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ICE
INTELLIGENT COMMUNITY ENERGY

Interreg
France (Channel Manche) England

EUROPEAN UNION

ICE SUB-REPORT 2.3: ACCESS TO FINANCE AND CAPITAL

30/06/2019

BRETAGNE DÉVELOPPEMENT INNOVATION

EXETER

PLYMOUTH UNIVERSITY

UEA

marine

Task T2.3:

Access to finance and capital

Marine South East

1 Introduction

1.1 The ICE project

Supported by Interreg VA France (Channel) England, the Intelligent Community Energy (ICE) project aims to facilitate the design and the implementation of innovative smart energy solutions for isolated territories of the Channel area that face unique energy challenges.

Many islands have no connection to wider electricity distribution systems and are dependent on imported energy supplies, typically fossil fuel driven. The energy systems that isolated communities depend on tend to be less reliable, more expensive and produce more greenhouse gas (GHG) emissions than mainland grid systems.

In response to these problems, the ICE project considers the entire energy cycle, from production to consumption, and integrates new and established technologies in order to deliver innovative energy system solutions. These solutions will be implemented and tested at our unique pilot demonstration sites (Ushant island and the University of East Anglia's campus), to demonstrate their feasibility and to develop a general model for isolated smart energy systems elsewhere.

The ICE consortium brings together research and business support organisations in France and the United Kingdom; and commitment from SMEs will support the project rollout and promote European cooperation.

1.2 Purpose of this document

This document addresses one of the barriers that ICE is intended to help overcome, namely the difficulty that SMEs face in securing the finance they need to diversify and grow. This has been described in the ICE work plan as follows:

- Support SMEs in their quest to get financial support for innovative activities related to smart grid issues and isolated territories.

Access to finance and capital is today one of the most important issues that companies and in particular SMEs face. To support growth and innovation, access to finance is crucial and especially considering the high level of risk attached to the sector of renewables. Thus, ignoring the financial aspect for SMEs is a major mistake. The activity developed here should support SMEs in their quest to get financial support for innovative activities related to smart grid issues and isolated territories. Such markets are particularly small in terms of size compared to usual energy markets; thus limiting the attractiveness for substantial investors.

- Optimise and strengthen to funding case for these funding streams and support access to funding.

The strategies that will be developed will target a range of investment sources including the traditional banking sector but most importantly focusing on innovative funding schemes like peer-to-peer lending, crowdfunding, collective structures, funding angels and institutional funders. This activity will optimise and strengthen to funding case for these funding streams and support the business organisations involved in increasing their access to funds that are necessary for their growth.

1.3 Content of this Document

- Overview/manual of access to capital structure

This manual will summarise the main principles to get access to finance for companies and especially SMEs in the Low Carbon Energy sector. It will identify the main stakeholders, provide an exhaustive inventory of initiatives and opportunities, including its ways and means, related to finance in order to support growth and innovation for SMEs. This document that currently does not exist is of primary importance for SMEs, as it provides 'synthetic' information from a substantial number of sources. It is here a matter to 'digest' the substantial volume of information and translate in an understandable manner the technical subtleties and their implications for the eligibility of SMEs.

2 Overview of Funding Types

Most or all Member States also operate schemes to assist access to finance for SMEs, as part of their wider business support and RTD funding approaches. These traditionally comprise:

- Grant funding – public funding which is essentially gifted to companies and other organisations in order to part-fund an innovation project. This is a risk-sharing approach, reflecting the fact that firms, especially SMEs, often lack the financial strength to take on 100% of the project risk; equally, the benefits of success will reach beyond the company taking the risk, so there is a justification in subsidising the project;
- Loan funding – commercial funding which companies can borrow to finance their investment plans, with an element of subsidy or risk under-writing with public funds to enable more attractive loan terms. Since the loans have to be repaid with interest at the end of the term, this type of funding is more attractive for low-risk projects;
- Equity funding – commercial funding provided to companies by external investors in return for a stake in ownership of the company. Although the equity does not have to be repaid (though the company may choose to repurchase the stake), this mechanism becomes very expensive for high-risk projects, particularly where investors have difficulty in quantifying the risk.

Many SMEs find that none of these funding sources is available to them on terms which are affordable. The report therefore proposes some new approaches which could help to address these gaps, with emphasis on approaches that could be enabled by cluster activities.

2.1 Grant Funding

A very wide range of grant funding programmes are potentially available to innovative firms, whether at EU, national or regional level. This section outlines the major types of grant funding available.

