

Enova's Results and Activities Report for 2007

Enova SF is owned by the Ministry of Petroleum and Energy and was established for the purpose of initiating and promoting an environmentally friendly restructuring of energy consumption and energy generation in Norway. Enova's objective is to make it easier for households, businesses and the public sector to choose simple, energy-efficient and environmentally correct solutions.

All Enova publications are available at www.enova.no.

For more information:

«Enova svarer» 08049 (for professionals), or 800 49003 (for households)
svarer@enova.no

Enovareport 2008:2

ISBN 978-82-92502-34-1

ISSN 1503-4534

Enova SF

Abels gate 5

NO-7030 Trondheim

Norway





A driving force for progressive energy solutions

- Owned by the Norwegian Ministry of Petroleum and Energy
- Manages the Energy Fund
 - Managed approx. 140 million euros in 2007
 - Anticipates that budget will gradually increase in years to come
 - Budget 2008: approx. 235 million euros
- Established in 2001
- Located in Trondheim
- 40 employees

Purpose

Promote long-term, environmentally friendly changes in energy consumption and energy generation

Performance targets

- 12 TWh of energy conserved and added renewable energy generation by the end of 2010
 - Including 3 TWh of wind power and 4 TWh of renewable heating
- 30 TWh by 2016

CONTENTS

| | |
|---|----|
| Enova in the climate year 2007 | 2 |
| Summary | 4 |
| 1 Results and activities | 6 |
| 1.1 Goals, objectives and means | 6 |
| 1.2 Energy results | 7 |
| 1.3 Lifetime issues | 9 |
| 1.4 Reductions in CO2 emissions as a consequence of Enova's projects | 10 |
| 1.5 Funding and allocations - the Energy Fund | 12 |
| 1.6 Funding and allocations - other activities | 15 |
| 2 Results and activities related to the Energy Fund | 17 |
| 2.1 Wind power | 17 |
| 2.2 Renewable thermal energy and solid biofuel production | 20 |
| 2.3 Energy consumption in the built environment | 25 |
| 2.4 Industry | 26 |
| 2.5 Efforts targeting municipalities | 33 |
| 2.6 New technology | 34 |
| 2.7 Households | 40 |
| 2.8 Communication | 44 |
| 2.9 International work: development of expertise, instigator role and network-building | 47 |
| 2.10 Cooperation and consulting | 50 |
| 3 Other results and activities | 51 |
| 3.1 Natural gas | 51 |
| 3.2 Management of «Intelligent Energy - Europe» (IEE) | 51 |
| 3.3 Subsidy program for households | 53 |
| 3.4 Management of «Energy Technology Data Exchange» (ETDE) | 53 |
| 4 Glossary | 54 |
| Appendix | |
| Summary of consultation submissions and publications prepared in 2007 | 57 |

ENOVA IN THE CLIMATE YEAR 2007

The past year has been marked by growing interest in the climate challenges facing our world. The media, the political agenda and the attitude of the general public all reflect growing concern. 2007 was the year when the Climate White Paper was submitted to the Norwegian Parliament, marking the beginning of a compromise among most of the political parties in the Parliament. Never before has there been such broad agreement that action is needed, and that it is needed fast. Enova will play an important role in Norway's national climate efforts through our policy instruments aimed at efficient energy consumption and increased generation of renewable energy.

We achieved a milestone in 2007. During the period 2001-2007 we have contributed to projects that, in total, can result in 10.1 TWh in savings and additional energy generation, which means that we are well on our way to achieving the goal of 12 TWh by the end of 2010. In 2007, Enova has secured contractual commitments for 2.4 TWh in projects aimed at reducing energy consumption and increasing generation of renewable energy. This will contribute to better profitability and efficiency in Norwegian companies, an improved Norwegian power balance and, not least, lower CO2 emissions - not just this year, but each and every year for many years to come.

Facilitating the transformation to more environmentally friendly energy consumption and generation is our primary task. We conducted analyses in 2007 that revealed a large potential for more efficient energy consumption and for increased generation from renewable energy sources towards the year 2020. The signals given that Enova's budget will significantly increase strengthen our chances of harvesting this potential. The funds Enova puts to work will trigger many times their worth in investments from business and industry. This means that, through Enova's projects in the years to come, several billion kroner per year will be invested in green energy. Our success hinges on a broad-based effort to ensure effective use of policy instruments. Therefore, we have examined how we can further develop our efforts in the various market segments. One of the most exciting analyses shows the enormous potential Norway has for producing renewable energy offshore. As an initial step towards realising this potential, Enova supported a pilot project for generating electricity from floating offshore windmills.



Fridtjof Unander
Acting Executive Director

Enova achieved a record-breaking result in 2007 in renewable heat generation, but there is still much to be gained in this field. These results will be further reinforced through a new heating program with a three-pronged commitment to district heat generation, district heating infrastructure and local heating plants, which could yield substantial reductions in the use of electricity and oil for heating. Record results were also achieved within industry last year. These results are mainly linked to major projects in energy-intensive industries. Therefore, Enova will redouble its efforts towards

other areas of industry, using different types of policy instruments other than direct investment subsidies. The building and construction sector has experienced a boom in recent years, making it difficult to turn developers' focus to energy consumption. Nevertheless, comprehensive agreements with leading market actors will trigger major projects over the next five years; projects which are expected to create ripple effects far beyond the contractual energy results.

Another area which has been the subject of considerable interest in 2007 is our campaign aimed at Norwegian municipalities. We have developed a series of courses on municipal energy and climate plans which provide a good foundation for step-by-step development of good municipal projects in connection with Enova's heat program and programs targeting the built environment. This step-by-step campaign will be an important tool to aid in realising the enormous potential we have for energy efficiency and reduced greenhouse gas emissions in the municipalities. Enova also developed new campaigns for households in 2007. Lack of knowledge and access to information are

among the most important reasons for not releasing the huge potential that lies in efficient household energy consumption. For this reason, much of our effort is aimed at providing such information via the media, telephone help lines, websites, campaigns, trade exhibitions, etc. A new concept was also developed during the past year, «Enova Recommends», which is a labelling system for energy-efficient products with the objective of triggering positive actions as regards energy-efficient solutions in the private market.

At the beginning of 2008, Energi21 presented its strategy for the energy sector. Energi21 was formed in 2007 with the primary mandate of establishing a broad and unifying research and development strategy for the energy sector. Enova participated in Energi21's management group, representing the regulatory sector. Energi21 launched the following vision: «Europe's energy and environment nation - from national energy balance to green supplier». Energi21 points out that, with the right efforts, Norway can beco-

me a major supplier of environmentally friendly energy to Europe. One of the most gratifying aspects of the work in Energi21 was the enthusiasm and willingness on the part of the energy sector to develop a common platform for a commitment to renewable energy and increased energy efficiency. The involvement of the energy sector and energy consumers is an important prerequisite for achieving our ambitious goals. Enova will work diligently to reinforce this enthusiasm for development and use of progressive energy solutions. We look forward to continuing the good cooperation we have with market actors in all areas of this important work.

Fridtjof Unander

Acting Executive Director

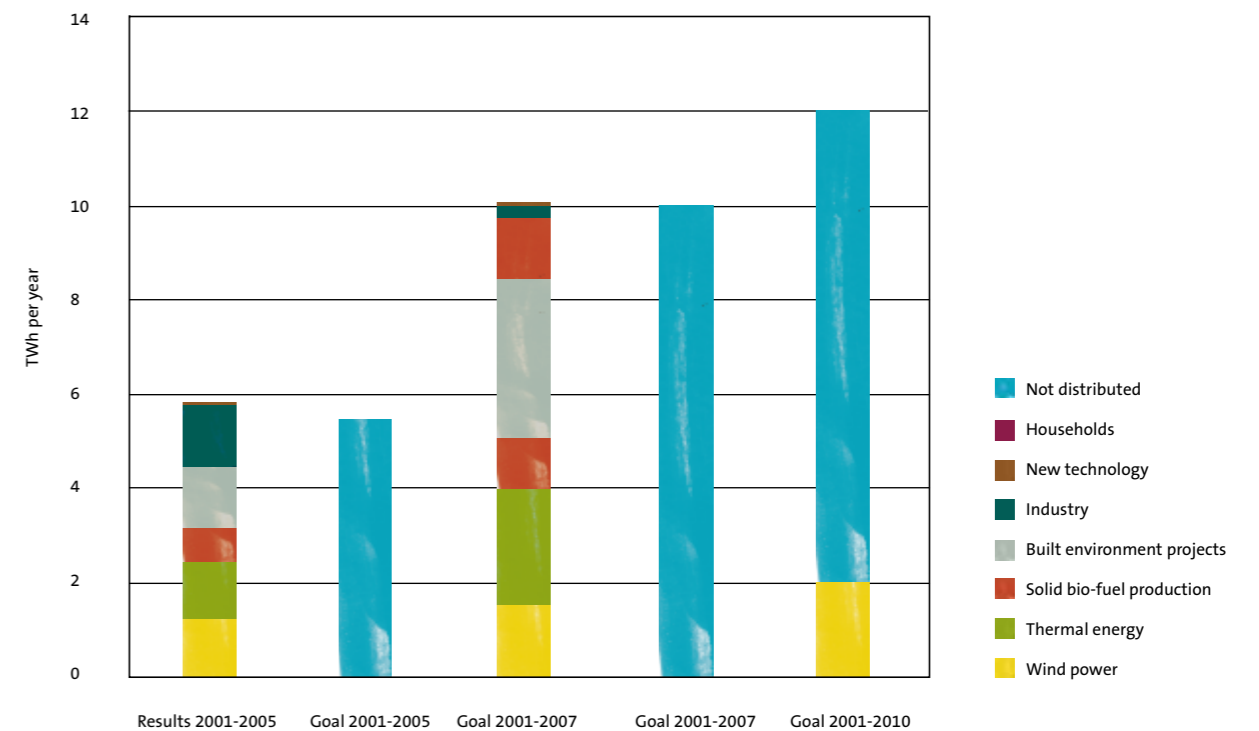


Figure 1: Results and goals in Enova¹

¹ Enova's management of the Energy Fund is controlled through an agreement with the Ministry of Petroleum and Energy. The 2007 agreement sets a goal for the period 2001-2007 of 10 TWh. A result of 12 TWh is to be achieved by the end of 2010.

SUMMARY

Enova's primary task is to utilise the Norwegian Energy Fund to contribute to environmentally friendly restructuring of energy consumption and generation. Enova's management of the Energy Fund is governed by an agreement between the Ministry of Petroleum and Energy and Enova. Restructuring national energy consumption is a comprehensive task, which includes identifying barriers and fine-tuning policy instruments to achieve changes in the market. In 2007, Enova achieved contractual commitments for an energy result of about 2.4 TWh, while 10.1 TWh was contracted in the period 2001-2007.

A 28 million euro wind power project received support in 2007, and counting this project, Enova has granted subsidies totalling 100 million euros for 11 different windmill parks located around Norway. A significant commitment was made in the heating area in 2007. An energy result of 751 GWh in renewable heating energy was contracted, distributed among 69 projects with total funding amounting to 40 million euros. Biofuel processing projects received 0.6 million euros, divided among four projects totalling 163 GWh. From 2008, three new heating programs will replace the existing heating program, and the solid biofuel production program will be discontinued. In 2007, Enova received 30 applications for the new technology program, of which 21 were connected to the joint effort with the Research Council of Norway and Innovation Norway. A total of ten projects have received pledges of support from Enova in 2007, totalling 10 million euros.

The program for energy consumption in buildings achieved a contractual energy result of 365 GWh in 2007. An evaluation was carried out in 2007 that will be used as a basis for tailoring the program activities to the market. The work aimed at energy efficiency and conversion to renewable energy carriers in industry has contributed a total contracted energy result of 814 GWh in 2007. The main program has been confirmed and maintained in 2007. The program entitled «Energy Management - companies in networks» has been discontinued, and its core activities have been moved to projects under the investment support program.

During the past year, Enova expanded its efforts aimed at Norwegian municipalities. In addition to the subsidy program «Municipal energy and climate planning», Enova has developed both guides and courses in energy and climate planning for the municipalities. In 2007, the Ministry

of Local Government and Regional Development and the Ministry of Petroleum and Energy entrusted Enova with the task of developing and conducting courses in energy and climate planning.

Enova has also made further strides in 2007 in the program it offers to households. Enova will implement a new strategy aimed at households in 2008, «Enova Recommends», which is a policy instrument whereby Enova will work together with market actors to ensure that consumers receive information about the energy qualities of the products they buy, at the time when they are purchased. In 2007, Enova's campaign for children and young people, the Rainmakers, has been presented in children's TV programs, on the regnmakerne.no website, in primary schools, at housing fairs and in the energy centre at the Hunderfossen family theme park. Media focus on Enova's activities reached new heights in 2007. A major image campaign was carried out in the autumn, aimed at national and municipal decision-makers, as well as business and industry. Knowledge about Enova, the organisation's tasks and achievements, improved in 2007. Enova's website has been restructured and improved in 2007 and will be re-launched in 2008.

Enova's projects reduce CO₂ emissions. Given certain assumptions, the total effect of Enova's projects could reduce oil consumption by an estimated 230,000 tonnes, and CO₂ emissions by 3.3 million tonnes. This is equivalent to a cost of measures in excess of 7.5 euros per tonne of CO₂, assuming alternative gas power coverage. Available funds in 2007 amounted to 160 million euros, including 50 million euros in commitment authorisations. 140 million euros million has been allocated. At year-end, there was 257 million euros in the Energy Fund account, of which 93 per cent is tied to a portfolio of 1023 active projects.

In addition to the resources in the Energy Fund, Enova manages certain other tasks with separate appropriations. In 2007, these tasks included natural gas, the EU program «Intelligent Energy - Europe» (IEE), the IEA program ETDE, subsidies for electricity conservation in households and pledges of support for courses in energy and environment planning for Norway's municipalities. As regards natural gas, contracts were signed for four projects in 2007 which could provide a total basis for gas sales equivalent to 970 GWh per year. A total of 7 million euros has been allocated.

Energy consumption in Norway

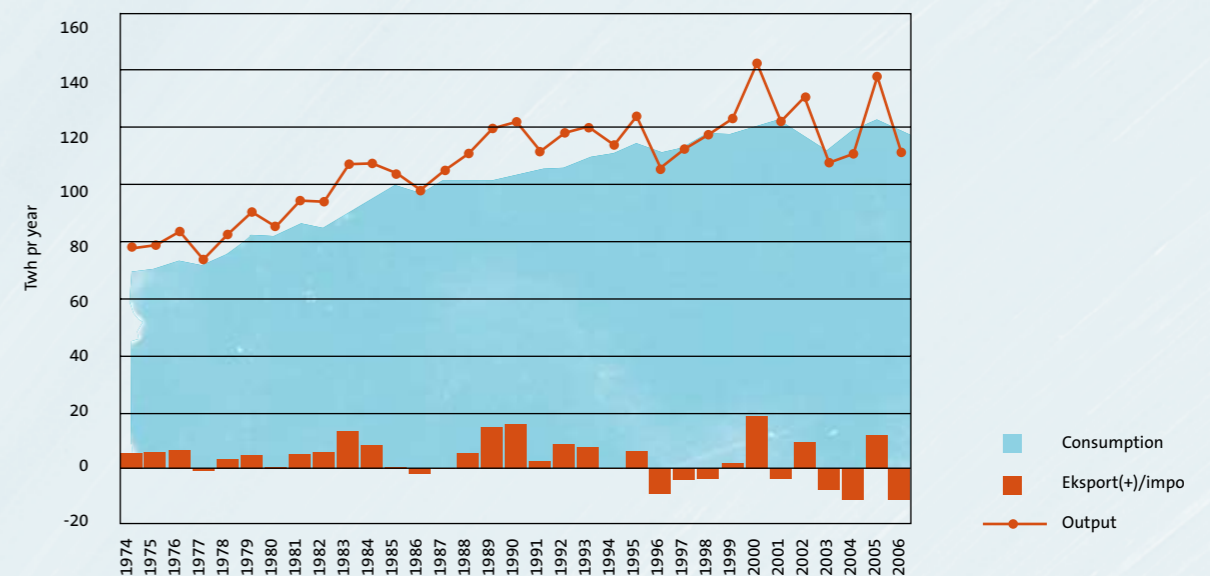
Demand for electricity levelling off?

Electricity consumption in Norway grew at a strong, steady pace until the mid-1990s. While total growth over the past decade has not been as great, there are substantial variations in this development, depending on which sector is examined. Households accounted for much of this growth up to the mid-1990s, while recent years have seen higher consumption in traditional and service industries. Growth in the household sector has levelled off, in spite of population growth and an increase in the number of households.

About 65 per cent of stationary energy consumption in Norway is provided by electricity. The second largest contributor is petroleum products, which account for a total of

14 per cent. Demand for electricity depends on many factors, where efficiency measures, activity level and access to alternative energy sources are among the most important.

Norwegian power generation comes from three main sources: hydroelectric, thermal and wind. Hydroelectric power still accounts for nearly all of the power generated. 0.9 TWh of wind power was generated in 2007, representing 1 per cent of total power generation. Although we have seen a significant rise in generation of electricity from wind power during the 2001-2007 period, it still accounts for just a small portion of total electricity generation.



Source: SSB

1. RESULTS AND ACTIVITIES

1.1 Goals, objectives and means

Enova's primary mission is to contribute to environmentally friendly energy consumption and generation through means in the Energy Fund. Management of the Energy Fund is governed by an agreement between the Ministry of Petroleum and Energy and Enova. The agreement sets out objectives and provides clear guidelines for this task. Restructuring energy consumption is a long-term, comprehensive task which entails identifying barriers and adjusting policy instruments to achieve changes in the market. Support to individual projects is not the objective per se, but is rather a means of achieving the paramount goal.

Restructuring energy consumption in line with Enova's objectives means that both consumption and generation of energy must take place in a more environmentally friendly manner. To accomplish this, there must be a shift in the market. This shift entails better access to good energy solutions, with an accompanying growth in demand for these solutions and a gradual departure from less efficient solutions. It is important that project support is provided in a manner that promotes the fastest possible market transition, with maximum cost-effectiveness.

Enova employs various types of instruments to achieve these objectives. Investment funding is a very important instrument, but it is not the only one. The support provided by Enova must trigger implementation of projects; in other words, the project or measure would not be carried out without this support. Enova ensures that this principle is maintained through formulation and implementation of the programs. Investment funding is used when profitability is an obstacle for implementing a project. In other cases, information and knowledge, support for new technology and prototype projects, are equally important measures. This is illustrated by the fact that the primary emphasis of Enova's measures aimed at households does not include investment funding.

