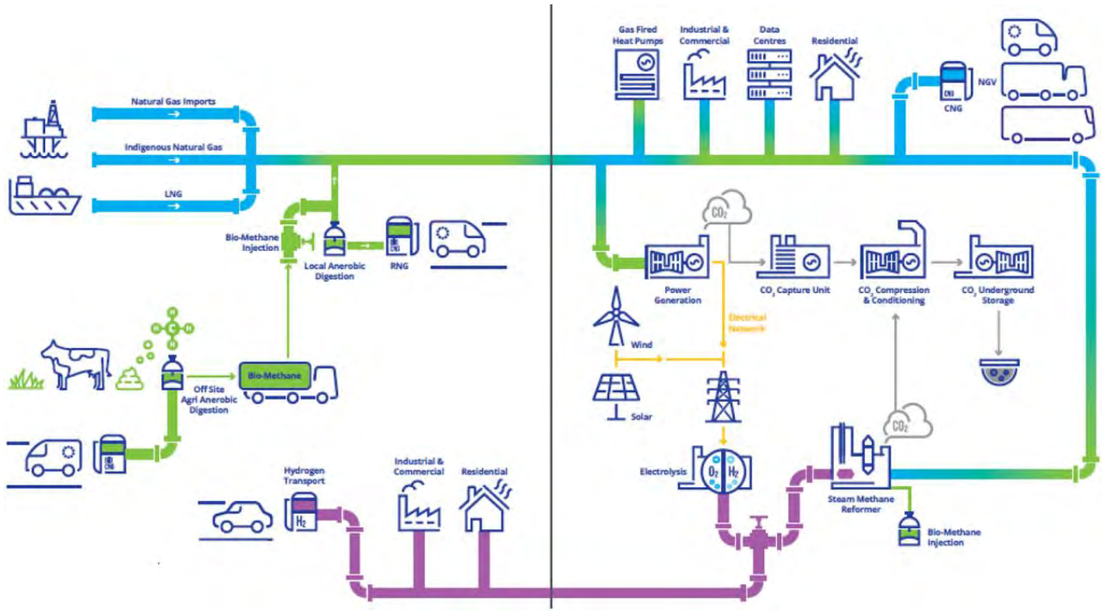

Figure 23: The Future of Gas in Ireland

7.3 Operational & Maintenance to the Renewable Energy Sector

The Rhode Green Energy Park could be an ideal location for Maintenance, Repair & Overhaul (MRO) Enterprises servicing the renewable energy sector given its centrality in a region upscaling wind and solar farm development.

Maintenance, repair & overhaul of a wind turbine is required at fixed intervals to ensure high performance and efficiency. Some of the key equipment which requires routine maintenance are gearbox, generator and wind blades. The shifting trend to cleaner and greener energy along with favourable government policies are driving the growth of the market. Increase in the number of wind energy generation facilities is creating demand for wind turbines which leads to the growth of wind turbine MRO market.

The wind turbine MRO market can be segmented based on the maintenance of various equipment. Some of the major equipment under MRO market are gearbox, generator, wind blades, electrical systems, and other wind turbine parts. From the cost of maintenance point of view gearbox, generator and wind blades have the largest market share while electrical systems require more frequent maintenance and repairment.

Some of the major players in the market include Vestas, Moventas, Siemens, Stork Gears & Services, Mekanord, Gamesa, and Suzlon etc

Facilities and services could include;

- Maintenance Repair & Overhaul Depot
- Supply Chain & Logistics Management
- Repair and inspection work
- Repowering of wind farms.
- Reconditioning of wind turbines and solar panels
- Data science and technology information sharing through customers service

8 DATA CENTRE AS A POTENTIAL TENANT

Our assessment of compatible industries and technologies has led to the conclusion that a Data Centre would be an ideal anchor industry for the park. How the industry type has met the relevant criteria is outlined below.

Data Centre investment in Ireland is expected to grow substantially in the coming years. The IDA has recently carried out a survey among existing data centres in Ireland. 85% of respondents projected a positive outlook, with 62% of respondents expecting to increase data centre investment levels and 31% looking to maintain investment levels. [6, p.28]

The industry has been targeted as a key player in Ireland's economic development for the foreseeable future and has strong potential to become a key industry in the midlands area in the vacuum left by peat harvesting and peat generation industries. Project Ireland 2040 explicitly states;

"Ireland is very attractive in terms of international digital connectivity, climatic factors and current and future renewable energy sources for the development of international digital infrastructures, such as data centres. This sector underpins Ireland's international position as a location for ICT and creates added benefits in relation to establishing a threshold of demand for sustained development of renewable energy sources. There is also greater scope to recycle waste heat from data centres for productive use, which may be off-site". [2, p. 9]

The same survey examined the envisaged effects of Brexit on the industry. Results were again positive, with 55% of respondents stating that a positive investment impact is to be expected in Ireland post Brexit and 67% project a positive Brexit impact on data centre investment specifically. [6, p.32]

8.1 Data Centre Opportunity

The potential for a data centre as an anchor tenant was chosen for further investigation for the following reasons:

- ***Growth Industry*** - There has been very strong growth in the data centre industry in Ireland in recent years. The modern world increasingly requires the retention and use of vast volumes of data, so this trend is likely to continue for the foreseeable future. A number of companies continue to actively search for suitable locations in Ireland where they can build new data centres.
- ***Economic Benefits*** - Data centre investment has provided significant economic and employment benefits to the Irish economy (approximately €7.18billion to the Irish economy since 2010 [6, p.4]). These benefits consist of both the initial capital investment and the ongoing operational expenditure which creates and sustains jobs across the wider economy. Data centre companies recognise the importance of local employment and using local contractors and suppliers. When appropriately sited, data centres have a net positive impact on their local communities.
- ***Infrastructure Requirements*** - Much of the infrastructure required for supporting a data centre is already in place at Rhode (space, road access, water / wastewater, power). Other infrastructure e.g. gas and data fibre is nearby.
- ***Sustainability Focus*** -In recent years, the design of data centres has seen greater focus on sustainability, energy efficiency and use of renewable power. There are clearly synergies between a modern data centre and renewable energy generation and storage enterprises such as those at Rhode Business Park, present and planned.

8.2 Outline Description of a Typical Data Centre

A data centre is a facility used to house computer systems and associated components, such as telecommunications and data storage systems. They underpin the operations of companies in the broad ICT sector, particularly those in social media and cloud computing.

- ***Physical Size:*** Data centres vary in size. The footprint for a typical data centre is approximately 1 acre, but some data centres have the potential to scale much larger.
- ***Data Connection:*** Hyperscale data centres necessitate speeds of multiple Gigabytes per second in magnitude and this speed demand will increase to Terabytes per second in the future with scaling up of the Internet of Things.
- ***Electricity Demand*****:** The size of the individual electricity demand connections depends on the scale of the business operation. These have varied from 20 MW with some possibly extending to 250 MW in the final stages of development. Their use of electricity tends to be constant throughout the year.
- ***Back-Up Power*****:** Data centres are very sensitive to power outages. Therefore, back-up sources of power must be available. For many data centres, back-up power is provided by on-site gas fired generators. Close proximity to a suitably sized gas connection is therefore an advantage. However, other sources of reliable back-up power, if adequately sized and dependable, are equally relevant.
- ***Water / Wastewater:*** The water demand and wastewater generation in data storage and processing operations can be millions of gallons per day, which is why water and wastewater treatment is a critical factor in siting and operating large data centres
- ***Access:*** There are no special access requirements other than good roads suitable for personnel and normal HGV use.
- ***Employment Potential*****:** RPS have estimated from IDA figures that on average a typical data centre in Ireland supports the employment of up to 70 operational personnel across various roles including Technicians, Engineers, Managers, Security Personnel, Software Developers and Health and Safety Personnel. RPS have estimated from IDA figures that up to 200 personnel could be directly involved in the construction of a typical data centre over a period of approximately 2 years. [6, p.6]
- ***Adjacent Industries***: A large data centre industry located in Ireland increases the attraction for related industries to also locate in Ireland, in order to service and interact with the data centres. This brings further employment opportunities, as well as introducing new knowledge and skills which get diffused to the data centre and other industries requiring skills similar to data centres. Data centres also support and attract other ancillary services within their own corporations e.g. back office functions, sales, marketing and finance leading to secondary employment as a result of the critical support facility being located nearby.