2.1.1 European

H2020

The Horizon 2020 programme is the main European funding programme for collaborative RTD. The projects are co-financed by the EU and the participants. For research and development projects the share of the EU contribution can be up to 100% of the total eligible costs. For innovation projects up to 70% of the costs, with the exception of non-profit legal entities which can also receive up to 100 % in these actions. In all cases indirect costs will be covered by a flat rate of 25% of the direct costs.

In this programme, several calls – open under the 2018-2020 Horizon Work Programme – are dedicated to the financing of projects focusing on smart cities, smart energy systems or renewable fuels. Funding up to €6M is available, depending on the call. Key call for proposals relevant for the ICE certified companies are presented below:

Call	Scope
LC-SC3-EE-1-2018-2019-2020:	**Proposals should focus on:** • Solutions addressing building fabric and/or technical systems that ensure faster and

Decarbonisation of the EU building stock: innovative approaches and affordable solutions changing the market for buildings renovation	more cost-effective deep renovations that result in high energy performance • Innovations in technology, design and construction methods • Innovations in business models • Energy efficient and low carbon solutions to retrofit building-level heating and cooling systems • Integration of on-site RE generation & energy storage systems • Development and improvement of hybrid energy systems • Monitoring and displaying of real time energy performance **Projects are expected to bring the technology to TRL 8-9**
LC-SC3-EE-3-2019-2020: **Stimulating demand for sustainable energy skills in the construction sector**	The objective is to increase the number of skilled building professional workers across the building design, O&M value chain (designers, architects, engineers, etc.) with a specific focus on the engagement of SMEs **Proposals should be on:** • the direct simulation of demand for energy skills in construction.
LC-SC3-EE-4-2019-2020: **Upgrading smartness of existing buildings through innovations for legacy equipment**	**Proposals should focus on:** • Cost-effective technological solutions to manage energy within existing buildings and interact with the grid providing energy efficiency, flexibility, generation and storage • Solutions using automation and IT
LC-SC3-EE-5-2018-2019-2020: **Next-generation of Energy Performance Assessment and Certification**	**Proposals should focus on:** • Definition and demonstration of innovative & cost-effective approaches for the assessment of building energy performance Such approaches should rely on the combination of existing and proven technology components (starting from TRL 6-7) with well-structured methodologies and protocols that can lead to the definition of new certification schemes.
LC-SC3-RES-1-2019-2020: **Developing the next generation of renewable energy technologies**	Proposals are expected to bring to TRL3 or TRL4 renewable energy technologies. **Technology-specific sub-topics are listed below**:

	• Energy technologies currently at low TRL (energy generation & conversion solutions) • Innovative materials for geothermal heat exchangers to maximize energy transfer and improve the overall conversion efficiency of a geothermal system • Innovative testing methods and design tools for acceleration of wind energy technology development and increased life time extension • Sustainable fuels other than hydrogen for energy and transport application • Innovative very high efficiency thin-film photovoltaics concepts
LC-SC3-RES-14-2019: **Optimising manufacturing and system operation**	**Proposals should focus on:** • Monitoring system for marine energy – ocean and offshore wind – (New intelligent sensors, fault detection and communication systems for accurate condition and structural health monitoring) • Photovoltaics: Development of innovative crystalline silicon wafer growth techniques to produce high-efficiency solar cells and modules. Proposals are expected to bring the technologies from TRL 3-4 to TRL 4-5.
LC-SC3-RES-19-2020: **Demonstration of innovative technologies for floating wind farms**	Proposals should focus on the **demonstration of floating offshore wind innovations** in view of scaling-up power rating to **>10 MW:** • Floaters, moorings, electrical subsystems and cabling, monitoring systems, and/or integrated systems • Whole wind turbines specifically conceived for floating offshore • Improve industrial design and manufacturing processes, installation methods and operation & maintenance. **Expected impact**: • Decrease the Levelized cost of Energy (LCOE) • Decrease the environmental impacts • Increase market value of floating wind power
LC-SC3-RES-30-2019: **Demonstration of plug and play solutions for renewable off-grid electricity**	**Proposals should focus on:** • Container-based integrated solutions for sustainable and long-term renewable