Lack of energy awareness on the part of decision-makers in the public and private sectors is often the reason for not investing in energy-efficient solutions. Enova's work aims to sharpen this awareness. Technological development is important and can lead to cheaper and easier reduction of energy consumption or use of renewable energy sources. Access to these renewable sources is also essential. It is important that we help enhance knowledge about the

possibilities that exist for using more efficient, flexible and cleaner energy solutions. Better expertise in energy and environment issues is crucial if we are to bring about a lasting energy restructuring in our society. Therefore, Enova must contribute to the work to improve such expertise.

From 2010, the annual framework for Enova's work will probably exceed NOK 1.5 billion. A larger framework increases the challenges entailed in allocating the funds in a cost-effective manner to achieve the paramount goal. To ensure that Enova's work has the desired effect, the overall impact of the funding must be quantified. Support for a project will give both direct and indirect effects, so-called indirect effects. Direct effects last throughout the project's lifetime, but are just one part of the overall impact of a project. Therefore, it is important to measure the indirect effects to determine whether the desired market changes are being realized. The best result is not necessarily achieved by managing and prioritizing according to the direct effects alone. In the past year, Enova has been concerned with finding a better way to quantify the effects of our policy instruments, both existing and new, that are not regulated by contracts.

The vast majority of our projects yield a quantifiable energy result through a mutually binding contract entered into between Enova and the project owner. This contract specifies the type of measure to be carried out and its estimated direct effects. In addition to the direct effects there will also be indirect effects in the form of market influence, dissemination of information, etc. The 2007 evaluation dealing with the built environment concluded e.g. that there are indirect effects in nearly all of the projects in this area. This will apply to many of Enova's programs and it is therefore important that we are aware of how the results will be measured even as the programs are planned. Quantifying indirect effects and direct effects that are difficult to measure entails many challenges. Enova will continue to work diligently in this area.

1.2 Energy results

In 2007 Enova had contractual commitments for an energy result of approximately 2.4 TWh. A total of 10.1² TWh has been contracted for during the period 2001-2007. Enova's agreement with the Ministry of Petroleum and Energy for 2007 sets a goal of 10 TWh for the period 2001-2007. A result of 12 TWh is to be achieved by the end of 2010. Many project owners have submitted final reports during 2007, and the results are uplifting. It appears that the contractual result is a good indication of the final reported result.

Of the total energy result in 2007, the energy result linked to energy consumption is 1.2 TWh, of which 814 GWh is generated through Enova's industry programs and 365 GWh through Enova's built environment program. A new element in 2007 is the «Enova Recommends» pilot project

within the households area. This project is aimed at contributing to a market shift in the direction of more energy-efficient windows, and has an expected energy result of 10 GWh. As regards energy generation, there are contractual commitments totalling 1.2 TWh. 1018 GWh are linked to establishing renewable thermal energy, wind power and new technology, while 163 GWh come through a program for processing biofuel. The results are shown in Figure 2, broken down by year and area.

Final reports^{3,4}, at the end of 2007 indicate approximately 3.6 TWh, which makes up just over one-third of Enova's total contractual energy results. For the portfolio as a whole, final reports indicate 14.9 GWh more than what was contracted for these projects. This means that the overall contractual results for these projects were a good forecast indication of what would emerge in the final reports.

| GWh/year | Contractual | | | | Contractual corrected for final reported result |
|---|------------------------|--------------|--------------|---------------|---|
| | 2001-2005 ⁵ | 2006 | 2007 | 2001-2007 | 2001-2007 |
| Wind power | 1 306 | 0 | 260 | 1 566 | 1 553 |
| Renewable thermal energy | 1 213 | 630 | 751 | 2 593 | 2 552 |
| Solid biofuel production | 713 | 100 | 163 | 975 | 978 |
| Built environment projects | 1 306 | 378 | 365 | 2 050 | 2 064 |
| Industry | 1 211 ⁶ | 759 | 814 | 2 785 | 2 835 |
| New technology | 65 | 7 | 7 | 79 | 80 |
| Households | 0 | 0 | 10 | 10 | 10 |
| Contractual | 5 813 | 1 813 | 2 370 | 10 058 | |
| Contractual, corrected for final reported result | 5 827 | 1 876 | 2 370 | | 10 073 |

Table 1: Contractual energy result in GWh broken down by area and year ^{7,8,9}

² The figure has been corrected for projects cut short and other changes.

³ That a final report has been submitted for a project means that all investments have been completed and all disbursements have been made from Enova. This does not necessarily mean that the entire energy result has been achieved. See also the definitions of final reported and realized result in the glossary at the back of the report.

⁴ The results from the NVE projects in 2001 are included in this figure, even though these projects are not included in Enova's project database in the same manner as subsequent projects.

⁵ The 2001 projects were supported by NVE, and have since been followed up by Enova. Enova's agreement with the MPE confirms that Enova can count the results from the projects. In 2002, Enova commissioned an external report that examined the energy results for 2001 according to the guidelines that apply for Enova's projects. This work was performed by Econ and Stavanger revisjon. Enova plans no further review of the projects, and they will therefore be counted together with the final reported results, even though the projects are not registered as having final reports in Enova's database in a comparable manner as for the projects supported by Enova.

⁶ Of this, 152 GWh relates to industry projects that have not been formalised in the form of contracts.

⁷ The year refers to the year when a contract was made for the project, and does not necessarily indicate when the project results will be realized in the form of kWh.

⁸ Due to round offs, the total sums will not necessarily concur with the total for the respective year.

⁹ Contractual results for the individual year will change from year to year due to cancelled/interrupted projects and other changes. This means that the figures in the table are not necessarily the same as reported in Enova's result report for 2006. An overview of changes in contractual results from the 2006 report to this report can be found on Enova's website

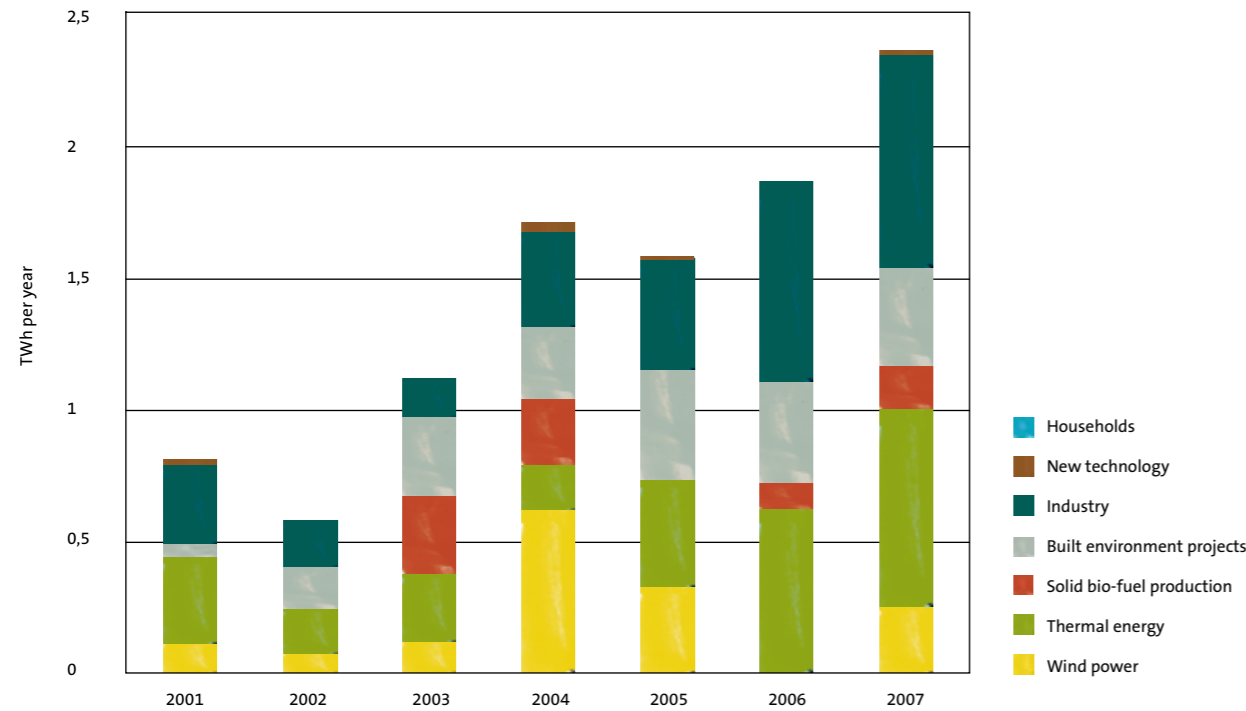


Figure 2: Contractual energy result corrected for final reported kWh in Enova for the years 2001-2007

Figure 3 shows the percentage of projects with final reports broken down by contract year. The percentage of the contractual portfolio that has final reports gradually shrinks, which concurs with expectations associated with a maturing project portfolio.

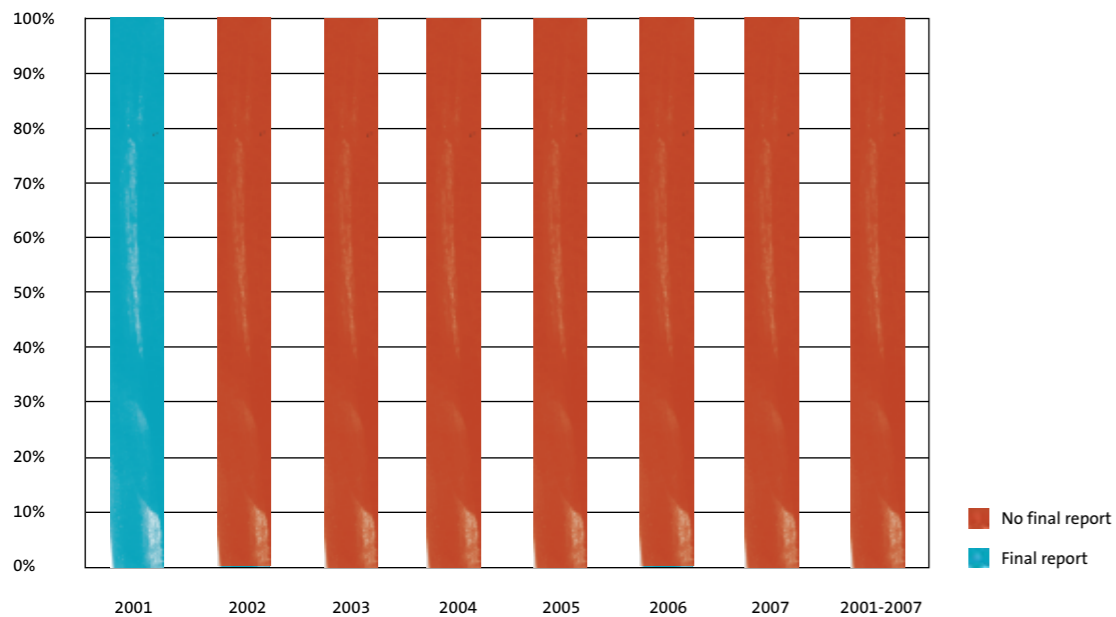


Figure 3: Percentage of contractual projects with final reports, broken down by year when the contract was entered into^{10,11}

¹⁰ The results from the NVE projects in 2001 are included in this figure, even though these projects are not included in Enova's project database in the same manner as subsequent projects
¹¹ The year refers to the year when a contract was made for the project, and does not necessarily indicate when the project results will be realized in the form of kWh.

1.3 Lifetime issues

The resources in the Energy Fund must be used in a cost-effective manner, which is why Enova works to achieve the greatest possible energy result from each NOK of support allocated. At the same time, the support is intended to function as a trigger for the projects, which means that projects that are profitable¹² without Enova's assistance will not receive funding. There are various ways to measure cost-effectiveness. Lifetime is one of the parameters that influence cost-effectiveness. Assuming a given investment cost, the longer the project lifetime, the more profitable the project because the costs of the project can be distributed over results achieved across many years. As mentioned in Section 1.1, indirect effects are also an important factor in cost-effectiveness.

Estimating the lifetime of a project is difficult, but if we assume that energy generation projects have an average lifetime of 20 years, and that energy consumption projects have an average lifetime of ten years, we can arrive at a picture of the costs associated with Enova's projects, as shown in Figure 2. Here the total costs of a program distributed over aggregate kWh are evaluated in relation to lifetime.

The differences in support levels between areas and over time are relatively large. This is due in part to specific milestone goals for wind and thermal projects. The importance

of the assumed lifetime must also be noted. If we assume that thermal projects have twice the lifetime of energy consumption projects, support for thermal projects can be justified even though they require higher funding amounts per kWh in total. Variation over time reflects the development in the program, in addition to the number of projects and the market situation in the respective areas. It is also likely that Enova's support has triggered the most cost-effective projects first, and that the cost of triggering new projects has increased. This is why Enova must develop alternative instruments that can help offset declining cost-effectiveness over time.

The costs associated with wind power and thermal energy projects, measured in awarded funding per kWh, has increased up to the present. As regards wind energy, the maximum funding percentage has increased from its starting level of ten per cent in 2003, to 25 per cent of the approved investment costs in 2004. The increase in the funding level was implemented to offset the loss of income that occurred when Norwegian wind power producers could no longer export green certificates to The Netherlands. There has also been a trend towards substantially higher development costs for wind power. The thermal area received relatively modest support from 2002-2005, while funding in 2006 was fairly high. This level declined again in 2007, when it matched the average level for the period

* 100 øre = NOK 1

| | Lifetime | 2002-2005 | | 2006 ^{13,14} | | 2007 | | 2002-2007 | |
|--------------------------|------------------------------|-----------|------------|-----------------------|------------|-----------|------------|-----------|------------|
| | | Øre/kWh* | Per year | Øre/kWh | Per year | Øre/kWh | Per year | Øre/kWh | Per year |
| Wind power | 20 years | 42 | 2,1 | - | - | 84 | 4,2 | 50 | 2,5 |
| Renewable thermal energy | 20 years | 32 | 1,6 | 52 | 2,6 | 43 | 2,1 | 41 | 2,1 |
| Energy consumption | 10 years | 20 | 2,0 | 25 | 2,5 | 28 | 2,8 | 23 | 2,3 |
| TOTAL | Weighted¹⁵ | 29 | 1,9 | 35 | 2,6 | 40 | 2,7 | 33 | 2,3 |

Table 2: Lifetime issues^{16,17,18}

¹² Profitability is defined as business profitability. Business profitability is highly contingent on the individual company's required rate of return. The required rate of return will depend on factors such as the risk the company sees in a project. The risk associated with various types of energy conversion and energy efficient projects is often perceived as being high, because these are not the company's core activities.

¹³ There were no wind power projects in 2006.

¹⁴ Starting with 2006, relevant costs associated with training are included in the individual area. This could mean that the cost level has increased from and including 2006.

¹⁵ The results are weighted according to lifetime.

¹⁶ The year refers to the year when a contract was made for the project, and does not necessarily indicate when the project results will be realized in the form of kWh.

¹⁷ The funding amount per kWh, adjusted for lifetime, is calculated by dividing total support for an area by the contractual result, multiplied by lifetime. The actual effect of this support on the project's cash flow will depend in part on the discount factor.

¹⁸ Indirect costs associated with administration of the programs are included in the estimated support level.

2002-2007. Much of this variation may be due to the mix of various types of projects in any given year. A relatively high level of support for thermal projects in 2006 can be explained in part by a single large, relatively expensive project that was considered to be of strategic importance due to potential indirect effects.

When lifetime is taken into consideration, the support level for energy consumption projects has had an upward trend. This is due to a number of factors, such as a gradual change in focus within the areas of industry and built environment projects. In 2006, the industry program supported a larger percentage of power recovery projects. The investment costs for these projects are generally relatively high, while the economic life of such projects can be longer than ten years. In 2007, a couple of major renewable heat projects linked to specific industrial consumers received a relatively high level of support through the industry program. A boom in the construction industry led to diminished focus on energy-efficient solutions in this sector, which means it costs more to contract for new projects. Moreover, the actual lifetime of energy consumption projects in built environment projects is probably more than ten years. This is particularly true for recent years since the transition from focus on energy management to support for physical investments means that the effect of the funding is more long-lasting.

It is important to be aware that the figures in the table do not necessarily reflect the actual cost-effectiveness of the measures. External framework conditions and the number of projects in any given year will be important factors influencing changes in the amount of support awarded per kWh. Support from the Energy Fund is intended to trigger the implementation of the project. This means that Enova cannot automatically choose to support projects that yield the highest energy result per NOK of funding, as these projects can often be

| | 2006 | 2007 | 2001-2007 |
|------------------------|--------|--------|-----------|
| Tonnes of oil per year | 56 000 | 66 000 | 230 000 |

Table 3: Reduction in annual fuel oil consumption as a result of Enova's projects ^{20,21}

¹⁹ Enova also supports projects to reduce the use of other polluting energy carriers, such as natural gas.

²⁰ The year refers to the year when a contract was made for the project, and does not necessarily indicate when the project results will be realized in the form of kWh.

²¹ The estimated reduction in fuel oil consumption is based on the fact that the result from the industry and BBA (the built environment) area is a gross result, while the result for renewable energy is a net figure. The reduction in gross oil consumption thus depends on the presumed efficiency, which is estimated to be 85 per cent for the heating area. Lower efficiency will result in a greater reduction in fuel oil consumption. Last year was the first time Enova reported on the impact on fuel oil consumption. The assumptions and data basis used last year have been revised and quality-assured this year to reduce the uncertainty associated with the estimate.

implemented profitably even without funding. Enova is also bound by the agreement with the Ministry of Petroleum and Energy (MPE) which defines specific goals for wind power and thermal energy.

1.4 Reductions in CO2 emissions as a consequence of Enova's projects

All generation of energy has an effect on the environment, but not all energy generation leads to an increase in greenhouse gas emissions. Generation of renewable energy is good for the environment, as it can replace energy generation from fossil fuels. In the same manner, reducing energy consumption has a positive effect on the climate since it allows us to reduce the use of fossil fuels.

Reducing stationary oil consumption¹⁹ is an important climate measure. Enova supports projects that reduce fuel oil consumption both through making energy use more efficient and through conversion to renewable energy sources. To quantify just how much fuel oil consumption has been reduced, we have to know what the fuel oil consumption would have been without the project supported by Enova. Existing buildings and/or industrial firms may often use both fuel oil and electricity for heating, which means that fuel oil consumption will depend e.g. on the price ratio between fuel oil and electricity at any given time. Therefore, an exact figure representing fuel oil reduction cannot be determined, although a potential effect can be estimated.

