

Enova SF is owned by the Ministry of Petroleum and Energy, and was established to take the initiative to and to promote an environmentally friendly restructuring of the use and generation of energy in Norway. The goal is to make it easier for households, businesses, industry, public enterprises and organizations to choose simple, energy-efficient and environmentally friendly solutions.

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Enova's Results and
Activities Report
for 2006



06

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Transforming Norway's energy system

Energy was high on the agenda in 2006. The higher than normal electricity prices, Norway's strong dependence on electricity, and the increased focus on climate change resulted in a lot of interest in environmentally friendly energy solutions. For Enova this meant an exciting and demanding year. At the same time it has been important to take into account the long-term perspective of our activities. Enova is supposed to be a driving force for future-oriented energy solutions and to contribute to a lasting change in Norway's generation and use of energy. During the past year better knowledge about what is happening to our world has had a positive effect on our efforts. This increased attention has provided Enova with the opportunity to demonstrate that energy efficiency and renewable energy are the keys to a sustainable energy future. Moreover, the general focus on energy has enabled us to more effectively provide business and industry, households and the public authorities with good energy advice.

For the years ahead even stronger support for energy efficiency and renewables has been signalled. Starting in 2010, this will mean that Enova will manage annual investments of about NOK 1.6 billion to stimulate clean and efficient energy solutions. In addition to these funds, a considerable amount of private capital will also be invested. This means that several billion kroner will be invested annually in green energy in the years ahead.

The increased funding allows for increased efforts in all areas related to renewable energy and energy efficiency measures. The focus on households and on more environmentally friendly heating solutions will be strengthened. A special support programme for infrastructure related to district heating will be established.

In 2006 we contributed to projects that might result in reduced energy consumption and increased generation of renewable energy totalling 2.1 TWh. For the period 2001-2006 a contractual target of 7 TWh was specified in the Agreement with the Ministry of Petroleum and Energy (MPE). This goal has been more than reached since at the end of 2006 we have contractual results totalling 8.3 TWh in saved and generated energy, of which 1.6 TWh are related to wind power projects, 2 TWh to heating and 3.9 TWh to projects aimed at increased efficiency in the use of energy. Thus, we are well on our way towards the target of 10 TWh for the year 2007, and the work to develop markets for efficient and renewable energy solutions has been reinforced.

In 2006 Enova's freedom to target areas where the effect would be the greatest yielded record results with respect to both heat generation and infrastructure. In order to enhance the flexibility of the Norwegian energy system,

it is important to concentrate on renewable heating solutions. To maintain this, however, it is important to arrange for the use of central heating in new and existing buildings and to consider alternative heating solutions in small and large local communities, in buildings and in business and industry.

In the current construction boom we see that the use of energy is given even lower priority by the property developers than at other times. It is a big challenge, therefore, to help make it easier for builders who want to concentrate on future quality by constructing energy-efficient buildings. The implementation of the EU's Buildings Directive and the appurtenant Act and Regulations will be measures that can further this development.

Increasingly, climate change will be an important reason to introduce new initiatives related to renewable energy and energy efficiency. Over the next few years, there is much we can do in this area, for Norway is favoured with great opportunities related to renewable power and renewable heat and has a great potential to start using efficient energy solutions. The challenge is to exert an influence on all small and large investment decisions so that the right energy solutions are prioritized. In this context all our means, be they investment support, counselling, dissemination of knowledge, network building or model projects, will be important.

We live in a country with ample opportunities, but we are also faced with challenges. For Enova it is a privilege to help facilitate future-oriented energy solutions. We look forward to continued good co-operation with players from all fields in this important work.