	electricity production, storage and distribution **What should be optimized:** • Versatility of renewable energy sources to utilise (e.g. photovoltaics, wind, bioenergy); • Plug and play capabilities towards the external electricity sources as well as storage options; • Maximising the share of renewable electricity sources compared with diesel generation; Proposals are expected to bring the technology from TRL 6-7 to 7-8.
LC-SC3-RES-31-2020: **Basic science technology development for offshore wind**	**Scope**: To bring new technologies/models/methods to TRL 4-5 **Proposals should address one or more of the following research areas for offshore wind:** • Atmospheric multi-scale flow modelling (from meso-scale to wind farm flows); • Understanding and modelling key uncertainties and physical phenomena of offshore wind energy design and operation; • High performance computing and digitalisation (e.g. data processing, machine learning and data analytics methods for implementation in data-driven design, digital twins and control and monitoring for O&M); • Development and validation of models of structural damage and degradation for offshore wind turbines and/or for their components as functions of loads and environment; • Numerical and test methods for accurate assessment of system and component reliability when introducing new materials and technologies; • Design tools and methods for manufacturing, construction, installation and/or decommissioning **Expected impact**: • lower the Levelized Cost of Energy (LCOE) • to increase the market value of wind power
LC-SC3-RES-32-2020:	**Proposals should focus on new test rig prototype** devices to improve testing of low TRL **wave or tidal** device components or sub-systems – e.g. facilities,

New test rig devices for accelerating OE technology development	tools and procedures - and make **accelerated life testing** possible. To connect and integrate the various capacities and resources of the beneficiaries and other ongoing European and national projects **Expected impact**: • accelerate and reduce the cost of the ocean energy technology development pathways • contribute to the exchange of knowledge
LC-SC3-ES-3-2018-2020: **Integrated local energy systems (Energy islands)**	**Proposals should:** • Develop and demonstrate solutions which analyse and combine, in a well delimited system, all the energy vectors that are present and interconnect them where appropriate. • Present a preliminary analysis of the local case and propose to develop solutions and tools for the optimisation of the local energy network but having a high replication potential across Europe. Local consumers, small to medium industrial production facilities and commercial buildings should be involved in the projects from the start. TRL will range between 5 and 8. Proposers will indicate the estimates levels of TRL at the beginning and at the end of the project.
LC-SC3-ES-4-2018-2020: **Decarbonising energy systems of geographical Islands**	**The proposed solutions should enable to:** • Achieve high levels of local renewable energy sources penetration; • Achieve highly integrated and digitalised smart grids based on high flexibility services from distributed generation, demand response and storage of electricity, heat, water, etc.; • Develop synergies between the different energy networks (electricity, heating, cooling, water, transport, etc.); • Achieve a very significant reduction of the use of hydrocarbon-based energies;

	• Develop innovative approaches to energy storage, electricity storage • Define effective business models for sustainable solutions; **Proposals must include**: • At least one demonstration on one island; • At least 2 other follower islands with similar issues; these follower islands will develop plans to adapt similar solutions to their island in a cost-efficient way. The TRL will range typically between 5 and 8.
LC-SC3-SCC-1-2018-2019-2020: **Smart Cities and Communities**	**Scope:** Integrated innovative solutions for Positive Energy Blocks/Districts will be developed and tested and performance-monitored in the Lighthouse Cities. Projects will consider the interaction and integration between the buildings, the users and the larger energy system as well as implications of increased electro-mobility, its impact on the energy system and its integration in planning. Innovation actions are needed to: • connect and integrate buildings; • enable Positive Energy Blocks/Districts; • foster innovative systems integration; • complement the wider energy system.

2.1.1.1.1 SME programme

A dedicated *SME programme* is available for individual SMEs. Two categories of project can be supported: feasibility assessment (for which a lump sum grant of €50k is available), and innovation project (for which funding up to €2.5m is available, at an intervention rate of 70% of eligible costs). Further support for commercialisation is also available, but in the form of risk capital (instead of grant funding). Advice is available from the Enterprise Europe Network. More information here.

2.1.1.1.2 Fast track innovation

The *Fast Track to innovation (FTI)* is a fully-bottom-up measure promoting close-to-the-market innovation activities that is open to all types of participants. FTI aims to reduce the time from idea to market and to increase the participation in Horizon 2020 of industry, SMEs and first-time industry applicants. It also aims to nurture trans-disciplinary and cross-sector approaches. **On offer is a maximum EU contribution of €3M per proposal with time-to-grant (from the cut-off to the signature of the grant) of around 6 months.** More information can be found here and here.

