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Project title:

**Lombardia & Rhein-Main towards Zero Emission:
Development and Demonstration of Infrastructure Systems for Hydrogen as an Alternative Motor Fuel**

Instrument Integrated Project

Thematic Priority Sustainable Energy Systems

Deliverable D 7.8:
SME-involvement and strategies to strengthen it

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Dissemination Level		
PU	Public	x
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

Executive summary

This report outlines the present stage of Zero Regio research regarding the involvement of SMEs, i.e. small and medium sized enterprises. It includes a set of hypotheses developed for this research, questionnaires circulated or drafted, as well as a progress report and a work plan.

The research proceeds from a set of hypotheses, to be substantiated or rejected:

(1) While the Zero Regio partners are exclusively large companies, the project indirectly stimulates a significant activity in subcontracting companies.

(2) The Zero Regio partners are reluctant to work outside their own core competence area, and are therefore keen to outsource significant tasks.

(3) Subcontracting activities add a financial stimulation for external R&D in excess of the resources available in the EC FP6 programme.

(4) An important part of R&D intensive subcontracting is directed towards SME's.

(5) The Zero Regio partners prefer to seek subcontractors with deep pockets for R&D. This tends to work against SME involvement.

(6) The Zero Regio partners are keen to expand their supplier base and enhance competition among potential subcontractors. This creates opportunities for SME's.

(7) The Zero Regio partners tend to subcontract with SME's in their own region or language area, rather than across European borders.

(8) Sub-contracting works as a market-pull, as opposed to the push by direct government subsidies for R&D. This promotes the market orientation of SME's and enhances their ability to attract finance.

(9) SME's are difficult to engage more directly in demonstration projects such as Zero Regio, because participation is seen as too costly and/or bureaucratic.

(10) The direct involvement of SME's in R&D consortia may be of limited importance, compared to their indirect involvement through the procurement activities of large companies.

Preparatory work has been done in 2007. The bulk of empirical research shall be done in 2008. The final analysis will be published in the spring of 2009. This shall include policy advice concerning ways to strengthen SME involvement.

Contents

Preface

The Zero Regio project is a demonstration of hydrogen infrastructures and a small number of hydrogen-fuelled cars on the streets of Mantova (Italy) and in the airport of Frankfurt am Main (Germany). It is part of a larger effort by the EU to demonstrate hydrogen technology, for reasons of energy security and environmental protection. Information concerning the Zero Regio project can be found at http://www.zeroregio.com, while more general information concerning EU hydrogen policies and activities is found at the web sites of the European Commission[1] and the European Hydrogen and Fuel Cell Technology Platform.[2]

This progress report is a contractual requirement in the Zero Regio project, defined as deliverable D7.8 and due in the third year of the project. The report outlines the present stage of the research regarding the involvement of SMEs, i.e. small and medium sized enterprises. It includes a set of hypotheses developed for this research, questionnaires circulated or drafted, as well as a progress report and a work plan.

Results concerning SME-involvement as well as strategies to strengthen it will be published as part of the final report on business development, due in May 2009 (Month 54), covering SME-involvement, business relations and finance issues.

2007-11-30

Peter Helby,
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1 http://ec.europa.eu/research/energy/nn/nn_rt/nn_rt_hy/article_1142_en.htm

2 https://www.hfpeurope.org

Definitions

The small or medium sized enterprise (SME) is a concept originally used for statistical purposes. Now it is used more broadly, for general scientific as well as administrative purposes. With this broader use, definitions have also proliferated.

However, the concept is well represented by the administrative definition used in the FP6, where an SME is defined as an enterprise

- with less than 250 full time equivalent employees,
- with an annual turnover not exceeding EUR 40 million or an annual balance sheet total not exceeding EUR 27 million,
- which is not controlled by 25% or more by a company which is not an SME.

For statistical purposes, we shall stick to this definition. However, most of our work here is analytical rather than statistical. For analytical purposes we shall be more catholic about the definition.[3]

[3] From an analytical point of view, the important issue is a set of qualitative attributes assumed to be associated with enterprise size. Smaller enterprises are assumed to be more agile, less hierarchical, more informal, more focused, often more innovative than larger enterprises. This is important from an economic or technology policy point of view, because these attributes mean that such smaller enterprises are an important resource for economic adaptation, renewal and growth.

Even if these attributes are assumed to depend on size, they certainly do not emerge or go away at any precise statistical or administrative boundaries. They may be somewhat watered-down already in enterprises with 250 employees. On the other hand, they may linger on in enterprises several times that size. They are not necessarily lost when control is taken over by a larger company.