It is reasonable to expect that the impact on fuel oil consumption will vary between different program areas. Projects within energy consumption areas target both heating and specific consumption of electricity. Generally speaking, reduction

of fuel oil consumption will therefore be less from these areas than from the renewable heat area. District heating and local energy centres will satisfy both new and existing heating needs. In some cases, the heat can replace electrical heating, while in other cases fuel oil or other types of energy are replaced.

In many cases, the customer may have had different alternatives for heating prior to the transition to renewable heating, which would have meant that fuel oil consumption varied from year to year. To estimate the effect on fuel oil consumption, it is estimated that about one-half of the kWh result from the heating area replaces fuel oil. It turns out that each kWh of the industry result may have led to a reduction in fuel oil consumption of 30-40 per cent. Projects in the area of the built environment are expected to yield a proportionately smaller reduction in fuel oil con-

sumption of just more than 10 per cent. In total, this yields a reduction in fuel oil consumption as shown in Table 3.

Norway is part of an international power market where fossil-based power generation often meets marginal demand. Increased generation of renewable power and reduced demand for electricity in Norway could thus reduce CO2 emissions. If alternative supply of power from gas power plants without carbon capture is assumed, and if we also assume that the results from heating and energy consumption projects lead to a reduction in both fuel oil and electricity consumption, the effect of all of Enova's projects on Norwegian CO2 emissions is estimated at 3.3 million tonnes per year. To illustrate the range of potential CO2 reductions, results have also been indicated where it is assumed that energy consumption and heating projects replace only electricity or only oil, as well as what the re-

| Millions of tonnes CO2 per year | 2007 | | 2001-2007 | |
|---------------------------------|----------------------------------|------------------|----------------------------------|----------|
| | 45% fuel oil and 55% electricity | Just electricity | 45% fuel oil and 55% electricity | Just oil |
| Type of electricity: | | | | |
| Coal power | 1,6 | 8,6 | 6,6 | 4,2 |
| Gas power | 0,8 | 3,3 | 3,3 | 3,3 |
| Gas power with carbon capture | 0,4 | 0,5 | 1,5 | 2,7 |

Table 4: Reduction in CO2 emissions as a result of Enova's projects ^{22,23,24}

sults would be for various assumptions for alternative supply of power.

Figure 4 illustrates the reduction in CO2 emissions assuming that the reduction is distributed between 45 per cent reduced fuel oil consumption and 55 per cent reduced electricity consumption. In comparison, the total Norwegian emissions of greenhouse gases amounted to 53.7 million tonnes of CO2 equivalents in 2006.

The average cost of support for all of Enova's projects during the period 2001-2007 is shown in Table 2. If this cost is

divided between the estimated reduction in CO2 emissions (distributed between fuel oil and electricity), this is equivalent to a cost of measures in excess of NOK 60 per tonne of CO2, assuming alternative power coverage through gas power, and in excess of NOK 30 per tonne of CO2 if the alternative is coal power. In comparison, the cost of supplying Norwegian offshore petroleum production with power from onshore is estimated to start at NOK 1600 and upwards, and the quota price in Europe is about NOK 190 per tonne of CO2 (January 2008)²⁵.

²² The case of 45 per cent fuel oil and 55 per cent electricity is based on the same distribution of oil/electricity as in Table 3, but also takes into account the use of other, non-renewable energy sources.

²³ The year refers to the year when a contract was made for the project, and does not necessarily indicate when the project results will be realized in the form of kWh.

²⁴ Emissions from conventional gas power plants vary, depending on factors such as technology and heat utilisation. These calculations assume an emissions coefficient for gas power equal to 378 kg CO2/MWh. The source is «National Climate Measures Analysis» (Nasjonal klimatilaksanalyse), (Civitas 2005). There will also be emissions from gas power plants that have provisions for carbon capture. These emissions are estimated to be equal to 15 per cent of the emissions associated with conventional gas power plants. The assumed emission coefficient for coal power plants is fixed at 950 kg CO2/MWh, which was obtained from the US Department of Energy. The Norwegian Petroleum Industry Association (Norsk Petroleumsinstitutt) reports figures for emissions of CO2 from fuel oil heating; in the industrial sector 331 kg CO2/MWh, in other sectors 378 kg CO2/MWh. An average figure of 355 kg CO2/MWh has been applied.

²⁵ The source is a report on electrification of the Shelf (NPD, NVE) and the Energy Report.

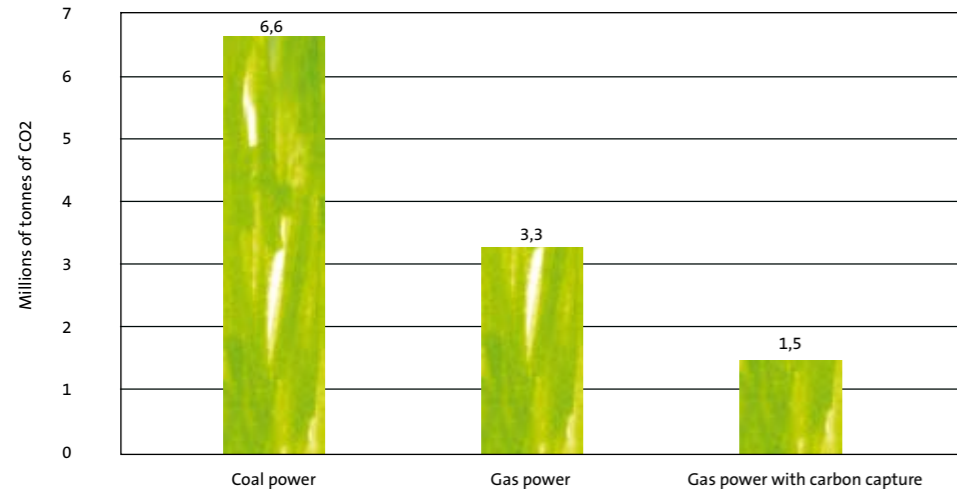


Figure 4: Reduction of CO2 emissions as a result of Enova's projects (by type of electricity generation)

1.5 Funding and allocations – the Energy Fund

Disposable funds in 2007 amounted to NOK 1277 million, including NOK 400 million in commitments. NOK 1122 million has been allocated in the form of commitments, purchase of goods and services and other projects. At year-end, there was NOK 2.2 billion in the Energy Fund account, of which 93 per cent is tied to a portfolio consisting of 1023 active projects.

Several formal requirements govern the management of the Energy Fund, such as not using more resources than the Fund has accumulated. This means that all decisions on support, purchase, etc. are followed by a corresponding allocation of funds. In other words, funds must be allocated simultaneously with the acceptance of a project application for funding, or if a decision is made to purchase services. Because of this, funds will continue to accumulate in accounts that are linked to specific projects.

Enova's support is intended to trigger implementation of the project. Some projects are cancelled, but since disbursements to projects take place only after documented progress, Enova has practically no real loss of funds. It is natural that some projects are suspended, as the very requirement for Enova's support entails that projects basically have marginal profitability. As regards projects that, for whatever reason, are not initiated according to the plan, Enova will withdraw the agreed commitment. Allocated funds are then freed for use in new projects.

Figure 5 illustrates how resources are transferred to and from the Energy Fund from year to year. The Energy Fund is primarily financed through a surcharge on the grid tariff for tapping power from the distribution grid. The grid tariff surcharge is 1 øre/kWh, which means that a household with annual consumption of 20 000 kWh pays NOK 200 per year to the Energy Fund through its electricity bill. Since

such a large portion of the income comes from grid tariff surcharges, the exact amount of the total disposable framework is unknown until year-end, which means that Enova must operate with a certain safety margin. Therefore, the main rule is that funds are transferred to the next budget

year. The size of the transfer varies from year to year, depending on e.g. whether major projects are cancelled at the end of the year. Starting in 2008, the Energy Fund will also include the return on a basic capital of NOK 10 billion, growing to NOK 20 billion from and including 2009.

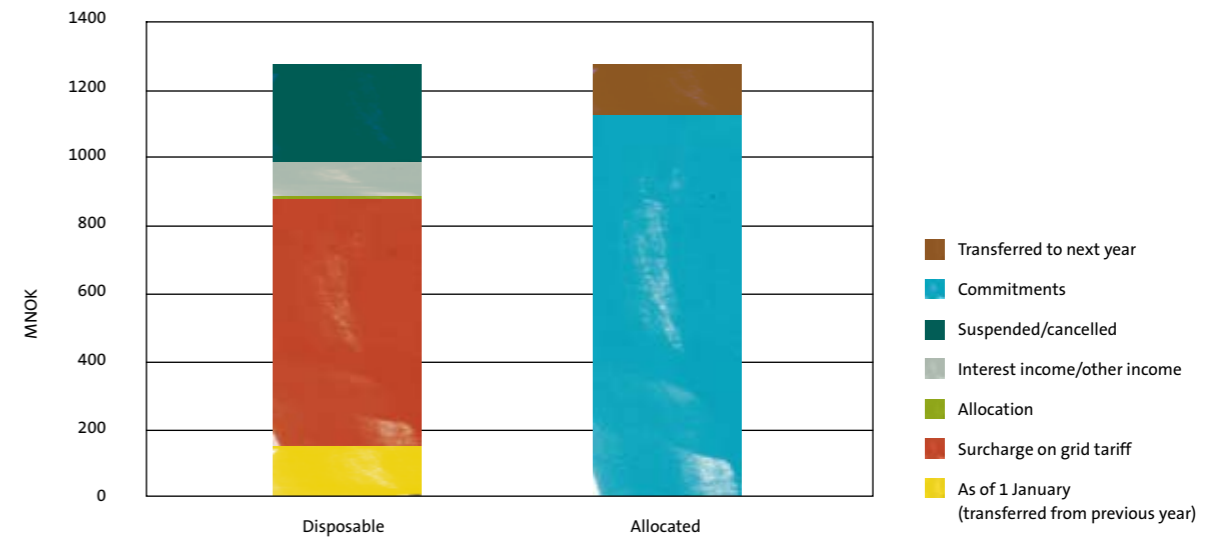


Figure 5: Financial framework for the Energy Fund in 2007

| | No. of applications processed in 2007 | Percentage of projects to receive support (%) | MNOK ^{26,27} |
|-----------------------------|---------------------------------------|---|-----------------------|
| Renewable heat | 138 | 54 | 322 |
| Biofuel processing projects | 11 | 36 | 5 |
| Wind power | 2 | 50 | 218 |
| Built environment projects | 45 | 83 | 128 |
| Industry | 26 | 85 | 200 |
| New technology | 30 | 33 | 75 |
| Municipality program | 46 | 96 | 6 |
| Total | 298 | 65 | 955 |

Table 5: Overview of project applications, approved projects and funding for open programs which accept applications

²⁶ Total funds used per area, including administration costs for the programs (in excess of Enova's administration fees).

²⁷ Adjusted for cancelled projects.

| | MNOK ²⁸ |
|---------------------------------------|--------------------|
| Households | 46 |
| Information and communication | 22 |
| International programs | 9 |
| Analyses/studies | 14 |
| Administration fees Enova (incl. VAT) | 61 |
| | 152 |

Table 6: Overview of allocated funds for self-initiated activities

Tables 5 and 6 provide an overview of the number of applications and funds linked to approved applications and self-initiated activities. A total of 296 applications to Enova's open programs were processed in 2007. 65 per cent of the applications were approved in 2007. In areas where Enova has self-initiated activities, there was a total of 235 different projects in 2007, and funds totalling NOK 91 million have been allocated. If we disregard Enova's administration fees totalling NOK 61 million including value-added tax, 86 per cent of the funds have been allocated within the open program areas.

Figure 6 illustrates the distribution of suspended/cancelled projects in GWh and millions of NOK distributed over the years when the projects were originally contracted. The figure shows that a relatively large percentage, measured in contractual kWh, of the projects for which contractual commitments were made in 2003, have subsequently been suspended. These kWh consist of a major wind project and several major heating projects, and come in addition to the 10.1 TWh Enova reports as a contractual result. This means that Enova has contracted for a total of more than 12.1 TWh, of which 2 TWh, or 16.5 per cent, has been suspended or cancelled during the period 2001-2007.

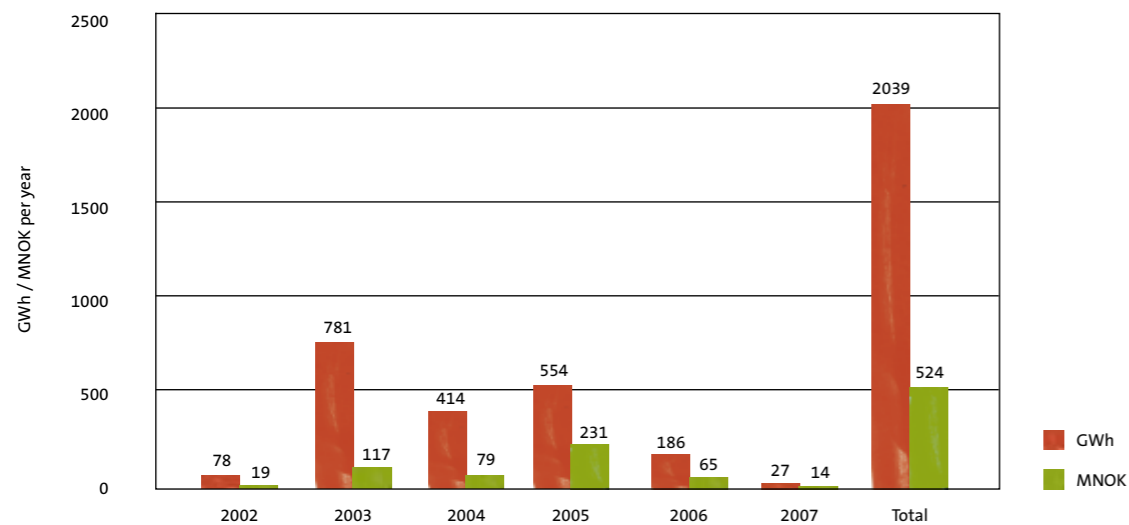


Figure 6: Suspended/cancelled projects in GWh and MNOK per year²⁹

²⁸ Adjusted for cancelled projects.

²⁹ The figure shows GWh and MNOK for all suspended/cancelled projects. In addition to this, there may also be project revisions that result in changed energy targets and different approved amounts. Therefore, the figures cannot be compared directly from year to year.

1.6 Funding and allocations – other activities

In addition to the resources in the Energy Fund, Enova also manages other tasks with separate funding. These tasks in 2007 have encompassed natural gas, the EU program Intelligent Energy Europe (IEE), the IEA program ETDE, subsidies for electricity conservation in households and commitments for support for preparation and implementation of courses in energy and environment planning for Norway's municipalities. This section deals with financing and allocation of these funds. Chapter 3 contains a broader review of these areas.

In the autumn of 2006, the MPE initiated a subsidy scheme aimed at reducing electricity consumption in households. Enova was asked to manage the scheme and to draw up criteria for granting subsidies. The earmarked allocation in 2006 was NOK 71 million, and no additional funding was granted in 2007. Disbursed subsidies in 2007 amounted to NOK 33.7 million, and the plan is to wind up the scheme in 2008.

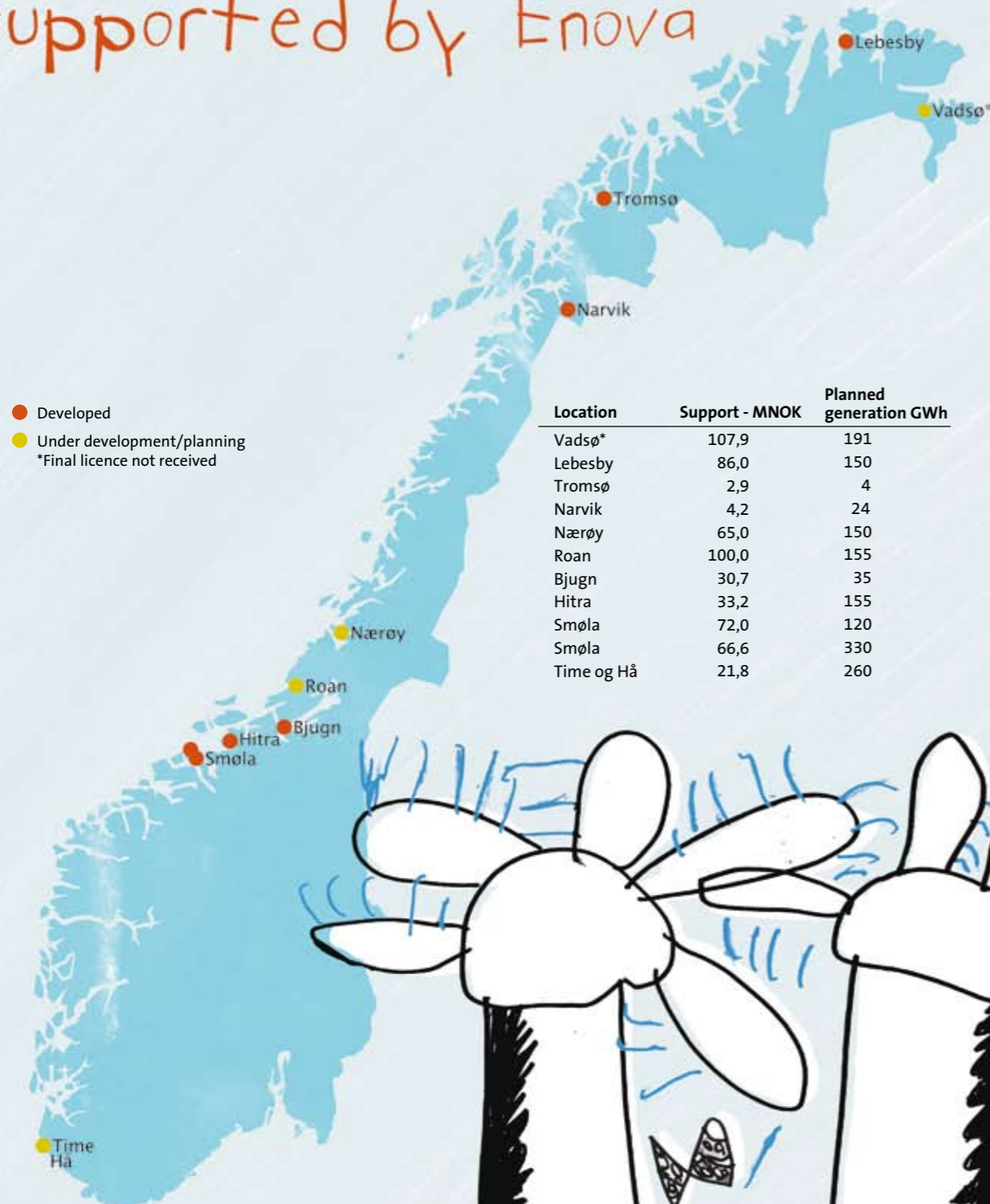
Another important non-Energy Fund management task in 2007 was to manage funds to contribute to realising the Government's goal of increased environmentally friendly domestic use of natural gas. The funds available in 2007 amounted to an allocation of NOK 30 million, in addition to a continuation of commitment authorisations amounting to NOK 20 million. Not counting the exercised commit-

ment authorisations in 2006, disposable funds in 2007 amounted to NOK 47.6 million. NOK 2 million of this was earmarked for Norsk Gassenter, a competence centre for end-user technology at Haugalandet. Funds totalling NOK 14.6 million were returned during the course of the year, most of which comes from a single cancelled project. A total of NOK 61 million was allocated to natural gas in 2007.

