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Energy RTD Information Systems in the ERA

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Table of Contents

	Page
Abbreviations and definitions	5
Foreword	7
Management summary	9
Introduction	15
Today's situation regarding EU energy RTD information systems is no longer satisfactory. To meet future challenges, a clear structure and strengthening of coordination and branding are needed	19
There is lack of structure and connectivity for EU energy RTD information systems	20
<i>Energy RTD information systems is not specifically addressed as an issue</i>	20
<i>No European one-stop-shop for energy RTD information</i>	20
<i>A common language is missing</i>	21
<i>Co-operation and coordination between different stakeholders in the European knowledge-value-chain of energy RTD is weak</i>	21
The variety of energy RTD information systems is unknown to or not used by large groups of European users	22
<i>Many existing information systems are unknown to users</i>	22
<i>Existing information systems are not appealing enough to potential users</i>	22
Most EU energy RTD information systems only moderately match the EU user's needs	24
<i>Accessibility of the systems is deemed crucial but requires improvement</i>	24
<i>Content provided by the systems does not sufficiently match the EU user's needs</i>	26
There is imbalance in the availability of energy RTD info systems at different levels	29
Current branding, transparency and accessibility of EU energy RTD information systems does not reflect the targets of a leading knowledge-based economy	32
This situation requires both short- and medium-term actions	33
Define a European strategy and roadmap for energy RTD knowledge management	33
<i>Short-term action 1: launch the strategy formulation process</i>	34
<i>Short-term action 2: create a basic portal for European energy RTD</i>	35
Streamline knowledge management of existing EC energy websites and of EC-funded energy RTD	36

Annexes	37
Annex A – Questionnaire results.....	37
Annex B – Selected examples of energy RTD information systems.....	67
Annex C – Descriptions of 70 other examples of energy RTD information systems	97
Annex D – Interviews and advisory board	107
Annex E – Spending on energy RTD according to IEA.....	109
Annex F – Literature and sources.....	111
Annex G – US DOE’s Technical Information Management	113

Abbreviations and definitions

Energy	Non-nuclear energy
EnR	European Network of Energy Agencies
ERA	European Research Area
E-RTD	Energy RTD
EU	European Union
IEA	International Energy Agency
Information systems	Web-based systems (websites, databases or combinations of both) that have a substantial group of users with a certain level of accessibility
Portal	A website with (hyper)links to other information systems
RTD	Research and Technological Development (fundamental research, socio-economic research, industrial and applied research, and (pilot) demonstration activities)
US DOE	United States Department of Energy

Foreword

In order to fully benefit from the new opportunities for networking, coordination and co-operation offered by the European Research Area, scientists as well as decision-makers involved in energy research need reliable and easily accessible information on energy R&D at European level. This includes information such as data on the state of the art of particular technologies, R&D projects, funding, national policies, and strategies and actors throughout Europe.

Today these needs are not adequately met because of the enormous heterogeneity of national and international information systems, characterised by very diverse features (with respect to target groups, scope, geographical coverage, language, and conditions for access) and because they are not appropriately linked or connected.

Therefore, the European Commission launched a study on *"Improving and networking of Energy RTD Information Systems – assessing users' needs"* (shortened to 'Energy RTD infosystems') which should analyse the current situation of energy R&D-related information systems, compare it with users' needs, and propose recommendations for improvement.

This report presents the results of the study. It is based on the responses to the questionnaires sent out to experts (78 responses), the descriptions of all identified and assessed information systems, interviews held with key stakeholders in the Member States, discussions with the advisory board, and desk research. In order to discuss and validate the conclusions and recommendations of the study, experts participated in a workshop which was held on 15 December 2004 in Brussels. This event provided useful feedback and comments which contributed to further enriching the content of the study and its conclusions.

This work, carried out by Prospect Consulting and Services, addresses a variety of stakeholders involved in programming, disseminating and performing energy RTD. Both short- and long-term recommendations are proposed which would ultimately lead to a more coherent and efficient European energy R&D information strategy and could contribute significantly to improving the efficiency of national and European research in this field.

