GREBE

Generating Renewable Energy Business Enterprise

Northern Periphery and Arctic Programme

Commercialization of Ready-To-Deploy Renewable Energy Technologies

Professional project development as a strategy for getting to access leverage and manage risk on the path-to-market

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The GREBE Project

What is GREBE?

GREBE (Generating Renewable Energy Business Enterprise) is a €1.77m, 3-year (2015-2018) transnational project to support the renewable energy sector. It is co-funded by the EU's Northern Periphery & Arctic (NPA) Programme. It focuses on the challenges of peripheral and arctic regions as places for doing business, and helps develop renewable energy business opportunities in areas with extreme conditions.

The project partnership includes the eight partners from six countries, Western Development Commission (Ireland), Action Renewables (Northern Ireland), Fermanagh & Omagh District Council (Northern Ireland), Environmental Research Institute (Scotland), LUKE (Finland), Karelia University of Applied Sciences (Finland), Narvik Science Park (Norway) and Innovation Iceland (Iceland).

Why is GREBE happening?

Renewable Energy entrepreneurs working in the NPA area face challenges including a lack of critical mass, dispersed settlements, poor accessibility, vulnerability to climate change effects and limited networking opportunities.

GREBE will equip SMEs and start-ups with the skills and confidence to overcome these challenges and use place based natural assets for RE to best sustainable effect. The renewable energy sector contributes to sustainable regional and rural development and has potential for growth.

What does GREBE do?

GREBE supports renewable energy start-ups and SMEs:

- To grow their business, to provide local jobs, and meet energy demands of local communities.
- By supporting diversification of the technological capacity of SMEs and start-ups so that they can exploit the natural conditions of their locations.
- By providing RE tailored, expert guidance and mentoring to give SMEs and start-ups the knowledge and expertise to grow and expand their businesses.
- By providing a platform for transnational sharing of knowledge to demonstrate the full potential of the RE sector by showcasing innovations on RE technology and strengthening accessibility to expertise and business support available locally and in other NPA regions.
- To connect with other renewable energy businesses to develop new opportunities locally, regionally and transnationally through the Virtual Energy Ideas Hub.
- By conducting research on the processes operating in the sector to improve understanding of the sector's needs and make the case for public policy to support the sector.

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GREBE Northern Periphery and Arctic Programme

Renewable Energy: A business opportunity

Renewable energy projects have developed into an attractive business opportunity for the private sector including entrepreneurs, local companies, contractors, operators, suppliers or other stakeholders. The respective technologies have matured and provide attractive investment-grade opportunities for private investors.

Those who decide to embark on renewable energy as a sponsor or host often do have to start without professional experience as a project developer in this special field. They are confronted with new responsibilities starting from the identification of a business opportunity and continuing through project conception, assessment and commissioning up to the commercial operation of the project.

The fundamentals of project development as they are put down in this paper apply to all kinds of businesses, irrespective of their size and legal form, from large corporations to sole proprietorships, and to all forms of renewable energy.

Project development: How it connects to the GREBE mission

GREBE mission and key activities

The promotion of international technology transfer for pushing renewable energy technologies forward on the path-to-market provides the motivation for the key activities of the GREBE project. One of the key activities of GREBE was the preparation of case studies for the investigation of the market access paths of renewable energy technologies. The case studies provided in-depth information that covers technology descriptions, technology demonstration and deployment related issues such as demonstrations and piloting routines, and technical and financial risk assessments. This information provides the background for the business mentoring support of the GREBE project.

The case studies investigated by GREBE inform about local applications of various renewable energy technologies, more precisely, their applicability under conditions that characterize the northern peripheral regions. The technologies reviewed in these cases represent different maturity steps, in other words, readiness-levels. They include both demonstrations in the actual operational environment and systems already proven, and those that are ready to be deployed in larger consumer markets.

Technology push and demand pull

For the needs of GREBE, technology readiness levels were defined by reference to the classification schemes developed and applied by NASA, EIB, and OECD or by the EU Framework Programme for Research and Innovation. These classification systems applied basically reflect the traditional, that is, linear view of innovation as a process comprising a number of stages from basic research to finished product. Thereas this ‘technology-push’ view of innovation stresses the importance of science and engineering as its drivers, according to the so-called demand-pull model it is market demand that gears innovation dynamics. In the case of the deployment of renewable energies with its need to mount capital-intensive technologies, it is the judgement of investors and the financial market about the business opportunities that a technology offers and the financial viability of a renewable energy deployment project, which is essential for driving innovation forward.