The grant for Norway's participation in the IEA's multinational information program «Energy Technology Data Exchange» (ETDE) was NOK 1.7 million in 2007, all of which was allocated. Similarly, the MPE contributed to financing selected projects within the EU program «Intelligent Energy – Europe» (IEE), where the projects fall outside the framework for utilising resources from the Energy Fund. There were no allocations related to this scheme in 2007. Unappropriated funds from previous years, as well as returned funds from suspended and cancelled projects, yielded a disposable framework of NOK 2.5 million in 2007. A total of NOK 0.3 million was allocated in 2007.

In the autumn of 2007, Enova was given the task of developing and conducting courses in energy and environment planning for Norwegian municipalities. The 2007 grant was NOK 10 million. Project implementation is scheduled for the autumn of 2007 and winter 2007/2008, and the plan is to complete the project in 2008.

Wind power plants supported by Enova



2. RESULTS AND ACTIVITIES RELATED TO THE ENERGY FUND

2.1 Wind power

In 2007, Enova announced potential investment funding for wind power. At the time, there were three windmill parks with final licences that were eligible to apply. Two of the projects applied for funding: the Kvitfjell project for Norsk Miljøkraft AS and the Høg Jæren project for Jæren Energi AS. A commitment of NOK 218 million was granted to Jæren Energi AS. The park is expected to be in production sometime during 2011. With this addition, Enova has provided a total of NOK 787 million in investment funding to 11 different windmill parks in Norway.

Table 7 provides an overview of contractual results and funds associated with the wind power projects supported by Enova (a total of 11). Seven of the windmill parks are already in production; two are under construction, while two are still in the engineering and design phase. The location of the parks is shown on the map. Annual energy generation from the parks is estimated at more than 1.5 TWh. For purposes of comparison, the entire Norwegian generation of power, largely hydroelectric power, is about 120 TWh per year.

Enova has provided investment support for wind power since 2002. Experience from the completed developments shows a predominantly positive attitude towards wind power on the part of affected local populations. Some of the projects have also reported a shift to more positive attitudes after the windmills are in place. Increased awareness about climate issues can lead to greater understanding for a continued commitment to Norwegian wind power in the years to come.

Enova's primary goal for this area is to achieve the national objective of at least 3 TWh wind power by 2010. Introduction of a support scheme for renewable energy has been adopted, and negotiations on a common green certificate market with Sweden have also been resumed. This has resulted in some uncertainty in the short term regarding which policy instruments will be employed in the future. Pending clarification surrounding the future support regime, Enova will continue the investment funding program for wind power in 2008.

| Contractual | GWh | MNOK | |
|--|---------------------------|------------|------------|
| | | allocated | disbursed |
| 2002 | 80 | 35 | 35 |
| 2003 | 124 | 27 | 27 |
| 2004 | 645 | 294 | 156 |
| 2005 | 337 | 137 | 74 |
| 2006 | 0 | 0 | 0 |
| 2007 | 260 | 218 | 0 |
| Originally contracted | 1 566³⁰ | 711 | 292 |
| Corrected for final reported result | 1 553 | | |

Table 7: Wind power (GWh, MNOK) ³¹

³⁰ This includes 120 GWh from NVE's projects from 2001. Cancellation of a project that was contracted in 2005 entails that the total result for the period 2001-2007 is at about the same level as the result in the 2006 results and activities report.

³¹ The NOK amounts in the table are corrected to reflect potential adjustments after final reporting. The year refers to the year when a project is contracted, and does not necessarily indicate when the results of the project will be realized in the form of kWh.



Huge potential for renewable heating

There is a huge potential for conversion to renewable heating in Norway. Even without public support, 7.5 TWh of renewable heating could be profitably developed in Norway by 2020. This is sufficient to heat 750,000 households, and the technical potential is even greater.

In 2007, Enova commissioned a study of the potential entailed in expected development of district heating and biobased local heating plants up to 2020, in total and by municipality (Xrgia). The study also addresses the need for support for district heating in a ten-year perspective and the impact of changed framework conditions. The study found that there is a technical potential for delivery of 18 TWh of energy via district heating and local heating plants based on renewable energy sources in 2020. This comes in addition to the 2.4 TWh of district heating that has already been established to date. If we assume that all new buildings are equipped with water-based heating, 7.5 TWh of renewable heating could be in place by 2020 without additional public funding. 0.7-1.7 TWh of this comes from district heating.

Enova Senior Adviser, Helle Grønli, was pleasantly surprised at the very large estimate of the potential for profitable renewable heating.

«7.5 TWh is equal to the energy consumption of 750,000 households with 10,000 kWh in annual heat consumption. It was also surprising that the estimate of the potential for local heating plants was so high,» says Grønli.

INCREASED EFFORTS BY THE AUTHORITIES

The background for the task is the authorities' ambitious goals for conversion to renewable energy sources to replace electricity and oil for heating. Enova has been charged with implementing a major campaign to provide support for district heating developments which will facilitate long-term utilisation of bioenergy, waste and waste heat. Based in part on this report, Enova has prepared three new funding programs for heating: establishing local heating plants, developing new district heating and developing infrastructure for district heating. These programs are to take a goal-oriented approach towards realising the potential identified in this study.

«The study provides a basis for a more goal-oriented program for local heating plants and district heating infrastructure. It also contributes helpful information about the



RATIONAL DEVELOPMENT IS THE KEY, SO THAT DISTRICT HEATING AND LOCAL HEATING PLANTS CAN COMPLEMENT EACH OTHER.

*Øyvind Leistad,
Head of Unit,
Renewable Heat
Enova SF*

market and market outlooks, which will be important in our continued work,» says Grønli.

The infrastructure program provides compensation for market actors who are willing to develop infrastructure for district heating. The objective is to trigger infrastructure projects that are not initially profitable, and to compensate for the uncertain development in the demand for district heating. The program for new business start-ups also provides support for renewable energy generation.

The local heating plant program aims to increase the number of local heating plants based on renewable energy sources such as solid bio-fuel, thermal solar heat or heat pumps. An important objective of the program is to facilitate conversion of Norway's many oil burners to renewable energy sources, in addition to establishing new local heating plants.

As the report indicates, district heating and local heating plants target somewhat overlapping markets.

«The district heating potential we can expect to develop is primarily located in the larger cities and densely populated areas. There is a considerable market potential for local heating plants in rural areas where district heating is not an option. However, if local heating plants «skim the cream» in metropolitan and densely populated areas, this could undermine the possibility of profitable district heating. Therefore, efficient development is the key, so that district heating and local heating plants can complement each other,» says Enova's Head of Unit - Renewable Heat, Øyvind Leistad.

NEED FOR INVESTMENT SUPPORT

Substantial investment support is required to trigger a considerable volume of district heating beyond what is built without subsidies. Analyses show that, with an investment subsidy of NOK 1-1.5 billion, as much as 2.1 TWh of additional district heating development can be realised. This estimate assumes that Enova will succeed in guiding its grants towards projects where financial support can trigger additional capacity.

2.2 Renewable thermal energy and solid bio-fuel production

There was a significant commitment to thermal energy in 2007, as was also the case in 2006. During the course of the year, contractual commitments were made for a total energy result of 751 GWh within renewable thermal energy, distributed among 69 projects. The total amount of funding was NOK 322 million. The total contractual energy result for the period 2001–2007 is 2.6 TWh. Solid bio-fuel production projects received support totalling NOK 5 million, divided among four projects. These four projects have contracted for a total of 163 GWh. Since the start in 2001, a total of 1 TWh has been contracted from solid bio-fuel production projects. The thermal program was continued unchanged in 2007, accompanied by extensive work on program development throughout the year. Starting in 2008, three new thermal programs will replace the existing thermal program, and the solid bio-fuel production program will be discontinued.

The objective of this commitment to thermal energy is to reach the national goal of 4 TWh of water-borne heating based on renewable energy, heat pumps and energy recovery by 2010. Table 8 provides an overview of contractual results and funds linked to the thermal projects. Through the agreement with the Ministry of Petroleum and Energy for 2007, Enova has committed to establishing a dedicated program aimed at long-term development of

infrastructure for district heating. This was the basis for a revision of the thermal program in 2007. A study of the potential for renewable thermal energy was carried out in the autumn of 2007, covering the period up to 2020³². A study of barriers was also conducted³³. The program development work has been thorough, including input from various external actors. Starting in 2008, the existing thermal program will be replaced by three programs aimed at infrastructure for district heating, establishment of new district heating and local energy centres.

In 2007, Enova has continued the course «Business development and engineering of biofuel energy plants», implemented for the first time in 2005. Feedback regarding the usefulness of the course has been good. This activity was carried out in 2007 by Norsk Bioenergiforening (the Norwegian Bioenergy Association). Enova's renewable heat conference was held for the second time in 2007. The conference is an important meeting-place for the sector, and attracted about 150 participants.

There is an increased commitment to renewable and environmentally friendly heating solutions in Norwegian municipalities and energy companies, and interest in the thermal program was on the rise in 2007. More actors are active in this sector than previously, and the focus has broadened from basically local to the same actor working in multiple areas around the country. There is considerable

interest in securing licenses for new areas, and some places have actually experienced multiple district heating actors sending in applications for the same area.

There was a substantial increase in the number of district heating plants in 2007 with nearly 50 such plants in operation, more than double the number in 2006. Although Eastern Norway dominates the picture, district heating plants can now be found all over the country. More than 70 new district heating plants are being built and about 30 new district heating projects are in the planning stage. The trend is toward rapid growth in new district heating plants being established in communities in the outlying districts. Enova will emphasise development of the market for smaller heating plants through measures aimed at both the supply and demand sides in 2008. Following up the market for thermal energy is very important in this connection. Determining whether a lack of competence in the value chain for local energy centres and water-borne heat in buildings constitutes a barrier for further development will also be important. Measures to remedy or reduce such lack of competence will be considered. The cost of installing

water-borne heat in buildings will be examined in more detail, and the costs of local energy centres will be studied and compared.

Table 9 provides an overview of contractual results and funds linked to the processing projects supported by Enova. In many cases, access to biofuel is a prerequisite for increased generation and use of renewable heating. Therefore, investment funding has been awarded to plants for processing and handling biofuel in areas where access to fuel has been a limiting factor for growth in the thermal market. The biofuel program will be discontinued as of 2008. Enova has supported these types of facilities for a period of time because it constituted a barrier for development of the thermal market in several regions. About 51 000 tonnes of pellets were produced in Norway in 2006, of which approximately 29 000 tonnes were exported.³⁶ The significant export, as well as the fact that biofuel is now available throughout large parts of the country, indicates that focus in the years to come should be on development of the demand side.

| Contractual | GWh | MNOK allocated | MNOK disbursed |
|--|---------------------------|----------------|----------------|
| 2002 | 166 | 49 | 49 |
| 2003 | 262 | 41 | 30 |
| 2004 | 221 | 80 | 46 |
| 2005 | 235 | 98 | 44 |
| 2006 | 630 | 326 | 62 |
| 2007 | 751 | 322 | 14 |
| Originally contracted | 2 593³⁴ | 917 | 245 |
| Corrected for final reported result | 2 552 | | |

Table 8: Renewable thermal energy (GWh, MNOK)³⁵

³² Xrgia.

³³ NoBio, Novap and NP.

³⁴ This includes 328 GWh from NVE's projects from 2001.

³⁵ The NOK amounts in the table are corrected to reflect potential adjustments after final reporting. The year refers to the year when a project is contracted, and does not necessarily indicate when the results of the project will be realized in the form of kWh.

| Contractual | GWh | MNOK allocated | MNOK disbursed |
|--|------------|----------------|----------------|
| 2002 | 0 | 0 | 0 |
| 2003 | 295 | 9 | 5 |
| 2004 | 255 | 14 | 14 |
| 2005 | 162 | 7 | 7 |
| 2006 | 100 | 4 | 3 |
| 2007 | 163 | 5 | 2 |
| Originally contracted | 975 | 38 | 30 |
| Corrected for final reported result | 978 | | |

Table 9: Solid biofuel production (GWh, MNOK)³⁷

³⁶ NoBios price and sales statistics 2006.

³⁷ The NOK amounts in the table are corrected to reflect potential adjustments after final reporting. The year refers to the year when a project is contracted, and does not necessarily indicate when the results of the project will be realized in the form of kWh.



Low-energy in Løvåshagen

It is a challenging task for the construction sector to change its practices and erect the buildings of the future. Enova has provided support for a number of projects which demonstrate that the solutions of the future can be implemented right now.

In the course of 2008, the Løvåshagen Housing Cooperative in Fyllingsdalen outside the city of Bergen will be ready to welcome its residents, with 28 passive houses and 52 low-energy residences. The homes have received support from Enova as part of a prototype project.

Løvåshagen Housing Cooperative consists of a total of 80 flats with first class environment and energy solutions. SINTEF Byggforsk has estimated the potential annual energy savings to be approximately 550,000 kWh compared with normal housing.

Measures have been implemented in nearly every part of the construction process in order to achieve the energy goals. The objective was to build energy-conserving housing, and to prove that these types of qualities can be accommodated also in larger projects. The passive houses entail a maximum heating requirement of 15 kWh/m², while the target for the low-energy housing units is approximately 25 kWh/m².

The development company ByBo AS in Bergen is in charge of the construction process behind Løvåshagen, in cooperation with Enova, Sintef and Husbanken (the government-owned housing bank). Enova's support was essential in realising these residences.



*Kjetil Helland,
ByBo AS*

WE ALREADY HAVE PLANS FOR NEW PROJECTS WHERE WE CAN BENEFIT FROM WHAT WE HAVE LEARNED.

He tells us that one of the things they learned during the process is the positive effects of these measures on the indoor climate. «And Løvåshagen showed us that we can do things differently and achieve benefits for the environment, without disproportionate costs. This helps ensure that we will take this experience with us, and we already have plans for new projects where we can benefit from what we have learned,» Helland concludes.

«We contacted Husbanken early in the process, and they gave us suggestions and the inspiration to go for energy-reduction measures along with universal design,» says Kjetil Helland in ByBo AS, who adds that this was well-received by the City of Bergen. The developer has extensive experience with energy-reduction measures, while passive houses and low-energy residences were a new experience for the company.

«We have devoted more time and energy to the detailed engineering than we normally would. Each and every critical detail has been examined and reworked over and over until we felt certain that the housing units would live up to the stringent requirements and that they would function well in our climate here in Western Norway.»

Construction sector and Enova pledge new cooperation

As an industry with more than 300,000 employees, the building and construction sector cannot be expected to change over night. The hope is that a long-term Low-Energy Program will lead to Norway's largest mainland industry becoming a powerful contributor towards reducing national greenhouse gas emissions.

Enova will work together with other key private and public sector actors to promote a comprehensive effort towards efficient energy restructuring, and in September 2007, the Low-Energy Program for building and construction projects was in place. This program is a collaboration between the construction industry represented by the Federation of Norwegian Construction Industries (BNL), Arkitektbedriftene i Norge (Architect firms in Norway), Statsbygg (the Directorate of Public Construction and Property), Enova, the National Office of Building Technology and Administration (BE), Husbanken and NVE (the Norwegian Water Resources and Energy Administration). This is a unique cooperation agreement for a greater commitment to energy efficiency in a sector that, to a large extent, relies on yesterday's solutions.

An important argument for putting together a formalised collaboration for this sector has been that the potential in the industry can be realised most effectively through cooperation among public and private sector actors. Better access to information is another pressing need, as is enhancing expertise and offering better practical guidelines for improved energy solutions. These objectives can be achieved by creating an understanding that energy-efficiency measures will pay off for the sector over the long term.

One of the main pillars of the cooperation program is that energy efficiency and conversion to environmentally friendly energy in building and construction projects takes place by enhancing knowledge and developing expertise, both in the industry itself and in educational institutions. The program is also intended to stimulate development and application of new technology and new solutions. It is important to emphasise that the Low-Energy Program is a

long-term commitment by the industry and the authorities. Enova's resources will through this program be supplemented with measures aimed at increasing competence and stimulating technological development.



OUR HOPE IS THAT WE CAN TURN A SOMEWHAT STAID INDUSTRY INTO AN INNOVATIVE ONE.

Jørgen Leegaard, BNL

A POSITIVE INDUSTRY

Jørgen Leegaard in BNL points to an industry that is ready for change. «Our hope is that we can turn a somewhat staid industry into an innovative one,» he says optimistically.

«The most important thing for us is that this is a collaboration between the industry and the authorities. The fact that we are preparing such a comprehensive energy conservation program meant to last for ten years, and which includes both large and small groups in the industry as well as public sector actors, is something that is totally new.»

He thinks that the most important change that BNL's member companies will notice is the increased access to proper training programs so that the companies and the employees can achieve the goals in the new building code.

«We will put good prototype projects into place for testing new technologies and solutions, and the experience we gain from these projects will benefit all of the companies. The goal is for consumers to have access to good buildings that do not use a lot of energy; but we must not forget that this is a long-term process,» Leegaard emphasises.

«At the same time, it is important for us that the public sees that the industry is dealing seriously with this issue and is aiming for the goal of achieving good buildings and good solutions.»

2.3 Energy consumption in the built environment

Energy efficiency and conversion to renewable energy in the building and construction sector is an important commitment area. Enova's program targets an industry that represents a broad and complex market. 2007 has been yet another very active year in this market, which poses extra challenges for Enova. Nevertheless, the program for energy consumption in the built environment managed to achieve a contractual energy result of 365 GWh in 2007. The total contractual energy result for the period 2001–2007 is in excess of 2 TWh. The main challenge in the years to come will be to promote even greater focus on energy efficiency and more use of renewable energy. An evaluation was conducted in 2007 that will be used as a basis for adjusting the programs offered to the market.