We would like to thank everyone involved in this study for their co-operation. Their input and information were of crucial importance for the quality and relevance of the report.

Brussels, May 2005

Management summary

Interchange of scientific knowledge is essential, for energy RTD as well

Spending on energy RTD is significant. The IEA estimates that governments in IEA countries spent 6.7 billion on energy RTD in 2000. The principal deliverables from this RTD are scientific knowledge and technical results. Dissemination of both this knowledge and other energy RTD-related information is important for several reasons:

- Transfer of RTD output from the RTD actor to the actual user is crucial to ensure effective uptake of the knowledge and to create dynamic, effective and efficient innovation circumstances
- The actual RTD can be done more efficiently as duplication of work is prevented and learning curves can be steeper
- RTD actors can operate more effectively as they can learn from best (and worst) practices in other countries
- Free interchange of ideas and criticism is essential for scientific and industrial progress and public understanding, and to enlarge the fund of technical information
- The actual exchange of knowledge and information can take place in various ways, through publication in scientific literature or journals, exchanges at scientific conferences, through direct personal contact or co-operation, via press and media attention, through technical reports or patents, or a combination of these. Web-based information systems facilitate this information exchange and can increase the overall impact and productivity.

The trend towards increased collaboration and co-operation at EU level is fostered by EC programmes and by the progressive implementation of the European Research Area call for improved access to relevant information on all energy-related RTD activities and initiatives prepared, carried out and evaluated in Europe.

Study aim: recommendations on the basis of a user assessment

The European Commission is currently investigating the most effective ways and means of improving and networking energy RTD information systems, and asked Prospect Consulting and Services SA, Brussels, to undertake the study *Improving and Networking of Energy RTD Information Systems – Assessing users' needs*.

The study aims to contribute to the improvement and increase of networking energy RTD information systems by:

- Providing a well-documented assessment of user needs for energy RTD information systems, at European level, and by
- Helping to identify (on the basis of this assessment) possible options towards user-friendly and cost-effective networking of energy RTD information systems.

Energy RTD information systems are defined as web-based systems designed to provide a relatively large group of users with energy RTD information. The study focuses on non-nuclear energy RTD covering fundamental research, socio-economic research, industrial and applied research, and (pilot) demonstration activities.

In order to gather the data for this study, Prospect C&S

- Circulated a questionnaire among users of energy RTD information systems located in the EU-25 plus Norway and Switzerland
- Undertook a web search on and analysis of available energy RTD information systems
- Interviewed key stakeholders (users and providers of energy RTD information systems and policy actors involved in energy, RTD and/or knowledge management) and experts from the knowledge management community.

Central finding:

'Today's situation regarding EU energy RTD information systems is no longer satisfactory. To meet future challenges, a clear structure and strengthening of coordination and branding are needed.'

Over recent decades, the currently available web-based information systems and databases on energy RTD have played an important role in disclosing and sharing information on energy RTD at a national level. Their development contributed to the creation of national relevant information networks and platforms. Some of the established international and European energy RTD information systems also contributed to the co-operation and coordination of research activities at these respective levels. A bottom-up growth process developed this information structure more or less organically.

The individual systems and the overall structure of energy RTD information systems have reached their intended structure and objectives. However, the situation has changed in recent years; the focus of energy RTD has shifted from national to European and international level. At EU level there is a need for energy RTD information systems that meet the future challenges of improved collaboration and co-operation, as well as European and international competitiveness. These challenges are fostered by EU programmes and by the progressive implementation of the European Research Area (ERA). But the research community itself is also becoming more and more focused on the international and European research arena, as national funding mechanisms are becoming less self-evident.

Other – external – drivers for change:

- The role of the Internet in the RTD society is changing rapidly
- Innovation models of industry are changing more and more towards open collaboration structures with preferred knowledge suppliers
- The energy RTD is entering a new phase of development – as a consequence of liberalisation and a gradual maturing of the energy markets. As a result, decisions on starting new RTD and making investments in innovation systems ask for a solid business rationale.