Some new aspects of technology deployment

This paper presents some complementary aspects of market deployment, which apply to any technology, but specifically also for renewable energy technologies. One of the main points is the fact, that the understanding and implementation of fundamental principles of project development and financial risk management is crucial for the diffusion of renewable technologies into commercial operation. Another motivation is the view that the implementation of a professional project development and assessment process has to be considered as one of the keys to unlock and mobilize the external resources and expertise that are critical for a technology to successfully proceed on the path-to-market. In practice, technology assessment is embedded in a wider project evaluation framework that accounts also for the operational and organisational aspects as well as the external environment that have an effect on the financial conditions for technology deployment.

Focusing on project development as a collaborative endeavour accounts for the fact, that technologies are deployed in a social context and that innovation in connection to renewable energies has become a multi-organisational and cross-sectoral phenomenon, which is dependent on new forms of inter-organisational and inter-sectoral cooperation. In the case studies, too, this importance of the social context was recognized as market access was investigated under the conditions of different types of partnerships and cooperation relations.

Project approach and proof of concept

The paper adopts a project approach to technology deployment. A project, by a working definition, is described as a local application of a generic technology or a combination of generic technologies for the deployment of renewable energy. In the case of biomass based energy, these technologies also comprise, besides a conversion technology other technologies that are employed in the biofuel supply chain.

As to its further relations to the GREBE project, the paper addresses new aspects of technology deployment that apply to technologies that reside on the higher levels of technology readiness. These levels are well represented by the case studies prepared under the working agenda of the project. As to their financial risk, technologies assigned to these levels of technology readiness are likely to be rated as investment-grade financial commitments. In practice, for investment-grade, that is, ready-for-deployment renewable energy technologies, to get access to the market, readiness must be assessed and confirmed within the scope of a commercial project development process.

Another extension within the scope of GREBE activities and outcomes is related to the pivotal notion of "proof of concept". Here this paper adds a new dimension by defining it as the course of action that relates to the assessment of the financial viability of a project.

Tackling investor risk and finance as barriers on the path to market

Risks and risk sharing

First of all, for a sponsor or host, it is good to realise that the deployment of renewable energy bears considerable financial risks concerning the substantial upfront investments that it requires. A substantial share of the investment is technology and site specific. Decisions about technology, production site and plant layout, once they are made, are irreversible and determine the future expenses of operation, which mostly include fuel, operating and maintenance costs and financing costs.

Also, such a project cannot be mastered alone. The first thing must be to think about how to mobilize external resources and expertise. For this end, a project must create motivation for third-party private equity investors, a professional developer and other key customers and stakeholders to embark on the project.

Attracting private investors

Renewable energy projects, as energy infrastructure projects in general, are highly capital-intensive, highly leveraged and long-term investments. That is why the availability of financing and its terms and conditions play a crucial role for the feasibility and profitability of a project.

Following the maturation of renewable energy technologies, private sources provide the bulk of renewable energy investment. Although public finance can play a key enabling role by covering early-stage project risk, private investors are key for new businesses looking to raise start-up capital. Not only do private investors bring financial help to the entrepreneur, often these investors can provide expertise and contacts that the new business may need. In project development, therefore, it is common practice and recommendable to apply an approach on the basis of a regular, repeatable, documented project development methodology that has its foundation in commercial project development practice.

Risk aversion

As for raising funds, a common obstacle for a renewable energy project to get underway is limited financing opportunities in terms of equity capital and securities available for risk financing and the aversion towards taking loans that allow the lender to take unlimited recourse on any asset owned by the borrower. Risk aversion, as a behavioural trait, is particularly pronounced when small-scale entrepreneurs are involved. Large renewable energy projects are usually financed by a consortium of partners. Sponsors of small projects may comply with equity finance requirements by entering into a joint venture partnership. In general, risks can be mitigated and transferred by limited liability partnerships and contractual arrangement.

Project finance

A special vehicle for tackling financing constraints is the project company. A project company is formed by the project sponsors to limit their liabilities and to separate the ownership, development, management and funding of a project from their other business engagements. A project company is used as the holder of a project's assets, liabilities and legal entitlements and it functions as a contracting party for arrangements concerning the development and implementation of a project.

