



Sustainable Process Industry through
Resource and Energy Efficiency



6th SPIRE Brokerage Event

Frankfurt, 14 June 2018

Lessons Learnt and Improving Project Proposals

Mark Talford (Bristest)
Enrico Callegati (CRIT)
Project SPRING

www.bristest.co.uk



Context

- There are many different programmes for accessing EU funding
- If you are looking at preparing a proposal for a **SPIRE** project, it is important that you consider the context of what SPIRE needs to achieve and what has already been done
- Your project will be part of the SPIRE programme; not in isolation
- Moreover, SPIRE is a **Public-Private Partnership (PPP)**, through which the industrial community and the European Commission pursue a common goal through a 7-year action plan and dedicated budget

SPIRE Goals

SPIRE aims at integrating, demonstrating and validating systems and technologies capable of achieving two key resource and energy efficiency targets across all SPIRE sectors:

- **a reduction in fossil energy intensity of up to 30%** from current levels through a combination of, for example, introduction of novel energy-saving processes, process intensification, energy recovery, sustainable water management, cogeneration heat-power and progressive introduction of alternative (renewable) energy sources within the process cycle
- **a reduction of up to 20% in non-renewable, primary raw material intensity** compared to current levels, by increasing chemical and physical transformation yields and/ or using secondary and renewable raw materials
- a significant contribution to the political and societal objectives of drastic efficiency **improvement in CO₂-equivalent of up to 40%**

PROCESS EFFICIENCY			SUSTAINABILITY AND CIRCULAR ECONOMY			ENABLING SUSTAINABLE INDUSTRY DEVELOPMENT
Modelling and integrated process control	Process Optimisation	Valorisation of different energy sources	Adaptable processes using alternative feedstock	Recovery from Waste	Industrial Symbiosis & Water	
DISIRE	VULKANO	SUSPIRE	FReSMe	CABRISS	EPOS	STYLE*
MONSOON	DREAM	TASIO	ICO2CHEM	RESLAG	SYMBIOPTIMA	MEASURE*
iCspec	PRINTCR3DIT	CHPM2030	RECODE	BAMB	FISSAC	SAMT*
COCOP	ADREM	SOLPART	Carbon4PUR	REMAGHIC	SHAREBOX	INSPIRE*
FUDIPO	TERRA	I-ThERM	OCEAN	REE4EU	SPOTVIEW	HARMONI*
CONSENS	ROMEO	Indus3Es	REHAP	ADIR	ReWaCEM	SPRING*
CoPro	MEMERE	DRYficiency	KARMA2020	RESYNTEX	INSPIREWater	
ProPAT	MAESTRI	SMARTREC	MOBILE FLIP	PolyCE	ZERO BRINE	
RECOBA	IMPROOF	ETEKINA	Bio4Products	FiberEUse	SCALER*	
Morse	SIDERWIN	ECCO	SteamBio	ECOBULK		
	PRODIAS		MefCO2	Plasticircle		
	ibD		CIRC-PACK			
	ENSUREAL		CarbonNext*			
	SUPREME					
	DEMETO					
	NOVUM					
	PORTABLECRAC					
* = CSA Project Completed Project						

The proposal – where am I most likely to fail?