Eli Arnstad

Eli Arnstad
Executive Director

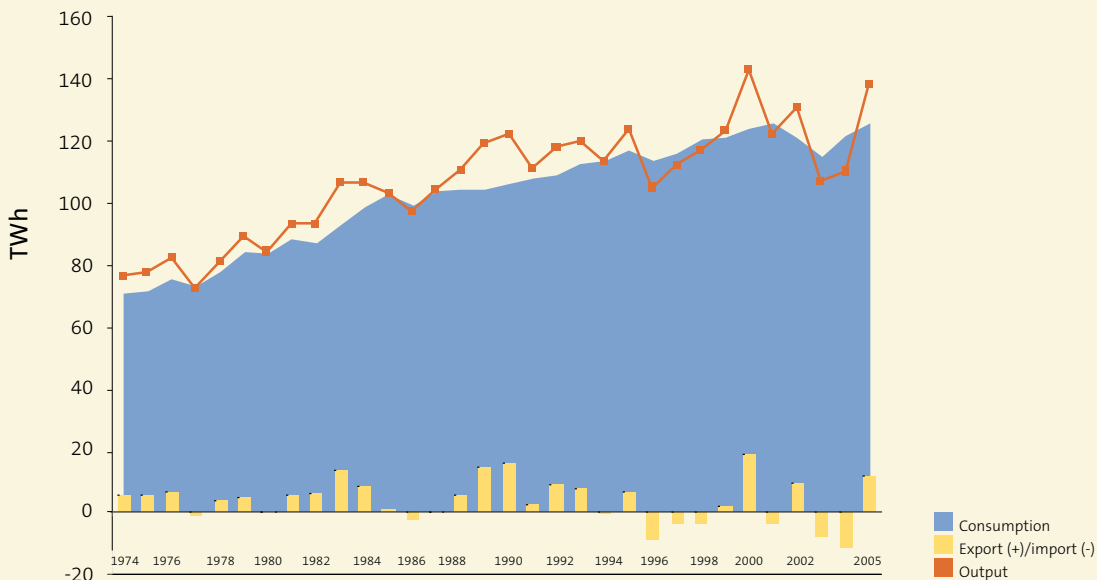


In 2005 more than two thirds of all energy consumption in Norway apart from energy consumed in the transport and oil sectors was based on hydroelectric power. Still, it is important to increase the share of renewable energy.

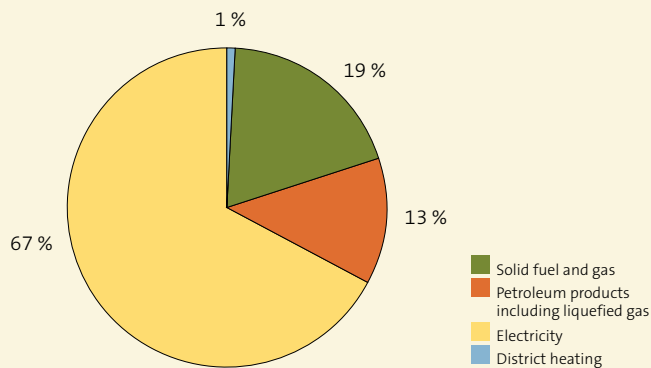
From 1974 there has been a steady increase in electricity consumption in Norway. Up to the mid 1990s this increase prima-

rily took place in the household and the service sectors. Over the last few years consumption has stabilized in the household sector, while the growth in the power-intensive industry and the service sector has continued. For the most part, electricity output has increased in step with consumption, even though consumption and output show great variation from year to year because both are weather sensitive. The columns in the diagram below show the amount of electricity that has been exported and imported each year. Here as well, there are great variations from year to year, and it is difficult to say if there is a tendency towards increased import.

**Output and consumption of electricity in Norway
1974 – 2005**



Stationary energy consumption in Norway in 2005



Summary

Through the Agreement with the Ministry of Petroleum and Energy, Enova has been entrusted with the task of contributing to energy efficiency and the use of environmentally friendly energy corresponding in total to at least 12 TWh by the end of 2010. In 2006 Enova has supported projects with contractual energy results of 2.1 TWh. Since its establishment five years ago Enova has contracted energy results corresponding to 8.3 TWh.

Enova had no call for proposals for investment support for wind power in 2006. One of the reasons for this was uncertainty about future framework conditions related to renewable power generation. Compared with previous years, Enova greatly increased its support to renewable heat in 2006. In the course of the year an energy result of 681 GWh of renewable heat energy was contracted. Energy efficiency measures and conversion to new renewable energy carriers within the built environment represented a contractual energy result of 380 GWh in 2006. Enova's work aimed at energy efficiency and conversion to renewable energy carriers in industry has contributed a total contractual energy result of 891 GWh in 2006, which is more than twice the results for 2005. Enova has increased its support to municipalities. In 2006 the programme "Municipal Energy and Environmental Planning" was expanded to also include support for preliminary projects related to energy efficiency and conversion.

