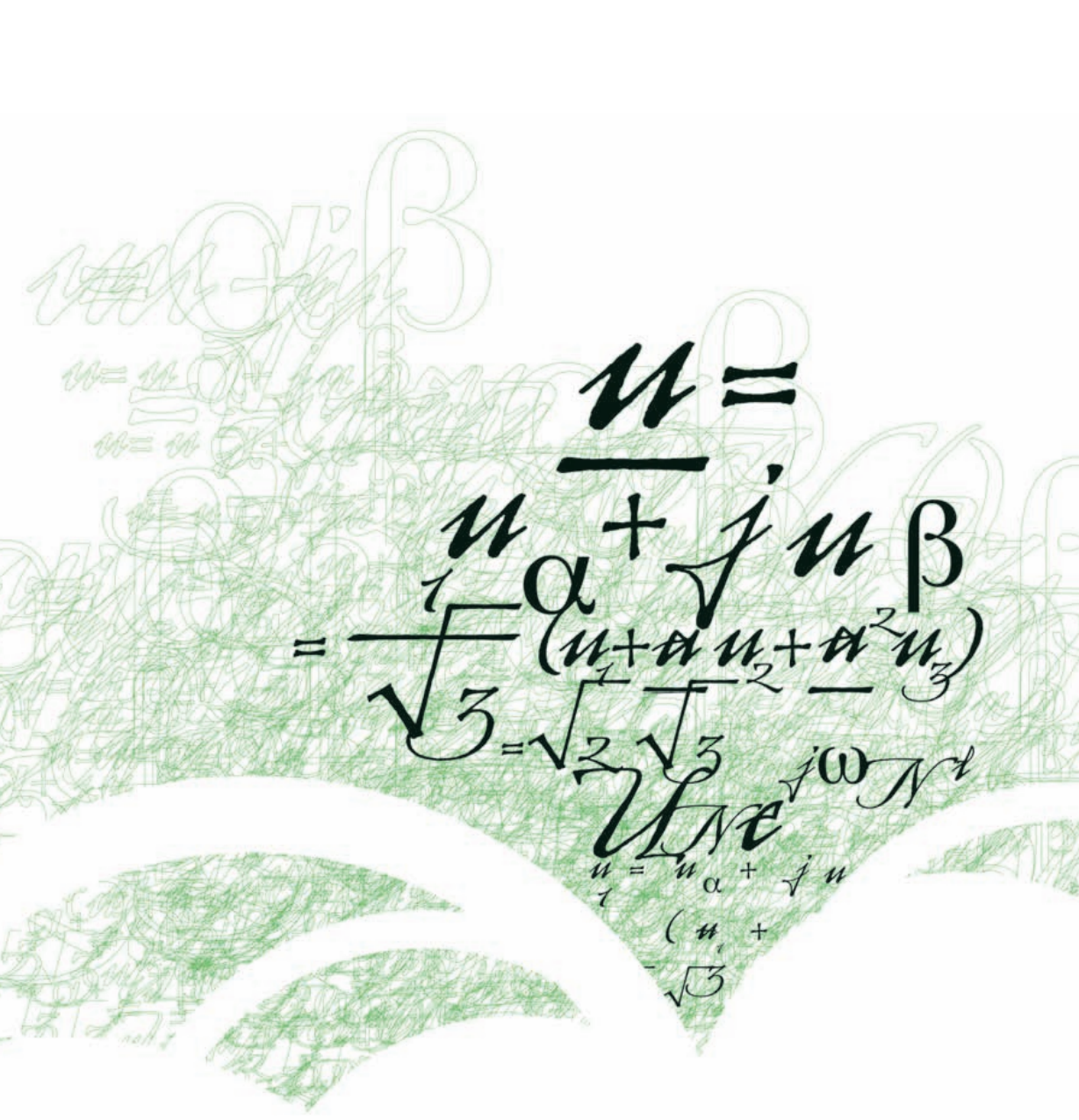

Effectively supporting the commercialisation of research results

ProRETT

ProRETT

The present booklet presents the outcome of the Commission funded FP6 project "ProRETT–Promotion of Renewable Energy Technology Transfer"

Project reference :	TREN/05/FP6EN/S07.55804/020152
Duration :	14.2.06-13.2.08
Consortium :	EUREC Agency (European Renewable Energy Research Centres), i.con innovation, Technofi, Mermaid Ventures, Asesoria Industrial Zabala, Axiom Venture Capital, EREC (European Renewable Energy Council)
Coordinator :	Katharina Krell, EUREC Agency

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SIXTH FRAMEWORK
PROGRAMME

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From research to market: objectives and processes

Foreword

ProRETT and the return on investment

Europe produces useful, high quality results from publicly-funded research projects in renewable energy technologies. But Europe also faces difficulties in the way it transforms these results into commercial applications. Various reasons can explain this: lack of market demand for new technologies given the commodity character of energy; high up-font costs to be borne by users while benefits accrue to society; infrastructure inertia to serve incumbent technologies; complex permitting procedures; cultural differences between academia and business, limited entrepreneurial spirit on the part of researchers and an aversion to risk on the part of investors. Moreover, technology developers and potential start-ups typically lack the knowledge to develop business models and plans, to prepare investment deals and to access the right investor for support.

In the light of all these hurdles to innovation and of the new targets fixed by the European Union to achieve energy and climate change goals (by 2020: 20% reduction of greenhouse gas emissions compared to 1990 levels; 20% renewable energy in the final demand energy mix; 20% increase in energy efficiency) the European Commission has adopted a European Strategic Energy Technology Plan (SET-Plan) (COM(2007)723). The aim of the plan is to trigger innovation, and to accelerate the development and the market take-up of new low carbon technologies.

This is where the ProRETT team has already achieved some good results. European experts along the innovation value chain scrutinised the commercial potential of over 60 renewable energy research results from some of Europe's finest research institutes. Half of these technologies were considered business opportunities and received further coaching. This assessment has destroyed some business dreams but today, after two years of work, the ProRETT team can lay claim to the following set of stunning results:

- 10 companies created;
- 2 licence deals underway;
- 4.3 million of investments in ProRETT business opportunities.

The Commission's investment in the ProRETT project has leveraged a five times greater investment by the private sector in ProRETT business opportunities. And it shows that using the ProRETT-methodology has achieved a commercialisation rate ten times of what is usual in the venture capital industry.

I am proud to be able to present you this good practice manual, which illustrates the ProRETT methodology. It also highlights the European added-value derived from bringing together the technology developers, the innovation experts and the investors from across Europe.

Alfonso Gonzalez Finat, Principal Advisor
Directorate General Transport and Energy
European Commission

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Executive summary

Bridging the gap between research and first market introduction

ProRETT stands for promotion of renewable energy technology transfer. While technology transfer is a wide notion used differently by different people, the ProRETT project acted on the very sensitive and complex part of the technology / knowledge transfer and innovation process, which follows after the technology development and precedes the market replication of a given technology: it focussed on the first market introduction of a new technology or knowledge-intensive service in the form of a spin-off creation or a licensing deal.

The outcome of publicly co-funded research projects usually consists in technology concepts that have been demonstrated on a laboratory scale in form of a prototype. At that stage, a product has yet to be developed and the process leading to this contains many unknowns: Does the new concept present a business opportunity with commercial potential? How much money and time does it take to make a marketable product out of the concept? Who will offer the new product to the market? Who is ready to invest in its development and under what conditions?

The ProRETT-team has worked closely with technology developers at European research centres in order to address these unknowns and to support them in their efforts to successfully commercialise their R&D output.

The ProRETT project has developed and tested an innovative and structured methodology for quicker and broader commercial exploitation of existing scientific research results in the fields of renewable energy and energy efficiency resulting in licensing deals and spin-off creation in Europe.

At the project outset, the main objectives were to address the technical barriers for transforming scientific research results into viable innovations, to unite all stakeholders relevant for technology transfer, to promote the market uptake of renewable electricity and renewable heating and cooling technologies by European companies or start-ups, and to distil good practices and policy recommendations.

Results, impact, and reasons for the success

All publicly (co-)funded research in the fields of renewable energy and energy efficiency coming out of European research centres was eligible for support through ProRETT.

- 63 technologies proposed for commercialisation by technology developers were evaluated.
- 31 technologies were considered a priori as business opportunities and were further assessed.
- 26 technologies seemed to have substantive business potential and received individual support.
- 22 technologies proved to be "truly commercially promising". ProRETT helped the teams behind the technologies develop business plans and concepts and prepared them for contacts with investors.
- 10 spin-offs were created with the help of private investors; 2 licensing deals are still pending.