Table 10 provides an overview of contractual results and funds linked to Enova-supported projects in the area of the built environment. Objectives are achieved through projects within three main categories: comprehensive energy contracts with major developers, building owners and contractor firms, project contracts linked to individual buildings and prototype projects. Comprehensive energy contracts with leading market actors will trigger major projects in the next five years, and are expected to create market effects beyond the contractual energy results. This is part of Enova's strategy, where the objective is to engage market actors that have a say in important decisions, and who in turn affect energy utilisation in the building being erected.

Enova offers support to prototype projects where energy consumption is to be considerably lower than in the current standard construction practice. The projects must also be well-suited for profiling and demonstration by exhibiting good, progressive solutions which have substantial potential in large parts of the market. Progressive solutions can entail both demonstration of familiar technology as well as testing of totally new solutions. Six such projects were approved for funding in 2007.

Experience from 2007 indicates a continued need for financial support to realize measures aimed at reducing energy needs. Enova will promote greater efforts both for existing buildings and new construction through major energy agreements and prototype projects. This is a complex market with many actors that must all be willing to work together in order for the focus on energy to result in concrete measures. To achieve this objective, Enova plans to expand its programs in 2008. A study was performed in 2007³⁸ to ascertain how the supplier industry can play a role in the work to stimulate use of the best possible technology. On this basis, an expanded program offering to the market will emerge as being more tailored to target specific groups. It is expected that development in the commercial building market will be marked by a growing degree of professionalisation and specialisation. This is linked in part to the fact that the owner's interest in the building is often linked to capital investment and return. Through its low-energy program for buildings and construction projects,

| Contractual | GWh | MNOK allocated | MNOK disbursed |
|--|---------------------------|----------------|----------------|
| | 2002 | 154 | 58 |
| 2003 | 284 | 72 | 60 |
| 2004 | 266 | 78 | 47 |
| 2005 | 559 | 126 | 56 |
| 2006 | 378 | 122 | 11 |
| 2007 | 365 | 128 | 2 |
| Originally contracted | 2 050³⁹ | 583 | 232 |
| Corrected for final reported result | 2 064 | | |

Table 10: Energy consumption in the built environment (GWh, MNOK)⁴⁰

³⁸ Market survey of energy efficient products (conducted by Vekst Teknologi AS).

³⁹ This includes 44 GWh from NVE's projects from 2001.

⁴⁰ The NOK amounts in the table are corrected to reflect potential adjustments after final reporting. The year refers to the year when a project is contracted, and does not necessarily indicate when the results of the project will be realized in the form of kWh.

Enova will follow up the sector and the challenges that accompany the stricter energy requirements in the technical regulations under the (Norwegian) Planning and Building Act⁴¹. Competence enhancement measures at all levels will be a key element of this work. Enova's initiatives vis-à-vis the municipalities will also be followed up through the program for the built environment.

Marketing the programs offered by Enova is essential, as is maintaining close contact with the market actors to

trigger new projects. A guide for energy efficient lighting in non-residential buildings has been prepared as a first step in that direction. Another key element of this work is the network gathering organized in February of each year, and the energy statistics from Enova's network of buildings, an annual Enova publication showing the status of energy in a number of building categories.

2.4 Industry

| Contractual | GWh | MNOK allocated | MNOK disbursed |
|--|---------------------------|----------------|----------------|
| 2002 | 177 | 20 | 20 |
| 2003 | 104 | 17 | 17 |
| 2004 | 343 | 57 | 52 |
| 2005 | 287 | 46 | 23 |
| 2006 | 759 | 165 | 21 |
| 2007 | 814 | 200 | 1 |
| Originally contracted | 2 785⁴² | 507 | 133 |
| Corrected for final reported result | 2 835 | | |

Table 11: Energy consumption in industry (GWh, MNOK)⁴³

Enova works to help Norwegian industry strengthen competitiveness through environmentally friendly and efficient use of energy. The work aimed at energy efficiency and conversion to renewable energy carriers in industry has contributed a total contractual energy result of 814 GWh in 2007. Enova continued its primary program targeting mainland industry in 2007. Through the program «Energy Consumption – Industry» all companies with projects having a potential energy result of more than 0.5 GWh can apply for investment funding. Funding is granted for energy-efficient solutions, energy recovery measures and conversion to renewable energy sources. The program «Energy management – companies in networks» has been discontinued and its core activities can now be incorporated into projects under the investment funding program.

Table 11 provides an overview of contractual results and funding linked to the industry projects supported by Enova. A total of more than 2.7 TWh has been contracted within Enova's industry programs. Costs will vary according to the nature of the various measures, and there is a substantial difference between energy efficiency, energy recovery and conversion, see Table 12.

Emphasis is placed on incorporating typical energy management activities into the projects. In other words, the projects must be firmly supported by the company's management, and the investment must be weighed against other relevant energy-related investments in the company or the group. To this end, securing larger contracts is an advantage, whenever possible. It is more advantageous to sign a contract with a network of companies, such as a group, rather than an individual company. In addition to yielding

greater aggregate results, the companies and external consultants can benefit from useful cooperation and sharing of experience. Combining smaller projects in a company into one major project is another way of achieving economies of scale.

Enova has made several major commitments to industry projects in 2007, in addition to a large number of smaller-scale projects. The amounts pledged to the individual projects range from NOK 250 000 to NOK 82 million, with contractual energy results ranging from 991 000 kWh to 300 million kWh. Several major projects have submitted their final reports in 2007, with 300 GWh in total reported energy results.

The industry area faces many of the same challenges as the energy consumption area as a whole. Prosperity in some sectors brings diminished focus on energy efficiency, such as in the aluminium industry; while branches facing difficult competitive and market conditions, particularly wood processing, pay closer attention to all cost elements.

Two studies of potentials were performed in 2007 to chart energy consumption and energy conservation potential in various industries. One of the studies was aimed at the food industry, while the other was a revision of a previous study of power-intensive industries. The studies reveal con-

siderable profitable potential that Enova will work to realize in the years to come.

A good dialogue with the trade organisations and close market contact with industry actors is desirable. A cooperation agreement was signed with the Federation of Norwegian Industries in 2007. This is a trade organisation covering power-intensive industry in Norway, as well as a majority of the smaller technological companies. A special seminar aimed at the aluminium industry was held in 2007, where key industry actors were gathered to discuss joint opportunities. An industry seminar was organized in Trondheim in the autumn of 2007, with invitations sent to industrial firms, consultants and trade organizations. This is an annual event which drew a record number of participants in 2007; about 130 persons representing the industry area's target group.

Enova's expanded program for new technology is also considered to be a useful instrument for the industry. Moreover, there is an added link to the heating program as an increasing number of industry companies recognise the benefit of converting their heating systems from fuel oil and electricity to renewable sources. The new program for local heating plants may also be a suitable instrument for industry actors.

| Type of measure | No. of projects | GWh | Allocated (MNOK) |
|---|-----------------|------------|------------------|
| Energy efficiency | | | |
| • Energy-intensive industry ⁴⁴ | 4 | 383 | 75 |
| • Less energy-intensive industry | 16 | 71 | 15 |
| Conversion to renewable energy | 2 | 361 | 110 |
| Energy recovery ⁴⁵ | 0 | 0 | 0 |
| Total | 22 | 815 | 200 |

Table 12: Energy consumption in industry (GWh, MNOK)^{46,47}

⁴¹ The low energy program for buildings and construction projects is a collaboration between Enova, the Norwegian State Housing Bank, the National Office of Building Technology and Administration, the Norwegian Water Resources and Energy Administration (NVE), the Directorate of Public Construction and Property (Statsbygg), Architects in Norway (Arkitektbedriftene i Norge) and the Federation of Norwegian Construction Industries.

⁴² This includes 300 GWh from NVE's projects from 2001.

⁴³ The NOK amounts in the table are corrected to reflect potential adjustments after final reporting. The year refers to the year when a project is contracted, and does not necessarily indicate when the results of the project will be realized in the form of kWh.

⁴⁴ Energy-intensive means industrial companies with annual energy consumption greater than 50 GWh.

⁴⁵ Energy recovery entails exploitation of own waste heat or exhaust for generation of electricity.

⁴⁶ The NOK figures in the two tables in this section are not completely comparable.

⁴⁷ The year refers to the year when the contract was made between Enova and the project owner, and does not necessarily indicate when the results will be realized.

A wake-up call for the food industry

By making some relatively simple changes, the food industry can cut its energy consumption by 30 per cent - or more than half a billion Norwegian kroner in savings. 70 per cent of the measures will be recouped within two years

This startling information emerges in a report prepared by NEPAS AS on assignment from Enova and in cooperation with the food industry's central trade organisations.

«The numbers were surprising. I didn't think the potential savings were that high because I know that many companies have worked on energy economization for many years. However, the report clearly shows that much remains to be done in this area,» says Knut Maroni, Managing Director of NBL (from March 2008 - NHO Mat og Drikke (NHO Food and Beverage)).

SETTING A GOOD EXAMPLE

Nortura Rudshøgda is a meat producer that is setting a very good example. In June 2007, it commenced operation of an energy recovery system that will yield annual savings equivalent to 170 single-family houses, and reduce CO2 emissions by more than 850 tonnes. The plant is now using a hybrid heat pump that is particularly well-suited to this type of industry because it can deliver the high temperatures required, up to 100 degrees Centigrade.

«Hybrid Energy AS and the Institute for Energy Technology have devoted more than ten years to developing this heat pump technology and, so far, we are the only suppliers in the world,» says Bjarne Horntvedt in Hybrid Energy. He explains how waste heat from the refrigeration and freezer units is recovered and used to heat water to 80-90 degrees C.

The project received a NOK 0.9 million grant from Enova, and Nortura will save about 3.4 GWh per year on the ener-

gy recovery system. Nortura's hybrid heat pump project cost NOK 4.7 million.

«We must commit to more environmentally friendly technology if we are to be a competitive company in the future,» says Ola Dahl, Technical Manager at Nortura Rudshøgda.



THE VAST MAJORITY OF NBL'S MEMBER COMPANIES EXPERIENCE INTERNATIONAL COMPETITION, AND REDUCED ENERGY COSTS CAN HELP IMPROVE THE COMPANIES' COMPETITIVENESS.

Knut Maroni, NBL

LITTLE AWARENESS IN THE INDUSTRY

Knut Maroni in NBL praises Enova for financing the study that revealed the huge potential savings in the food industry.

«It will be profitable for a great many food companies to implement various savings measures as described in the study. The majority of NBL's member companies experience international competition, and reduced energy costs can help improve the companies' competitiveness. The companies also want to contribute to reducing CO2 emissions». He also feels that awareness of energy conservation in his industry is disappointingly low.

«The primary reason for this is a lack of knowledge - they simply do not know what they need to do to use less energy,» says Maroni.

Last year, Enova signed an agreement with the Federation of Norwegian Industries, and is working to achieve an agreement with the food industry in 2008. Senior advisor in Enova,

Marit Sandbakk, therefore hopes that 2008 will be a year of awakening for the food industry.

«The food industry pays 2-3 times more for their electricity than some other industry sectors, and they have an opportunity to save substantial amounts on energy efficiency measures. If they implement even just the most profitable measures, the food industry could save about a half billion NOK per year,» says Sandbakk.





Better than expected

Borregaard Fabrikker in Sarpsborg had a goal of saving 140 GWh of thermal energy as part of a larger environment project. In fact, the company saved a whopping 160 GWh, reduced discharges to the Glomma River, and significantly improved its indoor climate.

Kjersti Garseg in Borregaard's Environmental Protection and Control Department tells us, «Nearly one billion Norwegian kroner have been invested in energy and environment measures at Borregaard in Sarpsborg over the last 15 years.» Garseg has played a key role in Borregaard's latest major energy and environment project, concluded in 2007 with extremely good results.

«Since 2005, Borregaard has invested nearly a quarter billion NOK in processing equipment, resulting in reduced discharges of organic material to Glomma, increased energy recovery as a consequence of reduced water consumption and better access to bio-fuel,» says Garseg.

EU requirements under the IPPC Directive mandate discharge permits based on the best available technology. Enova supported this energy economization project with a grant of NOK 27 million. The energy reduction achieved by the company amounted to 160 GWh, which is 20 GWh more than the objective.

«Before we started the project, we performed a calculation of the mass and energy balance to quantify the savings we could achieve in energy and discharge of organic material based on this investment. The fact that our result was better than expected indicates that our initial benefit calculations were a bit conservative,» Garseg explains.

Traditional cellulose production utilises large parts of the raw material as an energy source; only the fibre is needed for cellulose. Since Borregaard uses all of the components of



*Kjersti Garseg,
Borregaard Fabrikker*

the timber for products, energy needs must be met from other sources, including fossil sources. Because of this, Borregaard needs more energy from external sources than the wood-processing industry in general. Now, the boiling house, bleaching plant and the evaporation plant have all undergone significant modifications to bring energy loss and discharges down to an absolute minimum.

«One of the changes in the boiling house is that we invested in a unit that continuously washes the unbleached cellulose mass. The mass is now washed in more stages, thus significantly reducing the addition of fresh water,» Garseg explains. This means a corresponding reduction in the surplus of used wash water that contains organic material. Instead of the organic material ending up as discharge, it is now used as an ordinary raw material, yielding additional production of biochemicals such as lignin products and ethanol. Energy loss in the discharge stream has also been eliminated. The containment of the process in the boiling house has also resulted in significant improvement of the indoor climate.

All surplus used wash water from the bleaching plant now goes to the evaporation plant. The stream of wash water that previously went to the Glomma River via biological cleaning plants, resulting in discharges of organic material and energy loss, has instead become a resource stream, proving more bio-fuel for the bioboiler.

A 160 GWh reduction in energy needs means that the company uses about 16,000 tonnes less heavy oil in a year.

Focus on energy and climate after the Olympics

As a legacy from the 1994 Winter Olympics, the City of Lillehammer was among the first municipalities in Norway to draw up a climate and energy action plan.

The municipality is continuously working to conserve energy in its buildings, and one of its goals is for all buildings equipped with water-borne heating to obtain 85 per cent of their heat from bioenergy by 2016.

«The plan was adopted in 2001, however, the actual work started as early as in 1999 and the thought processes behind it started even earlier than that. Environmental issues had been on Lillehammer's agenda for many years, as a commitment to the environment was an important part of the Winter Olympics project in 1994. Therefore, we drew up concrete action plans to safeguard and further develop what we already had going,» says Mayor Synnøve Brenden Klemetrud.

Lillehammer has implemented energy conservation in all public buildings since 1997. Older buildings have been upgraded and the municipality employs strict requirements for new buildings. Today, all new municipal buildings larger than 500 square metres are constructed with water-borne heating.

THE PEOPLE WANT FOCUS ON ENERGY AND CLIMATE

All Norwegian municipalities must revise their municipal plan every four years. In this process, it is important that the municipality examines what can be done in the coming years as regards energy and climate. A poll commissioned by Enova and conducted by TNS Gallup last summer shows that nearly 70 per cent of voters think it is important that municipalities prepare their own local energy and climate action plans.

Lillehammer municipality received support from the Norwegian Pollution Control Authority (SFT) to develop a climate plan in 2001, and Enova supported the revised plan adopted in 2007. The municipality has also received expert assistance in this work. «What Enova has done is impor-



WHAT ENOVA HAS DONE IS IMPORTANT FOR US. HAVING THIS KIND OF EXPERTISE TO RELY ON IS NECESSARY FOR A MUNICIPALITY TO BE ABLE TO IMPLEMENT A PROCESS LIKE THIS.

*Synnøve Brenden Klemetrud,
Mayor of Lillehammer*

tant for us. Having this kind of expertise to rely on is necessary for a municipality to be able to implement a process like this,» says Klemetrud.

2008 will be another good energy year for Lillehammer, with new projects including the development of a residential area with about 300 homes. 100 of these will have a heating plant fueled by bioenergy or methane gas from the Roverudmyra waste plant. Eidsiva bioenergy is also working to realise a comprehensive district heating system in downtown Lillehammer. The municipality has recommended the licence and Eidsiva bioenergy plans to start the first phase of the development in 2008.

«The first phase of the development encompasses 7 MWh, and targets industry and businesses, i.e., larger buildings with water-borne heating. The heating will use wood chips and the ultimate goal is for Eidsiva to produce 15 MWh,» says Arne Bøe in Lillehammer's Strategy and Development Department.

MUCH TO GAIN

Buildings owned by municipalities and county municipalities account for one-third of all energy consumed in Norwegian office buildings. If all municipalities in the country implemented energy efficiency measures in their own buildings, they could save a total of at least NOK 500 million in annual energy costs. Enova's 2003 study of municipalities showed that lack of competence is a powerful barrier that keeps many municipalities from implementing comprehensive energy planning. The work to enhance competence will be intensified in the years to come. For this purpose, the Ministry of Local Government and Regional Development gave Enova an earmark grant of NOK 10 million in 2007 to be used to hold courses in energy and climate planning. The first four of a total of 50 courses were held in the autumn of 2007.

2.5 Efforts targeting municipalities

Enova has expanded its efforts targeting municipalities during 2007 with development of guides and courses on energy and climate planning; in addition to the support program «Municipal energy and climate planning».

The focus in 2007 has been on the importance of the municipal role in the work to achieve national goals in energy restructuring and reduction of greenhouse gas emissions. An energy and climate plan is an important tool for the municipalities in this work. The Norwegian Government wants all municipalities to have such a plan in place, and Enova wants to help achieve this goal using the means at its disposal. Changes were made in the award criteria for the support program in 2007, and Enova now promotes the idea that municipalities should first seek support for development of a plan, before seeking funding for a pilot project. This change has yielded good results, with nearly 90 per cent of all applications in 2007 asking for support to develop energy and climate plans. Larger towns and cities with populations in excess of 50,000 may receive as much as NOK 300 000 in funding.

The «All municipalities should have an energy and climate plan» guide was sent out to all of Norway's municipalities in the autumn of 2007.

The guide provides an introduction to the planning process and shows how municipalities can use the plan to identify

energy and climate measures and to convert them into concrete actions.

In 2007, the Ministry of Local Government and Regional Development and the Ministry of Petroleum and Energy charged Enova with the task of developing and implementing courses in energy and climate planning. This task is financed through sources outside the Energy Fund. The first of a total of 50 courses was held in Ås in November 2007, with Minister of Petroleum and Energy Åslaug Haga in attendance. Four courses with a total of 155 participants were held in the autumn of 2007. The objective of the course is to motivate Norwegian municipalities to prepare an energy and climate plan. This is a one-day course which provides an introduction to the planning process, and explains how to proceed from plan to action.

Enova's hope is that plans from the municipal program serve as a basis for decisions to proceed with the project on to Enova's heating program and the program for the built environment. In this manner, the municipal program can contribute to promoting good local energy solutions. A total of 75 municipalities have applied for funding through the «Municipal energy and climate planning» program in 2007. Of these, nine applied for support for pilot projects and 66 applied for support for energy and climate plans.