2.1.1.1.3 Eurostars

Eurostars is a funding programme dedicated to help R&D performing SMEs bring their innovation to the market. The programme is supporting innovative product development and commercialisation and is co-funded by the European Commission under Horizon2020. Eurostars projects are always led by a SME, involving 3-4 participants from 2-3 countries. The duration of each project is generally 2 to 3 years. More information can be found here.

2.1.1.2 LIFE

The LIFE programme is the EU's funding instrument for the environment and climate action. The general objective of LIFE is to contribute to the implementation, updating and development of EU environmental and climate policy and legislation by co-financing projects with European added value. As such, the scope of LIFE funding for innovation is limited. However, piloting of new clean technology to enable widespread deployment could be supported.

One particular call that addresses the priority area "***environment and resource efficiency***" might be relevant for the ICE certified companies. This call finances projects in the environmental sector in particular in the areas of air, chemicals, green and circular economy, industrial accidents, marine and coastal management, noise, soil, waste, water, and the urban environment. The programme provides action grants for pilot and demonstration projects to develop, test and demonstrate policy or management approaches. It also covers the development and demonstration of innovative technologies, implementation, monitoring and evaluation of EU environmental policy and law, as well as best practices and solutions. The European Commission is particularly looking for technologies and solutions that are ready to be implemented in close-to-market conditions, at industrial or commercial scale, during the project duration. Projects receive a co-funding of up to 55%. More information here.

2.1.1.3 Interreg NWE

The INTERREG North-West Europe (NWE) Programme is a transnational European Territorial Cooperation Programme funded by the European Union. The areas involved in the NWE Programme are Ireland, the United Kingdom, Belgium, Luxembourg, Switzerland, and parts of France, Germany and the Netherlands. The programme supports projects that aim at:

- Implementing and adopting zero/low-carbon technologies in enterprises and industrial production processes; particularly those relating to energy generation and/or energy reductions/efficiency;
- Delivering and rolling out of emerging energy technologies;
- Implementing transnational living labs to test and demonstrate the use of zero/low-carbon solutions in real life conditions;

- Implementing of joint zero/low carbon technology demonstration schemes and facilities, including fab labs and R&D/testing facilities;
- Ensuring that new energy solutions are feasible.

2.1.2 International level

The **Shell Foundation** works with a small number of entrepreneurial partners to identify the market failures that underpin many of the world's problems and co-creates new social enterprises to solve them. They provide grant funding, extensive business support and access to networks to help pioneers to validate new models, achieve financial independence and to expand across geographies.

- Once a new solution is proven to be viable they create specialist intermediaries to facilitate growth and replication at an industry level.
- By applying this approach to major global challenges such as job creation, access to energy, urban mobility and sustainable supply chains, they have created several strategic partners that are now delivering large-scale impact in multiple countries across Africa, Asia and Latin America.
- See: http://www.shellfoundation.org/

2.1.3 National & Regional

All member states offer grant support for innovation and collaborative RTD. Grants are allocated under a competitive process, addressing targets defined by the specific awarding body. All grant programmes have to comply with EU-wide State Aid regulations, which limits the level of intervention (depending on whether the project topic fits under one of the block exemptions).

Several opportunities might be of good relevance for the ICE community. These have been short-listed in the following section 3.

2.2 Loan Finance

Once the prototype validation of the solution has been achieved, the technical risk would be at a level where loan finance could be considered. Some general types of loan funding that might be relevant are outlined below, while specific loan funding programmes are listed in section 3 below.

2.2.1 Private Lending

The great majority of firms, across all sectors including marine, raise all their external finance in the form of debt capital from commercial lenders such as banks. There are many reasons for this, including:

- Reluctance to dilute equity stakes of founders
- Complexity and management overhead of dealing with equity partners
- Potentially high cost of equity capital due to risk premium

Bank finance has become more difficult to access after the financial crisis due to banks' requirement to improve their liquidity ratios. Also company directors frequently have to risk their homes to provide a loan guarantee. Although there is a widely held belief that traditional bank lending is not the best way to support growth companies, there is presently a lack of accessible alternatives (see below).

2.2.2 Public/Private Lending

One possible answer to the lack of suitable commercial lending by banks is to leverage private capital with public funds. This can be achieved by using the public funds to underwrite most of the risk. These are generally operated at national or regional level. Assuming an average default rate, a relatively small amount of public underwriting can leverage a large (eg 50x) amount of investment.