This new situation provides clear input for defining a roadmap towards a more coherent and client-based European network of RTD information systems. Reasons which support reaching the overall findings are:

- **There is a lack of structure and connectivity for EU energy RTD information systems**

Lack of coherence and overall structure are weaknesses in the current situation for energy RTD information systems. Almost everyone approached – respondents to the questionnaire and interviewees – mentioned the lack of structure and overview. Sub-conclusions are:

- The issue of energy RTD information systems is not specifically addressed
- There is no European one-stop-shop for energy RTD information
- A common language is missing
- Co-operation and coordination between different stakeholders in the European knowledge-value-chain of energy RTD is weak

- **The variety of energy RTD information systems is unknown to or not used by large groups of European users**

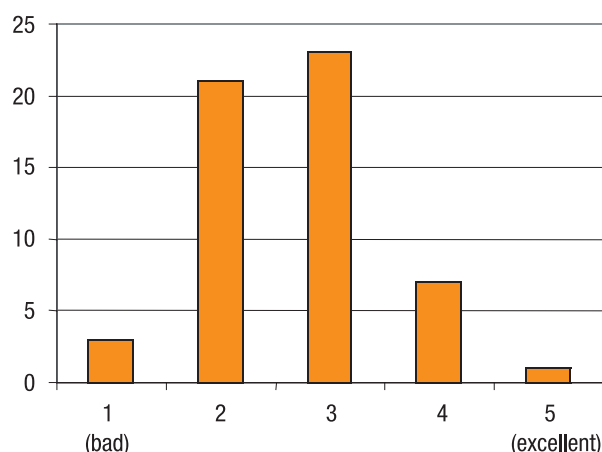
Many existing energy RTD information systems are unknown to users. Questionnaire respondents know only a very limited number of the systems that are currently available. Existing information systems seem insufficiently appealing to become used and known.

- **The majority of EU energy RTD information systems only moderately match EU user needs**

As can be seen from the figure below, the respondents express a moderate satisfaction with today's energy RTD information systems. The current situation of such systems does not meet the needs of all EU users:

- The largest group (44%) of respondents gave a more or less neutral score (2-3) indicating that the systems partly fulfil their needs
- 8% of the respondents to the questionnaire stated that the current situation regarding energy RTD information systems is (very) satisfactory
- 3% expressed their complete dissatisfaction with today's systems.

Figure 1 – Satisfaction with current situation on Energy RTD information systems



Sub-conclusions are:

- The accessibility of energy RTD information systems is deemed crucial but requires improvement, according to the respondents
- The content provided by energy RTD information systems does not sufficiently match EU user needs.
- There is an imbalance in the availability of energy RTD information systems at different levels

At **international** level, the IEA and the IEA member countries have realised several comprehensive information systems relevant for energy RTD.

At **EU** level, there is no such central energy RTD information system. CORDIS provides valuable information on EU RTD programmes and projects but it is relatively difficult to use and does not have a clear focus. CORDIS encompasses all research fields in the EU Framework Programmes and energy RTD is not distinguished. The Transport DG hosts several websites which give access to energy RTD results under the EIE and precursor programmes, but access is confusing, focus is on demonstration, full text documents on the RTD are not available and the information is sometimes outdated. ManagEnergy is an interesting and professionally managed initiative, although not directed to energy RTD but to the dissemination of EU policy and good practice of new energy technologies and solutions. There are several other EU websites that disclose energy RTD results but their actual status and purpose is unclear.

At **national** level, some EU countries have comprehensive energy RTD information systems on-line. These countries are those that traditionally invest most in energy RTD. The identified national systems have different purposes.

Although some websites related to energy RTD exist in the **ten new Member States**, comprehensive energy RTD information systems were not identified in these countries, although they house many energy RTD groups. Apparently, there is little priority given to web-based energy RTD knowledge management or funding accountability. Current web-based information systems are focused on access to European funding by giving support through information on European RTD programmes, partner search facilities, and practical help with establishing research proposals.