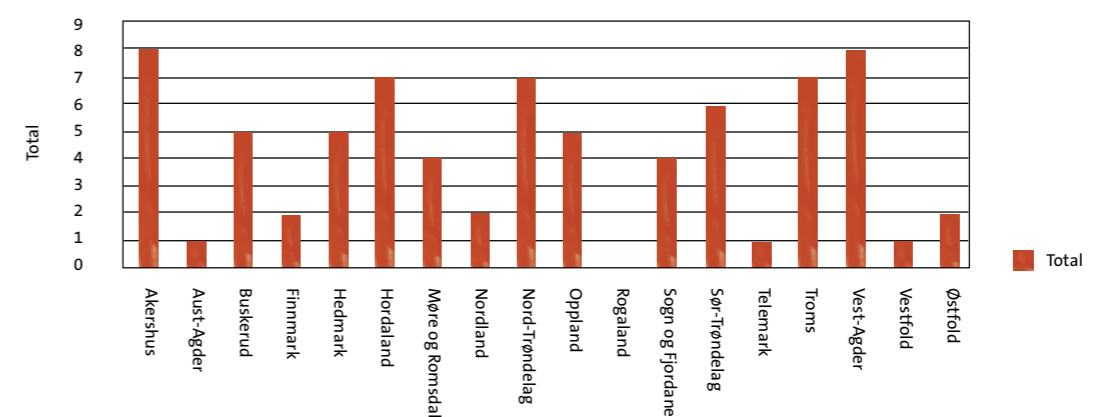


Figure 7: Number of municipalities that have applied for funding through the program «Municipal energy and environment planning»

2.6 New technology

In 2007, Enova received 30 applications for the new technology program, 21 of which were connected to the joint effort with the Research Council of Norway and Innovation Norway (Innovasjon Norge). A total of ten projects have received pledges of support from Enova, totalling NOK 75 million in 2007. In addition, the Research Council of Norway pledged support to two projects under the joint effort. Program parameters remained unchanged in 2007.

Enova is to be a driving force for progressive energy solutions and shall accomplish this objective by supporting the use of new energy technology and development of new energy markets. Potential priority areas include technologies that have previously only been tested under laboratory conditions or on a small scale, which are not widely available, and for which there is no functional market in Norway.

Several Norwegian energy companies are involved in a number of different development projects with the goal of demonstrating new technology in energy generation. In 2007, Enova pledged support for demonstration projects in offshore floating wind power and salt power. In the area of heating and energy efficiency, funding was confirmed for projects related to solar energy and energy efficiency in the aluminium industry.

Enova's program work included the implementation of a study of the potential for ocean energy, launched in the autumn of 2007. The study documented a huge potential for offshore wind and wave energy in Norway.

Cooperation with Innovation Norway and the Research Council of Norway has been further developed in 2007. The parties have worked together with several other market actors to plan the «Energy Week 2008» conference, which took place over a three-day period in February 2008.

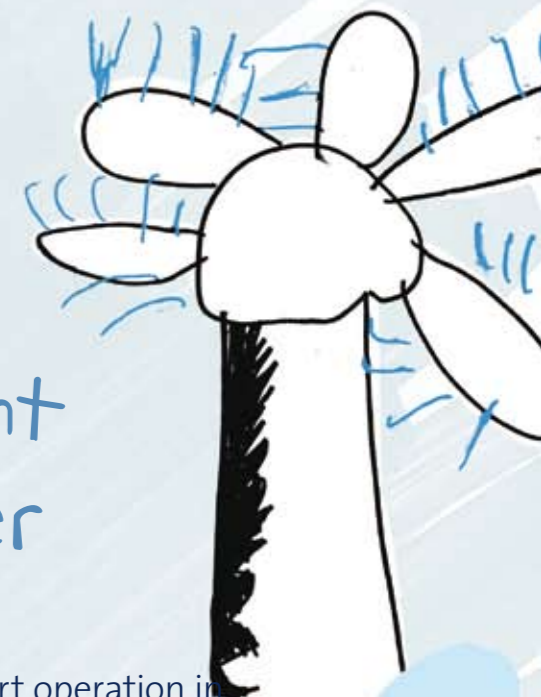
| Contractual | GWh | MNOK | MNOK disbursed |
|--|------------------------|------------|----------------|
| 2002 | 1 | 19 | 19 |
| 2003 | 0 | 0 | 0 |
| 2004 | 35 | 35 | 8 |
| 2005 | 1 | 2 | 2 |
| 2006 | 7 | 10 | 5 |
| 2007 | 7 | 75 | 0 |
| Originally contracted | 79⁴⁸ | 141 | 33 |
| Corrected for final reported result | 80 | | |

Table 13: New technology (GWh, MNOK)⁴⁹

⁴⁸ This includes 28 GWh from NVE's projects from 2001.

⁴⁹ The NOK amounts in the table are corrected to reflect potential adjustments after final reporting. The year refers to the year when a project is contracted, and does not necessarily indicate when the results of the project will be realized in the form of kWh.

Large-scale commitment to offshore wind power



The world's first full-scale floating windmill will start operation in 2009, and Enova is providing NOK 59 million in financial support for StatoilHydro's Hywind pilot project.

«The response to this project from all over the world has been fantastic. It would be easier to list the coastal states that have not called us to talk about Hywind. This will be the world's first full-scale floating windmill,» says Project Manager Sjur Bratland in StatoilHydro.



WITH THIS PROJECT, STATOIL-HYDRO IS TAKING A HUGE STEP FORWARD FOR WIND POWER TECHNOLOGY.

*Sjur Bratland,
Project Manager in
StatoilHydro*

Hywind is the name of StatoilHydro's major new initiative in offshore wind power generation which uses floating structures like the ones we know from offshore activities as a substructure for windmills. We are taking a 2.3 MW commercial turbine from Siemens, and placing it on top of a floating concrete structure. The concrete substructure will extend 110 metres down into the sea, and protrude 80 metres above the sea surface. It will measure 9 metres in diameter, and the turbine on top of this will weigh about 150 tonnes.

«The dimensions we are talking about here are almost inconceivable. On the other hand, we are also talking about being able to generate very significant amounts of electricity, if the pilot project can be developed as we hope,» says Bratland.

«If we were to utilise the area encompassed in four offshore blocks, the Hywind concept could help us produce as much electric power as all of Norway consumes in a year - 125 TWh. We can compare this with the annual production from the Ormen Lange field, but Ormen Lange will only produce for 20 years. Obviously, this kind of a development

would require enormous investments, but it does illustrate the inherent potential in offshore wind energy,» says Bratland.

In October 2007, Enova decided to support the project with a grant of NOK 59 million. The total cost of the project is estimated at NOK 200-250 million. StatoilHydro has not yet committed to the investment, but Enova's support means that part of the financing needs are met, which will help increase the likelihood of a positive decision in StatoilHydro. The final decision on the project will be made in the first half of 2008.

«Stationary offshore windmills are gradually becoming more common, in addition to the construction of mainland windmill parks. With this project, StatoilHydro is taking a huge step forward for wind power technology,» says Bratland.

MANY OPPORTUNITIES

StatoilHydro believes that the new project will provide good opportunities for Norwegian businesses, and Bratland indicates that they are counting on the involvement of business and industry in various parts of the project, such as sea transport, materials technology or the concrete substructure. The substructure represents a significant project cost.

«We want to help Norwegian business and industry become world leaders in these areas.»



Plenty of wind for everyone

There are unlimited amounts of energy in the ocean and, unlike oil and gas, we will never run out.

These are the words of Enova's Head of Unit for New Technology, Kjell Olav Skjølvik. And he has uttered them on many occasions this past autumn. An extensive study of the potential for ocean energy was completed in November 2007, sparking an enthusiastic response from experts, politicians and the media. Skjølvik held many lectures throughout the autumn, and his message causes listeners to perk up their ears. Norway has riches in the ocean that far exceed the country's oil wealth.

While Norway produces 120 TWh of hydroelectric power per year, the potential for offshore wind power is a staggering 14 000 TWh. Wave power has a potential of 600 TWh, while tidal power has a potential of just 1 TWh.

«If we can harness just one per cent of the energy found in offshore wind, that would be more than all the hydroelectric power Norway produces today,» says Skjølvik.

Enova has a dedicated array of programs for introduction of new technology, and receives an increasing number of applications and inquiries regarding various types of ocean energy projects.

«Most of the people who approach us with their projects like to talk about their technology, while it has been harder to obtain good information about opportunities and challenges. Now we have a better factual basis from which to describe the energy potential, challenges, problems and opportunities entailed in phasing in ocean energy in the Norwegian energy system,» says Skjølvik.



IF WE COULD HARNESS JUST ONE PER CENT OF THE ENERGY FOUND IN OFFSHORE WIND, THAT WOULD BE MORE THAN ALL THE HYDRO-ELECTRIC POWER NORWAY PRODUCES TODAY.

*Kjell Olav Skjølvik,
Head of Unit for New
Technology in Enova*

The study is based on technology that is available today, which means that it is restricted to wind, wave and tidal power. Particular emphasis has been placed on analysing the gap between income potential and existing cost level for various technological solutions. And this is a large gap. For the time being, there is an enormous gap between the costs of new technology and infrastructure, and the revenues that can be expected. Over the short term, ocean energy will be very expensive.

«Significant government support will be needed. We have a long way to go in terms of technology, and it will be expensive. However, if we look at the potential, export will be an important argument for making the commitment. In fact, the potential is so huge that it predates power being exported. Norway does not have the capacity to receive the enormous amounts of energy that can be generated when and if the technology becomes commercial,» Skjølvik confirms.

The dream of clean power from the ocean is not unattainable. Offshore windmills producing 1000 megawatts of electricity are already in place in Europe, and there is a great deal of activity going on in Norway. Several Norwegian market actors indicate that they are willing to make a commitment in the area, with Enova's help, as exemplified by Enova's support of the Hywind project. Nevertheless, Skjølvik thinks that it might take a whole generation before we can approach the goal of profitable development.



Influencing consumers and the market

Enova aims to gradually enable households to make energy choices that are easy to live with - for the environment, for their homes and for their pocketbooks.

This will primarily come about by making good energy solutions competitive, so that they are the preferred solutions, and otherwise making good energy behaviour the natural choice.

«Household energy behaviour is a complex phenomenon which is difficult to interpret,» says Turid Helle, Enova's Head of Unit for Households. Correct action is not always triggered even if people have plenty of knowledge, good attitudes and money.

Enova's household activities in 2007 were characterised by development work in relation to new policy instruments, methods and architecture for a comprehensive effort aimed at households. This work will be continued through an increased commitment to the household sector in 2008, which will take a very specific shape through good examples as well as subsidies and recommendations for energy-efficient products and solutions.

The household sector has a huge energy efficiency potential, both as regards improving existing buildings, selecting good heating solutions and general electricity conservation. A greater effort within the household sector will require new instruments and new methods of measuring the results, particularly since much of the potential is linked to existing homes. The instruments and the message must be adapted to the consumers' various activities, whether they are buying a new home, renovating, or just want to reduce energy consumption in the home that they live in. Most people can reduce energy consumption by at least ten per cent without investments and without reducing comfort. «All it takes is consistent behaviour», says Helle.

«The goal of this effort is to make it easier for consumers to make good energy choices, but we will also work with the organisations that offer household products and services, as we constantly strive to make energy-efficient products and solutions available at a reasonable price. Our job is to raise consumer consciousness, while simultaneously ensuring that energy-efficient products and solutions become available,» says Helle.

«We want to highlight, promote and spread knowledge about the good energy homes of the future, so that consumers will want such homes as time progresses. The subsidy scheme will make it possible to develop market areas for energy-efficient products that are not in great demand. We can also focus on the most efficient products in a well-



OUR JOB IS TO RAISE CONSUMER CONSCIOUSNESS, WHILE SIMULTANEOUSLY ENSURING THAT ENERGY-EFFICIENT PRODUCTS AND SOLUTIONS BECOME AVAILABLE.

*Turid Helle,
Head of Unit for
Households in Enova*

developed market through a labelling system. In 2008 we will be launching a recommendation program for energy-efficient windows. In this manner we want to stake out the path for the consumer, provide support for selected products and help consumers make the right choices when making purchases. This labelling system will be called «Enova Recommends».

SUCCESSFUL SUBSIDY PROGRAM

The 2006 subsidy program for households was launched by the Norwegian government in late August 2006. The scheme is financed through the fiscal budget, with a framework of NOK 71 million, and Enova is responsible for designing and implementing the program.

In 2007, 4692 households received subsidies for investing in pellet heaters and pellet boilers, heat pumps for water-borne heating or central control systems.

«This program fills an important function in developing markets for technologies that can contribute to reduced energy consumption in households,» according to Enova Special Adviser, Sverre Inge Heimdal. «It has been met with great interest from the consumers, with the number of applicants surpassing 21,000 during 2007.»

Heimdal says that the single largest measure to receive support is subsidies for air/water heat pumps. This product seems to have experienced a substantial market rally in 2006 and 2007. Enova has noted considerable willingness to undertake investments in those households that have availed themselves of the subsidy scheme. These measures affect a total of more than 15,000 persons, and work on the program will continue in 2008.

2.7 Households

The household area has shown varying interest during the year in energy restructuring and conserving electricity. Even though the media has focused on climate challenges, the connection to energy consumption has not always been obvious. As in previous years, the cost of electricity is the most important reason for interest in energy conservation, with 42 per cent of households citing saving money as the reason for implementing measures.⁵⁰ Over the course of the autumn, however, media interest in energy conservation started to grow as a result of higher prices and increased focus on the stronger link between energy conservation and climate. This media focus, together with a major information campaign in the autumn of 2007, led to increased awareness of Enova and the programs available to households. Awareness of Enova's commitment to children and young people, the Rainmakers, remained stable at 46 per cent.

Through the agreement with the Ministry of Petroleum and Energy, Enova is obliged to provide a nationwide information and consulting service for anyone who wants or needs advice regarding energy consumption and conservation. Enova fulfils this task e.g. through its website, the telephone/web-based help line «Svartjenesten» and various information campaigns. As proven by many studies both in Norway and abroad, even profitable energy con-

servation measures are not implemented. Many surveys have also been conducted in an attempt to understand why this is the case. The lack of knowledge is one of many barriers. The purpose of Enova's Svartjeneste and website is to ensure that information is available for everyone in a simple and reasonable manner. But for these services to bear results, the markets must be aware of Enova and know what Enova has to offer. Over the long term, easily accessible knowledge and information about good, profitable solutions will spread through the market, so that more and more people choose to invest and to act with a view towards energy efficiency, simply because they know about the options that exist. If more people choose to use a product, both price and availability will improve, and a market shift will be achieved.

The primary target group in the private market in 2007 included people who were building a new home, renovating a home, moving to a new home, as well as all those interested in conserving electricity. Programs offered to households in 2007 consisted of consumer information via the help line/web site, participation in trade fairs, the website minenergi.no, as well as a continuation of the subsidy scheme established in 2006. All in all, the activity remained at about the same level as in 2006. Table 14 provides an overview of the activities in the area in 2007.

| | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|-----------|-----------|------------------|-------------|-----------|
| Inquiries Svartjenesten | 55 500 | 35 000 | 22 000 | 33 000 | 27 000 |
| Distributed material, number | n/a | 124 000 | 137 156 | 262 000 | 218 410 |
| Visitors at trade fairs | 40 000 | 250 000 | 250 000 | 160 000 | 250 000 |
| Hits per day - minenergi.no | n/a | n/a | n/a | n/a | 1 260 |
| Campaigns ⁵¹ | 3 | 4 | 4 | 2 | 2 |
| | | | (household only) | (household) | |
| No. of applications for the subsidy scheme | n/a | n/a | n/a | n/a | 21 200 |
| Distributed material, primary and lower secondary schools | n/a | 65 000 | 64 000 | 80 000 | 30 000 |
| Hits per day - regnmakerne.no | 5 000 | 15 000 | 14 000 | 19 000 | 18 500 |
| No. of schoolchildren at the annual Rainmakers' Day (Vennergidag) | n/a | 4 000 | 4 000 | 4 500 | 3 500 |
| Audience ratings per broadcast of the Energy Match | 250 000 | 340 000 | 270 000 | 263 000 | 329 000 |
| | - 350 000 | - 560 000 | - 330 000 | - 413 300 | - 492 000 |

Table 14: Overview of activities in the household area

⁵⁰ TNS Gallup.

⁵¹ For 2006 and 2007, only campaigns aimed at households are included here.

One of the challenges associated with information as a policy instrument is that measuring the effect of the efforts is extremely difficult. Enova devotes significant resources to the household area, with a total budget for this area of NOK 42 million in 2007. Determining what kind of effect these measures have is important, and one method of accomplishing this is the use of surveys. Enova implemented a survey in 2007 targeting users of Enova's help line/web service «Svartjeneste». People have been interviewed after their contact with Svartjenesten; some simply in the capacity of private citizens and some representing professional users. The responses show that 60 per cent of private callers have implemented specific measures after their contact with the service. Only a certain portion of those who have implemented measures say that this contact was the determining factor in their decision to implement measures. This indicates the importance of the information that can be provided by the consulting service about how measures should be implemented, as well as on the various types of measures. The responses also show that the users are satisfied with the information they receive. If we look at the people who say that their contact with Enova led to implementation of measures, and if we assume that they are representative of all callers in 2007, the effect can be estimated at 5 GWh; which only includes the private callers. If we include everyone that has implemented measures, the effect could be more than 14 GWh.

Enova has further refined the programs offered to Norwegian households in 2007. In 2008, Enova will implement a new strategy aimed at households which entails the use of new instruments. «Enova Home» is intended to promote the broad range of services Enova can offer households and will include advice and guidance, good examples, subsidies in selected technologies and recommended, energy-efficient products. «Enova Recommends» is a policy instrument in which Enova, working together with market actors, will ensure that consumers receive information about the energy properties of products at the time they are purchased. Studies show that many people want to do the right thing in terms of energy, but that many of them do not know what concrete decisions they must make. «Enova Recommends» is a labelling system for various products that meet stringent energy requirements and are also generally of good quality. Such a label means that consumers need not grapple with various technical energy terms in order to make wise energy decisions. They need only look for the «Enova Recommends» label to know that they are making a sound choice. There is no charge for manufacturers or distributors to participate in this campaign.