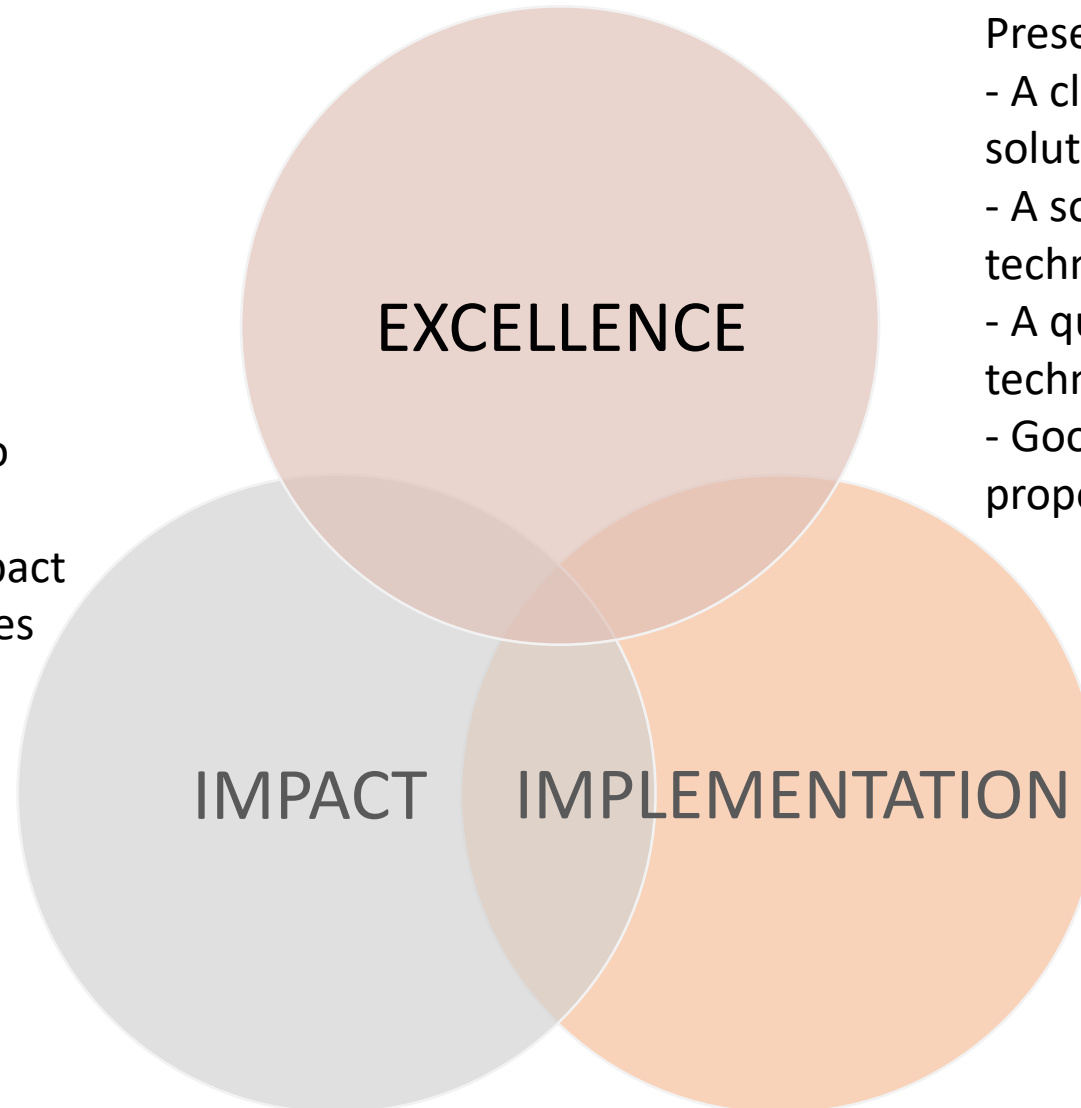
Often a lack of attention to critical factors:

Measures to maximise impact
Credibility of methodologies and figures used for

- Economic potential
- Environmental impact
- Replication potential

Business model

Outline business plan (at higher TRL)



Present objectives without:

- A clear description of the lack of adequate solutions to a technical problem
- A sound case for applying the proposed technology to the proposal field of action
- A quantitative assessment of the new technology's performance
- Good alignment between the actual proposal TRL and the type of action

Estimate resources based on the work to be undertaken

Ensure other direct resources are justified

Consider carefully the implementation plan

- Timing of deliverables
- Use of milestones

Risk analysis often much better than the contingency plans

Projects to help other projects...

Several Coordination and Support Action (CSA) projects have been funded to focus on cross-cutting, 'horizontal' issues that affect all SPIRE projects, whose findings can support your Impact section:



Standardisation
and regulatory
bottlenecks



Business models



Sustainability indicators and tools



Enhancing impact



Use of CO₂/CO and
fossil resources



Industrial symbiosis

Learning from Cross-Cutting Topics

- Sustainability Evaluation
 - Tools, methodologies, data, best practice
- Standards
- Business Models
 - How to make the business case for your innovations
- Impact
 - Exploitation of results
 - Managing and monitoring impact
 - Communication and dissemination
- Skills, Education and Training