- **The branding, transparency and accessibility of the current EU energy RTD information systems does not reflect the target of a leading knowledge-based economy**

The establishment of the European Research Area, and the goal to become the most competitive knowledge-based economy worldwide, implies (co-)leadership with respect to Japan, Canada and the USA. It is recognised that these goals cannot be reached without a global perspective and co-operation with the important players. These may be research 'competitors' but also concern the new growth markets in developing and emerging countries, specifically Africa and Asia.

Looking at the current status of the European energy RTD information systems there is a strong internal focus. Today, there is no leading European meeting place able to serve as a main portal for non-EU citizens as a starting point for acquiring information on energy policy, European research structure, and RTD results. Building an improved energy information structure should go hand in hand with putting Europe on the international map (by external 'marketing').

Recommendations: This situation requires both short- and medium-term action

Today, the situation regarding EU energy RTD information systems is no longer satisfactory, and a clear structure and strengthening of coordination and branding are needed in order to meet future challenges. Currently, energy RTD information systems are fragmented across the EU, and several initiatives launched or supported by the EU provide low-quality information. This clearly requires some improvement. RTD users anticipate that the EU, as a leading knowledge-based

economy and a substantial investor in energy RTD, has an effective one-stop-shop energy RTD information system in place.

In our view, a key feature of an effective energy RTD information system is that high-quality (reviewed) detailed (full text) energy RTD information can be easily accessed (in English) through the Internet (free of charge, easy navigation, good structure, instrumental search engine) with large coverage (covering all energy RTD issues, one-stop-shop, covering EU- and Member-State-funded RTD).

In our view, changing the current situation will require strong leadership by the European Commission. We have identified two areas for action that are detailed in the sections below:

Define a European strategy and roadmap for energy RTD knowledge management

To be able to improve the current situation of energy RTD information systems in the long run, it is crucial that a clear strategy and roadmap for energy RTD knowledge management be developed by key stakeholders from the European Commission and the Member States.

To start this process, we have identified two short-term actions:

- **Short-term action 1: Launch the strategy formulation process**

As the key stakeholder and problem owner of the current unsatisfactory situation of European energy RTD information systems, it seems logical that the European Commission takes the lead and launches the strategy formulation process, first internally, and afterwards externally in co-operation and consultation with external stakeholders.

The central goal is to develop and identify a common vision on how future European energy RTD knowledge management should look and what it should deliver.

The goals for such energy RTD knowledge management could be as follows:

- Deliver the scientific knowledge generated by or relevant to EU energy RTD programmes via cost-effective e-government information retrieval systems to government, university, and industry users so as to provide free interchange of ideas and criticism which is essential to scientific and industrial progress and public understanding and to enlarge the fund of technical information
- Contribute to the EU's overall information infrastructure through partnerships with international organisations and knowledge-management initiatives such as the International Energy Agency's Energy Technology Data Exchange (ETDE)
- Contribute to the EU's overall information infrastructure through partnerships with Member State initiatives on energy RTD knowledge management
- Enhance the creation of the energy ERA by interconnecting the European energy RTD community.

- **Short-term action 2: Create a basic portal for European energy RTD**

In parallel with launching the strategy process, in our view the Commission should quickly establish a basic European portal on energy RTD in order to break with the current unsatisfactory situation. The main purpose of this basic portal would be to help users find information that exists elsewhere. The portal would link to national, European and international energy RTD information systems and provide guidance on the information available in these systems.

Development and maintenance of such a basic portal will not require large financial and time resources. The work in the present study could be used as a starting point. A marketing budget should be foreseen to attract the energy RTD community to use the portal.

If in line with the long-term strategy, this portal could be extended and evolve to 'The European energy RTD gateway'. In addition to the basic portal described above, this gateway would also facilitate communication and knowledge sharing in the European energy RTD community. It should become a lively tool for this community by offering functionalities such as an extensive library, discussion forums, blogs, question-and-answer systems, 'Yellow Pages', personalised news announcements, newsletters, a personalised environment, on-line team rooms, good search functionality, etc. It will be crucial that users really use the tool.