8.2.1 Sustainable Energy Demand

The availability of a secure, reliable and sustainable source of energy is a key factor for data centres. 'Uptime', the proportion of time that a data centre is operational, is a key industry measure that is used to categorise data centre performance. Higher performing data centres have a greater proportion of 'uptime' and have energy back-ups and redundancies in place to ensure this. As a result, a significant portion of a data centre's operational expenditure is energy related.

Data centres have established a clear preference and priority that utilisation of energy should come from renewable energy sources. This commitment makes a significant contribution to policy formation and supports the renewable energy industry by creating demand for renewable energy and providing greater certainty and reducing the risk for investors in new renewable infrastructure.

8.3 Compatibility with Rhode Green Energy Park

A data centre could be a very good 'fit' with the Green Energy Park for the following reasons

- ***Available Space***: Subject to meeting necessary planning requirements, there are a number of potential sites that are within the Green Energy Park or very nearby. This can be seen on Figure 15 where the footprint for a typical data centre is also shown.

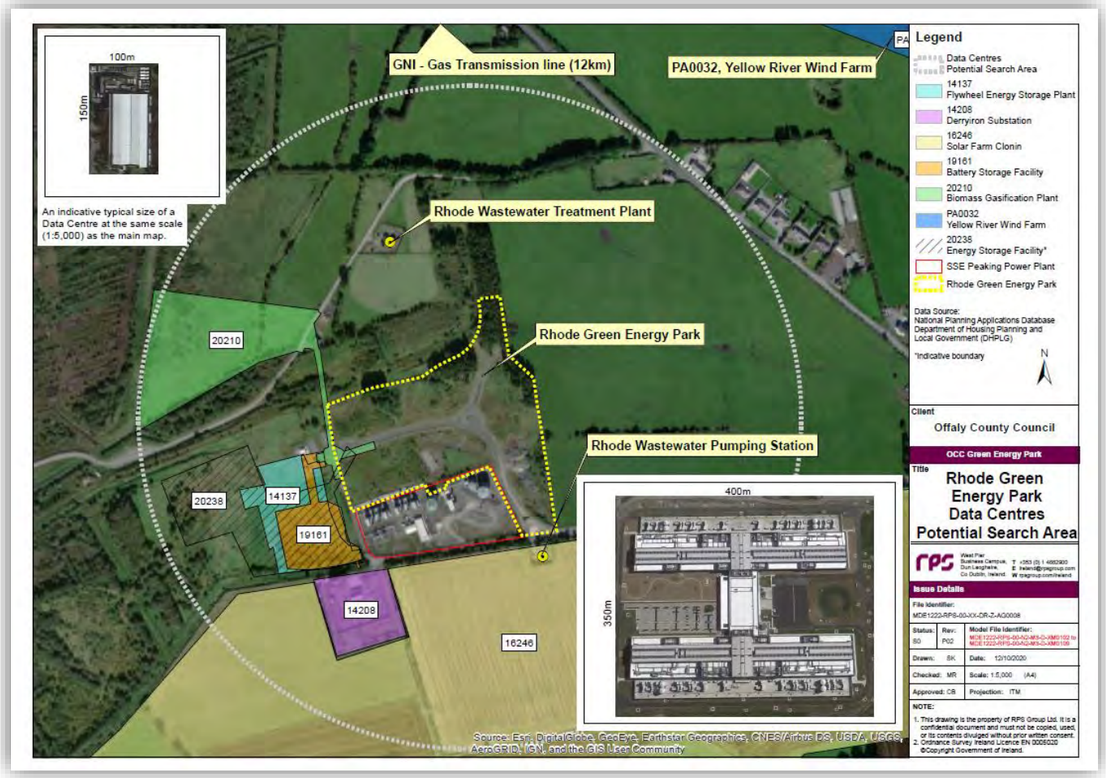

Figure 24: Data Centre Site Footprint Space Availability (Drawing in Appendix A)

- ***Data Connection***. Rhode and its surroundings are currently well served by broadband for domestic and commercial use. A number of a high capacity data utilities potentially capable of serving a data centre exist within proximity of Rhode as outlined in Section 6.3. Further engagement with telecom / data fibre providers will be required to understand the key challenges involved in bringing a high capacity data utility to Rhode.
- ***Electricity Connection:*** There is more than adequate grid capacity at Rhode to cater for the electricity demand of a medium sized data centre. The configuration and cost of a connection would be determined by Eirgrid and ESB Networks in response to a formal application.
- ***Back-up Power:*** Options for back-up power include:
  - On-site generation via a new gas connection.
  - Resilient electricity network with backup power from neighbouring;
    - SSE Airtricity / Endesa peaking power plant and
    - flywheel battery storage facility amongst others.
- ***Water / Wastewater:*** The Shannon to Dublin pipeline will open up further opportunities for water intensive industries. Rhode Wastewater Treatment Plant is located adjacent the Green Energy Park and requires assessment to establish its capacity to cater for large water intensive industries.
- ***Access:*** Access to the Green Energy Park is more than adequate.
- ***Employment:*** There are excellent opportunities for sourcing skilled, semi-skilled and unskilled personnel in the local Offaly community wider Midlands Region as a whole.
- ***GNI / Aurora:*** GNI has developed a combined offering of natural gas, renewable gas and dark fibre (through Ervia's telecoms business Aurora Telecoms) for its data centre customers. This 'package' has particular relevance to the Green Energy Park concept. Additionally, biogas and hydrogen are important elements of GNI's 'Vision 2050' statement to become net zero carbon by 2050. Both are currently being developed by GNI. If a gas connection was made to serve a data centre at Rhode, it could also potentially become a location for biogas and hydrogen injection. This would be a natural development of the Green Energy Park concept and another source of synergies with local industry centred on energy.

8.4 Next Steps

To develop the potential for a data centre choosing to locate within the vicinity of the Green Energy Park, the following areas should be further explored:

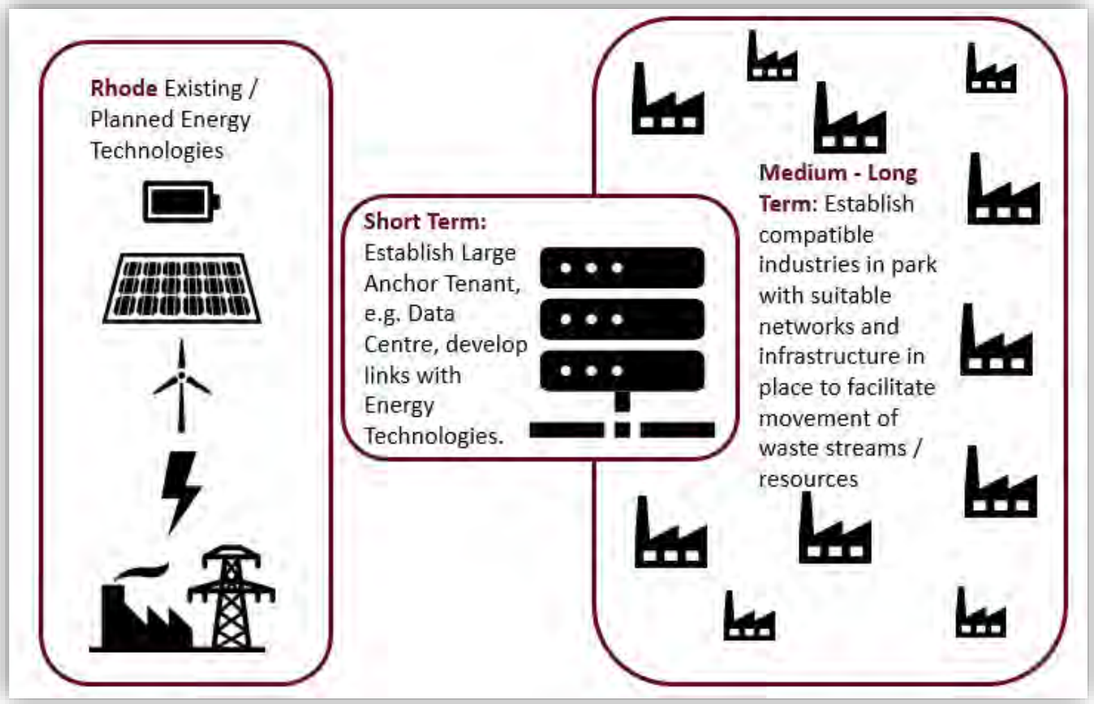

Figure 25: Development strategy with a Data Centre as an anchor tenant.