The increased attention in 2006 on energy saving and renewable energy has enabled Enova to become more efficient in providing private sector, households and public authorities with good advice. In 2006 Enova's help line received 33,000 enquiries, which was 45 per cent up on the previous year. An evaluation of this service shows that as many as 46 per cent of those contacting Enova have taken action following their communication with Enova's advisers. In August Enova launched a new website, *minenergi.no*, aimed at households. By the end of the year this website had a total of 600,000 hits. A larger number of news articles related to Enova's activities than ever before was registered. Awareness of Enova's efforts towards children and youth, the Rainmakers, increased from 40 to 46 per cent. A special arrangement for energy instruction in primary schools at *regnmakerne.no/larer* was launched simultaneously with the distribution of the third and last Rainmaker Book.

The available funds in 2006 totalled NOK 970 million, of which NOK 825 million were allocated to projects, informa-

tion and counselling activities, international activities and analyses. At year end the balance in the account of the Energy Fund was NOK 1,813 million, of which 92 per cent was assigned to a portfolio of 930 active projects.

The funds of the Energy Fund are to be employed in a cost-effective way. Enova's obligation, therefore, is to derive as large an energy result as possible from the money spent on project support. In addition, the support is supposed to help trigger the projects. This implies that projects that are commercially profitable without support from Enova are not entitled to support. The average support for projects that Enova supported in 2006 was NOK 0.026 per kWh over the estimated lifetime of the projects. On a continuous basis Enova is working to further develop methods for project evaluation and results reporting.

Most of Enova's projects have an impact on the environment. On the assumption that the alternative power generation will be from gas-fired power stations, all of Enova's projects would amount to a reduction in future CO₂ emissions of about 3 million tonnes per year. This constitutes approximately 6 per cent of the total Norwegian greenhouse gas emissions for 2005 and almost half of the total emissions from Norwegian cars.

In addition to the money in the Energy Fund, Enova is responsible for managing other projects through special separate grants. In 2006 these projects included infrastructure for natural gas, the EU programme Intelligent Energy Europe (IEE), the IEA programme ETDE, as well as grants for electricity saving in households. In 2006 a contract was entered into with a developer of a reception and storage facility for LNG that altogether may form the basis for gas sales corresponding to 200 GWh annually when the plant becomes fully operational. A total of NOK 15 million out of available funds of NOK 32 million has been spent on this.

A new subsidy scheme in 2006 for households was launched by the Government towards the end of August 2006. This programme is funded through the fiscal budget with an upper limit of NOK 71 million. At year-end a total of 15,225 applications had been submitted, of which 20 per cent were for support to install pellets heaters, a little less than 2 per cent were applications for support for pellets boilers, 19 per cent were for support for central control systems and the rest were applications for support for heat pumps.



Fridtjof Unander has broad international experience in the field of energy and environment. For a number of years he worked as a scientist at the Institute for Energy Technology at Kjeller, Norway and at Lawrence Berkeley National Laboratory at the University of California at Berkeley. Between 1997 and 2006 Mr. Unander was with the International Energy Agency (IEA) in Paris. Here, among other things, he was in charge of the work on the IEA study "Energy Technology Perspectives: Scenarios and Strategies to 2050", which was presented at the G8 summit in 2006. He has also been in charge of IEA's work to analyse trends in energy consumption where the use of indicators for energy efficiency plays an important role.



Fridtjof Unander, Deputy Executive Director, Enova

We have reached our intermediate goals

Since Enova was established five years ago, ambitious, quantifiable targets have been set for the activities of the organization. These goals have been laid down in the Agreement between Enova and the Ministry of Petroleum and Energy (MPE). So far Enova has exceeded the targets that have been specified.

Ambitious goals for restructuring energy

“During the period 2001-2006 contractual results correspond to 8.3 TWh, whilst the target for the same period was 7 TWh,” says Fridtjof Unander, Deputy Executive Director of Enova. The diagram below shows Enova’s contractual results together with the targets for the years 2005, 2006 and 2010. So far the Agreement with MPE has specified that results must be contractual and/or realized. Realized results are the ultimate output from projects after completion, i.e. when the energy efficiency measures have been implemented, when the windmills have started to generate energy or when heating projects supply heat.