The concept of a project company is narrowly tied to project finance, which has been used for the financing of infrastructure and industrial projects. Project finance comprises non-recourse or limited recourse financing agreements between a project company and lenders. Most importantly, project finance decouples the project completely from its owners' balance sheets and delimits their financial risk to their equity contribution.

Project finance is often the only way an energy technology company can move their products from early adopters to mainstream customers. To do so, they may have to adopt a new business model, instead of being an equipment supplier by moving into developing and building energy projects.

Small-scale projects

With the deregulation of energy markets and the subsequent emergence of independent power producers, project finance has become essential for the new market entrants, who usually lack the capital-raising abilities of incumbent utilities. A recent trend has been the increasing use of project finance for renewable energy projects such as solar and onshore wind, many of which are smaller in scale.

As to small-scale renewable energy entrepreneurship, third-party project finance provides, mostly importantly, a means to engage in a capital-intensive energy project to groups of individuals that do not have a balance sheet or sufficient personal credit-worthiness. From a lender's view, because an entity does not have their own credit or operating histories, it is necessary to focus on the specific project cash flow, while the creditworthiness of the sponsors or the value of the physical assets becomes less important.

Professional project development

Opting for project finance involves an entirely different credit evaluation or investment decision process to determine the potential risks and rewards of project finance as opposed to the case, where the right to recourse provides access to the sponsoring entity's assets and income stream. In this case lenders have to place a substantial degree of reliance on the performance of the project itself. As a result, they will concern themselves closely with the feasibility of the project and its sensitivity to the impact of potentially adverse factors.

Therefore, lenders must work with engineers and project accountants to determine the technical and economic feasibility of the project. Sponsors and developers must agree on the project development and assessment framework to be applied. A renewable energy project is often assessed on the basis of the competitive procurement practice (RFP) applied, for instance, by a power purchase agreement (PPA) or feed-in-tariff (FIT) provider.

A structured project development process: some key aspects

Creating motivating by making the business case

At the initial stage, that is, prior to kicking off the project development process and before embarking on the specifics of any particular project, it is essential to establish fundamental motivation for a project as an attractive opportunity for investors, hosts, consumers and third parties.

Providing motivation for a professional developer to embark on a project suggested by a sponsor is often essential to get the expertise and the financial resources necessary to start and complete a fully engaged project development process. Participation may be conditioned by a successful nomination for a competitive selection process. A project sponsor, who intends to engage a professional developer must, as a first step, present a convincing conceptual layout of the project. To this end, the project should be submitted to a well-structured development and evaluation process, which qualifies by professional commercial standards.

Motivation for a project is created by establishing its business case. The business case captures the reasoning, justification or business logic of the project. The logic of the business case is that, whenever resources such as money or effort are consumed, they should be in support of a specific business need. The information to be included in a formal business case should comprise a description of the basic needs the project serves, the its technical and economic fundamentals and the key factors for the project's success. The description may range from comprehensive and highly structured to informal and brief in length.

A renewable energy project, though it may be collectively owned, a sponsor, having a strategic interest, is always the owner of the project and the one who makes the business case for a renewable energy project.

Project life and risk profile

De-risking a project, that is, risk identification and subsequent risk reduction or transfer, must be a major concern of project development. For a project or project proposal to be considered for commercial investment-grade funding, risk must be addressed by a suitable risk management process within the scope of a project development framework.

For a description of a risk profile, the project life can be divided into three main stages that are: project development, project commissioning, and construction and project operation. The uncertainty concerning the feasibility and financial attractiveness of a project is highest in the early stage of the development process. Each financial commitment to the project development process, which basically has to be made to eliminate unknowns and to assure that the project is feasible, incrementally builds up the project's financial risk in terms of the amount of capital at stake until all the financing decisions necessary for project implementation are made (**Figure 1**).