Next Steps:

1. More detailed information is required on the specific requirements of a data centre in terms of high capacity data fibre, power and back-up power. A targeted review of data connectivity especially, would be valuable in confirming feasibility. Specialist telecoms technical input will be required.
2. Engagement with the IDA should take place in relation to the critical features of a location that will attract (or discourage) data centres from establishing there.
3. Data centres desire for 'green' energy could stimulate supply and technology innovation in the renewable energy sector, attracts investment and increases the pace of transition to low carbon technologies.

9 ALTERNATIVE CONCEPTS FOR RHODE GREEN ENERGY PARK

In the course of this study, a number of alternative approaches to the Green Energy Park opportunity were explored in collaboration with Offaly County Council. Four distinct models are summarised below.

9.1 Local Business and Employment

This approach would see Offaly County Council creating a hub building, with shared services and meeting rooms, around which enterprise and innovation could develop. To create momentum, office space would be taken up by energy companies already active in the park.

Advantages: local companies / start-ups would have a landing space in a central 'nucleus' for the park.

Challenges: might duplicate similar hubs in Edenderry, Tullamore.

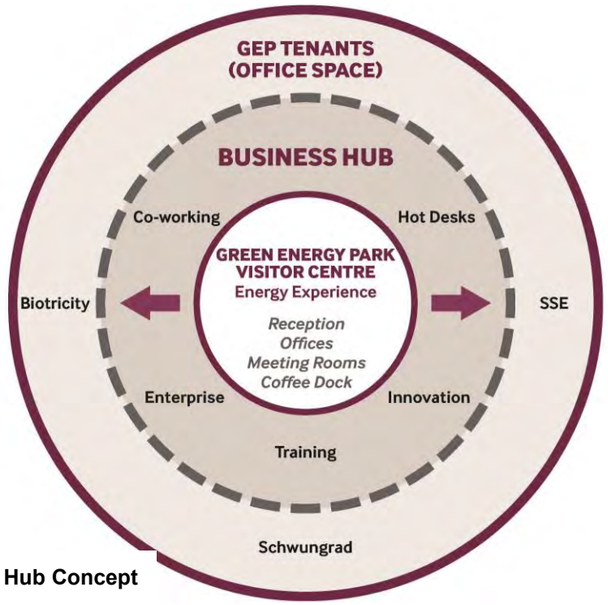

Figure 26: Business Hub Concept

9.2 Interactive: Community / Education / Recreation

One of the unique aspects of the opportunity at Rhode is the combination of energy systems at one location, and the layers of 'energy history' at Rhode. There is a thirst for knowledge about energy and renewables in particular, and examples of successful year-round visitor attractions are found worldwide. This model would see an emphasis on education and recreation, with links into the wider community.

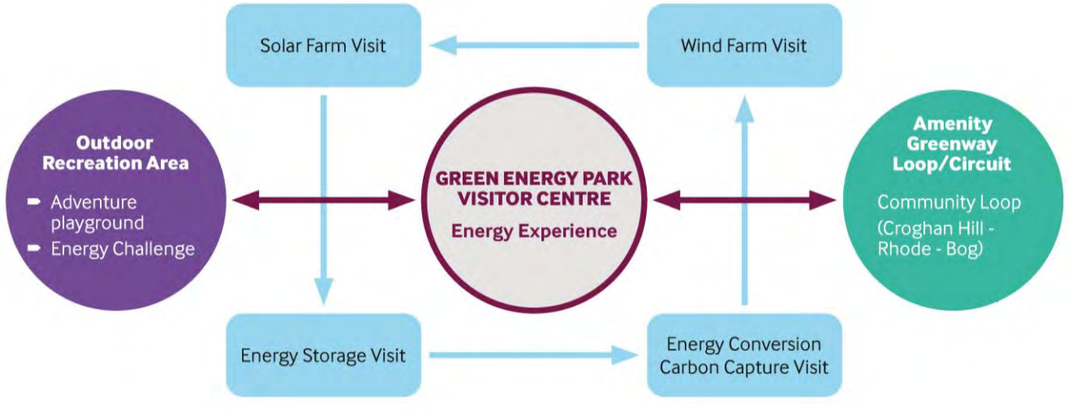

Figure 27: Visitor / Education Centre Concept

Advantages: Location is excellent to attract schools/ tourists. Potential year-round employment. Positive identity.

Challenges: Linked to successful completion of proposed energy infrastructure.

9.3 Energy Crossroads

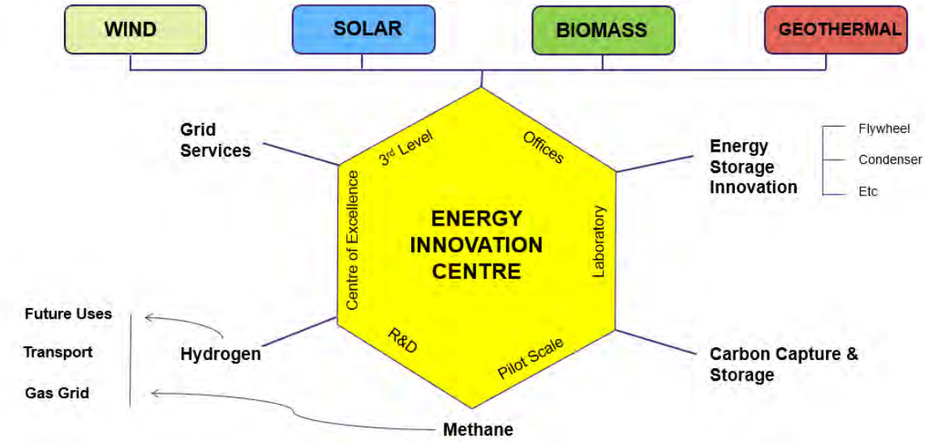

Figure 28: Energy Innovation Centre Concept

Because innovative and modern energy systems are planning to locate at Rhode, there is potential to create an energy focussed 'technology hub' at Rhode, where research and development work into future energy systems – for example energy storage, carbon capture, hydrogen - could be carried out. Such an approach would need a strong technical presence– e.g. a university or energy institute – as a key partner. The area of energy systems integration is one where Ireland is a leader, with potential to develop further.

Advantages: Would be central to energy transition and stimulate high tech activity. Potential to expand and develop in several directions.

Challenges: Attracting energy R&D activity away from existing locations. Linking job opportunities to local population.

9.4 Eco-Park – Industrial Symbiosis

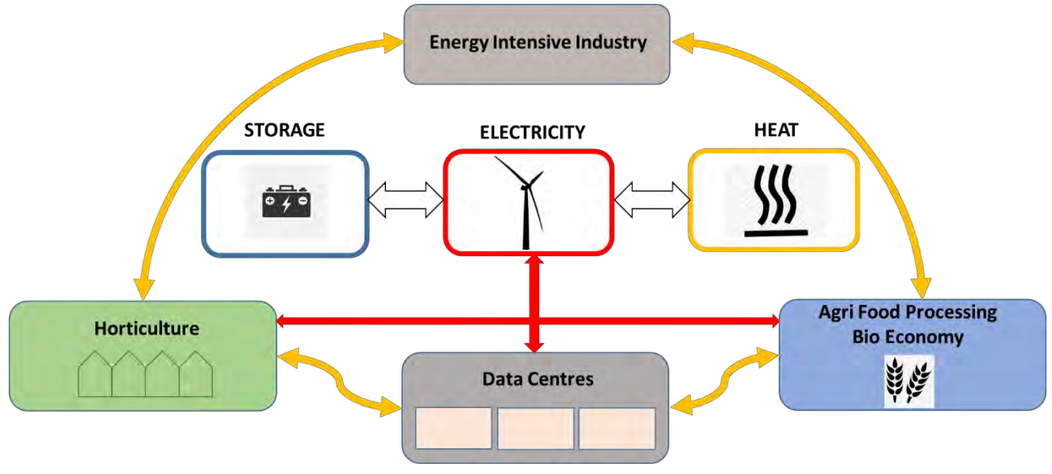

Figure 29: Eco-Industrial Energy Park Concept

This model is built around new industries / employers who would locate at Rhode owing to the availability of green energy – e.g. electricity, heat - and the benefit of combining resources with other companies located nearby. The by-products of one company can become the raw materials of another, following a 'circular economy' model. There are examples of this 'clustering' at locations across Europe.