Learning theme: **Sustainability Evaluation**

- STYLE, SAMT and MEASURE (2015-2016) looked at various aspects of sustainability evaluation and made recommendations for evaluations in general and those specific to SPIRE projects
- Key issues for sustainability evaluation in SPIRE projects:
 - **Lack of consistency** - in metrics and methodologies
 - **Lack of clarity** - regarding benchmark case, assessment boundaries and scale of potential impacts
 - **Lack of integration** - into the project decision making processes
 - **Methodologies and tools** – what's available and how to choose
 - **Sourcing data** - difficulties in finding and selecting appropriately
- Guidance produced for incorporating sustainability into SPIRE projects and methodologies for indicator measurement

General guidance for new projects

Set Scope –
Benchmark, Boundary, Functional Unit

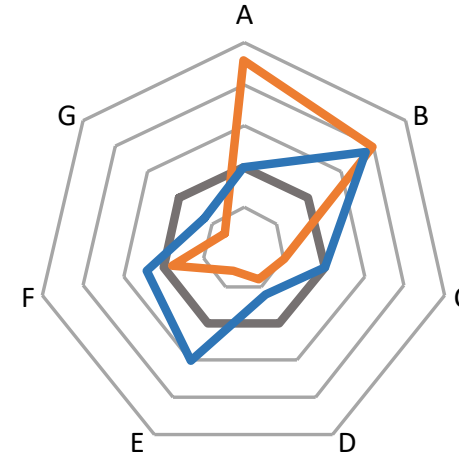
Start Simple – Qualitatively “what are you
aiming for your project to achieve?”

How will you get the evidence to prove this?
- **Quantitative** Data Plan

Visualise results against benchmark

Review at Project Meetings

— Baseline — Option 1 — Option 2



Trade-offs are always expected. You may be able to stop plastic ending up in the oceans, or save lots of water, but require more energy. Make this clear!

Talk to other SPIRE projects. Project SPRING will be starting a new “Sustainability Practitioners Group” to help share learning and develop methods across SPIRE projects



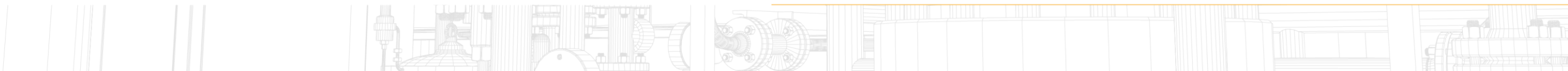
Template for communicating impact

What are the **key expected sustainability impacts** of ...?

(select Key Performance Indicators)

Baseline: e.g. 1000 te/yr [manufacturing plant of ...], using fossil fuel energy, conventional solvents, conventional heat exchangers etc., sited in Southern Spain, Cradle to Gate assessment (producing identical product; improving the process)

Indicator	Baseline	Expected Impact
Global Warming Potential (mainly CO2 emission reduction)*	Currently ~2 te CO2 equivalent per tonne of product	Unsure of impact; data to be evaluated in yr3 of project
Fossil energy intensity*	Cumulative energy demand currently ... MJ per tonne of product	May require higher energy usage; data to be evaluated in yr3 of project
Total material consumption*	No critical materials used currently. 250kg of fossil materials per kg of product	Expect 20% reduction in non-renewable raw material usage. Current evaluation shows 10-30% likely reduction.
Economic added value e.g. Annual Operating Cost of [manufacturing plant]	€2 million per year	Expect 5% reduction in OpEx
e.g. Toxicity of Process Chemicals	High tox process solvents in common use	Eliminate use of 'non-green' solvents