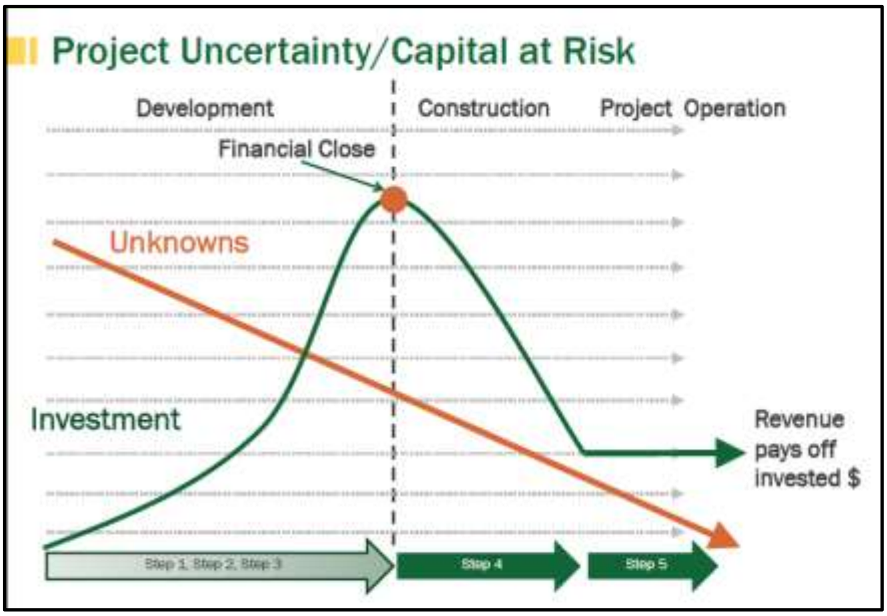

Figure 1. Project risk profile. Source: Framework for Project Development (U.S. Department of Energy).

First of all, because the risk of loss is accumulative, project development as a process, must assure that a fatal flaw that renders a project non-feasible, gets identified as early as possible. A fatal flaw is a shortcoming in regard to a threshold condition rendering a project either infeasible or economically non-viable. Project development risk may materialise as a fatal flaw as late as an application fails to be considered for funding or to get awarded with a contract as the outcome of a procurement process. Besides to eliminate the risk of fatal flaw as early as possible, there is a strong case for an interactive approach to allocating incremental investments for additional data collection and analysis in areas identified as the location of key financial risks.

Additional information may lead to modifications in the conceptual project design. The impact of these changes on project attractiveness should be assessed and reported using standard financial metrics such as a project proforma profit and loss statement and a project balance sheet.

In contrast to project development, where the financial commitments that are exposed to the risk of loss are gradually increasing, financial investment in the project finance phase is made in full or committed at the point of financial close. After all the risks are accounted for, the risk of loss of the financial investments made in the project finance stage is reduced to the risk of project completion due to delay, rework and over budget spending during the project construction process. To control this risk professional project management must take care for the project construction works to be well organised and carried through.

Financial and ownership structure and the risk of loss

Already prior to project implementation and commissioning a fully engaged renewable energy project development process is highly investment intensive as expenditures and the risk of loss accumulating over an extended time period. Project development usually relies on third party risk capital investments from project developers. Also public finance available to cover early stage project risk may play a key role.

Project development is completed with financial close. Financial close occurs when all financing agreements have been signed and all the conditions contained in them have been met. It enables actual project finance to be transferred so that the acquisition of physical assets and the commissioning of construction works can actually start. At this stage, all risks are well identified, mitigated or transferred to project participants or contracting parties. Risk transfer instruments available for renewable energy project owners include long-term offtake purchase agreements, the terms of energy sales, feedstock supply, power plant operating and maintenance contracts, insurance products and alternative risk transfer Instruments.

Prior to financial close the investments necessary to move project development forward, must be exclusively financed by the sponsors' project development equity capital or by risk capital providers (**Figure 2**). After financial close the financial agreements with equity investors and lenders or tax investors are put into practice. The project finance structure changes as far as lenders embark on the project providing debt capital as an additional source of funding necessary for project commissioning to start. The change in the financing structure of the project following financial close may coincide with a change in project ownership and the participation of third parties such as a PPA provider or technology supplier. In the case of project finance, project ownership is transferred to a project company. A developer may be the project owner until it finally sells the developed project to an investor either before or after construction.