With the support from ProRETT, the percentage of successfully commercialised technologies was ten times higher than the industry average: 16% of the technology proposals could be developed into start-ups, while venture capital funds typically invest in only 1-2 proposals out of every 100 proposals they receive.

ProRETT raised about five times its own Commission funding contribution in the form of private investments in R&D results, thus demonstrating a strong leverage effect.

The 16% commercialisation rate, the 10 start-ups created, as well as the 5-fold return on the Commission's financial contribution in form of private follow-up investments make ProRETT a very successful project.

This positive outcome can be explained:
First and foremost, ProRETT recognised the full complexity of innovation processes and addressed them accordingly. It relied of an individual coaching approach for each technology instead of developing one-fits-all-solutions. The coaching put people in the centre of the innovation process, and not a technology.

To competently address this complexity and the multiple barriers that need to be overcome, ProRETT pooled the entire range of innovation expertise within the consortium: it brought together researchers, transfer officers, technology transfer professionals and investors. Innovation patterns and actors differ from one sector to another, and the ProRETT-team's good knowledge of the energy sector adds a further explanation to the success.

The European dimension of the project enabled the team to tap transnational business opportunities and to match partners beyond national borders.

ProRETT has demonstrated that tailor-made sector-specific innovation support at EU level can really make the difference.

From research to market with the help of individualised innovation support services

The list of support services below illustrates the kind of assistance that the innovation professionals from the ProRETT-team have provided to researchers or staff from the R&D centres' technology transfer offices:

- Assessment of the commercial potential of the R&D result
- Risk analysis (market, financial, entrepreneurial risk)
- Advice on IPR management and exploitation
- Definition of an exploitation plan
- Coaching in business plan development
- Brokering contacts with interested investors
- Help with licensing deals
- Entrepreneurial training for scientists interested in start-up creation
- Assistance in start-up creation
- Continuous management support to young entrepreneurs

The different support services require a host of complementary expertise, and it would be very expensive and ineffective for most research centres to build up a transfer office capable of offering all these services. ProRETT could pool the required complementary and senior-level expertise and still be effective in using its resources because it was able to evaluate a large number of technology proposals. A ProRETT-type action becomes efficient from a minimum of 30 technology proposals per year.

Exit strategy

ProRETT–type innovation support services are based on a structured and innovative methodology that can be applied to other sectors beyond renewable energy and energy efficiency, and especially to those sectors with a highly decentralised R&D base, a relatively high importance of public research funding, and a high SME penetration. This definition typically applies to all environmental technologies.

In order to continue what has been successfully tested under ProRETT, some of the innovation professionals from the ProRETT team have created a joint organisation: Greenovate! Europe has its own legal entity and will continue the ProRETT-type innovation support services at EU level, with a sole focus on environmental technologies.

Technology developers, investors and policy makers are invited to contact Greenovate to discuss their ideas with our innovation experts.

February 2008

Greenovate! EUROPE

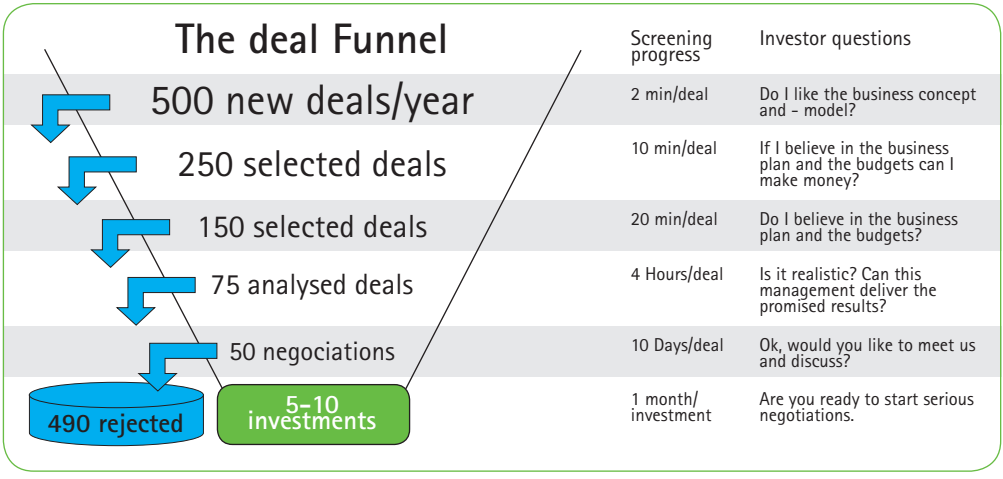
www.greenovate-europe.eu

Why expertise matters

Lessons learnt from the ProRETT Project

1. Introduction

Investors dealing with the exploitation of technology-based innovations today follow very stringent selection procedures. In essence this is depicted in the figure below. As a result, we observe that investors only fund 1-2 out of every 100 technology based innovation projects presented to them due to their investment criteria[1].



This booklet describes a new approach to improve technology-based innovations so that they can be commercialised more efficiently, with an emphasis on research output related to the renewable energy sector, which has been initially funded with the help of public money.

The ProRETT approach has so far dealt with 63 received proposals for technology-based innovations in the energy sector, leading to 10 investments. This is a ten-fold increase in effectiveness. This breakthrough result is based on one key finding:
Innovation in the energy sector is changing because the whole economic landscape is changing. Needless to say that old recipes based on closed innovation models are no longer working. Open innovation becomes the rule, the ProRETT players are encouraging business development through intense networking at all levels (R&D, manufacturing, sales, maintenance).

This booklet targets technology developers, investors, incubators and technology transfer offices at public research laboratories. It details the lessons learnt form a two-year real life experiment that was conducted by the ProRETT partners.

[1] *Current IRR (Internal Rate of Return) values for investors stand around 30% to approve an investment*

2. The innovation paradigm in a changing market environment for energy technologies: changing and invariant features

The increased use of renewable energy sources is linked to a paradigm shift of innovation processes in the energy sector. This paradigm shift has several features:

- the unbundling of electricity and gas companies has given birth to network operators that are regulated companies, which must allow a fair access to the electricity or gas market for any new player (producer or retailer),
- the liberalisation of energy markets where independent producers and retailers using renewable energy sources can now enter the market,
- the CO_2 abatement objectives, which will favour carbon free energy sources whenever possible,
- the advert of cheap, reliable IT components which can help either control energy production or energy consumption, while metering energy flows,
- the role of regulators in the Member States and at EU level, who now recognise the increased role of innovation to meet EU energy orientations (sustainability, security of supply, competitiveness).

Each of the above features will further catalyse future innovation processes, including the ones that lean on results or support work from public research organisations. Yet, innovation processes are also based on a few invariants, irrespective of the technology of interest and / or the application sector. Implementing an innovation successfully requires:

- a clear description of the new undisputable value brought to the market,
- the implementation of managerial processes that reduces the intrinsic instability of any innovation project,
- the right sizing of funds required to reach the first sales,
- the securing of early adopters onto which entrepreneurs will lean to surpass competitors

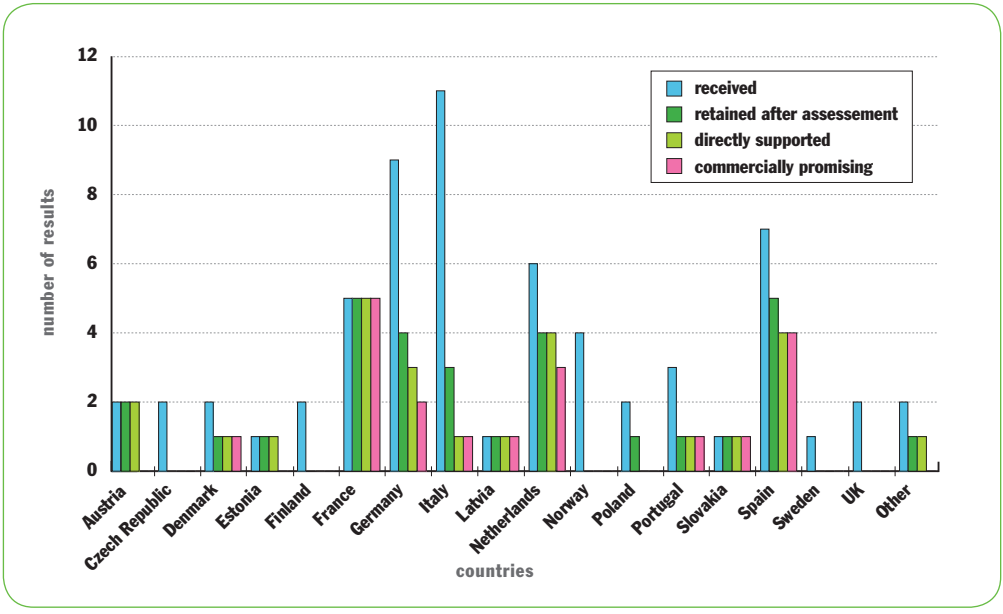
3. The projects supported by ProRETT

The European Renewable Energy Research Centres Agency (EUREC Agency) established individual contacts with research centres or other players identified. These encompass 70 research players and 16 technology transfer offices from 47 leading centres in the field, all members of EUREC Agency, progressively enlarged with more than 200 contacts from non-members of EUREC Agency involved in research in the fields of renewable energy and energy efficiency.