“There is a considerable time span, however, between the submission of an application for support for a project and the completion of the project. If Enova were to delay the reporting of potential results until the conclusion of the projects, it would take a long time before we and others would be able to assess whether the goals would be achieved. Consequently,” says Unander, “we report contractual results reflecting the anticipated results at the time when Enova allocates funds to a specific project. When all the investments have been made and the project is ready to realize the results, a final report has to be submitted. The result figures for 2006 show that 14 per cent of all of the projects in Enova’s portfolio have so far submitted final reports. Naturally, over time, the number of final reports will go up, and as projects are gradually completed the contractual energy result will be replaced by energy results accounted for in the final reports.

“So far the figures from 2006 show that the results presented in the final reports seem to be slightly above the original contractual results for the same projects,” says Unander. This implies that all in all the contractual results for these projects

constituted a fair forecast for what in the end was reported in the final reports.

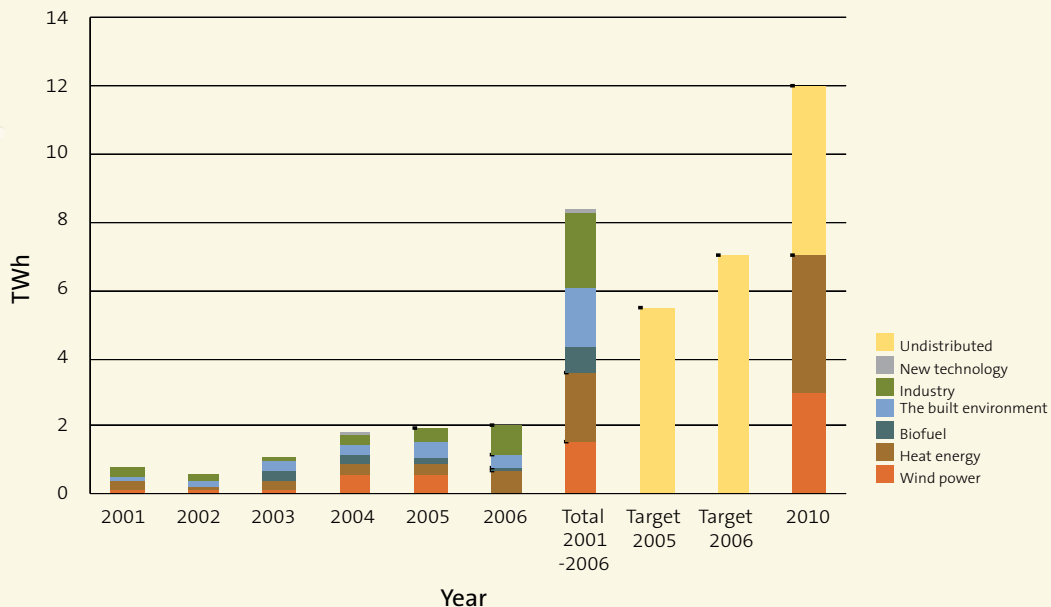
Support from Enova is intended to trigger investment in clean and efficient energy solutions. This means that Enova’s task is to give support to projects that are commercially unprofitable and that would not have been carried out without this support.

“Thus,” says Unander, “we support marginal projects. At the same time we are not supposed to provide too much support so that earnings become unreasonably large. If none of the projects we support were cancelled, that would probably mean that we gave too much support, or that we provided support for projects that would have been profitable regardless. This brings us to yet another important point. Funds granted for projects that are not realized are naturally not paid out but returned to the Energy Fund. These funds can then be allocated to other projects that may be implemented instead.”

The goal is lasting change

Enova achieves important results beyond the number of kWh specified in the contract with the project owners. Enova’s objective is to obtain a lasting, environmentally friendly restructuring of energy use in Norway. Enova’s Agreement with the Ministry of Petroleum and Energy for 2007 provides for the possibility of documenting results that reflect broader market changes than those that can be recorded at project level. This implies an opportunity to use other methods to measure results, such as, for instance, various indicators. One of the benefits of this will be to enable us to measure the results of our activities that are not related to specific investments. Examples of this are our training, information and advisory services aimed at households and industry.