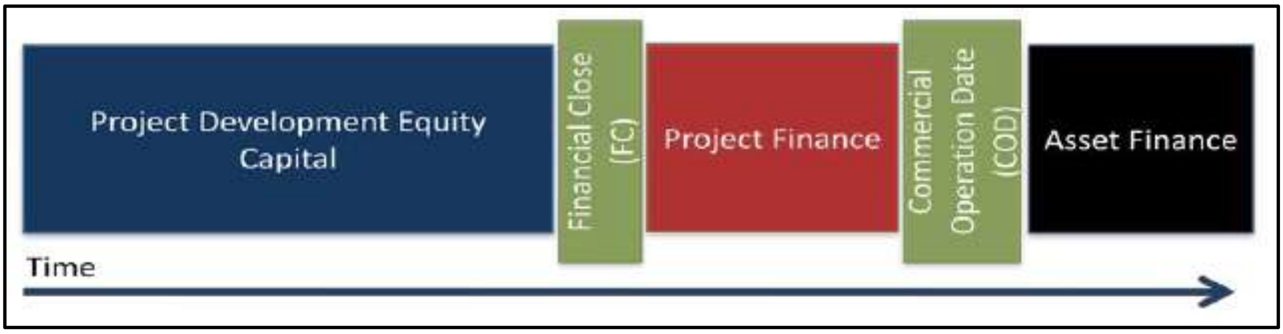

Figure 2. Stages of project lifetime and related change in its capital structure. Source: Springer, R. (2013).

Asset financing refers to the use of a company's balance sheet assets, including short-term investments, inventory and accounts receivable, to borrow money or get a loan. Debts are backed or secured by the cash flow generated by the project's operations and the resale value of its assets.

Project planning closure

Project planning is completed when all issues related to the construction, ownership, financing and operation of the project have been settled and all the respective contractual agreements have been signed. These agreements regulate the relationship between project company and the project sponsors or their affiliates as well as other unrelated companies. They concern services or immaterial property rights (IPR's) and may include an Operation and Maintenance Agreement (O&M), an Administrative Services Agreement (ASA), and a Technology License Agreement (TLA).

There are many other project agreements that are typically executed during the course of the project development process. The project agreements may include one or more offtake agreements; an engineering, procurement, and construction agreement (EPC); a site lease agreement; a renewable energy credit agreement; an interconnection agreement - for projects feeding into the electricity grid or a DH network; agreements for the provision of utility services; agreements for the provision of feedstock commodities - in the case of biofuels; and the price and supply hedging contracts. Furthermore, agreements including equity flip structures or other arrangements to assure taxation benefits.

Third-party inspections for project conformity

To gain the benefit of third-party investment, a project must give reliable evidence for the soundness of the project. Independent third party inspections are essential for projects, where differing stakeholders, such as banks and investors, require project quality assurance when it comes to their investment. Project certification comprises a range of specific technical reviews, a site-specific environmental assessment, technical design certification, installation surveillance and commissioning witnessing.

An environmental expert assessment of the project ensures that the project is able to take full advantage from renewable energy policy incentives, offering a range of benefits from renewable energy credits (RECs) to tax credits and grants. This is a key consideration for private developers and tax investors in deciding about funding a renewable energy project.

For leading investors, whether financial or strategic, it has become common practice to conduct commercial due diligence to increase confidence in financial project appraisals. In a commercial due diligence investigation, market projections and underlying uncertainties are addressed and compared with the expectations and projections made for the project. A financial analysis provides projections for the net earnings of the project and informs a potential investor about its earning potential.

Examples of risks and means to manage risks in renewable energy projects

Project implementation and operation

Project management, in a narrow sense, is concerned with delivering the project according to a predefined project plan. Project management includes managing the risks that accrue after project development but prior to project completion and project commissioning. The financial risks prior to project completion, for which risk prevention measures should be duly considered, comprise the risk of additional costs of rework and penalty payments for production start-up delay. These risks may be mitigated by negotiating contractual terms that allow risk transfer to technology vendors and works contractors. A contingent capital structure is a precautionary measure in case the project runs over budget.

A category of risks that relates to commercial property operations after project commissioning arise from an operational hazard that leads to a violation of terms of contract. Operational risks are typically transferred to third parties, for example, by means of long-term service contracts with technology suppliers. Others, such as those that are weather-related, tend to be retained by the owners and operators of the facility. Weather derivatives offer a means for hedging operational risk in the wind energy sector. The contractual terms of an offtake agreement should usually provide clauses for the securitization of receivables and indemnification claims for the case of an operational fault and delay.

Offtake-agreement

An offtake agreement, as the term is used in renewable energy project finance, is an agreement to purchase all or a substantial part of the output produced by a project. Depending on the nature of the project, this agreement can take the form of a purchase agreement or a service contract. Offtake agreements are fundamental to the bankability of a project and therefore an important issue in project planning.