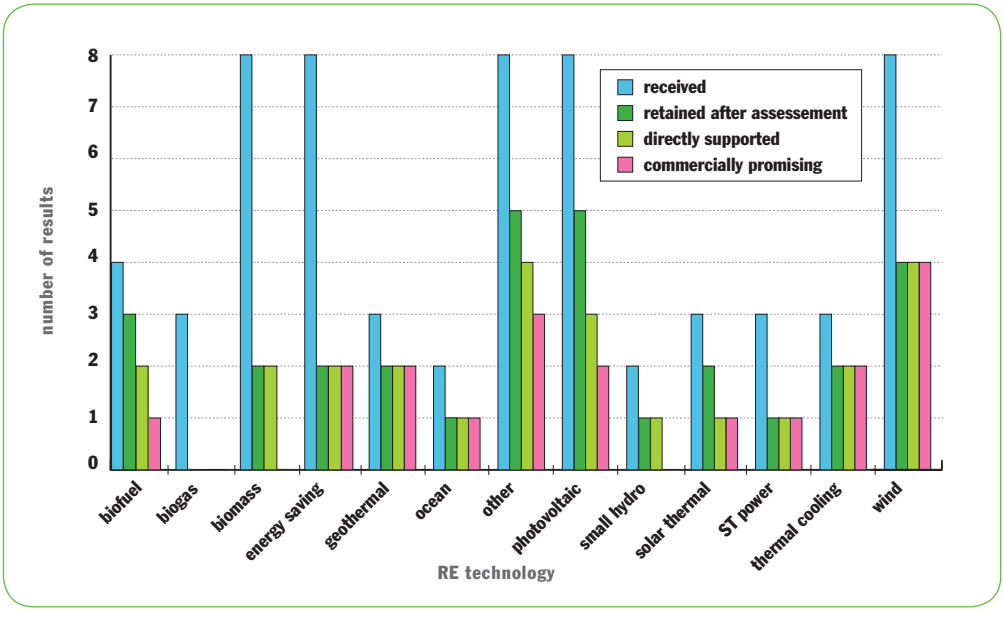
The ratio of research centres ready to make results available was lower than 10%, i.e. out of every ten centres contacted only one was willing to cooperate with actual results.

The following tables summarise the results obtained in the covered Member States and the type of technology supported by the ProRETT approach so far.

Results by country:

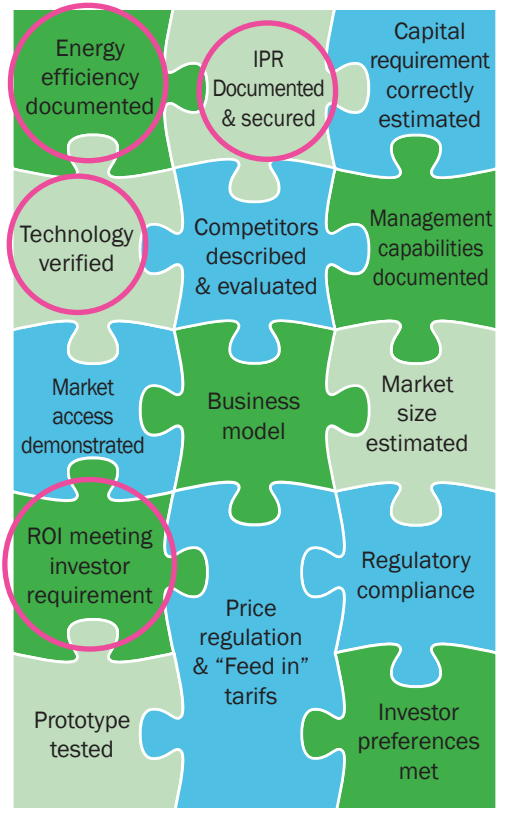


Results by type of renewable energy technology:



4. Lessons learnt from the ProRETT approach

Financing innovative renewable energy technology (RET) projects requires to put a 14 piece "Investor Puzzle" together (see figure below). This "puzzle" visualises the complexity of an investment decision in this sector. The pieces within the "circles" are the materials with which the ProRETT support process starts. The rest of the "puzzle" is left to the ProRETT process: first, the building blocks are shaped, and then they are progressively assembled to close an investment deal.



For the energy sector, a few building blocks are critical: the business model, the regulatory compliance, and the price regulations.

The following table summarises the lessons learnt out of this two year work to build tens of puzzles for each of the project examined.

Lesson N°1	In the energy sector, technology exchange is more suited than technology transfer to describe the processes by which research project outputs can reach market applications.
Lesson N°2	Assessing the readiness for commercialisation of a research project output is highly interactive and multidisciplinary.
Lesson N°3	The preferred route(s) for idea commercialisation must take into account the future investor(s) strategy (whether public or private).
Lesson N°4	Innovation embraces novel organisation and/or business model to reach the critical first sales, beyond the mere technology novelty.
Lesson N°5	The difficulty to assess costs to reach first sales can be circumvented by implementing a step-by-step funding approach in the business plan.
Lesson N°6	Research results require further packaging tasks to facilitate their take up by business players.
Lesson N°7	Researchers can become entrepreneurs, provided that they change their own decision process as project managers.
Lesson N°8	The IPR strategy must be addressed right from the start of the technology exchange process to avoid misleading decisions when contracting with industrial adopters.

Lesson N°1: In the RENEWABLE energy sector, "technology exchange" is more suited than "technology transfer" to describe the processes by which research project outputs can reach market applications.

Outputs from the field work

All the results that have been examined by the ProRETT teams fit within existing complex market schemes:

- either they improve existing products or processes,
- or they bring new ways to use renewable energy sources with some extra added value.

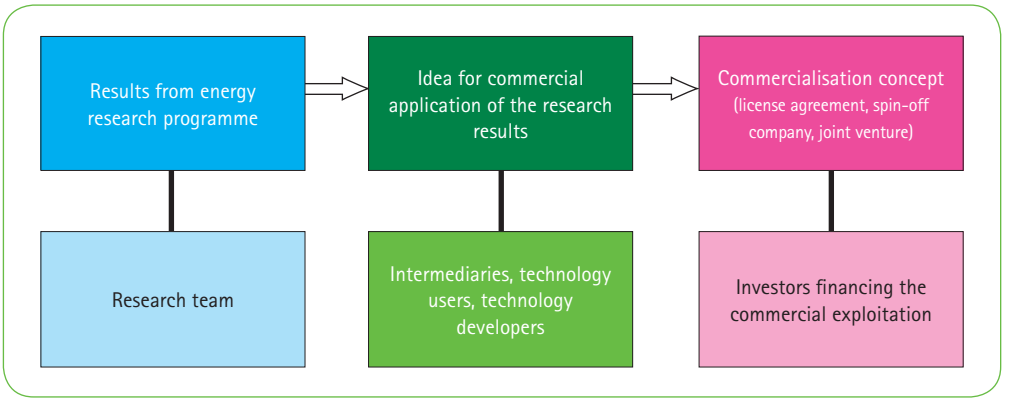
But at any rate, commercial adoption will require continuous exchanges of data, information, ideas, knowledge between the researchers and the developers that prepare market adoption. Hence:

- the image of transfer in a single step must be banished,
- researchers that are willing to market their ideas must comply with continuous relationship constraints during the idea development, very often leading to further contractual commitments with the "licensee".

In ProRETT, it has been observed that researchers had to make compromises between their internal activities and the new industrial players they are supposed to work with.