So, if a company somehow has the feel-and-touch of an SME, we shall not hesitate to treat it analytically as an SME, regardless of the exact size. However, the further we drift away from the administrative definition quoted above, the more we shall take care to argue, why we regard the company as SME-like and have chosen to include it in our analysis.

Progress report

The SME study was originally planned to be half-finished in 2007 and completed before the end of 2008. The present deliverable D7.8 was assumed to be a half-way report, already including a significant part of the research results.

However, due to the delays in Italy as regards the infrastructure and the vehicle demonstration, it has been necessary to postpone those parts of the socio-economic research that require on-site activities in Italy. This has mainly to do with acceptance research, rather than the SME-research. Due to logistic and economic considerations, it would however be impractical to split up the empirical work in Italy, as it can best be done as part of a prolonged on-site stay in Italy and as an Italian-speaking assistant will need to be employed. Therefore, as the heavy part of on-site work (concerning acceptance) could not be done in 2007, smaller tasks that require on-site interview work, such as the SME research, have also been postponed. In consequence, while the questionnaires have already been prepared, their circulation has been postponed, as they should not be circulated too far in advance of the interviews.

It has been possible, however, as a preparatory activity, to conduct some key interviews with partners in Frankfurt and Stuttgart, which has helped to direct the research and develop the research questions and the methodology. The first questionnaire (appendix 1) has also been circulated to all manufacturing partners, as the first step toward the preparation of the interview round in 2008. This questionnaire asks only for an overview of the involvement of subcontractors and other supporting companies. A follow-up questionnaire requesting much deeper and more detailed information about selected SME relations has also been prepared (appendix 2), but has not yet been circulated, as the selection of companies depend on the answers received from the first questionnaire and as it ought also not to be disseminated too far in advance of interviews. It has also been possible to conduct significant literature studies.

Making use of the literature studies and the interviews, a set of research questions has been developed, which shall serve as guide for questionnaire and interview activities. The depth with which each question shall be explored remains to be determined, as this must depend partly on the empirical evidence and the practical research options available.

Research hypotheses

Based on literature studies and preliminary interviews with Zero Regio partners, the following research hypotheses have been developed. They are, of course, only hypotheses, which might be substantiated or rejected as consequence of the empirical research, or may be shown to be in need of modification. The list of hypotheses is probably too ambitious, compared to the resources available and the scope for data acquisition within the Zero Regio project. However, instead of reducing them up-front, it will be more interesting to pursue them as far as possible within the project, and then in the final analysis abandon those, for which no good quality confrontation with empirical data has been possible.

(1) *While the Zero Regio partners are exclusively large companies, the Zero Regio project indirectly stimulates a significant activity in subcontracting companies.*

The research should attempt to establish to what extent this is true, preferably quantifying the market-pull thus arising from the project, as well as making qualitative observations.

(2) *The Zero Regio partners are reluctant to engage in hydrogen and fuel cell R&D outside their own core competence area, and are therefore keen to outsource significant tasks, with which they cannot or do not want to burden their own R&D staff.*

The research should attempt to establish if this is true, and to what extent. It should more precisely establish the considerations driving the outsourcing process.

(3) *The subcontracting activities stimulated by the Zero Regio project extend beyond that which is eligible for EC co-funding, thus adding a financial stimulation for R&D in excess of the resources available for the EC FP6 programme.*

This is a fairly uncertain statement, but worth exploring.

(4) *An important part of the R&D intensive subcontracting is directed towards SME's, as they are often the most dynamic and innovative companies in novel fields such as hydrogen and fuel cell technology.*

This is a key issue to investigate. The opposite might as well be true, insomuch as the Zero Regio partners could prefer the security and stability of large subcontractors, rather than engage with SME's perceived as more risky partners.

(5) *For key technologies, the Zero Regio partners prefer to seek subcontractors with deep pockets for R&D and with a stable, long-term commitment to hydrogen or fuel cell technology. This tends to work against SME involvement.*

This again is a key issue to explore. If true, it might significantly reduce the stimulation effect of the Zero Regio project vis-a-vis SME's. At least to the extent that SME's are competing with larger companies with more secure economic foundations.

(6) *The Zero Regio partners are keen to expand their supplier base and enhance competition among potential subcontractors. For this purpose they sometimes discriminate in favour of upcoming companies that often are SME's, and sometimes add extra resources to their subcontracting.*

The reality and importance of this consideration needs to be assessed, as well as the degree to which it affects SME's

(7) The Zero Regio partners tend to subcontract with SME's in their own region or language area, rather than across European borders. This tends to promote the development of regional competence clusters, which are important assets for technology development, and thus for economic growth in Europe. On the other hand, this mechanism does not promote European integration, as is the aim of FP6.