Enova will attempt to develop good new indicators that can be used to report achievement of objectives, assess the quality of the programmes and to make important projections of the effect of various initiatives in the different markets where Enova is active. There is a great deal of activity internationally in this area, organized both by the EU and the IEA. Enova is following these activities closely and will draw on experiences from this work when developing indicators that will be relevant in identifying the results of Enova’s contribution to a lasting environmentally friendly restructuring of energy use in Norway.



1 Results and activities

1.1 Goals, objectives and means

Enova's main mission is to contribute through the Energy Fund to an environmentally friendly restructuring of energy use and generation of energy. The primary long-term goals are related to energy saving and to the generation of new renewable energy. The management of the Energy Fund is governed by an Agreement between Enova and the Ministry of Petroleum and Energy (MPE). This agreement specifies goals and clear guidelines for this mission.

Enova's task is to help facilitate a lasting restructuring of energy use and supply in Norway. This is a long-term, comprehensive task that requires an identification of necessary market changes and how to attack barriers against such changes. Enova employs a number of instruments in this work. Investment support is the most important instrument, but not the only one. It is supplemented by information programs, support for new technology and support for model projects. In many cases the lack of knowledge is itself an impediment to investment or change of practice. Enova's programme aimed at the private sector is an example of an area where investment support is not the most important instrument.

Within its result areas and budget, Enova shall develop efficient and adequate instruments. To facilitate the cost-effective use of the funds in the Energy Fund, technological neutrality is important, given the goals specified for the activities. Through its instruments, Enova shall help develop well-functioning markets for efficient and environmentally friendly energy solutions. Investment support is used when insufficient capital is a barrier to the realization of a project. In 2006 Enova's support constituted an average of 15 percent of the total project costs¹. The investment support triggers investments in the enterprises many times the size of the grant amount. Enova's method of working consists of actively trying

to influence the market and establish contact with various industries. Forging alliances with organizations in business and industry, as well as other key players, is an essential part of this work.

An instrument that is being used to an increasing extent is the development of and support for model projects. These are projects aimed at developing and disseminating new ideas and technologies that may provide important contributions in future markets. By setting a good example and developing good projects based on world leading technology, Enova may also help promote Norway's role as a developer and supplier of environmentally friendly energy solutions.

1.2 Energy results

Through the Agreement with the Ministry of Petroleum and Energy (MPE) Enova has been entrusted with the task of contributing to energy saving and new environmentally friendly energy totalling at least 12 TWh by the end of 2010. At least 4 TWh of this total shall be increased access to central heating based on new renewable sources of energy, heat pumps and waste heat. At least 3 TWh shall be increased output of wind power. In 2006 Enova has contractual energy results of 2.1 TWh. So far in the period of agreement, the contractual energy results are 8.3 TWh².

The Agreement between MPE and Enova states that the results must either be contractual or realized kWh. The Agreement requires that the results are measured and verified at project level before being aggregated. From the time the contracts are entered into several years may pass before the results are realized. Therefore, in 2010, a large share of the contractual results will still not have been realized.

Table 1 shows contractual results broken down by area and year. During the period 2001-2006, Enova has entered into contracts with projects totalling the

¹ It is difficult to estimate exactly how much the enterprises will invest on the average. In addition to the support provided by Enova, other public players may also support the projects in some instances. As a rule, funding in addition to that provided by Enova will only be provided by the enterprise itself, either through equity or loans.

² This has been adjusted for interrupted and cancelled projects. Without this adjustment the contractual energy results total 9.6TWh.

equivalent of 8.3 TWh. The target set in the Agreement with MPE for the same period was 7 TWh. The total contractual energy results for the year 2006 are 2.1 TWh. Of this, energy results related to the use of energy constitute 1.3 TWh, of which 891 GWh have been generated through Enova's programme for industry and 380 GWh through Enova's programme for the built environment. A total of 681 GWh are related to the establishment of new generation of heat energy, and 100 GWh are generated through a programme for biofuel processing. In 2006, Enova has not provided any support for wind projects.

In 2006 Enova has increased its focus on the final reporting for projects. All in all, 1,354 GWh from projects Enova has supported have been reported. In addition, a total of 820 GWh for projects that were started in 2001 supported by NVE, and which will not be further audited by Enova, must be included³. This totals 2 174 GWh.

The 1 354 GWh from projects in Enova's portfolio where final reports have been prepared represent projects that altogether constituted a contractual figure of 1 316 GWh. When adjustments are made for energy results based on final reports, Enova can report 8 357 GWh.