A major source of public funding is the European Investment Bank (EIB) providing long term financing to the EU. It is the largest multi-national investing bank in the world i.e. £70 billion of lending which is 2.5 times more than the World Bank. Every project securing funding must be signed off by the individual Member State concerned, as well as the EC; this ensures that the project meets EU objective economic criteria and supports overarching EU policy goals.

The EIB invests in very large projects, including programmes which can be jointly funded with national or regional programmes. This is how EIB money can assist SMEs, across a range of projects including general R & D, maritime clean energy, resource efficiencies etc. There is opportunity to combine grant monies with EU budget and work in partnership with EC e.g. JEREMIE (Joint European Resources for Micro to Medium Enterprises) which has provided individual loans to businesses of an average amount of £300,000.

2.2.3 Retail bond market

Bonds are essentially an IOU debt instrument. The purchaser receives a set return each year (coupon) for a set number of years, at the end of which the bond can be redeemed.

Retail bonds are brought by individual investors, including individual savers, via an intermediary who manages the issue. The minimum amount invested can start at relatively small levels – usually under €1,000. Investors in retail bonds can buy or sell a bond at any time and check its price on the Stock Exchange – just like a share.

In the UK the retail bond market is smaller than other developed countries. The MOT in Italy, created in 1994, is the most successful, liquid and heavily traded retail bond market in Europe, with over 800 bonds listed, raising €700bn since its establishment.

2.2.4 Self-issued retail bonds

It is possible for businesses to self-issue a retail bond which is a finance option used predominately by medium-sized businesses looking for long-term growth capital.

In Germany, there have been around 200 self-issued bonds, with investors usually from the companies, its customer base or people local to the business. In the last year (March 2012-March 2013) the total issuance volume by German and Austrian companies was €1.9bn, with the average issue size around €35m.

In the UK, the market for self-issued bonds is less developed, although there have been several high profile bonds raised in recent years, including the renewable energy generating company Ecotricity.

2.2.5 Peer-to-peer & crowd funding

Peer-to-peer and crowd-funding platforms enable individuals and businesses to lend to small and medium-sized firms for a specific project. The peer-to-peer and crowd-funding market is experiencing significant growth, particularly in the UK and US, and in 2012 $2.7bn was raised globally from

crowdfunding and peer-to-peer lending. Peer-to-peer lending is suitable for businesses which have been trading for at least two years. However, this may vary depending on which platform is used.

However, long term performance of peer to peer lending is still unproven e.g., 'Funding Circle', ZOPA, SEEDRS, 'Market Invoice', 'Thin Cats', and there are concerns about their vulnerability to increased bad debt. There have been some high profile failures over the past year, which is denting the reputation of this as an investment option.

Crowd funding differs insofar as investors generally receive a return 'in-kind' rather than an interest payment.

2.3 Equity Finance

There is an over-reliance on debt finance, particularly in the SME market, but the level of over-reliance is highly variable between different Member States. For example , just 3% of small and medium-sized businesses use equity finance in the UK, below the EU average of 7% and much less significant than in countries like Denmark and Sweden, where equity investment accounts for 46% and 31% of SME financing respectively.

Equity firms provide medium to long-term finance in return for an equity stake in unquoted companies with high-growth potential. Some examples that might be useful for the ICE certified companies include:

- **IFP Energies Nouvelles** aims at supporting SMEs in their innovation strategy in the fields of energy, transport and environment and at increasing territorial competitivity. It can assist all processes developed within the project, focusing on offshore energy and coastal protection. More information on the IFPEN website.

- **EILAN** is a regional investment funding for renewable energies which has been created to invest in the companies which develop equipment and/or infrastructures linked with the production of renewable energy, especially offshore energy. See the website in French: https://eilan.sembreizh.fr

- **Marguerite** seeks to bring together public and private resources, allowing for public investors to join forces with the private sector. It supports key infrastructure investments in energy, renewables, transport and digital infrastructure. More information here.

- **The Global Innovation Fund** invests in social innovations that aim to improve the lives and opportunities of millions of people in the developing world. Among others, it invests in the implementation of smart energy systems to provide clean energy access to off-grid communities (e.g. India). See: https://globalinnovation.fund/

2.3.1 Venture Capital

Venture capital firms invest in early stage, high-risk but high-potential firms. Venture Capital investment is most typically suited for early stage companies that are experiencing high-growth or have potential for high-growth. For this reason, VC investment is unlikely to suit start-ups who have not yet established revenue. VC investments are also too large for many start-ups: the average VC investment into UK and international firms is around £1.5M .