Streamline knowledge management of EC energy websites and EC-funded energy RTD

Users and workshop attendees were clear about their expectations from EC websites and EC-funded research: these websites should be streamlined (unified, updated, upgraded). Furthermore, the EC should apply stringent procedures to ensure that every single EC-funded energy RTD project actively disseminates its results and publishes a final report on the Commission's website.

We have identified the following specific actions related to knowledge management of EC websites and EC-funded RTD:

- Streamline the EC's own information systems
- Streamline EC-funded external information systems
- Require peer-reviewed full text final reports and articles of EC-funded energy RTD projects
- Put stringent procedures in place for dissemination within EC-funded projects
- Offer an EC website facility for EC-funded projects.

These activities are mainly of a procedural or organisational nature and do not require significant investments. The website facility does require an initial investment but this, in our view, is highly effective since it avoids investments made by every single project consortium for the project-specific website, created with funds from EC RTD programmes.

Introduction

Background

Government spending on energy RTD is substantial. The IEA estimates that governments in IEA countries spent 6.7 billion on energy RTD in 2000.

The principal deliverables from this RTD are scientific knowledge and technical results. Dissemination of this knowledge and other energy RTD-related information (research organisations, RTD policy, RTD priorities, etc.) is important for several reasons:

- Transfer of the RTD output from the RTD actor to the actual user is crucial to create dynamic, effective and efficient innovation model
- The actual RTD can be done more efficiently as duplication of work is prevented and learning curves can be steeper
- Different actors (e.g. research and policy organisations) can operate more effectively as they can learn from best (and worst) practices in other countries.

The recipients of energy RTD knowledge and information can be diverse: a research institute, university, policy-maker, sector organisation or energy company. The actual exchange of knowledge and information can take place in various ways, through publication in scientific literature or journals, through exchange at scientific conferences, through direct personal contact or co-operation, through press and media attention, through technical reports or patents, or a combination of these. Web-based information systems facilitate this information exchange and can increase the overall impact and productivity. Key contributions of web-based information systems are:

- Creating direct access – most recipients, regardless of their industry, want to share knowledge and *speed up* the flow of RTD data
- Offering search engines that assist in matching a specific search profile with the information stored in the database; tools for rapid navigation and selection can make sense of the data offered
- Offering direct access to *digitalised* information, avoiding the handling of documents and allowing effective use of available data
- Enabling a check of the intellectual property situation when starting new research
- Monitoring (competing) trends by watching RTD publications, patents and even employment offers
- Connecting people, as contact profiles will include telephone and e-mail information
- Stimulating and accelerating the creation of new RTD projects. The databases can also be used to find partners offering unique and innovative technologies for joint commercialisation
- Avoiding the duplication of RTD, thus improving the overall effectiveness of the RTD energy system
- Creation of virtual communities on energy RTD¹. Create (new) RTD collaboration relationships. Most energy RTD actors operate in long-term collaborative networks. Innovative industries have started to invite their stakeholders to participate in the concept development of energy systems to co-create new energy solutions.

¹ The sociological term community should be understood here as meaning (1) a group of people (2) who share social interaction (3) and have some common ties between themselves and the other members of the group (4) and who share an area for at least some of the time. R.B. Hamman in "Computer Networks Linking Network Communities"

The diversity of information sources or information systems made available to possible users on energy RTD reflects the diversity of national activities in this area, as well as the characteristics of these activities: size and objectives of national programmes, if any, balance between basic science, applied research and demonstration, organisations involved in the definition, implementation and assessment of RTD work, etc.

The expected trends towards increased collaboration and co-operation at EU level fostered by EC programmes and by the progressive implementation of the European Research Area call for improved access to relevant information on all energy-related RTD activities and initiatives prepared, carried out and evaluated in Europe.