The share of projects for which final reports are available are shown in figure 1. The share of the contractual portfolio for which final reports are available decreases for later years. This is completely in line with what would be expected as the project portfolio gradually matures.

GWh/year	2001	2002	2003	2004	2005	2006	Sum
Wind power	120	80	124	645a	585	0	1 554
Heat energy	328	166	262	262	296	681	1 995
Biofuel	0	0	295	255	162	100	813 ⁴
The built environment	44	150	284	276	559	380	1 693
Industry	300	177 ⁵	106	355	364	891	2 192
New technology	28	1		35	1	7	72
	820 ³	574	1 072	1 828	1 966	2 059	8 319 ⁶

Table 1: Contractual energy results in GWh for the period 2001–2006^{6,7}

³ These projects were supported by the Norwegian Water Resources and Energy Administration (NVE) in 2001, and have subsequently been followed up by Enova. In Enova's Agreement with MPE it is stated that Enova may include the results from these projects. In 2002 Enova had an external report prepared where an assessment of the energy results for 2001 in accordance with the guidelines applicable to Enova's projects, was made. This work was performed by Econ and Stavanger revisjon. These projects will not be audited any further by Enova and are therefore included in the results appearing in the final reports, even if these projects have not been recorded as finally reported in Enova's database in the same way as projects supported by Enova.

⁴ Due to round-off, the grand total will not agree with the total for each year.

⁵ A total of 152 GWh of this is related to industrial projects that have not been formalized with contracts.

⁶ The year refers to the year a contract was entered into for a project and does not necessarily indicate anything about when the results of the projects in the form of kWh will be realized.

⁷ Contractual results for each year will change from one year to another because of cancelled/interrupted projects and other changes. This means that the figures provided in the table are not necessarily the same as those reported in Enovas results report for 2005.

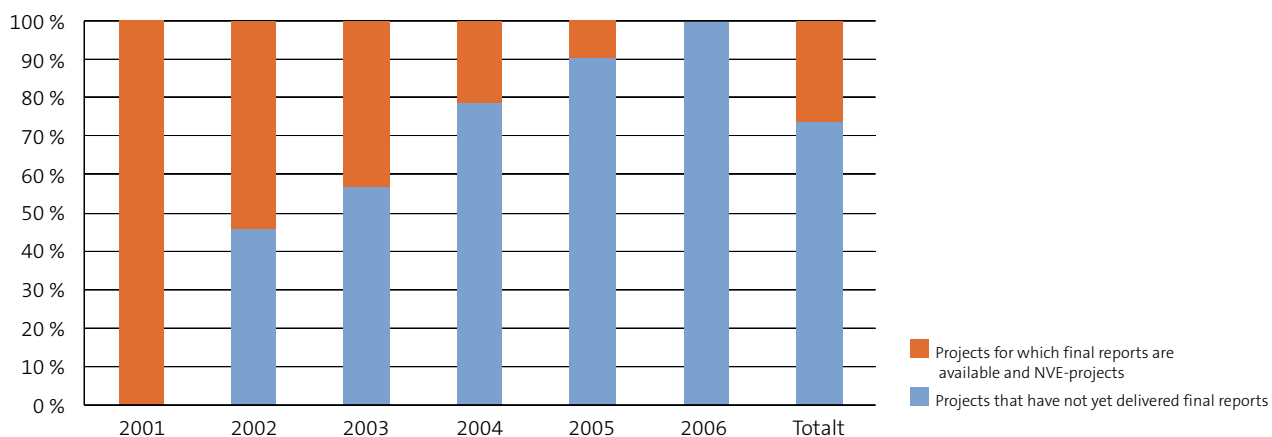


Figure 1: The share of contractual projects that have not yet delivered final report⁸

1.3 Project lifetimes

The Energy Fund is to be employed in a cost-effective way. Therefore, Enova is to maximize results from the Energy Fund. At the same time the support is supposed to trigger the projects. This means that projects that are commercially profitable without support from Enova will not receive any support. Cost effectiveness can be measured in different ways, but to be able to compare different projects it is important to take the lifetime of the project into consideration. Based on a given investment cost, the profitability of a project will increase in step with its lifetime because the costs for the project may be distributed among results achieved over many years.