The ProRETT approach

ProRETT considers this technology exchange process as a business activity per se, as depicted in the diagram below.



Entrepreneurs, innovators, researchers (a single entrepreneur, a team, a public research laboratory) with the possible help of local intermediaries first develop a business idea using part or all of the knowledge gained in the Framework Programme or nationally funded projects dealing with renewable energy and energy efficiency technologies or services.

Investors evaluate the corresponding business models and eventually invest into the start-up phase of these businesses or the knowledge acquisition by existing firms based on several potential sources of financing[2]. Like any other business process, this technology exchange must lead to commercially viable results i. e. the development of sustainable profits based on the transferred technological knowledge, with a sound return on investment. Last, but not least, technology exchange via spin-off creation gains increased interest when new business models are required to reach market application.[3]

[2] *There are four principle options:*
- *Private equity directly aiming at commercial exploitation of the technology/business concept. This type of financing will only be attracted if an acceptable (high) rate of return on investment/growth potential can be expected. Private equity investment generally supports technology exploitation by existing companies.*
- *Loans which may cover operations, for instance the cost of manufacturing floor space or equipment needed to perform a service; unless guarantied by third parties most loans are only provided against collateral.*
- *Further public support such as subsidies or guarantees (for further demonstration, first unit purchase by a public body end user, or else).*
- *License fees to acquire the rights to use the technology or the knowledge under specific transfer conditions*

[3] *This is one finding of the 4th European Innovation Forum of DG Enterprise, held on 5-6 December 2004 in Stuttgart, Germany.*

Lesson N°2: Assessing the readiness for commercialisation of a research project output is highly interactive and multidisciplinary.

Outputs from the field work

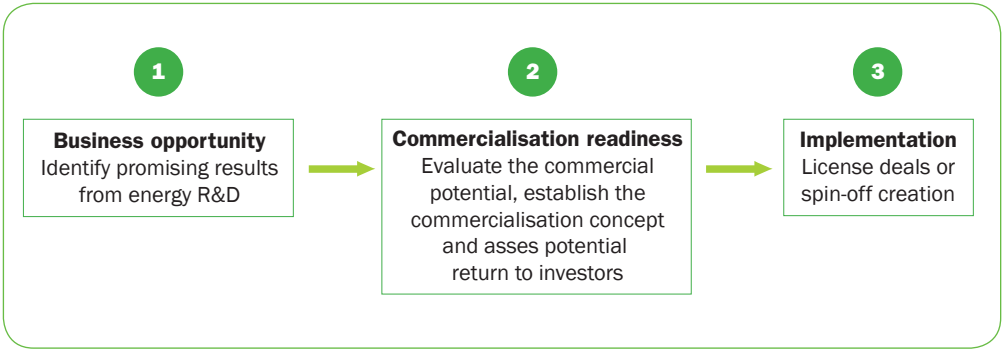
The process during which the stakeholders work together to fund the most appropriate deal is non-linear. It includes several iterations whatever the legal form reached as a conclusion for the deal. Five iterations are necessary dealing with:

1. the commercial readiness, i.e. how far the idea is from market use,
2. the assessment of the commercial potential,
3. the development of the commercialisation concept (which routes is best to reach market application),
4. the business model definition, dwelling first on value creation,
5. the funding needs according to the selected.

ProRETT has developed a structured process with interactions between the technology developers and the business developers that are managed according to the steps described below.

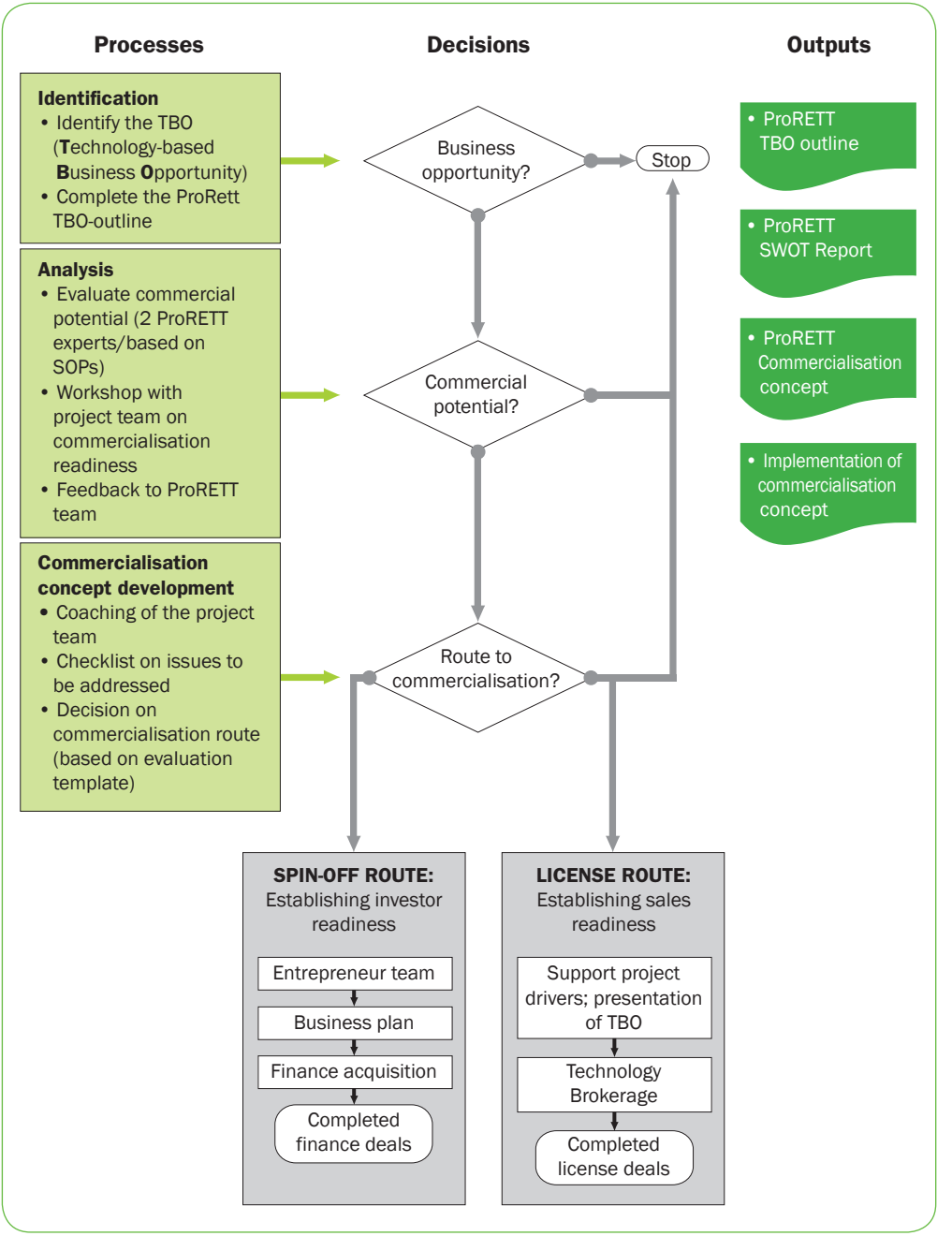
The ProRETT approach

The ProRETT process covers three steps to make research results reach the market:



1. Identify R&D results that present a promising business opportunity.
2. Evaluate the commercial potential and establish readiness for commercialisation, based on a well-defined commercialisation concept.
3. Implement the commercialisation concept through license deals or spin-off creation.

The process work flow is shown in the following figure:



1. The ProRETT Lead Coach (LC) receives a completed "Technology Based Opportunity (TBO) template", i.e. an idea for commercialisation.
2. The basic assessment of the TBO includes:
   - Work by lead coach and a second evaluator to decide on the follow-up of the TBO.
   - An initial workshop between lead coach with the TBO team (Signature of an individual non-disclosure agreement).
   - The consortium decides to follow-up the result based on lead coach's / evaluator's view.
3. The detailed analysis/evaluation of the commercial potential and funding possibilities.
4. The commercialisation concept development.
   - The lead coach coaches the project team to detail the commercial potential of the TBO.
   - The lead coach fills in the "evaluation template" to structure future work and documents the decision process. A second evaluator will assess the TBO.
   - Coaching means also support to the commercialisation concept.
   - The final decision on the concept is discussed within the ProRETT-team.
   - Coaching assesses financing needs from both public and private sources.
5. The researchers are informed about the decision and, if positive, about the next steps.