Objective

The European Commission is currently investigating the most effective ways and means of improving and networking energy RTD information systems, and asked Prospect Consulting and Services SA, Brussels, to undertake the study *Improving and Networking of Energy RTD Information Systems – Assessing users’ needs*. The study aims to contribute to the improvement of and increase in networking energy RTD information systems by:

- Providing a well-documented assessment of user needs for energy RTD information systems, at European level
- Helping to identify (on the basis of this assessment) possible options towards user-friendly and cost-effective networking of energy RTD information systems.

Actions undertaken

In order to gather the data for this study, Prospect C&S:

- Launched a questionnaire amongst users of energy RTD information systems located in the EU-25 plus Norway and Switzerland
- Undertook a web search on available energy RTD information systems
- Interviewed key stakeholders (users and providers of energy RTD information systems and policy actors involved in energy, RTD and/or knowledge management) and experts from the knowledge management community
- Collaborated in organising an expert workshop in Brussels where the preliminary conclusions and recommendations were discussed.

Seventy-eight (78) respondents involved in energy RTD filled in the questionnaire. This number is not sufficient to draw statistically justifiable conclusions but, in parallel with the other input, provided a valid information basis for the study. The conclusions and recommendations laid down in this report are based on a mixture of respondents’ input, scientific literature, web search, interviews, independent analysis, advisory board feedback, and stakeholder workshop feedback.

Scope

For the purpose of the study, energy RTD information systems are defined as web-based systems that have a large group of users with a certain level of accessibility. The study focuses on non-nuclear energy RTD covering fundamental research, socio-economic research, industrial and applied research, and (pilot) demonstration activities.

Reporting

The main results of the study are presented in this report. The central findings are that “Today’s situation regarding EU energy RTD information systems is no longer satisfactory. To meet future challenges, a clear structure and strengthening of coordination and branding are needed” and that “this situation requires both short- and medium-term action”. This is detailed hereafter respectively in chapter 1 and chapter 2.

Full results are included in the annexes of this report:

- The results of the questionnaire (Annex A)
- Data sheets of 25 selected examples of web-based energy RTD information systems (Annex B)
- Brief descriptions of 70 other web-based energy RTD information systems and websites related to energy RTD (Annex C).

Additional supporting annexes are also attached:

- Interviews and Advisory Board (Annex D)
- Spending on energy RTD according to IEA (Annex E)
- Literature and sources (Annex F)
- US DOE’s Technical Information Management (Annex G).

Today's situation regarding EU energy RTD information systems is no longer satisfactory. To meet future challenges, a clear structure and strengthening of coordination and branding are needed.

The currently available web-based information systems and databases on energy RTD have played an important role in disclosing and sharing information on energy RTD at national level in the past decades. In retrospect, their development contributed to the creation of relevant national information networks and platforms. Some of the established international and European focused energy RTD information systems have already contributed to the co-operation and coordination of research activities at these levels.

The current information structure was developed more or less organically by a bottom-up growth process in the last decades. The individual systems and the overall structure of energy RTD information systems have reached their intended structure and objectives. However the situation has changed in recent years. At EU level there is a need for energy RTD information systems that meet the future challenges of improved collaboration and co-operation but also European and international competitiveness. These challenges are certainly fostered by EU programmes and by the progressive implementation of the European Research Area (ERA). But also the research community itself is more and more focused on the international and European research arena, as national funding mechanisms are becoming less self-evident.

Other – external – drivers for change are:

- The role of the internet in the RTD society is rapidly changing.
- Innovation models of industry are changing more and more towards open collaboration structures with preferred knowledge suppliers.
- The energy RTD is entering a new phase of development – as a consequence of liberalisation and gradual maturing of the energy markets. As result, decisions on starting new RTD and making investments in innovation systems ask for a solid business rationale.

This entirely new situation provides clear input for defining a roadmap towards a more coherent and client-based European network of RTD information systems.

Based on the questionnaire, the analysis of the available energy RTD information systems, the interviews and desk research, the overall conclusion is that the current situation is no longer satisfactory for the future and potentially needs improvement.