Advantages: Employment potential is high and inclusive. Industries achieve high levels of sustainability.

Challenges: It takes time to attract companies and establish the co-operation.

10 FUNDING OPPORTUNITIES

A combination of public and private investment will be needed to bring the opportunities identified to fruition.

In the longer term, development of energy infrastructure and industrial enterprise will rely mainly on private finance to develop economically viable assets. Already privately financed energy proposals are emerging at Rhode, albeit focussed on individual projects as opposed to a regional energy park concept.

To bring the opportunity forward and develop it further, Offaly County Council will need to invest in feasibility work to create the right physical and policy conditions to attract investment. Building partnerships in the energy, innovation and education sectors will be necessary.

Funding to assist Offaly County Council can potentially be drawn from a number of sources. We have considered some of the potential funding channels under the following headings:

- National Programmes/ Regional and Local Funding (Table 6)
- EU Programmes and Funding (Table 7)
- Energy Sector (Table 8)
- Community Sector (Table 9)

Harnessing these funding channels with the intent to put Rhode Green Energy Park at the centre will capture core principles for the development of the park as illustrated in Figure 28 below.

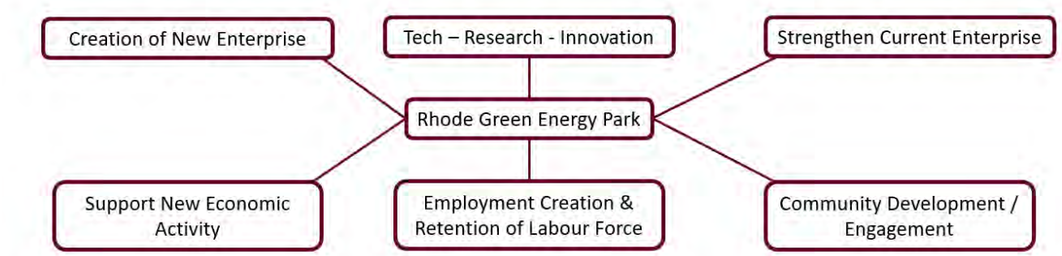

Figure 30: Core Principles behind funding the Rhode Green Energy Park

Table 6: National Programnes /Regional & Local Funding

National Programmes / Regional & Local Funding	
Climate Action Fund - DCCAE	The fund will support initiatives that contribute to the achievement of Ireland's climate and energy targets in a cost effective manner. It offers the potential for innovative interventions which, in the absence of support from the Fund, would not otherwise be developed. The Fund will also seek to facilitate projects that contribute to other Government policy priorities including:- Supporting innovation and capacity building towards the development of climate change solutions capable of being scaled and delivering benefits beyond a once-off impact Generating wider socio-economic benefits such as job creation, air quality improvements, reduction in fuel poverty, bio-diversity and community resilience and development The Department of Communications, Climate Action and Environment has responsibility for implementing the fund, which will have an allocation of at least €500million over the period to 2027.
Disruptive Technologies Innovation Fund - Department of Business, Enterprise and Innovation	Funding collaborations that demonstrate technology-based disruptive innovation, collaborations that can: - Alter markets; - Alter the way business operates; - Involve new products or the emergence of new business models. Note that enterprises can claim up to 50% of their eligible costs. Research Performing Organisations (RPOs) can claim up to 100% of eligible costs. RPOs cannot receive more than 50% of the total DTIF funding in any collaboration
SEED & venture Capital Scheme – Enterprise Ireland	2019-2024 The overall vision of the Seed & Venture Capital Scheme (2019-2024) is; To increase the availability of risk capital for start-ups to support economic growth through the continued development of the Seed and Venture Capital industry in Ireland to achieve a more robust, commercially viable and sustainable sector. To realise this vision, the objectives include: To encourage and leverage private sector investment into sectors (and stages of development) that find it difficult to secure appropriate funding.; To leverage domestic and international private sector/institutional capital into investment in Ireland; To support the growth strategies of Enterprise Ireland's sectors with capital and expertise; To maximise the 'additionality' that any commitment will bring to the overall sector in terms of both additional capital and expertise in company development; To seek innovative funding solutions that reflect current international best practice.
Rural Regeneration & development Fund – Irish Government	The Fund seeks to provide investment to support rural renewal, strengthen and build resilience in rural communities and assist in the regeneration of towns and villages with a population of less than 10,000, and outlying areas. Fund - €148million (so far) - can assist in achieving sustainable community and economic development in rural Ireland; the revitalisation and regeneration of towns and villages; the encouragement of entrepreneurship and innovation; the development of key economic growth sectors such as the bio-economy and agri-food; assist other sectors, such as tourism. Fund will only support investments of scale which would not otherwise be delivered without the additionality provided by the Fund.
North Offaly Development Fund	This fund was created by the ESB following the closure of the Rhode power station in 2004, as a form of local community support. The main investment was in creating the Rhode Business Park. Remaining money in the fund will be available to support physical completion of the park and support this current initiative.
Science Foundation Ireland	SFI supports research and innovation across technical and scientific disciplines, mainly through university programmes, but with an emphasis on collaborative approach engaging academic and private companies. Partnership with third level institutes would open opportunities for funding through this body.

Table 7: EU Programs & Funding

EU Programs & Funding	
EU 'Coal Regions in Transition Programme' - EU level/ Irish Government/ MRTT	Recognising the challenge faced by regions switching from coal (or peat) reliance in the energy sector, the EU is establishing mechanisms to support the communities and workers most affected. The Midlands region of Ireland is included in this programme. There will be financial support (including an EU Just Transition Fund) and technical assistance available to affected member states. Exactly how the support will work, and the extent that it will apply to the Rhode project is not yet clear. However, the objective of creating new enterprise and employment relating to the energy transition, centred in an area of former power generation, matches the aims of the programme at EU level.
START (Secretariat Technical Assistance to Regions in Transition) European Commission DG Energy/ Irish Government/ MRTT	START is funding the Midlands Regional Transition Team (MRTT) which is co-ordinating the national response to the energy transition, specifically the closure of pear-fired power stations. This technical assistance should be beneficial to projects such as Rhode, albeit unlikely to be a direct financial support in itself.
EU Life	The EU LIFE Programme provides funding opportunities for the support of Environment, Nature Conservation and Climate Action projects throughout the EU. Applications are encouraged from public and private organisations seeking co-funding for projects. Large and small companies, government and non-government organisations (NGOs, Higher Education Institutes and community groups) can participate. The maximum EU co-financing rates for projects are 55, 60 or 75%, depending on the project topic.
Horizon 2020	Horizon 2020 is the biggest EU Research and Innovation programme ever with nearly €80 billion of funding available over 7 years (2014 to 2020) – in addition to the private investment that this money will attract. It promises more breakthroughs, discoveries and world-firsts by taking great ideas from the lab to the market. Funding is available in the following "areas" of particular relevance to the Green Energy Park; Bio-Based Industries, Biotechnology, Energy Environment & Climate Action , Innovation, Funding Researchers , ICT Research & Innovation EU Funding & Tenders site will issue "Calls" for funding applications. If Offaly County Council wishes to respond to a call that aligns with Rhode Green Energy Park goals and targets, a proposal must be submitted before the relevant deadline.

Table 8: Energy Sector Funding

Energy Sector	
GNI Innovation Fund - €4.17million that may be spent over a 5 year period (2017 to 2022)	The Innovation Fund is open to public/private organisations and also entities that carry out research. Examples of research entities include third level institutions and state funded research bodies. The fund has supported energy feasibility studies, projects piloting new technologies, process optimisation projects, demonstration projects and academic research.
EEOS - SEAI	S.I. 131 of 2014.1 and amended by S.I. 634 of 2016, "Energy suppliers are designated as Obligated Parties based on the volume of their final annual energy sales across all fuels, including gas, electricity, oil and solid fuel (*i.e.* greater than 600GWh of energy per annum). Some Obligated Parties are not gas and/or electricity suppliers. Similarly, some energy suppliers are not Obligated Parties." "Obligated Parties achieve their targets by supporting **businesses**, public sector bodies and homeowners to improve the energy efficiency of their organisations, operations and properties. The energy saved through these energy efficiency improvement measures ("Measures") can be counted towards their targets. Obligated Parties notify SEAI of Measures they have supported and SEAI records their progress."