This standardised process to support the commercialisation process of R&D results has the following benefits: clearly structured support with well-defined procedures, transparent decision process, commercialisation based on team initiative, efficient technology exchange with the market players, Early assessment of realistic financing possibilities, early adjustment of project structure to increase commercialisation and financing possibilities.

The ProRETT added value covers: a European market appraisal using a network of energy experts, instant links with investors to strengthen business models and business plans, coaching of entrepreneurial teams that want to create start-up companies, coaching of RTD managers that want to find license agreements.

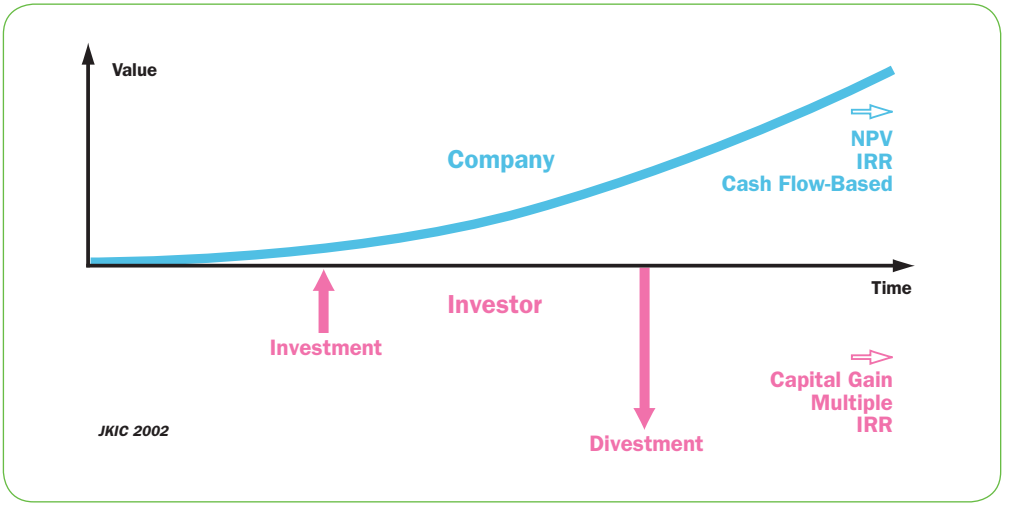
Lesson N°3: The preferred route(s) for idea commercialisation must take into account the future investor(s) strategy (whether public or private).

Outputs from the field work

Public researchers or entrepreneurs using public research results must understand that investors in ventures DO NOT view their commitment with the same eyes:

- the project manager sees a continuous set of actions to reach exploitation and, hopefully, profits from using public research results,
- an investor sees a discontinuous set of commitments (one or several deal closing steps) where, once the investment has been made, he/she is expecting exit conditions that are favourable.

[4] *For the assessment of TBOs a list of assessment criteria includes: Innovation and technology, Market, Team and company, Finance, Cost-benefit of supporting TBO*



The ProRETT process aims at supporting innovation projects by taking into account the investor's viewpoint: public investors (via subsidies or loans) are preferred when the validation or demonstration risks are still too high to attract private ones. Private investors (small venture capital (VC), business angels, corporate funds) can be involved depending upon the sector of use and their own investment orientations.

The ProRETT approach

The assessment of the commercial potential of the TBO is based on 3 steps: the basic analysis by the lead coach and a second assessor, the initial workshop, the decision on commercial potential based on the expected investor profile. These steps are described hereafter.

The analysis by the lead coach and the second assessor values the commercial potential of the TBO. This assessment uses information on "innovation" and "market" since, due to the early stage of the commercialisation process, information on issues such as team, financial needs and possible return on investment for investors are in most cases not available or cannot be assessed. As a result of the basic evaluation process a short evaluation report is produced which contains the evaluation results and a SWOT (Strengths-Weaknesses-Opportunities-Threats) analysis of the TBO.

The initial workshop is the first intensive discussion between researchers – responsible for the potential team for the spin-off – and the lead coach. It:

- enables the participants to build up an atmosphere of confidence and trust,
- offers the easiest way to answer open questions regarding the TBO,
- generates a more holistic view of the TBO for the lead coach and
- permits the possibility to set up a roadmap for the upcoming work to be done.

The workshop is divided into three main steps: analysis, planning and assessment. **Analysing** the TBO covers the innovation potential, the relevant stakeholders and their interests, conflicts and relationships as well as the business idea. **Assessing**[4] the TBO focus on Indicators to measure progress of work Identification of underlying assumptions and risks the SWOT analysis of the TBO. **Planning** issues become important when the decision for commercialisation route has been taken:

- Realistic, achievable, specific and measurable objectives,
- Results and outputs, i.e. objectives translated in measurable values,
- Preparation of a work plan,
- Estimation of financial resources.

Both the format and content of the workshop have to be adapted to the individual needs of different TBOs. Progress in understanding and assessment, establishing a good working atmosphere between all participating parties and a clearly formulated working plan are critical. Since content and form of the workshop differ widely depending on the individual needs of the TBOs, the minimum set of results can be defined, which may differ for different TBOs:

- Deeper understanding of business concept (including marketing strategy),
- Clarification of status of the intellectual property rights,
- Outline of further work to be done (e.g. R&D),
- First overview on financial needs and return of investment,
- First steps towards an acquisition strategy for investors,
- Elaboration of a task list, including work allocation and time schedule until reaching the milestone "decision on commercialisation route"

The main outcome of the workshop is the definition of the next steps for researchers and the ProRETT partner responsible.

Lesson N°4: Innovation embraces novel organisation and/or business models to reach the critical first sales, beyond the mere technology novelty.

Results from the field work

A successful market appropriation in the energy sector includes also the solution to non-technological barriers such as:

- reduction of marketing and commercial costs to reach the first clients,
- indirect sales via distributors to facilitate the penetration of foreign markets,
- new sales techniques, such as the use of the Internet, to address worldwide clients with appropriate packages.

[5] *"Creating a successful business model is much like writing a good story... And because it tells a good story, it can be used to convince customers of a company's value proposition, and align collaborators around the company's value creation process."*

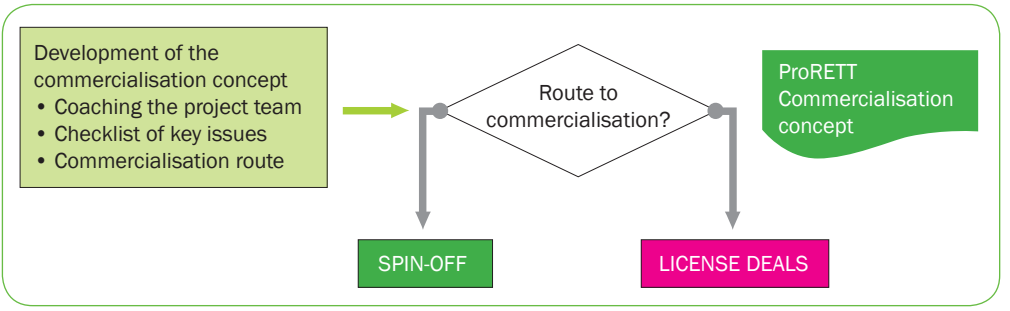
ProRETT provides a structured marketing approach by combining the expertise of several Member States to address new potential markets.

The ProRETT approach

ProRETT helps to develop the commercialisation concept:

- To provide a European market appraisal using a network of experts.
- To validate the entrepreneurial team talents: start-up case.
- To validate managerial talents: the technology transfer case.
- To validate the economic feasibility.
- To infer a coherent business plan, the mix between management, entrepreneurship skills, market needs and funding requirements.

The criteria influencing the commercialisation concept are: the business opportunity (innovation / technology, market), the team (vision, entrepreneurial attitude, and capability), the economic feasibility (business model, investment needs, ROI)



A roadmap is then required: this is the Business Plan to face unexpected events, to make sure the team sticks to the initial orientations, to present the business opportunity to investors. The Business Plan supported by ProRETT insists on a clear, understandable description of the business opportunity. It provides convincing arguments that make this business opportunity credible. It also formulates a direct request to investors, strategic partners, or potential employees to join within appropriate contracts the business development project, while analysing the strengths and weaknesses of the business concept. In the energy sector, the **Business Model must be convincing based on** a description of the business with respect to its value creation and market-orientation, combining elements of resourced-based and market-based viewpoints of the business[5] (Value proposition, Configuration for value creation, Revenue model).

Why do Business Models matter particularly in energy innovation?