The research should attempt to establish if this is true, and to what extent. It should more precisely describe the geographical aspects of the SME-related networking seen in the project.

(8) *The subcontracting from large companies due to Zero Regio and similar projects is perceived by SME's as a market-pull, as opposed to the push by direct government subsidies for R&D. It has different (and positive) effects on the market orientation of SME's and on their ability to attract finance.*

This hypothesis can only be explored, if resources and research options allow direct contact to several SME's.

(9) *SME's are reluctant to participate in demonstration projects such as the Zero Regio, because participation is seen as too costly and/or bureaucratic, due to the limited level of subsidy, the long lead time, and the heavy up-front paperwork. While the aims of the FP6 programme emphasise the value of SME participation, the realities of the programme mechanisms work in the opposite direction, limiting the interest of SMEs and making the search for SME partners difficult.*

This hypothesis can only be explored, if resources and research options allow direct contact to several SME's.

(10) *In consequence of (8) and (9), the direct involvement of SME's in R&D consortia may be of limited importance, and greater emphasis should be put on the procurement activities of large companies participating in such consortia, and on ways to twist such activities in the direction of SMEs.*

This hypothesis can only be explored, if resources and research options allow direct contact to several SME's.

Work plan

The work performed has been summarised above in the progress report. The main outcomes are the research hypotheses outlined above and the two questionnaires that follow as appendices.

The first questionnaire (appendix 1) has been circulated to all manufacturing partners, as the first step toward the preparation of the interview round in 2008. This questionnaire asks only for an overview of the involvement of subcontractors and other supporting companies. Based on an analysis of the results from this questionnaire, and a comparison with public information about the listed subcontractors, a second questionnaire (appendix 2) will be circulated to the partners, asking for deeper and more detailed information about selected SME relations. When needed, this will be followed up by additional rounds of email questions-and-answers.

Based on the information thus gathered, a series of interviews will be planned for 2008. These are planned to cover around 10 companies, including Zero Regio partners as well as SME's identified during the questionnaire round. The number of interviews may be adjusted to fit the research needs. Italian and German partners and their subcontractors will be given equal weight, unless results or events during the research indicate that special weight should be given to certain partners, in order to obtain the most valuable research results.

The interviews shall be used to address issues that have been too complex for coverage in the questionnaires. They will also be used to improve the information gathered by the questionnaires, i.e. fill gaps, clear ambiguities, ask for supplementary information, and discuss the why's and how's that have not been completely covered by the questionnaires. The interviews will focus on the collection of data and opinions relating to the research hypotheses that were outlined above.

Problems may arise with regards to secrecy and confidentiality. This may well limit the scope and depth of research. However, such problems are difficult to assess in advance, even if they can have important effects on the research. Formally, the consortium agreement takes care of such problems, as it protects the confidentiality of sensitive information. Additionally, from a more practical view point, partners can be assured about the non-dissemination of sensitive information also within the consortium, even to the point of restricting data access to one single researcher. Even with such assurances, some partners may not want to provide all requested information in sufficient depth and detail. Such obstacles may be difficult to overcome, and can significantly influence the path of the research, as research will need to be concentrated on the data that can be made available, rather than on issues that might be interesting but cannot be supported by data.

Based on the research hypotheses and the empirical work outlined above, a final analysis will be prepared for publication in the spring of 2009 (month 54), as part of a deliverable included in the implementation plan for months 37-54, covering SME-involvement together with other business relations and finance issues that are also part of the socio-economic work package (WP7).

This analysis shall include policy advice concerning ways to strengthen SME involvement, to the extent that the research results allow this type of conclusions.

Appendix 1

Questionnaire for overview of subcontractors and other supporting companies

This questionnaire is addressed to all manufacturing partners in the ZR project. The purpose is to assemble a report on the involvement of small and medium sized enterprises (SMEs) in the technology development promoted by the ZR project. Making this report is part of the ZR-contract (task 7.1)

The questionnaire is meant to be fairly simple, and does not require very precise information. After the first analysis of the data, we probably need to return for additional information, in a more selective way.

If you need guidance concerning the questionnaire, please contact us by mail: sav@mail.dk. Your comments are also very welcome.

Your company:

Contact person for this questionnaire:

Your total costs for the ZR project:

	Euro
(a) Costs included in the contract	
(b) Additional costs, outside the contract	
(c) Total costs for your activity in the ZR project (c = a+b)	

The information we are now collecting

Several companies are probably providing products and services that somehow support your tasks in the ZR project.

In the table below, we ask you to list all such companies.