Table 9: Community Funding

Community Sector	
Yellow River Wind Farm Community Gain – SSE Airtricity	A community gain contribution from the operational wind farm towards the local community is expected once the project is completed and energy starts to flow. The amount and nature of the fund is not yet known and may depend on rules for of government renewable energy support schemes (RESS). Potential for this ongoing community dividend to support the Green Energy Park
SEAI – Better Energy Communities	The BEC scheme supports new approaches to achieving energy efficiency in Irish communities. Upgrades can take place across building types to reduce energy use and costs in a community. The goal of the scheme is to see energy savings for homeowners, communities, and private sector organisations. A project seeking the grant ought to be community oriented with a cross-sectoral approach and must prove to be sustainably financed. The scheme promotes "partnerships" between sectors which aligns to principles described in section 7. This can include public and private sectors, residential and non-residential sectors, commercial and not-for-profit organisations, or financing entities and energy suppliers. Measures the scheme aims to promote are; Building Fabric Upgrades - Technology and System upgrades - Integration of Control Systems - Integration of renewable energy sources - Domestic Combined Fabric Upgrade A project coordinator from the SEAI must be engaged and a completed application submission is to be provided to the SEAI subject to funding being awarded.

Table 10: Private Funding

Private Investment	
Data Centres	2006-2016 €3 Billion was invested in constructing Data Centres in Ireland – "France Ireland Chamber of Commerce" Until withdrawn, investment required for proposed Apple Data Centre in Athenry was expected to be in the region of €850million Data Centre Related investment is projected to reach €9 billion by 2021
Energy Companies	As well as continued investment in renewables (wind, solar, biomass) the decarbonisation programme of the Climate Action Plan will see major private investment in energy storage, conversion and management systems. New operation and maintenance services industries will also be required.

11 COMMUNITY INTEGRATION

11.1 Just Transition Goals

The Just Transition in the Midlands is focussed on assisting individuals and communities directly affected by the move away from peat exploitation. The interlinking themes of the Just Transition include training/upskilling, enterprise creation, and assisting communities to transition to a low-carbon society. A parallel goal is the creation of viable long term employment opportunities to enable economic regeneration. These goals are connected strongly in EU and national policy to the opportunity provided by green energy and the low carbon transition.

The Green Energy Park creates an opportunity to respond to the Just Transition on a number of levels:

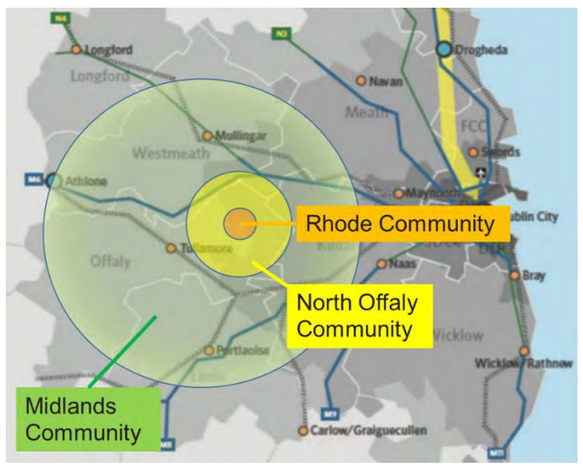

Figure 31: Rhode Community

Rhode Community – directly affected by closure of the power station and ending of peat harvesting on the nearby BNM bogs (Derrygreenagh).

North Offaly Community – wider dependence in the area on peat harvesting, electricity generation, and ancillary business (peat briquettes, horticultural peat, engineering, maintenance).

Midlands Community – an ambition to create a stronger enterprise and employment base, reducing daily exodus for employment, and to forge a stronger regional identity.

11.2 Connecting the Green Energy Park with the community

The following aspect need to be included in the development of the concept:

Strong Identity – by creating an identity that addresses all three community tiers, the project can win support and become a beacon for the energy transition in the Midlands. The concept of an **Energy Crossroads** has resonance on a number of levels:

- We are turning away from traditional energy methods, towards modern low-carbon solutions
- Rhode lies at a strategic location geographically, in the centre of the country, but close to the M6 motorway and the Greater Dublin Area
- The potential to combine various forms of renewable energy, storage and conversion at this location is strong – a technology cross-roads for energy integration

11.2.1 Local Community Engagement

Goal – the development of a local energy community initiative centred on Rhode and its immediate hinterland.

Investing resources at this early stage on community energy engagement is recommended. This will enable a better understanding and sense of local ownership of the Energy Park, improve chances of people upskilling to avail of employment opportunities and engage positively with the Just Transition.

A number of energy communities have developed across Ireland, many with the support of the SEAI Better Energy Community programme. BEC programme supports new approaches to achieving high quality improvements in energy efficiency within Irish communities. Projects typically involve physical improvements to residential and community buildings. A partnership approach is encouraged. (see Chapter 15 Funding Opportunities)

Many local communities also engage with third-level colleges and local authorities. This strand of energy engagement takes time. Finding motivated local leaders within the local community is a good starting point. Offaly County Council can help initiate and support this programme.

Connecting with the North Offaly Community

One way to develop momentum for the project, and widen local awareness and support, is to develop a partnership approach with other initiatives across North Offaly, such as the development of technology, business and innovation in the town of Edenderry. By connecting with existing agencies and networks, the opportunities emerging in Rhode can be shared across the wider area.

E-Hive Edenderry

Offaly Local Enterprise Office (LEO)

North Offaly Community Development Network

11.3 Engagement with the Wider Midlands Region

The development of a green energy park has the potential to energise the transition to clean energy in the Midlands. Employment opportunities will be available to the wider region, given the good connectivity of Rhode. Offaly County Council can make the project relevant and positive for the wider region.

Working alongside the Midlands Regional Transition Team (MRTT) – The MRTT is developing a holistic plan that will inform the Just Transition programme across the region. This project can be developed to align with the plan. Working with the MRTT can also open communications with other Just Transition projects across the region, and develop international links with other regions across the EU that responding to similar challenges.

11.3.1 Engaging with regional educational/ training initiatives

Engaging with educational institutions at various levels can increase regional participation. An example being IT Sligo launching, in collaboration with data centre industry partners such as Google, a degree programme in data centre facilities engineering, aimed at servicing the growing and highly specialised data centre sector with skilled graduates – the first of its kind in Europe. This is indicative of what could potentially be achieved within the environment of a green energy park at Rhode. The shared focus of the data centre, neighbouring energy producers and researchers could be on innovation in the area of sustainable energy management. Establishing links with Athlone IT or NUI Maynooth would be a way to create regional involvement.

11.3.2 Engaging with enterprises and employers

Collaboration with larger employers in the region –for example Bord na Móna, ESB, or employers in the agri-food sector can stimulate interest in the opportunity for clean energy and circular economy in Rhode. This can influence thinking on new investments, sharing of resources (inputs and outputs to industrial processes) and knowledge sharing between companies in different market sectors.

Next Steps:

1. Develop a clear identity for the project: Rhode Green Energy Park – Becomes Energy X Roads Project
2. Initiate a community engagement project centred on Rhode but encompassing the wider local population of North Offaly.
3. Develop a communication and engagement programme to develop awareness of the project and develop opportunities for collaboration with stakeholders across the Midlands Region

12 STRATEGIC DIRECTION

12.1 Overview

The opportunity assessment has helped identify and underline the key advantages of Rhode as a location for a Green Energy Park, as summarised in Figure below:

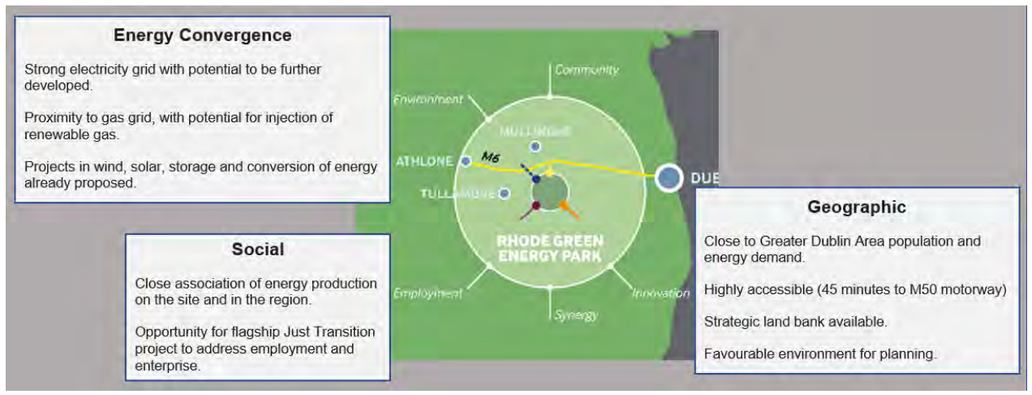

Figure 32: Key Characteristics of Rhode

The following three strategic opportunities are emerging as the most promising ways to develop the opportunity further.