- Customer benefits are not fully realised: the reduced environmental impact never fully translates into reduced private cost for the consumer, because the environmental externalities of conventional technologies (such as the damages caused by CO_2 emissions) are not fully internalized in market prices.

- The high capital costs of new installations.
- Reluctance to change – due to economic interests to fully exploit previously installed infrastructure.

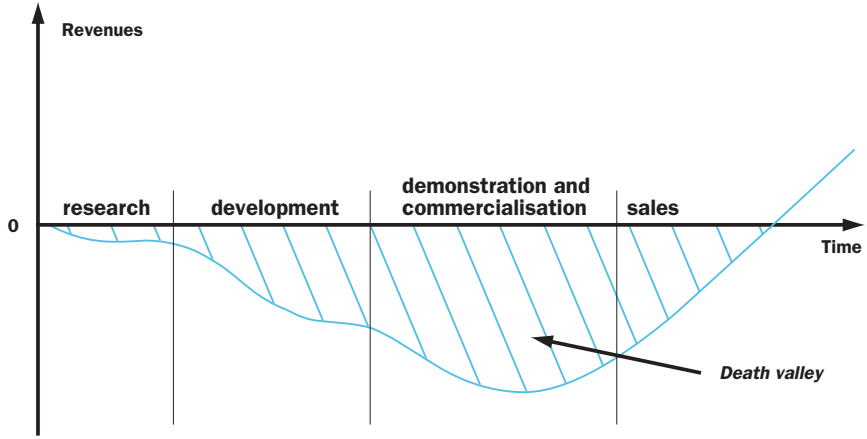
Business model innovation is what distinguishes superior companies. The **change of the innovation paradigm** in the energy and environmental markets will create many new opportunities to develop such innovative business models.

Lesson N°5: The difficulty to assess costs to reach first sales can be circumvented by implementing a step-by step funding approach in the business plan.

Outputs from field work

One of the main barriers for RET technologies to reach market applications is to appraise carefully the cost of first sales. Appraising these costs correctly require a careful analysis of the prototyping and industrialisation costs, the marketing and sales costs, the maintenance and support costs during the early life. Unless an industrial investor brings his/her internal expertise to help public researchers, there is a need for a multidisciplinary approach to size the costs and revenues of this critical development phase, which in turn has an impact on the investment needs.

ProRETT provides a structured approach with the marketing and technical experts, and sometimes with the investors, to size the cash needs. Sizing the right amount of funds is one of the most critical steps to pass through the "death valley", which exists before the first sales occur.



The ProRETT approach

The structured approach addresses:

- The **commercialisation concept**
  - When is the technology ready?
  - What is the market?
  - How much does it cost to reach the market?
  - What will be the direct and indirect competition?
  - What will be the client, client of the client and marketing partner benefits?
- **The funding requirements**: Equity, loans, subsidies (public/private), or a combination
- The **expected profits**
  - The start-up case: reach positive cash flow and increase profitability to ensure the best exit conditions for everybody: there is no a priori time limit for the deal
  - The idea transfer case: a win-win situation to be found where profits from sales pay for the initial research costs and beyond: there is always a time limit

The successful promotion of research results towards market exploitation requires assessment of the project along these dimensions.

Lesson N°6: Research results require further packaging tasks to facilitate their take-up by business players.

Outputs from the field work

The packaging of the research results to be developed into products or services is highly critical for the rapid success of the technology exchange project. Most often, before any commercialisation decision is taken, there is a need to define what can be developed and marketed, and the value it is supposed to bring, based on the technology developer opinion. Here packaging means: experimental or simulation data bringing the proof of novelty, designs and mock-ups that can be inspected, IP rights and duties typical of the organisation where the work has been performed, what is excluded from the cooperation agreement. ProRETT uses an approach where research project holders are guided within a simple data sheet to provide enough information for the external experts to design a first opinion about the idea market potential.

The ProRETT approach

Right from the start of the contacts, the ProRETT coaches have in mind the funding constraints to reach market applications. The coaching process used by the ProRETT process implements guidance and tools to package the knowledge according to the future funding options and investors requirements, whoever they are.

Financing innovative RET projects requires to start putting the 14 piece "Investor Puzzle" together with packaged data on the knowledge to be valorised. When putting the "investor

puzzle" together, new insight to address issues and opportunities is brought in. Speeding up that process requires well structure knowledge to start the iterative process as depicted below.

From idea to investor contact

1. The idea!
2. Revised and realistic business plan
3. Realistic capital requirement
4. Realistic investment memorandum
5. Investor contact

The initial **workshop is most important for packaging the results.** The preparation tasks include work both from the researchers and the ProRETT coach. The ProRETT coach performs his / her own investigations on technology and market. It is necessary to check and verify data e.g. on technology and market given by the researchers. Next a list of complementary tasks for the researchers is prepared, e.g. regarding:

- a more detailed market analysis including potential customers, competitors, potential transferee for licence.
- more detailed information on technology and innovation including state-of-the-art, competing technologies, potential for further development, intellectual property rights.
- more information on the research team and its ambitions.

The researchers have to perform the task requirements before the workshop occurs. The workshop lasts 4 to 8 hours depending upon the issues to be addressed. A successful workshop is one where the knowledge to be valorised is clearly depicted together with its value content when sold to the expected clients.

Lesson N°7: Researchers can become entrepreneurs, provided that they change their own decision process as project managers.

Outputs from the field work

The profession of researchers (who are publicly or privately funded) is geared to one basic goal: **to be right** in understanding and explaining new areas of science and technology. They are supposed to produce this new knowledge which, in turn, can be used and implemented fruitfully in industrial and commercial applications.

Entrepreneurs are geared to take orders with products or services: they have **to be the first** ahead of competitors.

The necessary condition for a researcher to become an entrepreneur is to understand that the decision process "to be right" differs highly from the one "to be the first". ProRETT supports public researcher in advising them on the best way to join an enterprise thus participating in the technology exchange process, which will lead to the successful commercial exploitation of their ideas.

The ProRETT process

ProRETT measures the decision profiles of researchers that are willing to enter commercial exploitation with outsiders. It helps guide the future innovation team when a start-up is envisaged. The following issues must however be emphasised:

- The commercial potential of a TBO is strongly related to team capabilities. The average team profile of a TBO is characterised by highly qualified researchers, who most likely lack the appropriate management abilities, which a management team must exhibit from the start, thus avoiding the "one man band" syndrome often encountered in technology based ventures.

- In all cases, as to be expected, the scientists do not have much commercial expertise. Surprisingly and despite their commercial ambitions, they usually do not seek to integrate into their proposal or to identify external persons who can COMPLEMENT their own technological skills. This is one of the main challenges for successful implementation of spin-offs: matching commercially experienced talent from the private sector, with scientists from the institutes. Moreover, such external talent must be willing and able to thrive in a start-up environment.

The projects coming form public research are much less mature and ready for potential commercial exploitation than normally seen when dealing with entrepreneurial teams looking for commercialisation opportunities. There is little if any understanding of investor requirements and an almost complete lack of understanding of time and cost involved in moving a project from the research level into an industrial project.

Lesson N°8: The IPR strategy must be addressed right from the start of the technology exchange process to avoid misleading decisions when contracting with industrial adopters

Outputs from the field work

In the energy sector, idea maturation can take a long time very often between 5 and 10 years before the first sales start. The IPR strategy (patenting, disclosure, licensing, and exclusivity) is therefore critical to pave the way for a successful cooperation. Each public research laboratory or university has its own rules, with very different approaches throughout Europe. ProRETT advises public researchers with their Technology Transfer office about the IPR strategy and its costs.

The ProRETT approach

Disciplined efforts allow conducting simple checks to assess the commercial potential and funding needs of a new business idea. One of the three options will then be pursued: Licensing, Business development through a dedicated spin-off, Postponement until further development/ results have been obtained.

At any rate, contracts will have to be signed based on rights and duties acquired during the research phase.

Licensing appears an easy way of commercialisation when compared with the spin-off route. Nevertheless, the variety of situations makes the licensing route a difficult path full of unexpected obstacles. Technology Transfer Offices (TTOs) usually negotiate and sign licensing agreements with industrial organisations: they feel well prepared for the legal writing up of the licensing agreements and the IPR management. Nevertheless, the very same TTOs feel uncomfortable during the negotiation of license conditions with energy industries, especially those related with market issues: expected sales, competition risks or exclusivity clauses which will lead to set a pricing strategy for the license negotiation.

