Description of the call for projects on decarbonising industry

Context

Within the framework of the National Low-Carbon Strategy, an 81% reduction in greenhouse gas emissions must be achieved by 2050. This particularly concerns the manufacturing sector, because of its high energy consumption and the inherent dependence of certain manufacturing processes on gas energy.

In response to this strategy, GRDF supports its customers in reducing their consumption and has placed top priority on working to develop green gases, such as biomethane. In parallel, GRDF supports the decarbonisation of gas use in industry by applying three approaches:

- Promoting the widespread use of the most energy-efficient solutions,
- Supporting the development of solutions for the recovery of waste heat,
- Supporting the development of Carbon Capture, Utilisation and Storage (CCUS) systems.

As a priority, these actions are aimed at the sub-sectors with the highest consumption of those connected to the GRDF network: the agri-food industry, the metals industry, and the materials industry.

This call for projects is therefore intended for any company, or consortium of companies, in France or Europe (R&D centres, start-ups, technical centres, design offices, energy service companies, energy operators, manufacturers) that could propose solutions to:

- improve the efficiency of gas systems,
- recover waste heat in industry,
- capture the carbon discharged by gas processes, to utilise it or store it.

If you are involved in working on any of these issues, please do not hesitate to submit a proposal! The application procedure is described in detail on the website www.grdf.innovation.fr
Applications will be accepted until 30 April 2021.
A panel consisting of internal GRDF and and external experts will select up to six winners in early June 2021.

The winners of this call for projects will receive an individual prize valued at up to €40,000 to help them develop their solutions, and will benefit from GRDF communication in the sector, as well as advice from GRDF based on our extensive experience.
According to the maturity of the project, the winner(s) may also receive the following benefits, within the framework of a two-year partnership with GRDF:

- support for the development of their project (e.g. incubator or accelerator, contacts with industrial partners and financial backers),
- advice and services from specialist technical and R&D centres in the sector (modelling, simulation, laboratory testing),
- support from GRDF in the search for an industrial site to conduct a test under real operating conditions,
- GRDF referral channels in the sector, such as CEGIBAT.

The technical solution naturally remains the intellectual property of the candidate or winning companies.

Challenges

1. Energy efficiency

The cheapest energy will always be the energy that is not consumed. With a view to this thrifty approach, the optimisation of energy consumption remains a field with a great deal of potential. In 2017, ADEME indicated that the industrial sector could optimise its consumption by a further 25% by 2035.

GRDF places priority on supporting optimisation in the following areas:

1.1. Optimisation by technology

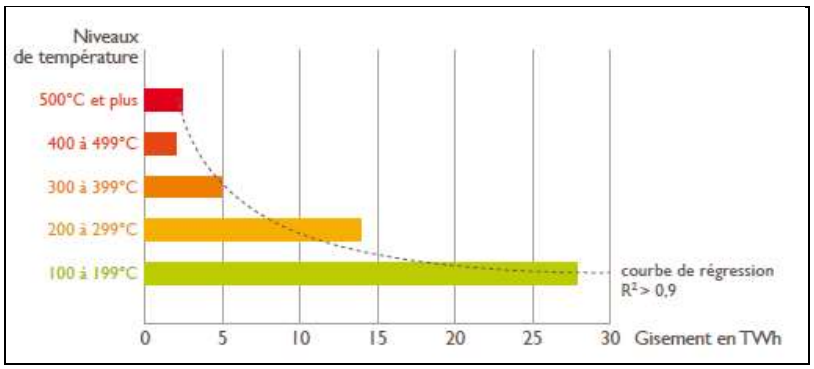
One way to reduce energy consumption is to use equipment with efficient performance thanks to its design (optimised combustion, reduced emissions, energy recovery systems) and its control (continuous optimisation of settings, identification of drift and maintaining optimum performance). Certain technologies currently on the market help to reduce energy consumption significantly. For that reason, they receive support from bodies such as the EC. This category includes, for example, hot air burners, optimised controls, economisers, and optimised insulation.

1.2. Optimisation via the Human and Organisational Factors approach

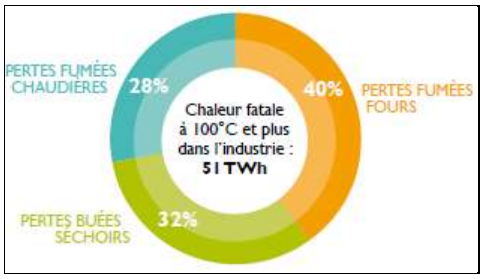
A proportion of energy consumption is the result of operators using equipment in a non-optimised way. Even though the use of big data or energy metering plans, for example, can help to inform, quantify, and promote awareness of these potential energy savings, a better grasp of Human and Organisation factors can, in certain cases, lead to significant benefits in return for small investments.