«Enova Recommends» is, in many ways, something new for Enova. For the first time, kWh are reported as part of our result, but are not contracted with another party. The first product to participate in the new scheme is energy efficient windows. The «Enova Recommends» window campaign was developed in 2007 and launched for the public

| | Energy result GWh | MNOK allocated | MNOK disbursed |
|--------------------------------|-------------------|----------------|----------------|
| Anticipated energy result 2007 | 10 | 46 | 22 |

Tabell 15: Husholdning (GWh, millioner kroner)⁵²

⁵² The year refers here to the year when the contract between Enova and the project owner was signed, and does not necessarily indicate when the results will be realized. This area is somewhat unique, since 2007 was the first year an energy result was recorded. The majority of the activity in the area does not lead to an energy result that Enova reports. This also emerges in the rest of this section.

in February 2008. This project significantly improves the availability of triple-glazed windows with a U-value⁵³ of 1.0 or better. The goal set for the project is a direct energy result of 10 GWh, which is not contracted in the same way as in other areas, but will be measured and verified using sales statistics for various types of windows. The estimate is based on the sale of 60 000 windows with a U-value that is significantly better than what is commonly sold today. 60 000 windows constitutes 7 per cent of annual total sales. The expected result concurs with the contractual kWh in the sense that this is an estimate of anticipated future kWh. When the measure has been implemented, the energy results can be calculated with relative assurance, based on sales statistics from the sector.

Enova published two editorial supplements in 2007: «Dette lurer vi på om energibruk» <Questions about energy consumption> and «Bytt til lavenergivinduer» <Switch to low-energy windows>. The demand for consumer information through the website minenergi.no, the Svartjeneste help line and consumer fairs has stayed at about the same level as in 2006.

Traffic to the minenergi.no website declined during the first six months of the year, but has shown a steady increase throughout the autumn. The number of unique users is on the rise, which means that an increasing number of Internet users have visited the site. The Svartjeneste help line processed 26 635 inquiries in 2007; 29 per cent of those who contact Svartjenesten request information on heat pumps and 34 per cent inquire about the availability of subsidies. The trend is towards more comprehensive and advanced questions, and the number of e-mail inquiries is also increasing. Evaluation of the service shows very good customer satisfaction, and a whopping 60 per cent of the households implemented measures following their conversation with Svartjenesten. Another consumer option is Enova's stand at trade/consumer fairs – «Gjør din bolig bedre» <Make your home better>. The stand consistently draws a good number of visitors, promoting Enova's programs at a total of 24 trade fairs open to the public in locations throughout Norway.

The Norwegian Government introduced the subsidy scheme for households in the autumn of 2006, with a budget framework outside of the Energy Fund, see Chapter 3. About 21 200 applications have been received for pellet

ovens, central control systems, pellet boilers, air/water heat pumps and liquid/water heat pumps. The greatest interest seems to be directed at air/water heat pumps.

Enova's commitment for children and young people, the Rainmakers, has been presented in children's television, on the regnmakerne.no website, in the primary and local secondary schools, at housing fairs, and in the energy centre at Hunderfossen family theme park. Knowledge about the Rainmakers in the target group aged 6-15 remained stable at 46 per cent. The energy education program for the primary and local secondary schools, including both teacher and student materials, was continued. Activities targeting teachers have been significantly reinforced through close cooperation with the Norwegian Centre for Science Education, including 12 teacher courses (two in connection with the Rainmakers' «Energy Friends Day» <Vennergidag>). The annual Rainmakers' day was held in Kristiansand. Never before has a municipality taken such a great interest and ownership in the event, which resulted in nearly 100 per cent participation by the schools in the area. Also this year, the Rainmakers have been on children's TV on the NRK1 channel on Saturday mornings, focusing on various energy topics. For the second time, an international version of the Energy Match was produced with children from Norway, Finland and The Netherlands. The Rainmaker concept has now been reviewed following four years' of existence, and necessary adjustments will be implemented starting in 2008.

Enova coordinates the EU project «Kids4Future», which involves a total of ten European countries. The objective of the project is to test the Rainmaker concept in Europe, and efforts got underway in January. Preparatory work has been completed, including an outline for efforts aimed at young people in the upper secondary schools. Cooperation has been initiated with Junior Achievement – Young Enterprise Norway regarding the award of an annual energy innovation prize for companies run by young people.

Energetic export

Enova's efforts aimed at children and young people gain international recognition.

THE RAINMAKERS EXPAND TO THE EU

Because of its active involvement in efforts targeting children and young people, Enova has taken up the post of international coordinator for the EU project, Kids4Future. Kids4Future is organised under the EU program IEE – Intelligent Energy Europe, and its objective is to raise awareness, improve attitudes and develop knowledge about and understanding of energy consumption - and the consequences this has for the environment.

Enova's program for this target group is called the Rainmakers, and in connection with Kids4Future, the Rainmakers have become a European concept. Ten countries are involved in the project, and in each of these countries at least 20 pilot schools receive Rainmaker material for testing.

The idea behind the Rainmaker concept is to build energy knowledge among children and young people through activities they like and can access via their school, the Internet, TV or various kinds of events. The Norwegian author Klaus Hagerup wrote a trilogy that created the foundation for the entire Rainmaker universe. These books have previously been distributed to all primary schools in Norway. They have now been translated into several different languages and will be incorporated in the teaching at the Rainmaker schools in participating countries.

The project has been enthusiastically received in the participating countries in Europe. A teacher in Slovenia said this about the first book of the trilogy: «The Rainmaker story is an instructive, different and fun teaching tool. Its message is sure to reach the children and get them involved in this interesting story.»

Positive feedback has also come from administrative sources in the EU. Bernd Decker in the EACI (European Agency for Competitiveness and Innovation) is excited about the project. He praises the quality of the products and the



THE ENERGY MATCH ENJOYED GOOD RATINGS WITH A MARKET SHARE OF NEARLY 70 PER CENT.

*Arild Halvorsen,
Fabelaktiv producer*

website, and says that the book version of the Rainmaker story is bound to be well-received among children.

«ENERGY SURVIVAL»

TV-viewers around Christmas 2007 may have seen a series of programs where children from Norway, Finland and the Netherlands competed against each other with tooth, nail and energy ingenuity. This was the Rainmakers' international Energy Match, developed over the course of several years in a collaboration between Enova and the production company Fabelaktiv. A long collaboration has now become a successful export commodity.

«In the first few years, the Energy Match was only produced for Norway,» says Arild Halvorsen, Fabelaktiv producer.

«In 2005, the Dutch network KRO helped to further refine the format, and the program has subsequently been aired in the Netherlands, Sweden, Denmark and Finland. For the international market, the format has been called «Energy Survival». We have produced the programs for some of the countries, while others have produced their own versions.»

GOOD VIEWER RATINGS

Separate versions were prepared for Norway and the Netherlands in the last round from 2007, while Finland made its own version. The winners from the three countries met in an international final. The Norwegian version and the international final aired on NRK1 and NRK Super in the week between Christmas 2007 and New Year's.

«Our ratings were very good, with a market share of nearly 70 per cent, or an average of about 400,000 viewers. The program will be rebroadcast this spring, summer and possibly also in the autumn, bringing the average total audience to 450,000-500,000, which is phenomenal,» according to Halvorsen.

⁵³ U-value measures the insulation capacity of a window, including the frame. The lower the U-value, the better the insulation.

2.8 Communication

The attention paid to Enova's activities in prominent media stories reached a record high in 2007. A major publicity campaign was conducted in the autumn, aimed at decision-makers in the central government, municipalities and businesses. There was a positive development throughout the year in the awareness of Enova and knowledge about the company's activities and tasks. Enova's website was restructured and improved in 2007 and the result of this work will be launched in early 2008.

Information and communication will help contribute to Enova achieving its energy goals. It will enhance awareness of Enova and the company's tasks, as well as position Enova as a driving force for progressive energy solutions. Part of this work in 2007 involved development of a brand strategy and a profile manual for graphic design used to promote the company's image.

Surveys are conducted twice a year to chart important aspects of the Enova brand, the effect of the company's communication efforts, and to identify trends in attitudes and behaviour. This measurement is aimed at both professional and private target groups, and this year's survey revealed a positive trend compared with 2006. Unaided knowledge of Enova increased from 12 per cent in the fourth quarter of 2006 to 18 per cent at the end of 2007.

Media coverage is monitored, both as regards energy issues in general and Enova in particular. In addition to collection of figures at the macro level, a quarterly, in-depth analysis of media coverage is also prepared. Enova's activities at-

tracted record-high media attention in 2007. 2,971 articles or features were recorded during the year; 500 more than the level in 2006. Editorial articles mentioning Enova were most numerous during the first and last quarters of 2007. During the first quarter, there was a great deal of focus on the significant savings potential in commercial buildings and the municipal sector, and several of Enova's technical experts were quoted. These quotes were also repeated in other places as a consequence of the respective media features.

Climate and energy planning was a central topic in the municipal and county council elections in 2007. Enova's role in the climate issue was also a topic of interest, with broad discussion including the programs offered by Enova to municipalities and households. Autumn brought more attention to energy generation; with offshore windmills and salt power receiving particular mention in many newspaper articles, as well as TV coverage, in addition to reports on an active thermal market. The departure of former executive director Eli Arnstad was the object of frequent media reports at the end of the year.

Both the Government's White Paper and the fiscal budget for 2008 make special mention of Enova, and there were repeated reports in both national and local media in the last half of 2007. Both on its own, and together with its owner the Ministry of Petroleum and Energy, Enova has highlighted the company's importance as part of the national climate solution.

| | 2003 | 2004 | 2005 | 2006 | 2007 |
|--|--------|--------|--------|--------|--------|
| Campaigns | 3 | 4 | 4 | 4 | 4 |
| Articles about Enova | n/a | 675 | 657 | 2 463 | 2 971 |
| Energy stories | 35 | 7 | 14 | 12 | 9 |
| No. of inquiries to/ from the help line ⁵⁴ | 55 500 | 35 000 | 22 000 | 33 000 | 26 500 |
| Press releases | n/a | n/a | 23 | 26 | 23 |

Table 16: Overview of communication and information activities

⁵⁴ Interest in the subsidy scheme for households in 2003 was quite high.

In the autumn of 2007, Enova conducted its very first publicity campaign aimed at decision-makers in the central government, municipalities, private business and politics. Surveys show that public opinion largely associates Enova with energy conservation in households. The motivation for this campaign was to balance this picture with Enova's activities in the fields of energy efficiency for buildings and construction projects, industry and energy generation. At the same time, there was a desire to link Enova's activities more closely to climate issues, and to show how Enova makes concrete contributions in a climate context. The ambition of the campaign was to focus on the fact that our use of energy has a negative impact on our climate and the environment, and then to illustrate how Enova's activities contribute to solving climate problems through examples of energy projects it supports. An evaluation of the campaign revealed a high level of attention in the target group, that the information was relevant, and that many people subsequently wanted more information about environmentally friendly energy solutions.

Enova has worked diligently in 2007 to improve and restructure its website, and the result of this work will be presented in early 2008. In terms of content, Enova will direct and differentiate its products to target the three main user groups on the Internet. Businesspeople, households and children/young people will each have their own dedicated network channel with one common portal. The objective is for the users to have faster, easier access to the information that is relevant for them.

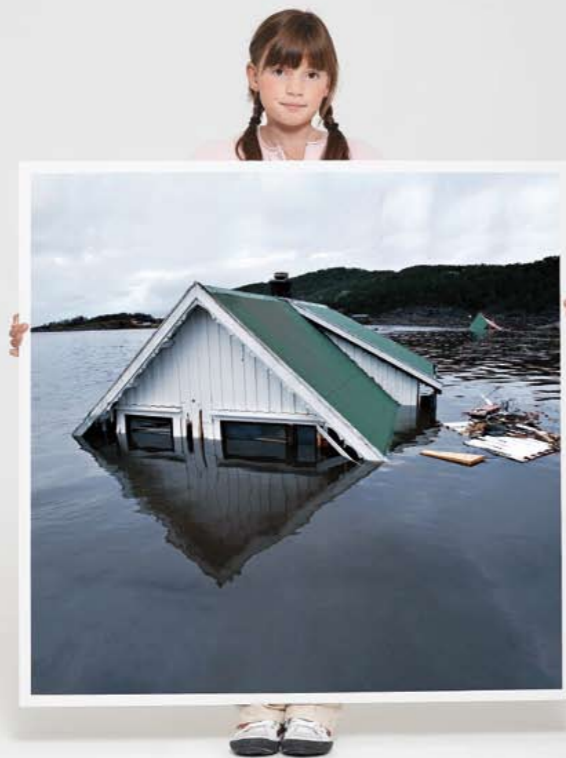
The content of the solutions is comprehensive, and they are used extensively. Use of the consumer portal minenergi.no grew throughout 2007, and the recently launched niche portal fornybar.no (a joint effort with NVE (the Norwegian Water Resources and Energy Administration), Innovation Norway, and the Research Council of Norway) has also gained a good foothold in the web market.

Traffic statistics for Enova's web-based solutions show 865 000 hits for enova.no in 2007, while minenergi.no had 461 000 hits, regnmakerne.no 6 750 000 hits and fornybar.no had 112 000 hits. This is in addition to the direct traffic to Enova's online application and reporting pages.

Enova conducted a comprehensive tender and evaluation process in 2007 aimed at new framework agreements in communication services. There was considerable interest in working for Enova and the organisation received many

high-quality bids. Enova carries out extensive information activities as well as market surveys and media monitoring, with annual purchases of communication services in the range of NOK 40-60 million. New framework agreements were signed with a total of eleven suppliers in 2007. The contracts run for two years, with the option of an additional two-year extension.

Det er en sammenheng mellom bruk av energi og alvorlige klimaendringer. Du kan bidra til løsninger – se enova.no



Drivkraft for fremtidsrettede energiløsninger

2.9 International work: development of expertise, instigator role and network-building

The purpose of Enova's international work is to support Enova's primary objective, which is to promote environmentally friendly restructuring of energy consumption and energy generation. Participation in the international arena provides the opportunity to use three important policy instruments: enhanced expertise, being a powerful instigator for energy efficient solutions and building networks.

The sum of Enova's international work forms an important component of the company's expertise development. Participation in international networks, forums and organisations allows for the use of best practice when choosing national policy instruments and setting objectives. Participation in these global arenas also makes it possible for Enova and Norway to present our experience to others and, not least, to influence international energy development.

Enova is active in several areas on the international scene, with most activities falling under three main fields: the International Energy Agency (IEA), the EU program «Intelligent Energy Europe II» (IEE II) and the «European Energy Network» (EnR).

Enova's involvement in IEA takes place mainly through participation in the agency's program «Implementing Agreements» (IAs). Through IEA, Enova gains access to energy data in the form of analyses and reports that may have a significant bearing on the selection of national energy policy instruments and commitments to technology. If this involvement is assigned high priority, Norway can get a head start on employing useful policy instruments through implementing technological measures that have proven effective in other countries. Some of the programs Enova participated in over the past year included technological developments in the areas of wind, solar, industry and heat pumps.

Starting from 2007, the EU program «Intelligent Energy Europe» (IEE) was placed under the overarching program called «Competitiveness and Innovation Framework Programme» (CIP) which is scheduled to run until 2013. By gathering the three main areas of energy, innovation and technology, as well as information and communication technology under CIP, the EU is taking another step towards its basic objectives of employment and growth set forth in the Lisbon Strategy. This program is a parallel to the EU's seventh framework program and has a total budget of 3.6 billion euros.

Projects developed under the IEE program provide opportunities for early-stage testing of European directives and energy policy instruments that will be implemented over time, thus contributing to unification and support of Norwegian and European objectives. Just as important is the fact that administration of and participation in the program make it possible to have an influence on the framework conditions set internationally, particularly in Brussels. Enova's support for IEE activities is partly financed directly from the Energy Fund and partly through a direct appropriation. For more details please refer to Section 3.2 and Enova's website.

Norwegian involvement in the «European Energy Network» (EnR) has remained high, even though in February 2007 Enova turned over the presidency of the organisation to the British «Energy Savings Trust». This is largely a consequence of the work that has taken place in the network's «Troika», i.e. the EnR board of directors consisting of former, current and upcoming presidents. It is also due to Enova's active participation in the network's working groups, as well as in EnR meetings. The membership in EnR proves that sharing experience and knowledge among nations can help individual organisations to achieve national goals. Enova will continue its commitment to EnR and, by availing itself of the network, will derive benefit from the knowledge already acquired in other countries.

EU project motivates Trysil

EU support, European cooperation and common sense underlie NEPAS' work to motivate municipalities to cut energy consumption. This work is part of an EU project in which NEPAS is participating, financed by IEE. The program has proven results in Norway, Ireland and Slovenia.

Intelligent Energy - Europe (IEE) is the EU's non-technological program in the field of energy. In Norway, the project is managed by Enova, on assignment from the Ministry of Petroleum and Energy. Projects in the IEE program are aimed at reducing non-technological obstacles for increased use of renewable energy and energy-efficient solutions. Enova provides advice and guidance in the application process, and can grant financial support for the formulation of project proposals as well as implementation of approved projects.

An IEE project must be rooted in and promote both national and EU policies, and have at least three partners from different EU or EEA countries. The projects have focused on widely varying subjects - from developing new measurement systems for energy-efficient buildings to training architects and building owners.

In 2007, IEE was incorporated into the EU's competition and innovation program (CIP), thus entering its second stage; IEE II. CIP has a budget framework for 2007-2013 of 3.6 billion Euros, of which IEE accounts for 730 million Euros. The two other pillars under CIP are entrepreneurship and innovation (EIP), and information and communication technology (ICT PSP).

«The intention of CIP is to consolidate and expand the activities in which Norway takes part. This will contribute to strengthening IEE as a program and an instrument to achieve the objective of national and European energy restructuring. CIP also leads to closer cooperation with the agencies that are responsible for the other pillars under CIP, such as the Ministry of Government Administration and Reform, the Ministry of Trade and Industry and the Research Council of Norway,» says Enova Advisor Anne Marie Abelgaard. «This synergy effect can help facilitate communication channels between the various programs and, not least, enable us to share the lessons we have learned as regards program development and use of policy instruments.»

INTERNATIONAL COMPANY AT KJELLER

The company New Energy Performance AS (NEPAS) has

its origins in the Institute for Energy Research at Kjeller in Norway. NEPAS works primarily with energy management, and the company has participated in a number of IEE projects supported by Enova and the EU, enabling the company to develop expertise that can be applied in Norway.



WHAT WE DID IN TRYSIL WAS TO LOOK AT POTENTIAL VALUE CHAINS THAT INCLUDED FOREST OWNERS, THE FORESTRY INDUSTRY, THE TOURISM INDUSTRY AND THE MUNICIPALITY'S MOTIVATION FOR NEW JOBS.