Moreover, new complexity arises when the license is negotiated between the research organisation and the research teams who try to promote a spin-off company. The license conditions may collide with the fact that the research organisation wants to become a shareholder of the spin-off. The amount of royalties to be paid by the spin-off company to the research organisation may reduce the future potential benefits of that new company.

Also, the spin-off teams might be interested in licensing the technologies developed to, for instance, other industrial companies able to manufacture and commercialise the product, or to companies working in non-energy industrial sectors.

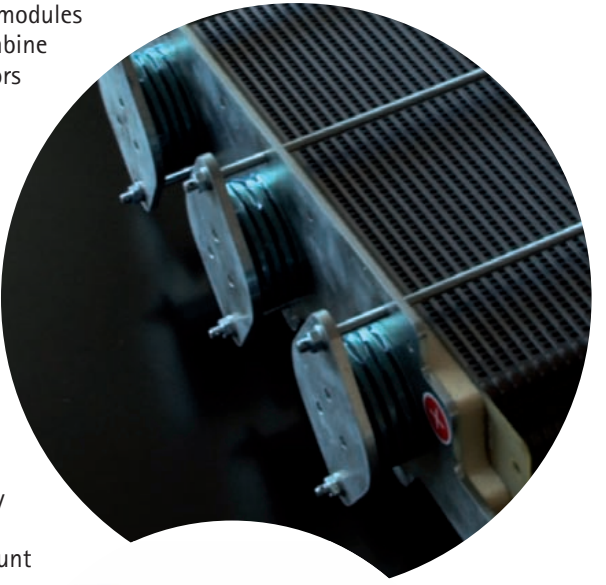
All this shows that the technology transfer offices, and the researchers need expert external support to go through the licensing commercialisation route, preparing the contractual frameworks to be written by authorised lawyers.

Testimonials

High performance cost-efficient fuel cell systems (0,5-20kW)

Technology description

High performance, cost-efficient fuel cell modules in the 0.5-20 kW range. These systems combine the benefits of batteries and generators while eliminating their disadvantages. The technology was derived from PEM FC activities at the ZSW. The unique system design allows for low complexity, easy manufacturing, scalability and modularity resulting in truly competitive cost without sacrificing performance, durability and reliability.



Competitive advantages / Innovative characteristics

- Smaller and lighter than battery solutions and competitor products
- Modular and scalable, 19" rack mount capable
- Latest fuel cell technology, low system complexity and a unique packaging concept result in an cost advantage compared to competitor products
- Zero-emission, low to no noise, no potential spillage of oil, gas, acid or lead.

Testimonial from the technology developers

To whom it may concern,

FutureE is a German start-up company offering PEM fuel cell system based power supply solutions in the power range of 0.5–4 kW. Due to the modularity of our units, power supplies up to 20 kW can be used for a multitude of possible applications, such as UPS, off-grid power, auxiliary power units, material handling, ground support equipment, boat power, and light electric vehicles.

The support provided by the i.con innovation team in the context of the ProRETT programme has was significantly contributed to the successful start-up of our company. Invaluable support provided by icon particularly in

- Developing our business model and commercialisation concept.
- Formulating and focussing the business plan to comply with investors needs.
- Setting up a financing concept to include different groups of investors, such as private (business angels) and institutional investors.
- Setting up contacts and arrangements with potential investors.
- supporting and coaching during negotiations with investors especially in moderating discussions with different kinds of investors.

This leads to the successful close of our first finance round and the setting up of our company.

During our ongoing next finance round we are continuing the cooperation with i.con. innovation, and again relying on their outstanding support in our search for investors.

Yours sincerely
Mark-Uwe Oßwald
Managing Director

Technology description

The Vertical Axis Wind Turbine technology is a vertical axis wind turbine (VAWT) that uses magnetic coupling between the rotating mechanical outfits and the power generator. Blade profiles have been numerically design to maximise the yield.

Competitive advantages / Innovative characteristics

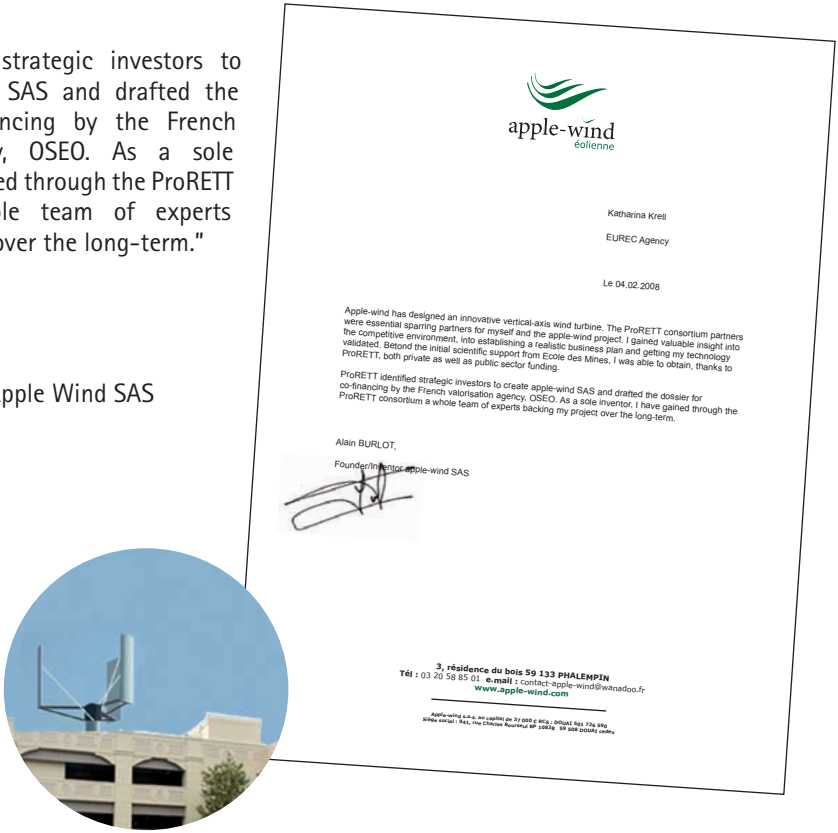
- Works in all wind directions. Delivers more power than competitors for the same swept area.
- Short mast.
- Manufacturing costs significantly lower than current VAWT Technology.

Testimonial from the technology developer

"The ProRETT consortium partners were essential sparring partners for myself and the apple wind project. I gained valuable insight into the competitive environment, into establishing a realistic business plan and getting my technology validated. Beyond the initial scientific support from Ecole des Mines, I was able to obtain, thanks to ProRETT, both private as well as public sector funding.

ProRETT identified strategic investors to create Apple Wind SAS and drafted the dossier for co-financing by the French valorisation agency, OSEO. As a sole inventor, I have gained through the ProRETT consortium a whole team of experts backing my project over the long-term."

Alain Burlot
Founder / Inventor Apple Wind SAS


apple-wind
éolienne

Katharina Kreil

EUREC Agency

Le 04.02.2008

Apple-wind has designed an innovative vertical-axis wind turbine. The ProRETT consortium partners were essential sparring partners for myself and the apple-wind project. I gained valuable insight into the competitive environment, into establishing a realistic business plan and getting my technology validated. Betond the initial scientific support from Ecole des Mines, I was able to obtain, thanks to ProRETT, both private as well as public sector funding.

ProRETT identified strategic investors to create apple-wind SAS and drafted the dossier for co-financing by the French valorisation agency, OSEO. As a sole inventor, I have gained through the ProRETT consortium a whole team of experts backing my project over the long-term.

Alain BURLOT,

Founder/Inventor apple-wind SAS

3, résidence du bois 59 133 PHALEMPIN
Tél : 03 20 58 85 01 e-mail : contact-apple-wind@wanadoo.fr
www.apple-wind.com

Technology description

The company offers accurate short term (less than 3 days) and medium term (less than 3 months) wind forecasts. The services are needed to sell the electricity generated by wind farms companies in the daily markets, to plan the wind farm maintenance and also to optimise the management of transmission and distribution networks and power plants.

Competitive advantages / Innovative characteristics

According to published data, the existing forecast services have an error in the 25%-30% range, and even higher. The Global wind forecasters' service is able to provide forecasts with an error margin lower than 20%, even in complex terrain.

Testimonial

"The ProRETT consortium partners introduced us the idea of Spin-off, evoking the real market potential of the products from our lines of research. They were of fundamental importance to the development of our Business Plan, contributing with valuable comments since the first sketch up to the final version. They had us a clear view on the legal frame to establish the relations between Global Forecasters, Ltd. and CIEMAT. Furthermore, they oriented us about private and public sector funding sources.