For simplification, please omit those partners that you judge to have no relation to hydrogen or fuel cell technology, and whose contribution you judge to be less than 1 per cent of your total costs.

One the other hand please be careful to include all partners that do have a relation to hydrogen or fuel cell technology, even if their contribution is quite small. Please include both the following type of companies:

- companies contributing knowledge/competence related to hydrogen or fuel cells,
- companies learning about hydrogen or fuel cells through their contact with the project.

If you are in doubt about a company, please include it, and add a brief explanation of your doubt.

We do not ask you to decide, if the companies are "small or medium-sized". We will make that assessment ourselves, as it is difficult and needs to be consistent. Of course, we may need your help later to get the necessary information about companies, if we cannot easily find it ourselves in annual reports and similar public sources. Please be precise about the name of each company, so we can find the relevant information without returning to you.

Some of the information may be sensitive or secret. It is protected by the confidentiality clause of the consortium agreement. No company will be mentioned in any public report, except after prior consultation and only with your permission.

If there are special cases, where you regard the confidentiality established by the consortium agreement as insufficient, you might further protect the information by omitting the company name. You can also veil sensitive economic information by giving only an approximated share of your projects costs, or an interval. If some information in the table has needed to be protected in this way, please put it in parentheses. Please do not use this option unless it is absolute necessary. It will reduce the quality of the research results from our project !

List of your sub-contractors and other supporting companies

Company name	Share of your total project costs (rough estimate) Per cent	Type of competence or learning in relation to hydrogen or fuel cells	Estimated level (before the ZR project) of specialised knowledge concerning hydrogen or fuel cells Use a scale from 0 to 9 Add explanations	Estimated importance of learning about hydrogen or fuel cells from the ZR project Use a scale from 0 to 9 Add explanations
Some hypothetical examples (can be deleted)				
Johnson Welding Services Inc.	0,3 %	Knows how to weld the special steels needed for hydrogen piping	3 The knowledge is not specific for hydrogen, but is applicable for several types of gas piping.	0 They did not learn anything new
Grenoble Fuel Cells SA	30 %	Provided the fuel cells	9 They are specialised in fuel cells	7 They did not have experience with vehicle applications and were eager to learn.
Medici Assurance SA	2 %	Risk assessment for ...	0 They knew nothing	1 They learned a lot about hydrogen, but this is a very small part of their business.
Frankfurt Constructions GmbH	5 %	None, they are a generalised building company	0	0 This was a business-as-usual project for them. Their task was not different because it was hydrogen.

Company name	Share of your total project costs (rough estimate) Per cent	Type of competence or learning in relation to hydrogen or fuel cells	Estimated level (before the ZR project) of specialised knowledge concerning hydrogen or fuel cells Use a scale from 0 to 9 Add explanations	Estimated importance of learning about hydrogen or fuel cells from the ZR project Use a scale from 0 to 9 Add explanations
Your real-world information *please add more lines, as necessary*				
Estimated costs for companies not on the list (because their contribution is less than 1% and has nothing specific to do with hydrogen or fuel cells)				
Total external costs, as percentage of total project costs (sum of all above)				

Appendix 2

Questionnaire concerning individual subcontractors and other supporting companies

We have now reviewed the list of subcontracting and supporting companies we have received from you, and have selected some of these for more in-depth studies.

Together with this questionnaire, we have mailed a file where the selected companies are highlighted. For each of these selected companies we now need more detailed information.

Some of the information may be sensitive or secret. It is protected by the confidentiality clause of the consortium agreement. No company will be mentioned in any public report, except after prior consultation and only with your permission. The information provided in this questionnaire will be handled strictly by one person (senior researcher Peter Helby) and will not be available to any other staff members.

The questionnaire is meant to be fairly simple, and does not require very precise information. When needed, after the next round of analysis of the data, we will return to you for additional information.

If you need guidance concerning the questionnaire, please contact us by mail: sav@mail.dk

The first page contains basic company information that is pre-filled-in. Please check that this information is consistent with your knowledge, and please do propose corrections or additions that might improve the quality of our data.