Typically after a 3-7 year investment, the venture capitalist will exit the company by selling their shares, either back to the business or to another investor.

2.3.2 Private equity

Private equity firms provide medium to long-term finance in return for an equity stake in unquoted companies with high-growth potential. The investors return is dependent on the growth and profitability of the business. As a result, most private equity investors will seek to work with firms as a partner to grow the business.

Private equity investment is most suitable for firms looking for longer term capital to fund their expansion activities. Contrary to popular belief, private equity is not limited to large firms: in 2011, around 800 UK companies benefitted from private equity investment, of which around 70% were small companies and 20% medium-sized businesses. Total private equity investments were €20bn.

For example, a private equity provider like Broadlake manages a fund of €100m and looks to invest between €2-10m in long term capital and strategic support to established and growing companies. They have invested in 45 SMEs in the past 20 years.

2.3.3 Public equity

In public equity, unlike private equity, the business becomes publically listed with shares able to be brought and traded by the public. The main public equity market in the UK and Europe for growing businesses is the Alternative Investment Market (AIM) which is operated by the London Stock Exchange. AIM offers smaller growing companies a public market with access to both retail and leading institutional investors within a regulatory environment designed specifically to meet their needs.

There are no rules requiring companies to be a certain size or have an established trading record. However, a Nominated Advisor (Nomad) would expect that a viable AIM candidate would have strong growth prospects and a management team that compares favourably with its peer group.

Since its launch in 1995, over 3,000 companies from across the globe have chosen to join AIM – collectively raising around €100bn.

2.3.4 Angel Investing

Business Angels are most commonly high-net worth individuals who invest in early stage or high growth businesses, either directly or through organised networks and syndicates. Business Angels usually have substantive knowledge and experience of growing businesses and can act as a mentor for the business, providing advice and guidance.

Angel investment is suitable for seed or early stage companies looking for their first or second stage of external funding to grow rapidly.

2.3.5 Corporate Venturing

Corporate venturing is a formal, direct investment relationship, usually between a larger and a smaller company. The larger firm provides direct support to smaller businesses usually in three ways, although some partnerships combine these types of investment:

- By making a financial investment in return for an equity stake in the business
- By offering debt finance to fund growth activities for an agreed return

- By offering non-financial support for an agreed return, such as providing access to established marketing or distribution channels.

Large businesses engage in corporate venturing for a number of reasons. It may be undertaken as a simple financial investment or as an opportunity to become an alternative provider of finance in the market. A firm might engage in corporate venturing for the strategic value it can provide e.g. supporting its supply chain, gaining market insight or ensuring knowledge transfer.

Corporate venturing is most attractive to growing businesses that would value a partnership approach to their next investment. Whether in providing knowledge or routes to market, the partnership in a corporate venturing arrangement will be diverse, as it is tailored to the needs of both parties.

3 Channel Region SME Funding Options

SMEs whose innovation is still at a relatively immature stage of development will be looking mainly at grant finance, since the higher risk would make other forms of finance unattractive. SME's looking to diversify their existing technology into community energy projects might be better suited to loan or equity finance. A range of grant, loan and equity funding options is available, specific to the country in which the SME is located. Key funding organisations for SMEs in UK and France are listed below.

3.1 UK

Programme or Organisation	Description	Website
ORE Catapult	*Operates test and research facilities to enable the scale-up of offshore renewable energy technologies. Supports the UK's research and innovation community through its testing, validation and engineering expertise*	https://ore.catapult.org.uk/
Innovate UK	*With a strong business focus, it runs a portfolio of grant funding programmes (eg Energy Catalyst) and also periodically runs loan financing calls for SMEs needing between £100k and £1m, with payback after five years. It also runs open calls for individual SMEs to fund novel product development, but these are highly competitive.*	https://www.gov.uk/government/organisations/innovate-uk

3.2 France

Programme	Description	Website
ADEME	*The agency has several financial instruments to help stakeholders financing their projects and ideas in various fields*	http://www.ademe.fr/en
French Regions	*French Regions receive a dedicated budget which is used to fund innovative projects and ideas, according to their regional priorities*	https://www.bretagne.bzh/jcms/JB080225_11542/fr/english *(Brittany Region)*
Total développement Régional	*Initiated by Total. Supports innovation, industrial development and economic prosperity. Focuses on all steps of the commercialisation/industrialisation. Loans are at 1% rate to fund innovative projects in the field of renewable energies, digital technology, etc. An amount of €100 to €500k – repayable over five years – is lent to French SMEs.*	https://www.developpement-regional.total.fr/