We are extremely grateful for their initiative!"

Alexandre Araujo Da Costa
Shareholder
Global Forecasters

Technology description

The innovative product includes a CoMeTas's proprietary silicon carbide membranes and can be integrated with already existing bio-gas plants. The ceramic membranes are manufactured from silicon carbide, a superior robust and durable material, which gives the membranes a significantly higher flux offered at competitive prices. The membranes can be manufactured with pore sizes between 0,02 – 33 µm (ultra- and micro filtration) in flexible module sizes having membrane areas up to 15 m2 per unit.

Competitive advantages / Innovative characteristics

The product is easy to use and has a high and cost efficient cleaning level.

Testimonial

"BioFuel Technology has benefitted greatly from sparring with the ProRETT consortium partners. Throughout the entire process, the consortium partners have given valuable and excellent advice and support, so that many pitfalls have been avoided and opportunities captured.

With the help of ProRETT, the strategy and business model was reshaped so that BioFuel Technology could be presented to investors with an attractive profile that secured the first round of financing."

Carl Johan af Rosenborg
Chairman of the Board of Directors
Biofuel Technology A/S

Observations and conclusions

Today, almost all research centres have their own technology transfer office (TTO). Not all TTOs offer the same or similar support to the commercialisation of R&D results. Some merely assist researchers with patenting issues; others even offer incubation services. However, the overwhelming majority of TTOs do not have the capacity to provide the entire range of innovation support services needed to reach the market.

Considering the financial implications of offering all innovation support services, it quickly becomes obvious that public research institutions cannot afford to recruit all technical, legal, managerial and financial expertise. Not to mention the networks needed and the in-depth industry knowledge.

However, each team willing to commercialise research results should be able to have easy and affordable access to the full range of innovation services. Hence the added value of the ProRETT team.

Technology transfer is a business activity per se and can only be successfully tackled if it is addressed with the right means. The possible pitfalls are multiple, and newcomers have ample chances to fail. Yet, failure is not a fatality if the innovation process is professionally managed by innovation experts with sufficient sectoral knowledge.

Finding a private investor is not an easy task, especially when his expected return on investment is not adapted to the particularly lengthy innovation cycle of energy technologies. The relatively important capital needs for a technology that still has to undergo demonstration at full life scale prevent energy technology innovations to be taken to the market by the famous "family, friends and fools" and business angels only. A professional investor is needed in most cases.

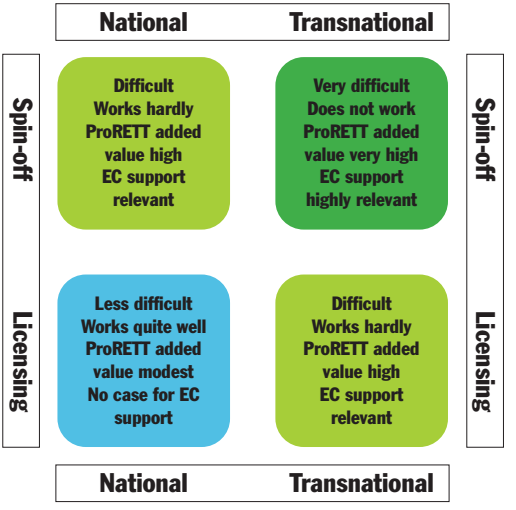
Europe is still lacking a patient technology development fund working below market return on investment expectations and operating at EU-wide level to spur the market introduction of environmental innovation.

EC

Commission funding was crucial for the success of the ProRETT project, allowing the team to go through a learning curve and develop the common track record needed to convince public R&D centres to cooperate. But it is also provided the extra funding for commercialisation activities that R&D centres are rarely ready to invest on top of what they already spend on their own transfer offices.

EU

Spin-off creation and licensing can happen at regional, national or international level. The consortium observed that licensing at regional level is happening relatively smoothly between actors that already know each other. Spin-off creation is more complex in the sense that it involves the creation of a new entity that has no credit worthiness with banks, no proven team and no working business model to lean on. The differing levels of complexity can be summarised in the graphic below. We deduct from these facts that the higher the complexity of the process, the higher the added value of ProRETT.



The ProRETT-team

The ProRETT-team offered expertise for all parts of the innovation value chain from research to market.

European renewable energy research

- EUREC Agency – the European Renewable Energy Research Centres Agency - Europe

Technology and knowledge exchange / Innovation management / Business development

- Asesoria Industrial Zabala SA (AIZ) - Spain
- i.con. innovation GmbH (ICON) - Germany
- Technofi SA (TECHNOFI) - France
- Mermaid Ventures / InvestorNet – Gate2Growth initiative (MERMAID) - Denmark

Innovation finance / Private investors

- Axiom Venture Capital (AXIOM) - Germany - Belgium

European renewable energy industry

- EREC - the European Renewable Energy Council - Europe

Annex

The barriers preventing research results to reach market applications

The value of public funded scientific research to society consists primarily in the development of new or improved technologies, materials, processes and applications that support sustainable growth and create employment in a knowledge-based competitive economy. Yet, society can only benefit from research results if these are transferred from the laboratories to the market as licensed technology or through spin-off companies created based on the business opportunities provided by these research results.

It has been widely recognised that too few projects initiated under both national as well as EU funded research projects find their way to commercial exploitation. At present, only 5% of innovation in Europe can be attributed to public funded research. It has also been widely recognised that there exists a lack of communication /information channels between the R&D institutions and financial institutions as providers of financial support for the commercial exploitation of the said results, and industry.

The above facts and figures are of extreme relevance in the sustainable energy sector. The reason is that, for sustainable technologies, a number of typical macro-economic barriers are persisting that hamper successful commercialisation beyond what is usually observed in any industrial sectors.

The ProRETT process addresses both the so called "macro and micro barriers" for which a differentiation has been suggested in a recent study of the e7-group:

- **Micro barriers** exist at the project level; they may arise from lack of management or financial capacity as well as technological factors that hamper commercialisation readiness. Micro barriers can be identified and addressed directly through focused, committed actions from individual stakeholders for each RTD project.
- **Macro barriers** can be identified at the policy, societal or macro-economic level. Macro barriers to energy technology diffusion may be rooted in financial, legal, political, institutional, and technical issues. Addressing these macro barriers requires broad, coordinated initiatives from various sustainable development stakeholders. These include especially the environment for energy technology transfer established by political and societal actions.

The ProRETT process establishes a validated a new framework for technology transfer which addresses both the above micro and macro barriers. The most significant barriers are often referred to as "market, technology, financial and managerial" barriers, as described below:

- **Market barriers** come from an insufficient analysis related to markets potential, cost and revenue estimates, or the effect of environmental externalities of existing technologies

that are not internalised in market prices (see below). In many cases these barriers are connected to the absence of conditions required for the use of a new technology, (e.g., the prohibitive cost of a raw material because a market for such material has not yet been developed) limited capacity in certain production processes, lack of standards and technical regulations, inadequate service and maintenance facilities, lack of user-friendliness,...

- **Technology barriers** relate to a deficit of prototype performance with respect to existing technical solutions. In many cases these barriers are connected to :
  - Lack of partners to bring the technical solution from "prototype" to a standardised product,
  - Underestimation of both time and requirements to make a product or a service
- **Financial barriers** are related to a lack of understanding of investor's requirements and "information asymmetry" between 'technologists' and potential investors. Most professional investors fully understand that a project can face insufficient manufacturing capacity, or competing technological or commercial solutions. Professional investors have experienced countless examples where even experienced management teams have underestimated both time and requirements before a product becomes a standard industrial product. Often financial barriers are also connected to a lack of understanding of the accumulated financial requirements before a product is ready to be launched into the market.
- **Managerial barriers** relate to a lack of experience from the innovation players with the development of business models, marketing strategies and financial plans, together with an underestimation of size/number of financing rounds needed to create a cash flow positive company. Especially the required number of financing adds the "dilution risk" into the financial plans – a risk normally completely overlooked by inexperienced management teams. Basically, inventors are reluctant to be part of a team able to address all the above issues without a sufficient background to make the right decision even when things go wrong.

These barriers are very often not fully considered by research teams wanting to launch a new renewable technology into the market. Facing a single of these barriers may not be that prohibitive. Yet, when combined, they lead to insurmountable costs and delays in the planned revenue stream, which will lead to abandon the commercial development prospects.

ProRETT