The most correct method for comparing the profitability of different projects is to take into consideration economic lifetime⁹. The economic lifetime of a project will depend on a number of different factors such as technical lifetime of equipment, technological development, cost development, level of knowledge, etc. Enova's project portfolio consists of a large number of different types of projects. The average lifetime of projects within a programme area are dependent on the initiatives that are supported. Training programmes, for instance, may have a shorter lifetime than investments in physical installations, e.g. heat pumps. Lifetime is also an important issue in connection with the Energy Services Directive. In the autumn of 2006 the European Committee for

Standardization appointed a task force (CEN Workshop Agreement 27) which had the objective of arriving at harmonized lifetimes for various measures within the framework of the Energy Services Directive. Enova will assess whether the results from this work are relevant to Enova's project portfolio. In previous results reports, estimated lifetimes of 20, 20 and 10 years respectively have been employed for wind power, renewable heat energy and energy efficiency in order to estimate the cost effectiveness of the support provided by Enova. In table 2 this is presented for the years 2002 to 2006. It is important to note that indirect costs related to administration are included in the estimate. Starting in 2006, training activities are included¹⁰.

The numbers show that the differences in estimated cost effectiveness among the areas are relatively large over time. The importance of the lifetime assumption is also worth noting. For instance, if it is assumed that the lifetime of heating projects is twice that of energy efficiency projects, then support for heating projects can be justified even if they require a higher amount of support per kWh with no adjustment for lifetime. Variations in cost effectiveness over time reflect the development in the programmes in addition to reflecting the number of projects and the market situation in each area. It is not unlikely that Enova's support has triggered the most cost effective projects first and that the costs of triggering new projects will gradually increase. For Enova, therefore,

⁸ The year refers to the year a contract was entered into for the project and does not necessarily indicate anything about when the results of the projects in the form of kWh will be realized.

⁹ In the glossary the terms economic and technical lifetimes are defined more clearly.

¹⁰ This implies that costs per kWh in 2006, all else being equal, will be higher than for other years.

it is important to develop alternative instruments that can help prevent a reduction in cost effectiveness over time.

The costs related to wind power and heat energy projects, measured by support granted per kWh, have increased up to now. For wind power projects the maximum share of support has increased from an original 10 per cent share in 2003 to 25 per cent of approved investment costs in 2004. This was done to compensate for the loss of revenue resulting from the fact that Norwegian wind power producers are no longer entitled to export green certificates to the Netherlands. In the heat energy area the cost effectiveness was relatively high in 2003 and low in 2006. The high cost effectiveness in 2003 could be ascribed to certain large projects with a very high energy result relative to the support from Enova. The relatively low cost effectiveness for heat energy projects in 2006 was due to one big project with a large documented ripple effect. This effect has not been included in the energy result for heating.

As regards the energy efficiency projects, the cost effectiveness measured in this way has been reduced from 2005 to 2006. This can be ascribed to a number of factors. Among other things, the focus within industry and the built environment has changed with time. In 2006 the industry programme has

supported a larger share of power recovery projects. In general, investment costs for such projects are relatively high at the same time as the economic lifetime for this type of projects may exceed 10 years. Within the built environment the boom in the construction industry has reduced the focus on energy efficient solutions. Consequently, it has become more expensive to enter into contracts on new projects.

It is important to realize that the figures in the table do not necessarily provide an unambiguous picture of the cost effectiveness of the measures. External framework conditions and the number of projects each year will be important premises for changing the level of support granted per kWh. Support from the Energy Fund must have a triggering effect on the implementation of the project. This implies that Enova cannot automatically choose to support the projects that give the highest energy result per krone granted, since the implementation of such projects will often be profitable even without support. Besides, Enova is obligated to adhere to the Agreement with the Ministry of Petroleum and Energy (MPE), which defines specific targets for the areas of wind power and heat energy.