BPI-France (PSPC)	*It lends funding to facilitate the implementation of collaborative innovative projects that present cutting-edge technologies and promising industrial objectives. It usually offers mixed funding between grants and repayable advances (depending on the project risk) to fund collaborative innovative projects needing between €5 and €50m. Repayments depend on the success of the project (BPI shares the risk with the applicant). The call for projects is opened permanently*	https://www.bpifrance.fr/PSPC

Regarding the ADEME, **one specific call** can be highlighted:

This call (more info here) supports the development of solutions in the field of renewable energies, e.g. biomass, marine renewable energies, solar photovoltaic, geothermal energy as well as hybridization projects of different renewable sources. It aims at:

- Lowering the LCOE over time through the development of new products (goods and services) and the improvement of the reliability of renewable energy production systems
- Reducing the environmental footprint of systems by improving manufacturing processes and optimizing the efficiency of the technologies used.

To meet these objectives, the submitted projects should focus on 2 axes:

- Axis 1: Development of innovative technological bricks (e.g. Wind, wave or tidal turbines, storage systems, etc.);
- Axis 2: Demonstration systems;
- Axis 3: Hybridization of systems for RE production.

Eligibility: The total cost of the project must be at least 2 million euros. Financing is in the form of repayable or partially repayable advances.

4 Case Studies

Two scenarios in which innovative SMEs might require third-party finance have been identified and are described below. Each scenario targets an investment opportunity at different stages of technical maturity, to show how this maturity affects the optimal route for financing. SMEs can use these case studies to assess where their own innovation sits, and then to target selected financing routes.

In addition, the financing of an overall community energy scheme has been outlined in a third case study.

4.1 Prototype Technology Validation

Innovation within smart energy networks is being accelerated by the activities of an ecosystem of smaller companies developing novel systems for optimising resource utilisation efficiency. The domains of most interest include, for example:

- Battery management systems which optimise the performance and durability of batteries
- Improved demand management interfaces that provide more sophisticated user flexibility whilst also offering ability to shift energy demand profile
- Roof-top solar integration systems that generate the greatest revenue under dynamic energy pricing arrangements
- Electric vehicle interfaces that allow EV storage to be used to smooth demand profile.

All of these innovations form part of an extended energy supply network and their testing and validation must include potential impacts on the wider operational environment. This is potentially expensive and beyond the scope of an SME to do alone. There are therefore two parallel requirements for such a company: collaboration with other companies involved in the smart energy network; and access to finance needed to run a test operation over a sufficient period of time. Fortunately these two requirements are complementary, in the sense that the case for investment in the SME is strengthened by the relationship with other companies in the value chain. A case study of an SME accessing finance for this kind of collaborative project is shown below.

Case Study 1 - EOLINK

EOLINK
Cost-effective Floating Wind Parks

EOLINK is a french start up which develops an innovative floating wind turbine (patented) to advance offshore wind energy by reducing the legalized cost of energy (LCOE).

The EOLINK project, in collaboration with France Energies Marine and the French Institute for Marine Studies (IFREMER), intends to demonstrate the suitability of a floating wind turbine design. The Levelized Cost of Electricity (LCOE) anticipated is linked to the turbine's pioneering patented architecture.

Unlike conventional fixed or floating wind turbines, the whole (pyramidal) structure rotates around a fixed point to ensure the turbine faces into the wind.

The concept has been tried and tested in tanks (scale 1/50) where wind was generated to measure the dynamic behaviour of the turbine and numerically model it to correlate the experimental tests with simulations.

The project has also produce structural dimensions for the turbine. The diameters and thicknesses of the beams has been optimised to reduce the mass while respecting the criteria for avoiding fatigue damage.

The resulting research will validate the design and demonstrate that this technological breakthrough can significantly reduce the LCOE.

The EOLINK project has been funded by the French national agency for research (Agence Nationale de la Recherche).

The company has also integrated partnerships to strengthen technological bricks and consolidate its development. As instance, Eolink is partner of the TIM project "Toward an industrialized single point mooring system" funded under the ERA-NET Co-fund Ocean Energy.