1. Strand 1: Energy decarbonisation/ innovation hub built around renewable energy, hydrogen and electricity system integration.
2. Strand 2: Eco-Industrial Park model whereby large-scale energy intensive employment – for example data centres, agri-food, horticulture, bio-economy – develops around the electricity and heat resources available.
3. Strand 3: Educational/ Innovation/ Centre of Learning for renewables and electricity grid: to improve awareness within the community of how the energy transition is happening.

In all of these concepts, the Rhode Green Energy Park concept is seen as a regional or national scale initiative, rather than simply a local one. The concepts above are options that are complimentary and can be advanced at the same time. Strand 1 and Strand 3 are closely related. Strand 1 and Strand 2 are also complimentary.

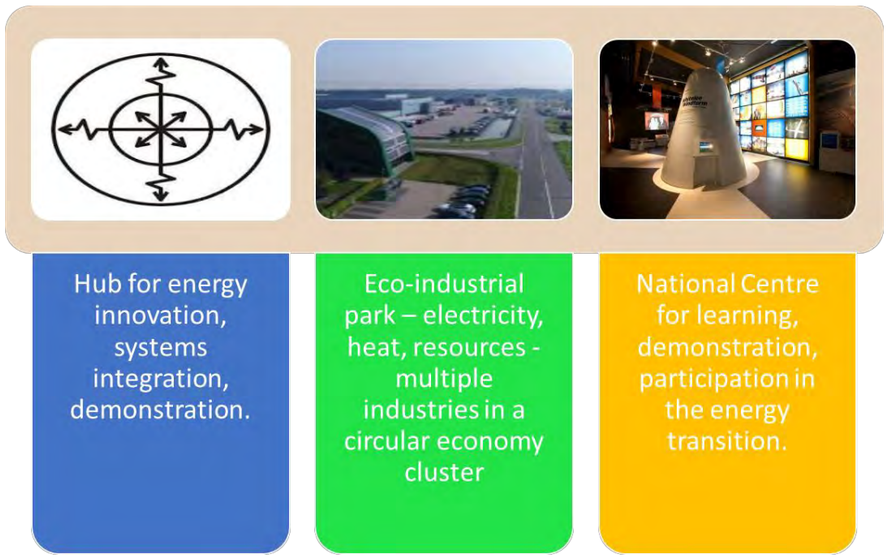

Figure 33: Strategic Opportunities

12.2 Opportunity Strand 1

Energy decarbonisation/ innovation hub built around renewable energy, hydrogen and electricity system integration.

Vision	Energy installations centred on the Rhode Business Park, whereby renewable energy is generated, converted, stored and fed into the national electricity and gas grids. The gas grid is fed by green hydrogen produced from wind and solar energy that is excess to grid requirements, and from syngas made from biomass. Battery installations and innovative grid services technologies connect to the grid through Derryiron substation. Smaller companies engaged in energy services and innovation are attracted to the hub in a clustering effect.
Lead	Energy Company Partnerships
Partner	Offaly County Council.
Collaboration	Third level research / R&D sector. E.g. ESIPP. State sector: CRU, Eirgrid, SEAI
Funding	The concept would align well with Just Transition support (EU and Irish level) and climate action funding in Ireland. Feasibility studies could draw on technology/ innovation funding at EU and national level. Pilot and demonstration scale projects would require support. Ultimately, commercial energy sector investment would be the main source of investment funding for major installations.
Next Step	Explore the concept further with energy companies. Advance the gas grid connection. Feasibility study with a focus on energy conversion (hydrogen, methane).
Time frame	Short – Medium Term

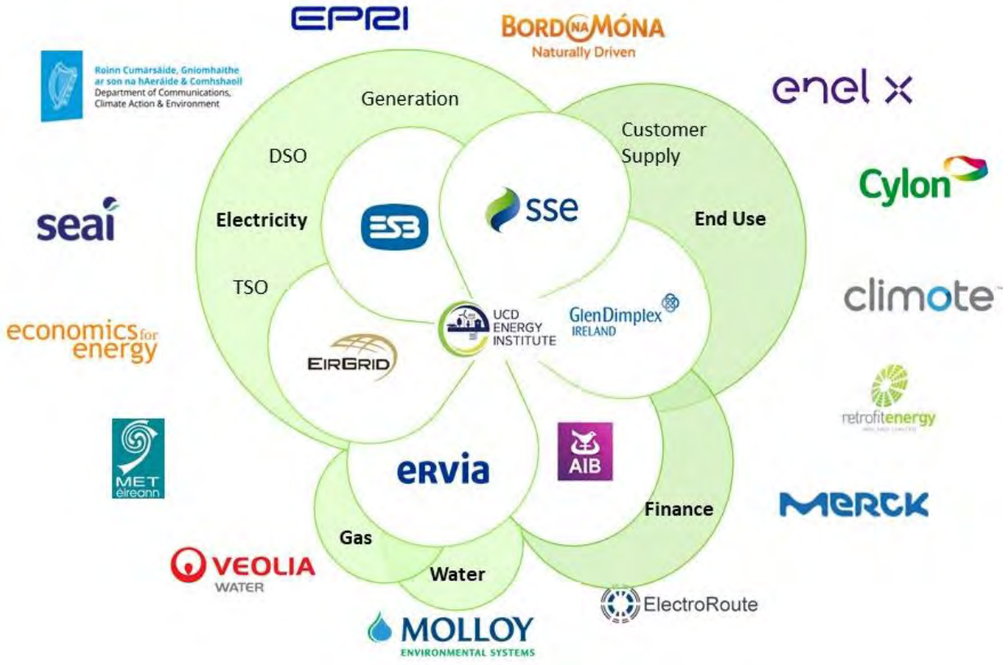

Figure 34: The Energy Systems Integration Partnership Programme (ESIPP)

12.3 Opportunity Strand 2

Eco-Industrial Park model attracting large scale energy intensive employment.

Vision	A number of large scale industrial companies develop operations around the Rhode Green Energy Park node, based on its strategic advantages. The companies create networks and collaboration in relation to energy and resources, in a circular economy model. Physical networks convey electricity and heat around the park and between companies. A range of employment opportunities is created. Synergy with the agricultural hinterland – e.g. growing of food, energy crops – is created. A governance model is created enabling companies to work together to continuously innovate and diversify, expanding the range of employers present. As major energy users and producers of recoverable heat, Data Centres can form an early part of this concept, acting as an 'anchor tenant'.
Lead	Offaly County Council (Concept and leadership). Private companies.
Partners	Data centres, Agri-food, Horticulture, Bio-economy companies
Collaboration	Strategic Landowners, Energy companies,
Funding	Developing the concept, identity and governance framework can be advanced by Offaly County Council with assistance from EU level and national funding. In addition to responding to the Just Transition, the circular economy concept can attract funding from EU, EPA, etc. Ultimately, commercial investment would be the main source of investment funding for major installations.
Next Step	Dark Fibre connection feasibility study. Develop Eco-Park concept and governance. Data Centre feasibility/ market sounding. Further research into agri-food and bio-economy potential.
Time frame	Short term: Data Centres. Medium – Long Term for other sectors.

Figure 35: Datacentre at Clonee County Meath (www.facebook.com)

12.4 Opportunity Strand 3

Educational/ Innovation/ Centre of Learning for renewables and electricity grid: the energy transition.