An offtake-agreement safeguards a project against future cash flow fluctuation. The finance of renewable energy projects may crucially depend on its success to reach a long-term agreement for a third party to deliver the future needs of feedstock input and to purchase the project's future output, either the power or heat it generates.

Without an offtake agreement, it could be difficult for a project to attract private capital. Lenders and investors are more likely to have confidence in a project, if there are buyers that are committed to offtake the energy it will produce. An offtake agreement secures the long-term revenue stream of a project and mitigates the cash flow risk and price volatility of merchant spot market sales. The one committed to take off the output of a project by a long-term contractual agreement may be the main sponsor or host.

Many energy utilities rely on long-term agreements, also called purchase power agreements (PPA), with independent third-party producers (IPPs) to meet the power supply needs of their customers. This kind of contracting-out of services to private third-party providers often antedates a tendering or bidding process. Project ownership may be assigned to the third-party based on a sale and leaseback arrangement (SLB). For a utility, as the purchaser of energy, a PPA represents a debt equivalent long-term financial obligation. Under a long-term PPA, a purchaser may be obligated to make fixed payments for available capacity or take-or-pay energy payments over multiple years.

An alternative business model has emerged in some wind power and solar power markets, where the output of power plants is being sold on a short-term basis under the terms of a merchant power arrangement. However, a new business model in order to be feasible must be supported by the financial market concerned.

Other instruments

Investors in renewable energies are facing barriers to transferring risks onto third parties. Most of the risks are borne by the investors directly, and are not outsourced, either because there is no instrument, such as an insurance product or financial derivative, available on the market or the cost of such instruments are too high as compared to the financial performance of renewable energy projects.

In general, insurance products on offer are tailored products that are suitable only for very large projects and they are out of reach of smaller developments. Also, as opposed to small companies, large companies have an opportunity to mitigate risks through geographical diversification.

Weather derivatives as an instrument to reduce the financial impact of unpredictable seasonal weather conditions have been available in energy as well as non-energy sectors. With respect to forest biofuels, weather conditions may have an impact on the accessibility of resources by their influence on logging, hauling and storage conditions. A biomass supply chain failure that leads to power outage may have costly financial implications.

Some other risk categories

Resource risk

Resource risk refers to the risk of losing funds that are to be invested into infrastructure for resource exploration, and into studies for information about the stock and availability of a renewable energy resource. Resource risk is not confined to resource appraisal but persists throughout the entire economic life of the project. Resource risk is specific for different kinds of resources, such as wind, solar, biomass, and geothermal heat.

Proving the existence of a resource, as the case will be, constitutes an early stage of resource exploration, which precedes further investments necessary to investigate resource properties. Size estimation quantifies the sustainable use of the resource by taking into consideration, among others, the impact of measures for resource development, the risk of resource degeneration and the emergence of competing demand. The suitability of a resource for exploitation is reflected in the technical efficiency, financial yield and capital costs associated with the technology considered.

The risk of resource deterioration may increase along the economic life of an investment project, for example due to climate change. Related to resource utilization, resource deterioration causes yield losses and increasing operational costs. Resource risk evaluation specifically related to the utilization of biomass must include supply security considerations with respect to supply chain related sourcing conditions.

Technical risk

Financiers avoid risk that is related to a technology that is new and without a track record. For technical risk mitigation, an established and proven technology should be preferred over one that is yet to emerge and new to the market. Furthermore, reliability is requested also regarding the selection of manufacturers with a successful history and a sustained long-term business outlook.

Permitting

Permitting encompasses all the authorization necessary for project construction and operation, including the requirements related to environmental regulations either based on state laws or ordinance enforced by local governments. Local or site-specific regulations and siting ordinances may be prohibiting or constraining types or scale of technical structures.

Unless process development has strongly advanced concerning project site and resource considerations, no large expenditures on applying for permits is made. Nonetheless, it is important to get an understanding already in an early stage of project development, if a project has foreseeably to struggle for permitting. The risks relate to the length, costs and final outcome of the permitting process. Risk of project delay is caused by appeals against a refusal, permit revocation, and permit exemption.

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Project Partners

GREBE will be operated by eight partner organisations across six regions:

- WDC
- Action Renewables – the future of energy, today
- Luke – Natural Resources Institute Finland
- FPN – Forskningsparken i Narvik
- eri – environmental research institute
- Fermanagh & Omagh District Council – Comhairle Ceantair Fhear Manach agus na hÓmaí
- Innovation Center Iceland
- Karelia

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