Resources that can help you



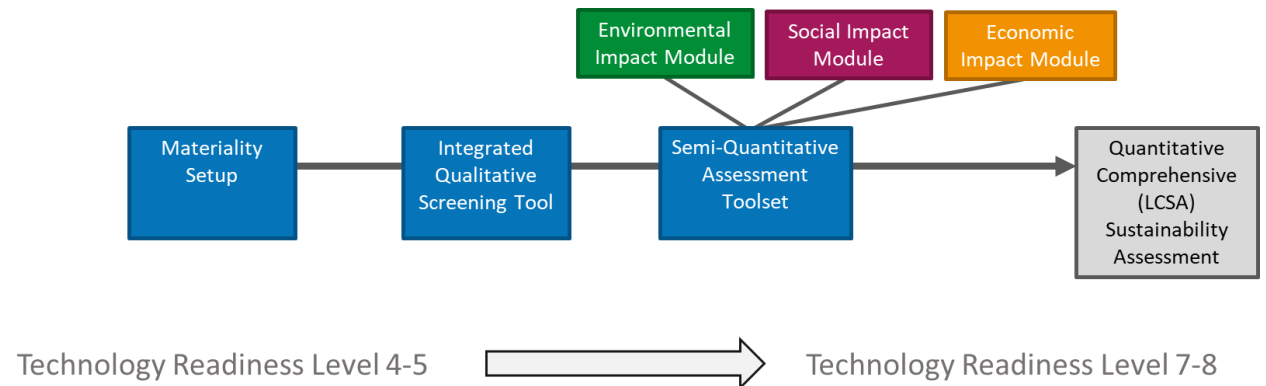
reports

Towards sustainability in SPIRE innovation projects
Current state in resource efficiency evaluation
Training slides concerning multi-criteria decision analysis
MEASURE Roadmap

RECOMMENDED LIFE CYCLE METRICS FOR THE EVALUATION OF THE SPIRE PPP TARGETS	
Recommended metrics	SPIRE sustainability goal by 2030
Cumulative energy demand [MJ] according to VDI 4600 guideline expressed in: - Non-renewable energy demand - Renewable energy demand	A reduction in fossil energy intensity up to 30 % from current levels;
Total material consumption [kg] grouped in: - critical/non-critical^[56] - fossil/non-fossil	A reduction of up to 20 % in non-renewable, primary raw material intensity compared to current levels;
Global warming potential calculated via infrared radiative forcing (100 years) [kg CO ₂ -eq.], based on IPCC data, 2013	Efficiency improvement of CO ₂ - equivalent footprints of up to 40 % compared to current levels.

STYLE publication

*Everyday Industry—Pragmatic approaches for integrating sustainability into industry decision making, Sustainable Production and Consumption, **13**, 2018, pp93-101*
<http://bit.ly/SPC-STYLE>



www.spire.2030.eu/measure, www.spire2030.eu/samt, www.spire.2030.eu/style

Learning theme: Standards

In order to ensure the greatest impact, standardization has to be included in your project from the proposal stage.

→ Screen existing standards

Browsing standards database can help you decide which standards would be useful for your project. If there is no standard that «fits» and you think a standard would bring value to your project, you might decide to contribute to ongoing standardization work or develop new standardization activities.

→ Contribute to ongoing standardization activities

If you want to contribute to ongoing standardization activities, your project can become a 'Liaison Organization'. This allows a representative of your project, once accepted, to participate in meetings of the relevant Technical Committee and contribute to the ongoing standardization work.

→ Develop new standardization activities

Identified standardization needs can be included as an activity (work package) in your project proposal. A CEN or CENELEC Workshop Agreement can be a first option as it can be delivered within your project timeframe. Alternatively, your project can lead to the development of a new Technical Specification (TS) or European Standard (EN).

→ Involve the right standardization partner

A CEN or CENELEC Member – the National Standardization Organization/Committee – can become a partner in your project.

Source: https://www.cencenelec.eu/News/Publications/Publications/Standards_Horizon2020.pdf

Learning theme: **Business Models & Cases**

- SPIRE does not exist to develop technologies that are just *interesting*, or just *green*. They need to be commercially viable too
- You must clearly articulate the business plan for commercialisation
- Different business models *may* be required to make your new technology commercially viable

Decentralised & Modular production

Production units operate in complementary parts of the value chain
Allows production at different locations
Modularity is enabler for the concept

Mass customization

Customer gets product that meets individual preferences
Customer gets part of design process
Mainly in discrete manufacturing, but will also impact chemical industry

Servitization

Delivering functionality instead of ownership
Integrates products and services (PSS – Product Service Systems)
Customer needs are focus
E.g. chemical leasing

Reuse

Optimizes input and reuse of raw materials, energy and water
Requires cross-sectoral collaboration
Waste is seen as profit center instead of cost
E.g. waste-2-chemicals