Vision	A national level centre of learning and innovation for electricity grid integration in the de-carbonised world. Built around a landmark visitor/ learning centre within the existing Rhode Business Park. This would be the nucleus for a campus-style cluster of enterprises working in energy innovation, learning and innovation. A busy, year round centre of employment. The theme of recreation and amenity is strong. This could become an international destination, building on Ireland's leading role in renewable energy integration.
Lead	Offaly County Council and Key Partner(s)
Potential Partners	State Agency such as Eirgrid, ESB, SEAI and Government departments. Energy companies, MRTT
Collaboration	Science/ Learning/ Education sector specialists.
Funding	To advance feasibility assessment, the concept would align well with Just Transition support (EU and Irish level) and climate action funding in Ireland. A joint-venture approach between Offaly County Council and a Key Partner would seem appropriate. Feasibility work can identify other funding avenues and partnerships.
Next Step	Develop key partnerships, and carry out joint concept development and feasibility work.
Time frame	Short – Medium Term

Figure 36: The Oil and Gas Innovation Centre, Scotland

13 NEXT STEPS

This report has highlighted the potential for creation of a Green Energy Park at Rhode. The project can form a focal point for the Just Transition in relation to energy system de-carbonisation for the Midlands region. It has potential to be a national centre of leadership and excellence, around integration of renewable energy into electricity and gas networks. Offaly County Council can create the conditions to attract suitable investment to the location. The following are the actions we recommend in fulfilling this potential.

13.1 Project Development

Identity

Develop a clear identity for the project: Rhode Green Energy Park – Becomes Energy Crossroads (Or Energy X Rhodes) Project. As well as being at a cross roads geographically and in relation to use of fossil fuels and peat, Rhode can be a technology cross-roads for energy integration.

Alignment with Just Transition Goals at National and EU level.

Continue to work closely with the Midlands Regional Transition Team and the Department of Communications Climate Change and Environment to advance the project in alignment with the Just Transition programme, with a particular focus on employment and enterprise in the energy transition and decarbonisation of electricity and gar networks. The project should also align with the EU Just Transition programme, which will open wider opportunities for funding and investment. Partnership with other communities across the EU facing the same challenge as the Midlands would be beneficial.

Project Management

In order to build momentum, create the necessary partnerships and advance individual recommendations in this report, Offaly County Council will need to commit resources to the project. Ideally the Just Transition fund will support the implementation. Programme management will be required to manage communications, community engagement, stakeholder engagement, feasibility studies and physical enhancements at the site. Edenderry is the natural point from which to co-ordinate activities and build momentum.

13.2 Engagement

Community Engagement

Initiate a community engagement project centred on Rhode but encompassing the wider local population of North Offaly.

Develop a communication and engagement programme to improve awareness of the project and develop opportunities for collaboration with stakeholders across the Midlands Region.

Engage further with existing stakeholders.

Yellow River Windfarm – Flywheel Storage – Derryiron Peaking Plant – Cronin Solar Farm - Biomass Gasification Plant - Derryiron 110 kV station are all currently in place, have planning permission approved or have submitted planning applications. Offaly County Council should look to engage with these enterprises and present them with an opportunity to integrate into the area, through involvement in the proposed park.

Create partnerships with University/ Third level institutes

Offaly County Council should build on contacts already made with the academic sector and establish partnership arrangements. Partnership with energy research, development and demonstration bodies will be essential to attract interest, tap into national and EU funding opportunities, and forge alliances with energy sector companies. Rhode can become a location for new energy technologies to be tested and assessed in operational conditions (the Schwungrad fly-wheel storage project being an example of what can be achieved). Researchers can also assist with social integration and community engagement.

Create Partnerships in the Energy Sector

In addition to the energy companies already involved in the area, Offaly County Council should forge further links with companies, umbrella bodies and state agencies in the energy sector. This will build momentum for the project, bring a commercial focus, and attract investment in emerging technologies. Opportunities exist in relation to energy systems integration, hydrogen, operations and maintenance as well as other areas.

13.3 Planning

Planning Policy

Provide further input to the completion of the County Development Plan (2021-2027), to guide future development of the Green Energy Park.

Assess planning applications in the area against the Guiding Principles set out in this report.

Develop design guidance for the future physical development of the park in a coherent and sustainable manner.

- Interconnections/ services corridor, and future connections to adjoining land.
- Sustainability Plan, including community and biodiversity aspects.
- Building design and landscaping guide.

Governance

Develop a governance model for future park operation that engages with occupants, the community and enables collaboration to develop.

13.4 Infrastructure

Physical Improvements at the site

Upgrade the physical environment within the park by investment in road surfacing, landscaping and signage.

Wastewater/ Water Capacity

Develop options for increasing treatment capacity at existing Rhode WWTP with Irish Water. Confirm water supply availability.

Road Connectivity

Upgrading the regional road R400 between the M6 and Rhode is planned and will assist the project. The upgrade works (and potentially the Yellow River Wind farm project) may present opportunities for extending gas and fibre networks toward the proposed Green Energy Park.

Fibre/ Telecommunications Connectivity

Further feasibility work - including consultation with owners and operators of adjacent networks to assess potential upgrade options - is necessary to enable higher bandwidth speeds. Hyperscale data centres necessitate speeds of TB/s in magnitude and this demand will increase in the future with scaling up of the Internet of Things.

Electricity Connectivity – Eirgrid

Engage further with Eirgrid on grid capacity at Derryiron: explore current and future grid capacity with Eirgrid the transmission system operator. This can be pursued by means of a specific project-related query. A high level engagement around grid capacity and expansion potential in relation to the overall Green Energy Park concept would also be beneficial.

Gas Connectivity

A connection between the gas grid and Rhode would open a number of opportunities for existing and proposed companies in the Park, and could make investment in hydrogen technology and biomethane very attractive at this location. This potential should be pursued in association with Gas Networks Ireland. A feasibility assessment application to the gas innovation fund could unlock this potential.

13.5 Targeting a Data Centre

To develop the potential for a data centre choosing to locate within the vicinity of Green Energy Park, the following areas should be further explored:

- More detailed information is required on the specific requirements of a data centre in terms of high capacity data fibre, power and back-up power. A targeted review of data connectivity would be valuable in confirming feasibility. Specialist telecoms technical input will be required.
- Engagement with the IDA and 'Host in Ireland' should take place in relation to the critical features of a location that will attract data centres.
- Landowner liaison – large scale data centres will need a footprint outside the park, meaning strategic landbanks in the vicinity of the site will be important.

13.6 Developing an Eco-Industrial Park Concept

A long-term goal should be to develop an eco-industrial park concept. This will build on the clean renewable energy sources available and combine with a 'circular economy' approach to sharing of resources and collaboration between future tenants.

Developing the Park: Offaly County Council must look at the possible resource streams which arise from the existing / planning approved / planned energy facilities located adjacent to the park, which could prove to be desirable resources within the completed business park.

- Short Term: Establishing an anchor tenant in the park which possesses a synergy with one or more of the Energy technology(s) operating in the area is a key step in establishing resource flow into the park. Offaly County Council can look to engage the existing energy technology companies with the anchor tenant, establish a relationship founded in the principles of "Industrial Symbiosis" and look to instil a culture of Inter-Firm Cooperation.
- Medium Term: Having in place an anchor tenant with established links to the energy technologies surrounding it, can be a bedrock to allow the park to develop around it. This tenant will itself, produce waste streams which would be considered a valuable resource by compatible industries. It is important to assess what these industries might be and target them as medium-term tenants in the park and through the planning process attempt to cluster these industries to facilitate the flow of waste streams / resources. At this stage, Offaly County Council can look to build on the relationships and culture established between the anchor tenant and surrounding enterprises.
- Long Term: With the park established, and a culture and formal governance structure ensuring a sustainable eco / low carbon type park in place, the park can now grow, further attracting industries that see value in the philosophy of the park and see compatibility with established industries in the park.

Offaly County Council can also look externally to the park at existing industry in the area and look for opportunities for waste streams from the park to be utilised as resources to these surrounding industries (and vice versa) and look to put in place infrastructure to facilitate the transfer of these resources.