Supporting reasons for this overall conclusion are:

- There is lack of structure and connectivity for EU energy RTD information systems.
- The variety of energy RTD information systems is unknown to or not used by large groups of European users.
- Most EU energy RTD information systems only moderately match the EU user's needs.
- There is imbalance in the availability of energy RTD info systems.
- Current branding, transparency and accessibility of EU energy RTD information systems does not reflect the targets of a leading knowledge-based economy.

Only 8% of the respondents to the questionnaire judged that the current situation of energy RTD information systems in Europe fitted their needs in the top two categories (annex A, question 17).

Specific areas of improvement were mentioned: overall structure (15 times), on-site search (10), comparability of data (7), information on current RTD projects (6), quality of data (6), information on the impact of projects/research results (5), user friendliness (3), and unavailability of data due to confidentiality (2) (Annex A, question 18).

The following paragraphs will discuss in more detail the underlying facts for these conclusions.

There is lack of structure and connectivity for EU energy RTD information systems

Clearly, lack of coherence and overall structure are weaknesses in the current situation on energy RTD information systems. Almost all persons approached, respondents to the questionnaire and interviewees mentioned lack of structure and overview.

Energy RTD information systems is not specifically addressed as an issue

With respect to responsibility for the subject, targeted audiences, scope and geographic coverage of energy RTD information systems the situation is diffuse. There are many different websites that include information on energy RTD. Most systems have a wider scope and cover either energy or RTD in a more generic way. Only a few information systems focus entirely on energy RTD: research and technological development on all aspects of energy systems. This is due to the fact that energy RTD knowledge management is dealt with by different policy and policy execution organisations. Also, many information systems are not created in isolation and are part of broader (dissemination) strategies.

In Germany, for example, four federal Ministries are involved in energy RTD:

- Energy RTD in general is part of BMWA (Ministry of Economics and Labour).
- Renewable energy is part of BMU (Ministry for the Environment, Nature Conservation and Nuclear Safety).
- Biomass and bio-energy is part of BMVEL (Ministry of Consumer Protection, Food and Agriculture).
- Overall RTD policy is the responsibility of BMBF (Ministry of Education and Research).

This diffuse situation is a practical hurdle for targeted policy and focused actions that can improve the coherence of energy RTD information systems at national and European or international levels.

No European one-stop-shop for energy RTD information

At present there is no European portal on energy RTD that functions as a gateway to energy RTD sites across Europe. At EU level many different websites exist related to energy RTD but they only cover a small part of the entire subject. The Research DG energy website mainly informs on EU energy RTD policy. DG TREN's websites inform on EU demonstration programmes and results. CORDIS informs on RTD programmes and projects in the Framework Programmes but does not focus on energy. There are in addition several national websites that give energy RTD information (e.g. in Italy, France, the Netherlands and the UK). At international level, a comprehensive set of energy RTD information systems exists (IEA ETDEWEB, IEA implementing agreements, IEA information centre, IEA Caddet and Greentie).

Respondents to the questionnaire mention the lack of portals as a reason that searches for specific information are time consuming and in many cases produce unreliable information. A user interface for specific target groups is missing in many cases.

A common language is missing

Assessment of the identified information systems shows that there is no common language. Themes, technologies and issues are not characterised by the same terminology and definitions. The variety of languages in which the information is provided makes things even more complicated. Only in rare cases are references made to standard classifications (e.g. international energy classification applied in the German ENergy TEChnology or ENTEC database, see Annex C).

Co-operation and coordination between different stakeholders in the European knowledge-value-chain of energy RTD is weak

Successful dissemination and exploitation of results of energy RTD projects is in the interest of both the RTD producer and the RTD community as a whole, and also can serve the economic, technological and social benefits for society and the energy industry.

Dissemination or sharing of knowledge is a crucial step in the knowledge-value-chain that consists of the following activities, which can be performed in a linear way or in more interactive and circular ways (Weggeman, 2000²):

- Creating knowledge
- Disseminating/sharing knowledge
- Acquiring and using/applying knowledge
- Evaluating knowledge.