5 jobs were created in the framework of the two projects.

https://www.eolink.fr/fr/

4.2 Technology Scale-Up

Once an innovative supplier has validated its technology (typically at a small scale in a local network) it needs to scale up its level of production to meet the larger market opportunity. In some cases, a company that has built a place in its traditional market seeks to diversify into an adjacent market. This may involve redesign of its product to achieve different customer priorities and/or economies of scale, development of appropriate support materials to enable deployment by third-party installers and maybe setting up of some support services to provide replacements in case of through-life failures.

There is a range of financing options available to companies facing this kind of situation. Access to rigorous reporting on the small-scale trials and feedback from these early-stage customers will be important to access such finance. A case study of an SME accessing finance of this kind is shown below.

Case Study 2 - Swanbarton

Swanbarton's principal business is energy storage and associated systems for integrating storage into power networks. They are actively diversifying into the community energy market where their expertise in power system optimisation can play a key role. They have implemented a number of collaborative projects to pilot their technology in this market, mainly using Innovate UK grant funding to support their own investment.

ADEPT is a power management and optimisation platform that was developed by Infinite Renewables in collaboration with GS Yuasa Batteries, Sheffield University and Swanbarton with the support of a £500k Innovate UK grant. The containerised platform integrates multi technology renewable generation, battery storage and smart metering to provide multi-control solutions:

1) Creating a time-shifting process for advanced renewable energy storage and optimisation

2) Time-Shifting Grid Power – importing cheap and efficient electricity in low-demand periods and storing the power to support peak-demand periods

3) Offsetting TRIAD Costs – incorporating prediction tools to respond accordingly to Triad periods

4) Managing Microgrid Systems – integrating DERs to intelligently manage a Microgrid system and supply residential, industrial or commercial developments with a combination of renewable, stored and grid power, resulting in lower electricity costs.

This innovative battery configuration is being managed by Swanbarton's battery control device MSM, which provides an integrated view of the whole battery, and by Swanbarton's site energy optimization product, EROS. MSM and EROS enable the battery to be used flexibly for time-shifting local renewable generation to match local demand, exploiting time-varying electricity supply tariffs, and optimising against network power peak costs

The programmable system and power management options within each containerised ADEPT platform will enable each individual community to benefit from an increase in renewable generation revenue and a reduction in on-site power costs.

Swanbarton's technology gives ADEPT unique capabilities for automated planning and control of battery actions based on optimizing self-consumption, minimising import costs and gaining ancillary services revenue.

4.3 Community Energy Project Financing

Although some community energy projects are authority-led, there is a significant potential for community-led projects too. Such projects might be led by a Community Interest Company (CIC) that reflects the local consumer interests, and which will ensure commitment from local stakeholders. This commitment provides confidence in future revenue streams from consumers, and this is 'bankable' in the sense of giving credibility in the eyes of a provider of finance.

However, the implementation of a community energy scheme also requires expertise and resources to procure, install, commission and operate the scheme. This will typically be beyond the capacity of a CIC. A range of companies exists now to provide these implementation resources, and such a company would typically be appointed by the CIC. This service provider would also typically be responsible for raising the finance, using its track record of delivery to reduce the financing risk. An example of such an arrangement is shown below.

Case Study 3 – Pinnacle Power and Triodos Bank

Pinnacle Power (part of the Pinnacle Group) designs, builds, operates and finances district energy networks for communities. Networks are thermal or electrical or a combination of the two. The networks are designed to deliver energy services to domestic and commercial customers, and offer a lower cost of energy compared with traditional energy supply options. Electrical and thermal energy storage forms a key part of the system optimisation, allowing imported and local energy resources to used at optimised price levels.

Pinnacle Power has experience of working alongside organisations the are leading community energy network projects, whether these are public authorities, community interest companies or other special purpose vehicles. They are comfortable managing projects at small scale (<10MW) which are more typical of CIC projects. They have established relationships with a variety of finance providers, securing terms that can exploit the reduced risk that Pinnacle can bring to the project.

One provider of finance is Triodos Bank which specialises in providing finance for community energy groups. Their standard financing model can provide up to €20m over an 18 year term, and is designed to finance all the construction, installation and set up costs for a community energy network, including the construction of renewable electricity generators (onshore wind and solar). Once the project is fully operational, it is possible to refinance the project using more conventional funders and to 'recycle' the Triodos funding onto the next development project.

Maximising the local supply chain content in the construction and operating phases of the project is a key consideration in these projects, since local suppliers can bring local knowledge, generally lower costs and continuity from the construction phase into the operational phase.