Sub-contracting or supporting company:

Name	[pre-filled-in]
Web page	[pre-filled-in]
Location	[pre-filled-in]
Number of employees	[pre-filled-in]
Yearly turnover	[pre-filled-in]
Company profile	[pre-filled-in]

Product(s) or service(s) provided for the ZR project:
(Please explain so that a non-technical person can understand)

Approximate value of product(s) or service(s) provided for the ZR project:
(If the precise value is unknown or very sensitive, please provide a rough number or interval)

Duration of cooperation between your company and the subcontracting/supporting company

	Tick the best answer	Comments
Cooperation was initiated when we needed the specific product or service for the ZR project		
Cooperation was initiated approximately when the ZR project started		
Cooperation was initiated during the preparation of the ZR project		
The companies were cooperating before we got involved with the ZR project		

Scope of cooperation

	Tick the best answer	Comments
The cooperation is exclusively about the ZR project		
The cooperation is almost exclusively about the ZR project.		
The cooperation is mainly about the ZR project, but has other important aspects as well. (please explain the other aspects)		
The ZR project is only one aspect of the cooperation, which is also about other tasks / projects that are equally or more important. (please outline the extent of the cooperation)		

Depth of cooperation with your company and the subcontracting/supporting company.

Please notice: ***Answers should be <u>only</u> about hydrogen or fuel cells activities.***	*Tick off all answers that are approximately correct*	*Comments*
The company is		
... a key strategic partner		
... a partner of some strategic value		
... a partner without strategic value, i.e. might easily be replaced by another partner.		
The ZR project is		
... only one part of the cooperation, which is also about other tasks / projects that are equally or more important.		
... the most important area of cooperation		
... the only area of cooperation.		
If the cooperation stopped, we would have		
... severe problems in our future business, difficult to solve.		
... significant problems in our future business, but we could solve them.		
... certain problems in our future business, but they would not be difficult to solve.		
... no important problems in our future business		

From this company, we are learning		
... key lessons		
... important lessons		
... some lessons, but not so important		
... nothing important.		
We are mainly using technologies and solutions		
... that are already part of the standard product portfolio of this company		
... that can be easily fitted or adapted from the standard product portfolio of this company		
... that requires minor development work, before it satisfies our demands.		
... that requires major development work, before it satisfies our demands.		
At our request, the company is developing technologies and solutions		
... for exclusive use in our products		
... to fulfil our specific needs, but not for exclusive use in our products		
... of a generic type, that can be used by us as well as others		

The technology development done by the company		
... is financed entirely by the company itself.		
... is financed partly by our company		
... is financed wholly or almost wholly by our company		
For our company, the cooperation means		
... that development costs and risks are shared with a financially strong partner		
... that we must pay for technology development, that is not in our own hands		
... that our financial risk is increased, because we become dependent on a financially weaker company.		
For the other company, the cooperation means		
... the first entry into the hydrogen or fuel cell field		
... a large increase in activities relating to hydrogen or fuel cells.		
... a significant new technological challenge		
... a new testing ground for existing products or services		
... an important additional market for existing products or services		
... not much new learning		
... not any important grows in sales.		

We expect the cooperation to		
... become deeper and more intensive		
... stay approximately at the present level of depth and intensity		
... gradually become weaker		
... to stop when the present tasks reach their end.		

In your estimate, how many other companies could provide the necessary product or service, with sufficient quality?

In Europe	
	No other companies
	1 other company
	2 other companies
	3-5 other companies
	more than 5 other companies
Outside Europe	
	No other companies
	1 other company
	2 other companies
	3-5 other companies
	more than 5 other companies
Comments:	

How would you regard the company, in comparison with competitors providing similar product(s) or service(s)?
(tick one or more boxes)

	It is among the leading companies in the world
	It is the world leader
	It is the European leader
	It is an upcoming company, which is or will soon be challenging the leaders
	It is a start-up company, which may have a long-term potential to challenge the leading companies
	It is a less important company, which is not challenging the leading companies.
Comments:	

Why did you choose to cooperate with this company?
(tick one or more boxes)

	Important reason	Less important reason	Irrelevant	Not true
There was not really any choice. There was no other company with the necessary competence.				
The company was part of our own group, so it was natural to cooperate with them.				
We have a long-term strategic partnership with the company.				
The company is located relatively close to us.				
The company has the same nationality and language as our company.				
The technology of this company made the best fit with our own technology.				
We already knew key staff in this company and had good personal relations.				
The company is very innovative.				
The company is stable and reliable.				
The company is part of a strong group, and will have enough resources to develop technology and be a long-term partner.				
The company has good access to venture capital.				
The company is young and upcoming.				
Development of the company will help to increase competition.				
Development of the company will give us better access to technology.				
other reasons:				

What ownership relations or strategic alliance exist between your own company and the subcontracting / supporting company?
(tick one or more boxes)

When ZR started (in 2004)	Now	
		We have the same owner(s)
		We are part of the same group
		We own a majority share of the supporting company
		We own a minority share of the supporting company
		We are owned partly or wholly by the supporting company
		We are both part of the same strategic alliance
		other ownership or strategic relations:
		There are no ownership or strategic relations between the companies.