Individual attributes of science and technology include the intrinsic intangible nature of research and knowledge, the risks and uncertainty involved in the energy RTD process, the time lags operating between RTD execution and the observation of the impact, the diversity of forms in which outcomes can manifest and the continuously changing patterns of science and technology. All these factors make it difficult to evaluate the contribution of existing energy RTD information systems. However, they have positively contributed to strengthening the crucial and traditionally weak transfer points in the knowledge-value-chain, including:

- Transfer of knowledge from one project to another project
- Transfer of knowledge from one research team to another, often competing, team
- Transfer of knowledge from research to industry and policy.

However, although the share of knowledge is crucial, as demonstrated above, and although the European and international share of knowledge is becoming more and more important in view of the international challenges to the energy industry and the ongoing strengthening of European and international energy RTD, the project team could establish only few European and supranational co-operation and coordination initiatives aimed at dissemination of energy RTD. These examples are:

- **EnR (European Energy Network):** EnR is an informal network that works on a voluntary basis. Co-operation and coordination between these RTD programme management organisations appears however to be relatively poor, as confirmed by the interviewees

² Weggeman M.C.D.P. (2000): "Knowledge management in practice (Dutch)", *Scriptum*

- **Nordic Energy Index:** The Nordic Energy Index is a system that discloses basic information on energy RTD funded by Scandinavian governments. Knowledge sharing is the basic driver for this system
- **IEA initiatives:** The IEA ETDEWEB and IEA Implementing Agreements in particular focus on disseminating energy RTD information. However, the effectiveness of these activities is sometimes criticised³. Recently a plan and activities were established to improve knowledge management activities.

Some other initiatives exist at project level. Examples are the EU Agores website, the EU Atlas website and the EU HyWeb initiatives aiming to create information platforms on renewable energy, energy RTD and hydrogen and fuel cells respectively (see Annex C). However, these initiatives are restricted in duration and scope. People work hard to meet clear but restricted objectives and to produce practical output within the budget or their project. A website is produced in relative isolation even if some coordination and co-operation in dissemination of the created knowledge is obligatory within the boundaries of the co-operation project or programme.

As a metaphor, today's situation can be characterised as small islands of energy RTD information in the wide ocean. This situation might partly be due to the competition between stakeholders but is surely also due to the fact that co-operation and coordination of knowledge management is not (yet) regarded as crucial and as having advantages for all European stakeholders in the medium or long term.

In our view, for the future, the existing islands should be anchored and nourished and strong bridges or rapid ferries should be realised to connect these islands of knowledge. Co-operation and coordination should be stimulated between the different stakeholder groups of energy RTD (such as research organisations, research programme management organisations, policy organisations and information system operators) active in these fields across Europe. The establishment of virtual networks or 'Technology Platforms', currently developed on CORDIS, is a first step in this direction.

The variety of energy RTD information systems is unknown to or not used by large groups of European users

Many existing information systems are unknown to users

When analysing the energy RTD information systems mentioned by the respondents of the questionnaire⁴ and the information systems that were identified by the researchers of this project⁵ it is obvious that many information systems are still relatively unknown to the majority of the target groups.

Table 1 – Number of known energy RTD information systems

Mentioned by respondents of questionnaire	Total identified
55	93

Existing information systems are not appealing enough to potential users

When looking at information systems it emerges that five of them are commonly known, the rest are only occasionally mentioned.

³ PricewaterhouseCoopers (2002): 'Evaluation of the Dutch participation to Implementing Agreements', Utrecht, 2002 ('Evaluatie van de Nederlandse deelname aan Implementing Agreements')

⁴ Annex A, question 20

⁵ Annex B and Annex C

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Reliable and easily accessible information on European energy R&D is a crucial factor for the implementation of the European Research Area. Numerous national and international information systems, varying with respect to target groups, scope, geographical coverage, language and conditions for access exist, but up to now they have not been well interlinked. This study analyses existing systems for the first time, compares them with user's needs and makes recommendations on how to improve European energy RTD knowledge management.