Business model archetypes explored by



INSPIRE

EXPLOITATION PATHWAYS

Further internal research	• These research activities must be beyond the project. • Relevant for research organisations and research intensive companies.
Collaborative Research	• The results used as background of future collaborative research projects. • Relevant for research organisations and research intensive companies.
Internal product development	• Results used in developing, creating and marketing a product/process. • Relevant for companies.
Internal service creation	• Results used in creating and providing a service. • Relevant for companies.
Licensing	• Results exploited by other organisations through out-licensing. • Relevant for all participants, but care should be taken to comply with Horizon 2020 rules.
Assignment	• Results exploited by other organisations by the transfer of ownership. • Relevant for all participants, but care should be taken to comply with Horizon 2020 rules.
Joint Venture	• Results used as background of a joint venture. • Relevant for all participants, but care should be taken to comply with Horizon 2020 rules.
Spin-off	• A separate company established in order to bring to the market technology resulting from the project. • Relevant for all participants, but care should be taken to comply with Horizon 2020 rules.
Standardisation activities	• Results used either to develop new standardisation activities, or to contribute to on-going standardisation work. • Relevant for all participants, but care should be taken to comply with Horizon 2020 rules.

Exploitable results can be categorized into the following areas:

- **Products** – items for sale
- **Processes** – ways to make or do
- **Equipment** – makes products using processes
- **Knowledge & IP** – valuation of “how to”
- **Services** – by offering the above products, processes, equipment, or knowledge
- **Other** – Platform, publications, patent....

A WINNING PROPOSAL IS NOT ALWAYS A GOOD PROPOSAL...

- Remember to consider:
 - The actual credibility of technical partners
 - The real commitment of exploitation partners
 - The complete understanding of end users

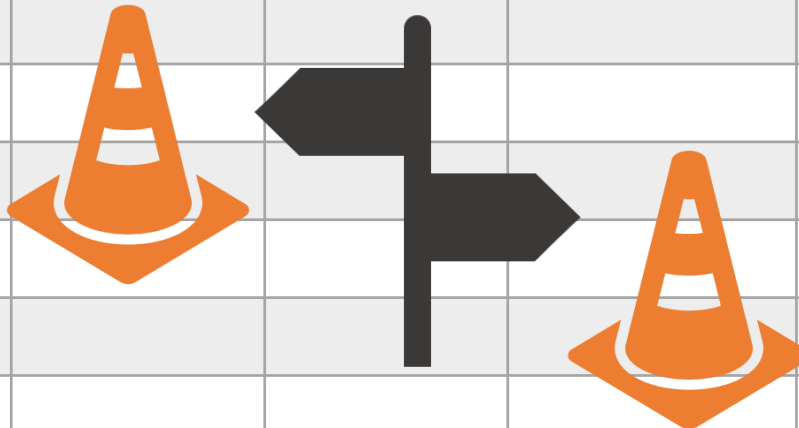


Learning theme: **Impact**

OUTPUTS	OUTCOMES	IMPACT
Products, goods, services arising from an intervention	Short to medium term effects arising from the Outputs	Positive and negative long term effects arising from Outputs – direct or indirect, intended or unintended

- SPRING is developing a knowledge capture framework to help others consider *both* alternative applications and limitations of SPIRE technologies

Output	Sectors in which there is application	Energy efficiency	Resource efficiency	CO ₂ reduction	Control and measurement
Technology					
Software					
Service					
Knowledge					
Product					
Standard					



Learning theme: **Education and Training**



- SPIRE projects need to include development of education and training resources
- The SusChem Educate to Innovate project identified the following needs
 - Rich in content from case studies based on real world examples
 - Learn through failure as much as success
 - Documented methodologies for problem-based studies
 - Understand how and why decisions were made, supported by good reference material
 - Accessible across different media platforms
 - Adaptable to different teaching curricula demand, learning styles and approaches
 - Flexible in use (not a standalone learning module)
 - Appeal to a broad community
- SPRING is developing
 - a framework to allow those in education/ training/ industry to find these resources more easily
 - Guidance on best practice formats for resources.
- See <http://bit.ly/SPRING-EducationWorkshop>





For proposers – Do not forget to consider:

- **Value Chain Approach**
- **Cross Sectorial / Transferable Technologies**
- **Lifecycle perspectives**
- **Outline Business Plan**
- **Valorisation of results and products**
- **Address Non-technological barriers / bottlenecks**
- **Links to Legislation and Standardisation**
- **No negotiation of proposals ➡ Only **complete** proposals can be funded**
- **AND don't forget to Pre-register your proposal and submit IN TIME**

Research and
Innovation



Sustainable Process Industry through
Resource and Energy Efficiency