2. Waste heat recovery:

A study of waste energy in France, conducted by ADEME in 2017, highlights the potential to recover 110 TWh from thermal processes, *of which half are above 100°C*, distributed according to the following temperature bands:



Distribution of waste heat above 100°C according to temperature band



Distribution of waste heat above 100°C

There are four main types of approach to recovering the waste heat currently lost that GRDF would like to support as a priority (non-exhaustive list):

2.1. Raising the temperature of the waste heat to integrate it into the local process

More than half of industrial waste heat is in temperature bands below 100°C and is therefore difficult to recover as-is on site. The aim is therefore to increase the temperature of this waste energy so that it can be integrated directly into the process, thus limiting the energy production upstream.

2.2. Converting waste heat into cooling

There are extensive requirements for cold in industrial processes, especially in the agri-food industries. The conversion of waste heat into cold energy could therefore be carried out easily on site whenever recovery in the form of heat is not possible (source too large, insufficient outlets, etc.).

Note that sources of waste heat in the agri-food industries are mostly below 200°C, so a process to convert heat into cold based on a heat source below 200°C would easily find very wide acceptance.

We will carefully examine any solution to convert waste heat into cold in all industrial sectors.

2.3. Converting waste heat into another energy vector (electricity, motive power, compressed air, etc.).

The recovery of heat energy on site is not always possible (lack of need, unsuitable temperatures, etc.). That is why conversion into another energy vector that is needed on the industrial site would be a way to extract value locally from the greatest possible quantity of waste energy.

This option for the recovery of waste heat at any temperature level would be usable in all industrial sectors.

2.4. Heat recovery and storage for deferred or remote use

In certain cases, waste heat might not be usable on the site that emits it, or might not be recoverable synchronously with its production. In such a case, storage methods for the asynchronous use of this waste heat would be useful, although intrinsically less efficient that synchronous re-use.

3. CO2 Capture, Use and Storage (CCUS)

By its nature, the industrial sector is one where the capture of atmospheric CO2 emissions is easiest to achieve because of the concentrated location of the emissions.

The International Energy Agency and the European Union are placing significant emphasis on CCUS technologies to decarbonise the gas chain and contribute to reaching carbon neutrality. In its scenarios for 2040, the IEA considers that around 16% of the effort to reduce greenhouse gas emissions will be achieved through these technologies.

3.1. Capture solutions

When applied to major industrial emitters, they are relatively mature and are already deployed on some sites in Europe that emit quantities of the order of a million tonnes of CO2 a year (thermal power stations, heavy industries subject to carbon quotas, for example). The issue is therefore to find solutions that can be used by smaller emitters such as the manufacturers that are connected to the GRDF network.

3.2. Transport solutions

Once it has been captured, the CO2 must be packaged in a form that can be transported (under pressure, liquid or solid), to be used potentially remotely from the capture sites. The reduction of transport costs through new technologies plays an important role in the economic balance of the entire CCUS chain.

3.3. Storage solutions

Storage is a very high-cost part of the CCUS chain. It is currently mainly deployed in major projects, outside the scope of GRDF's action. As such, it is not a priority issue for GRDF. Nevertheless, solutions shown to be of technical and economic interest for sites connected to the GRDF network could be considered.

3.4. Solutions for use and recovery

These solutions constitute a major issue. For large volumes, they are currently limited: most of the CO2 captured today is reused in chemical or agri-food applications, or even in an R&D phase, recycled in construction materials for example.

For smaller volumes, such as those emitted by sites connected to the GRDF network, these solutions have not yet been invented. Any contribution in this area will be examined with great interest.

Evaluation criteria:

GRDF will examine all of the proposals and will consider the following evaluation criteria to choose the winners. Note that some of this information might remain unknown, depending on the technology readiness level of the solution.

- **The Team and the Company**
- What is the composition and the expertise of the Company?
- What is its business model and what is its development strategy?
- What are its current or planned development partnerships?

- What are its available or planned sources of funding?

- **The Technology:**
- What is the level of maturity of the solution (TRL)?
- What is the innovative and differentiating aspect of the solution?
- What are the performance characteristics of the solution?
- How is the solution implemented and used? What preliminary studies are necessary?
- What are the reliability and safety level of the solution during its operation? What monitoring or maintenance is necessary?
- Are there other local or environmental impacts or externalities of the solution?

- **Target markets**
- What is the target market and its estimated size?
- What temperature and power levels are concerned?
- What references and feedback from operating experience are available?
- What is the anticipated return on investment time for the solution?