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Appendix A
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DRAWINGS

Legend

- 14137 Flywheel Energy Storage Plant
- 14208 Derryiron Substation
- 16246 Solar Farm Clonin
- 19161 Battery Storage Facility
- 20210 Biomass Gasification Plant
- PA0032 Yellow River Wind Farm
- 20238 Energy Storage Facility*
- SSE Peaking Power Plant
- Rhode Green Energy Park

Data Source:
National Planning Applications Database
Department of Housing Planning and Local Government (DHPLG)

*indicative boundary

N

0 50 100 200
Meters

Client

Offaly County Council

OCC Green Energy Park

Title

Rhode Green Energy Park & Surrounding Area

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Issue Details

File Identifier:
MDE1222-RPS-00-XX-DR-Z-AG0006

Status:	Rev:	Model File Identifier:
S0	P03	MDE1222-RPS-00-N2-M3-D-XM0102 to MDE1222-RPS-00-N2-M3-D-XM0109
Drawn: SK		Date: 15/07/2020
Checked: HM		Scale: 1:5,000 (A4)
Approved: CB		Projection: ITM

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HP Gas Pipeline

M6

Proposed Derrygreenagh Power Plant

Yellow River Wind Farm

Srah Solar Farm

Bord na Móna Lands

Energy Proposals Surrounding Rhode Green Energy Park

Rhode Green Energy Park

Clonin Solar Farm

Legend

- Proposed Derrygreenagh Power Plant
- Bord na Mona Lands
- Srah Solar Farm
- Clonin Solar Farm
- Yellow River Wind Farm Indicative Boundary
- Energy Proposals Surrounding Rhode Green Energy Park

ESB HV Network

- 110kV Overhead Line
- 220kV Overhead Line
- 400kV Overhead Line

GNI Network

- 70 bar High Pressure Gas Transmission Pipeline

NOTE:
All boundaries shown on this map are indicative

0 0.5 1 2
Kilometers

N W E S

Client

Offaly County Council

OCC Green Energy Park

Title

Rhode Green Energy Park Overview of Developments

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Issue Details

File Identifier:
MDE1222-RPS-00-XX-DR-Z-AG0009

Status:	Rev:	Model File Identifier:
S0	P02	MDE1222-RPS-00-N2-M3-D-XM0102 to MDE1222-RPS-00-N2-M3-D-XM0109

Drawn: SK	**Date:** 09/10/2020
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Legend

- Data Centres Potential Search Area
- 14137 Flywheel Energy Storage Plant
- 14208 Derryiron Substation
- 16246 Solar Farm Clonin
- 19161 Battery Storage Facility
- 20210 Biomass Gasification Plant
- PA0032 Yellow River Wind Farm
- 20238 Energy Storage Facility*
- SSE Peaking Power Plant
- Rhode Green Energy Park

Data Source:
National Planning Applications Database
Department of Housing Planning and Local Government (DHPLG)

*indicative boundary

N

Client

Offaly County Council

OCC Green Energy Park

Title

Rhode Green Energy Park Data Centres Potential Search Area

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Issue Details

File Identifier:
MDE1222-RPS-00-XX-DR-Z-AG0008

Status:	Rev:	Model File Identifier:
S0	P02	MDE1222-RPS-00-N2-M3-D-XM0102 to MDE1222-RPS-00-N2-M3-D-XM0109

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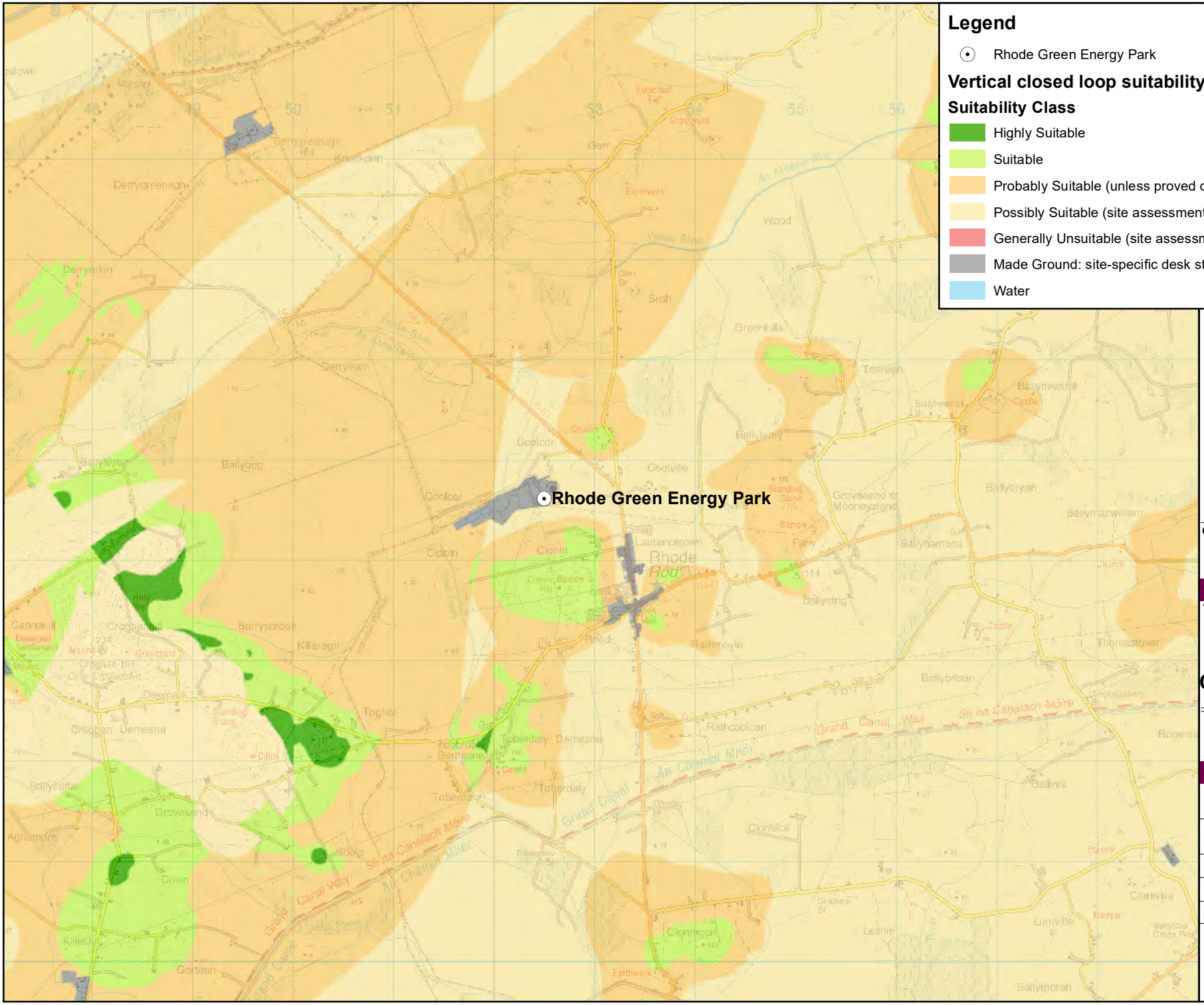

Legend

Rhode Green Energy Park

Vertical closed loop suitability map

Suitability Class

- Highly Suitable
- Suitable
- Probably Suitable (unless proved otherwise/site assessment required)
- Possibly Suitable (site assessment required)
- Generally Unsuitable (site assessment required)
- Made Ground: site-specific desk study required
- Water

Data Source:
Geothermal Map Viewer
https://gis.seai.ie/geothermal/

N

0 0.5 1 2
Kilometers

Client

Offaly County Council

OCC Green Energy Park

Title

Geothermal Mapping GSI Open loop Commerical Suitability

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Issue Details

File Identifier:
MDE1222-RPS-00-XX-DR-Z-AG0002

Status:	Rev:	Model File Identifier:
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Drawn: SK	**Date:** 23/06/2020
Checked: CB	**Scale:** 1:50,000 (A4)
Approved: XX	**Projection:** ITM

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Legend

Landholdings (Preliminary info)

Data Source:
Offaly County Council

N

0 100 200 400
Meters

Client

Offaly County Council

OCC Green Energy Park

Title

Landholdings (Preliminary Info)

Based on publically available records from Land Direct

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Issue Details

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Status: S0	**Rev:** P03	**Model File Identifier:** MDE1222-RPS-00-N2-M3-D-XM0102 to MDE1222-RPS-00-N2-M3-D-XM0109
Drawn: SK/IP		**Date:** 18/11/2020
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Approved: XX		**Projection:** ITM

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