*Hans Jacob Mydske,
General Manager of NEPAS*

NEPAS' contributions include formulating municipal energy and climate plans based on methodology developed in the IEE project, ELVA. ELVA stands for «Establishing Local Value Chains for Renewable Heat», and its intention is to anchor energy plans in local value creation. In Norway, Trysil was the first municipality to have an energy plan based on the ELVA results.

«Trysil is a typical outlying municipality with much of its area covered by forests. Therefore, creating forestry-related jobs is what gets people interested. What we did was to look at potential value chains that included forest owners, the forestry industry, the tourism industry and the municipality's motivation for new jobs,» explains Hans Jacob Mydske, General Manager of NEPAS. The ELVA work has resulted in several concrete projects which illustrate the realistic potential that lies in using local bioenergy resources to achieve local objectives.

«The forestry industry, which traditionally prepares lumber for the construction industry, can utilise larger portions of the timber for valuable purposes by moving towards bioenergy. Tourism will help by facilitating the use of bioenergy for heating and trail grooming, so that the environment will become an attractive part of Trysil's profile as a tourist destination. At the same time, the municipality will benefit in the form of more jobs,» says Mydske.

ELVA included participants from Great Britain, Ireland, Scotland, Portugal, Slovenia, Greece and Austria. The project is now complete, but work continues in several countries, with particular popularity in Ireland, Scotland and Slovenia.

«This is all about identifying the right things and doing them in the right order. No mystery about that - just plain common sense,» says Hans Jacob Mydske.



2.10 Cooperation and consulting

The agreement between the MPE and Enova specifies Enova's role as an adviser for the MPE, and as a representative of the MPE and Norway in various international forums. This role is also important in terms of achieving Enova's objectives in the best possible manner.

During the course of 2007, Enova has advised the MPE in connection with matters related to Enova's sphere of activity. This adviser role includes e.g. answers and clarifications within Enova's field of responsibility, consultation matters and work on studies. The appendix to this report provides an overview of topics for which Enova has submitted consultation comments, as well as reports and studies carried out or commissioned by Enova.

Enova maintains good regular contact with the Norwegian Water Resources and Energy Administration (NVE), the Norwegian Petroleum Directorate, the Research Council of Norway, Innovation Norway and Statnett, as well as other public agencies that play a role in energy restructuring.

Enova has extensive contact with research and university milieus, trade associations, financial institutions and non-profit organisations, in addition to its ongoing contact with market actors. Participation through lectures at meetings and conferences is a natural part of this work. Organising various types of technical seminars is another important element of Enova's work.

At the end of 2007, Enova participated in seven IEA programs, and is also the Norwegian partner in the ETDE agreement (multi-national information program – Energy Technology Data Exchange). In February 2007, Enova concluded its role as president of the European energy network EnR, and up to year-end has functioned as a member of EnR's board in collaboration with the presidency. On behalf of the MPE, Enova continued to handle the administration of «Intelligent Energy Europe II», and the company is also a member of the network known as «the European Council for an Energy Efficient Economy» (ECEEE). Enova staff members participated in a number of international seminars and conferences in 2007, both as participants and as speakers.

3. OTHER RESULTS AND ACTIVITIES

3.1 Natural gas

Under a separate assignment, Enova has entered into agreements with the developers of transport and storage facilities for natural gas. The arrangement is organised in accordance with the guidelines that apply for «Public Service Obligations» (PSOs). Contracts were signed in 2007 for four projects that, in total, could provide a basis for gas sales equivalent to 970 GWh per year when the facilities are fully operational. A total of NOK 57 million has been allocated, which represents the entire disposable amount.

Enova manages funds appropriated via the fiscal budget which are earmarked for the support scheme for natural gas infrastructure. As part of this task, Enova has developed a general template for designing terminal and storage facilities for LNG, in keeping with the above-mentioned service obligations and adapted to Norwegian conditions. Following clarification and description of the relevant service obligations, Enova carried out the first public announcement of the scheme in 2004. An evaluation of the scheme was initiated after completion of the tender process and negotiation of agreements in 2005. The results and conclusions of this evaluation were incorporated in the ongoing work. Following the announcement in 2007, Enova received bids from a total of seven different bidders with seven different projects. This represents considerably more bids than in 2006, which is probably due to increasing access to LNG in the market. Enova commenced contract negotiations with four of the bidders and by the end of 2007, agreements had been negotiated for all four projects.

The four facilities are:

- Gasnor AS for the LNG plant in Fredrikstad
- Agder Energi AS for the LNG plant in Kristiansand
- Tjeldbergodden Utvikling AS for the gas pipeline to Tjeldbergodden Biopark
- Saga Fjordbase AS for the LNG plant in Florø

The Tjeldbergodden development project relates to a gas pipeline from StatoilHydro's facility at Tjeldbergodden to an industrial area a couple of kilometres from the facility. This is the first time Enova has entered into an agreement regarding compensation for service obligations linked to a pipeline facility.

3.2 Management of «Intelligent Energy – Europe» (IEE)

Enova manages IEE II, the EU's non-technological program for renewable energy and energy consumption on behalf of the Ministry of Petroleum and Energy (MPE). Up-to-date information about the program and application rounds has been provided on Enova's website.

Enova has participated in the EU Commission's information meetings for national points of contact, as well as in steering committee meetings for the program. 2007 was the first year with applications under Intelligent Energy Europe II (2007-2013). This administrative responsibility entails both guidance and information to potential applicants, as well as offers of pilot project support and national co-financing for project implementation within SAVE and ALTENER.

Enova organised an information meeting in Trondheim on 14 April 2007, which was also streamed on the Internet. The meeting provided information about the IEE II work program for 2007, as well as general guidelines for the application process and the EU's formal requirements. The meeting was well-attended, and attracted a wide range of actors. Enova's website has featured continuous information about the program and the application rounds, and a dedicated e-mail address is used to respond to applicant inquiries. Information about the program and the financial support and guidance offered by Enova has also been sent out via e-mail to about 400 recipients. In early October, Enova took part in a kick-off meeting for implementation of CIP, and has in this context initiated collaboration with Innovation Norway and other public actors associated with the program.

The EU's deadline for submitting applications for IEE II was 28 September 2007. Under IEE II, projects can secure funding up to 75 per cent, as compared to 50 per cent under the initial IEE. Compared with previous years, the Call for Proposals 2007 did not entail major changes in the type of projects for which support can be sought.

Enova's application deadlines for pre-project support (FPS) and national co-funding of project implementation (NMF), were set for 1 July and 28 August 2007, respectively. At pre-

sent (as of the beginning of February), the EU has not completed its review of the applications. The results will be announced on Enova's website as soon as they are available.

| Sub-program | Applicant | Project name | Commitment (NOK) |
|-------------|---------------------------|--|------------------|
| SAVE | New Energy Performance AS | Education in renewable energy environment and climate change | 50 000 |

Table 17: Approved applications for pilot project funding, IEE II

Three projects applied for pilot project support; however, two of these fell outside Enova's mandate and therefore just one of the projects was approved for funding. Nine applications for national co-financing were received, eight

of which received funding commitments. The total committed amount is NOK 2 705 050.

| Sub-program | Applicant | Project name | Commitment (NOK) |
|-------------|-------------------------|---|------------------|
| ALTENER | Norsk Enøk og Energi AS | OPUS EST | 200 000 |
| SAVE | Norsk Enøk og Energi AS | LOCALEE | 300 000 |
| SAVE | Norsk Enøk og Energi AS | Penetration of Educational Markets - POEM | 298 800 |
| SAVE | Norges Naturvernforbund | Penetration of Educational Markets - POEM | 218 750 |
| SAVE | Sintef Byggforsk | Selection criteria of transparent components | 250 000 |
| SAVE | Sintef Byggforsk | Improving the market impact of energy certification by introducing energy efficiency and life cycle costs into property valuation taxis - IMMOVALUE | 250 000 |
| SAVE | Sintef Energiforskning | Identification and utilization of reducible loads in the SME sector «SME-Flex» | 400 000 |
| SAVE | Høgskolen i Oslo | Low carbon and low energy urban building complexes | 787 500 |
| Sum | | | 2 705 050 |

Table 18: Approved applications for national co-financing, IEE II

More information about IEE, as well as details regarding utilised funding and projects that have received support, can be found on Enova's website.

3.3 Subsidy program for households

The Norwegian Government introduced the 2006 subsidy program for households in late August 2006. This program has a budget framework of NOK 71 million, appropriated via the fiscal budget, and Enova was given the task of designing and implementing the program. A total of 4692 items were completed in 2007, which includes household investments in pellet ovens and pellet boilers, heat pumps for water-borne heating and central control systems.

This program fills an important function in the endeavour to develop markets for technologies that can contribute to reduced energy consumption in households. The program has sparked considerable interest, with more than 21 000 applications during 2007. Percentage-wise, the implementation rate is highest for pellet ovens and liquid/water heat pumps, more than 50 per cent, which is a high rate compared with a similar program in 2003. The largest single measure in terms of number of applications and implemented measures relates to air/water heat pumps, which seem to have taken the market by storm in 2006 and 2007. The households that have availed themselves of the program are very willing to make investments, and it is estimated that the measures have affected more than 15 000 people. Work on this program, which brings both breadth and diversity to household heating solutions, will continue in 2008. In the time to come, Enova will study the subsidy program for households in context with informational tools to create a comprehensive approach to developing markets for renewable technologies and energy efficiency.

3.4 Management of «Energy Technology Data Exchange» (ETDE)

ETDE is the IEA's multi-national information program. Enova is the Norwegian party to the ETDE agreement, as well as the Norwegian representative in the ETDE steering committee (ExCo). ETDE celebrated 20 years of existence in 2007, with many documented good results.

ETDE's objective is to collect energy-related literature and make it easily accessible. ETDEWEB is the world's largest energy database, with more than four million references to energy topics from books, journals, websites, etc.; many of which are available in complete versions.

Enova is responsible for following up and financing the work related to maintenance and operation of the ETDE database on Norway's behalf. According to the letter of award from the MPE, the Institute for Energy Technology (IFE) has been hired by Enova to carry out maintenance and operation of ETDE's database for Norway. 507 new documents and 100 new users were registered in Norway in 2007.

4. GLOSSARY

OTHER RENEWABLE ENERGY

For the purposes of this publication, other renewable energy means renewable energy other than wind power or thermal energy.

THE ENERGY FUND

Support for increased generation of renewable energy, improved access to thermal energy and reduced energy consumption is provided via the Government's Energy Fund, which is financed by a surcharge on the tariff for tapping power from the distribution grid. As of 1 July 2004, the surcharge is 1 øre per kWh. The Energy Fund also finances Enova's operations. The legal framework for the Energy Fund is laid down in the Act relating to the Amendment of the Act of 29 June 1990 No. 60 relating to generation, conversion, transmission, trading, distribution and use of energy, etc. (the Energy Act), Section 4-4, cf. Odelsting Proposition No. 35 (2000-2001) and Recommendation to the Odelsting No. 59 (2000-2001). The Ministry of Petroleum and Energy determines the articles of association for the Energy Fund.

ENERGY RESTRUCTURING

The contract between the MPE and Enova stipulates use of the Energy Fund to promote environmentally friendly restructuring of energy consumption and generation. This means that Enova's job is to enact measures aimed at making energy consumption less dependent on a single source of energy, as well as to promote switching of energy sources from non-renewables to renewables.

ENERGY RESULTS

One of the main objectives of the Energy Fund is to contribute to energy results, either through reduced energy consumption or more environmentally friendly energy generation. This is an important part of Enova's agreement with the MPE. Two different terms are used in this report to describe energy results: contractual and realized.

RENEWABLE ENERGY

Enova's definition of renewable energy is based on the definition used in the EU's directive on the promotion of use of energy from renewable sources (2001/77/EC). The directive defines renewable energy as renewable, non-fossil energy sources (wind, solar, geothermal, wave, tidal, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases). Biomass is further defined as biodegradable

fractions of products, waste and residues from agriculture (including vegetal and animal substances), forestry and related industries, as well as the biodegradable fractions of industrial and municipal waste.

FREE-RIDER

Enova defines free-riders as those who receive support for projects that the recipient would have implemented in any event, e.g. cases where the support of the Energy Fund was not needed to trigger the project. See also the definition of triggering effect.

CONTRACTUAL ENERGY RESULT

Funding awarded to projects is linked to an expected energy result, which is part of the contractual basis between the recipient and Enova. Failure to achieve the result will result in a corresponding reduction of funding. The contractual energy result is the energy result the parties expect to realize, as determined on the contract date.

INDICATOR

An indicator is a method of quantifying something that is difficult to measure directly. In an energy efficiency context, indicators are often linked to intensity factors that drive the need for energy, such as kWh per m², kWh per refrigerator per year, kWh per tonne of steel manufactured, etc. Other types of indicators can include market shares for new, energy-efficient solutions, the percentage of renewable energy, etc.

COST-EFFECTIVENESS

One of the purposes of establishing Enova was to bring about a more cost-effective commitment to renewable energy and efficient energy consumption. Enova prioritises projects according to the required funding in relation to the energy result (NOK/kWh), given the project's lifetime and the goals set forth in the agreement with the MPE. The projects that apply for support from Enova are evaluated in a three-step process. The first step is an assessment of the technical energy merits of the project, followed by an assessment of the project economy and need for funding. Finally, Enova's costs related to the project (the support amount) are weighed against the energy result (kWh). Projects that do not deliver an adequate energy result in relation to the funding will not succeed in the competition for funds.

LIFETIME

An important consideration in connection with new generation of energy and reduced energy consumption is how long the results will be beneficial. In this context, we can differentiate between technical lifetime and economic lifetime. Technical lifetime relates to how long the equipment can remain in operation with normal maintenance, while economic lifetime is linked to how much time will pass before it is more profitable to replace the equipment with new and improved technology. Enova uses economic lifetime as its basis, which is also reflected in Enova's investment analysis. Not only is project lifetime an important parameter when evaluating the need for support, it also indicates how long the benefits from the energy result provided by the project will last. The project lifetime multiplied by annual energy result (years*kWh) indicates the project's total lifetime energy result. Similarly, the lifetime energy cost can be calculated using the following equation $NOK/(year*kWh)$.

PROGRAM

Enova has elected to organise its activities in the form of programs. A program is a policy instrument aimed at one or more specific target groups, with firm application deadlines and criteria. This arrangement has been chosen to direct the use of policy instruments and to facilitate prioritization between projects that are relatively similar.

PROGRAM COORDINATOR

Enova outsources some of the initial application processing to free up internal capacity and ensure timely processing. These external resources are referred to as Enova's program coordinators.

REALIZED RESULT

In contrast to the contractual result and the final reported energy result, the realized energy result is not based on expectations, nor is it an estimate as such. The realized energy result is based on a review/audit of the energy results actually achieved by the projects. In practice, it can be difficult to quantify realized results, and the challenges presented may differ between energy generation and energy consumption. There may be significant time gaps between completion of the projects and reporting of the realized results. The realized result of Enova's activities includes the ripple effects of the support provided.

FINAL REPORTED ENERGY RESULT

All projects with energy results submit final reports on the completion date for the project. The final reported energy result is an updated forecast for realized results upon completion of the project. Enova evaluates the energy results reported by the projects to determine whether they are reasonable.

INDIRECT EFFECTS

While the contractual energy result is a direct consequence of the support provided by Enova, the ripple effects are the spin-off effects of this support. Ripple effects may fall under many different categories, such as additional investments that become profitable as a result of the initial project, market changes towards reduced costs, etc.

TRIGGERING EFFECT

As a steward of public funds, it is important for Enova to ensure that the funds it controls are employed in the best way possible. This principle is also confirmed in the agreement between Enova and the MPE. Subsidies provided by the Energy Fund are to contribute to ensuring realisation of projects that would not otherwise have been implemented. Enova's allocation of funds is intended to trigger projects that contribute to reduced energy consumption or increased energy generation. Projects that have low costs per produced or reduced kWh will often be profitable without assistance, and should therefore not receive support from the Energy Fund. The support is also considered to have a triggering effect if it accelerates the implementation of a project, or if the scope of the project is expanded beyond what would otherwise have been the case.

APPENDIX

Summary of consultation submissions and publications prepared in 2007

Høringer fra Enova er avgitt på følgende områder:

Lavutslippsutvalgets innstilling i NOU 2006:18
«Et klimavennlig Norge»

Endringer i energiloven – energitilstand i bygninger

Olje- og energidepartementets høring i forbindelse
med evaluering av Energiloven

Norges vassdrags- og energidirektorat høring av forslag
til endring i kontrollforskriften vedrørende KILE m.v.

Statens forurensingstilsyns høring av endring av forskrift
om kvoteplikt og handel med kvoter for utslipp av klima-
gasser (Klimakvoteforskriften)

Olje- og energidepartementets høring av utkast til for-
skrift om opprinnelsesgarantier for produsert elektrisk
energi

Olje- og energidepartementets høring av forslag til
endringer i naturgassforskriften

Olje- og energidepartementets høring av forslag til veile-
der for utarbeidelse av regionale planer for vindkraft

Olje- og energidepartementets høring av forslag til
forskrift om støtte til produksjon av elektrisk energi
fra fornybare energikilder

Evalueringer:

Evaluering av program for bolig, bygg og anlegg
2004-2006 (Utført av Econ Pöyry og KanEnergi)

Veileder:

Veileder for energieffektiv belysning i yrkesbygg
Veileder for kommunene om klima og energiplaner
Revisjon av kjøpsveiledere (13 stk.)

Rapporter, utredninger og andre publikasjoner:

Engelsk og norsk utgave av resultatrapporten 2006

Resultat- og aktivitetsrapport for industri

Rapport fra potensialstudien for næringsmiddelindustrien
(utført av NEPAS)

Bygningsnettverkets energistatistikk 2006

Markedsundersøkelse energieffektive produkter
(utført av Vekst Teknologi AS)

Funksjonell energieffektivitet – nye nøkkeltall for
vurdering av energieffektivitet i bygninger
(utført av Stiftelsen Østfoldforskning)

Bygningsnettverkets energistatistikk 2006 – Datakvalitet
(utført av Stiftelsen Østfoldforskning)

Konkurransflate mellom fjernvarme og gass
(utført av Xrgia AS)

Fornybar varme 2020. Potensialstudie og analyse av
framtidig utbygging av fjernvarme og lokale
energisentraler (utført av Xrgia AS)

10 år med røde tall. Barrierer for økt utbygging av lokale
varme-sentraler og nærvarmeanlegg (utført av Norsk
Bioenergiforening, Norsk Varmepumpeforening og
Norsk Petroleumsinstitutt)

Potensialstudie av havenergi i Norge
(utført av SWECO Grøner og Econ Pöyry)

Markedsundersøkelse energieffektive produkter
(utført av Vekst Teknologi AS)