	Life times	2002		2003		2004		2005		2006	
		NOK/kWh	Lifetime adjusted	NOK/kWh	Lifetime adjusted	NOK/kWh	Lifetime adjusted	NOK/kWh	Lifetime adjusted	NOK/kWh	Lifetime adjusted
Wind power	20 yrs	0,44	0,022	0,22	0,011	0,46	0,023	0,49	0,025	- ¹¹	-
Renewable heat energy	20 yrs	0,31	0,015	0,16	0,008	0,35	0,018	0,39	0,020	0,52	0,026
Energy use	10 yrs	0,20	0,020	0,21	0,021	0,22	0,022	0,20	0,020	0,26	0,026
TOTAL	Weighted	0,26	0,018	0,19	0,012	0,34	0,021	0,33	0,022	0,35	0,026

Table 2: Lifetime and cost effectiveness adjusted for changes¹²

¹¹ No support was granted to wind power projects in 2006.

¹² The support adjusted for lifetime is calculated by dividing total support to an area with contracted results aggregated for the whole lifetime. The effect of this support depends, among other things, on the discount factor. The year refers to the year a contract was entered into for the project and does not necessarily indicate when the results of the projects in the form of kWh will be realized.

1.4 Implementation time for projects

On a continuous basis Enova assesses the methods for project evaluation and the reporting of results. Part of the challenge associated with communicating how Enova's project portfolio and results develop is that after the contract between the project owner and Enova is concluded, there is a long time lapse for many of our projects before we actually see a result in the form of energy output or reduced use of energy. Many of the investment projects in the energy sector have a long-term perspective. Thus, to develop good projects it is absolutely necessary for Enova to take long-term effects into account.

Figure 2 shows an example of a project. The contract between the project owner and Enova is signed in year zero, and the contractual energy result corresponds to the energy result expected to be achieved at that point in time. It is typical to have an investment profile with investments distributed over several years. In this example, the first energy results are already derived in year two, whereas the full results are not obtained until year eight. In this imaginary case the first instalment of the support from Enova would have been paid out in year one, and the last instalment in year six or seven after the submis-

sion of the final report. If the project is not realized, no support would be paid out. However, Enova is obligated to set aside the total amount of granted support until the project has either received the full amount or has been interrupted. The figure illustrates that even at the time when the project submits its final report to Enova, it is still not clear what the final result of the project will be. For instance, final reports for wind power projects are typically submitted when all of the windmills are in operation. This does not necessarily mean that a stable output has been achieved. In the case of heat energy projects, the final report is submitted when the first delivery has taken place. The maximum potential will not normally be reached until a few years later.

If the economic lifetime has been correctly stipulated, it is profitable at the expiry of the lifetime to replace the equipment with new and better technology. If such a reinvestment is made, the original project will no longer provide any energy results. Enova's purpose in supporting projects is the assumption that it will result in more long-term effects in the form of ripple effects. If, for instance, the reinvestment that is made gives better energy results than would otherwise have been achieved, then Enova's support has achieved lasting effects. Therefore, the final, realized kWh result of a project will not be known until much later.

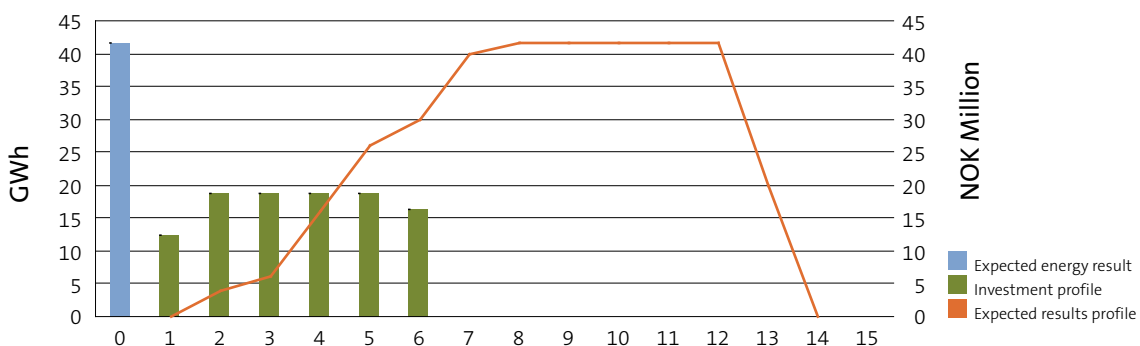


Figure 2: Example of investment and results profile for a project

1.5 Reduction in CO₂ emissions as a result of Enova's projects

Most of Enova's projects have an impact on the environment. When a project results in changes in the use or generation of energy, the emissions will change both locally and globally. Lower energy use reduces the need to supply energy. Increased use of renewable energy reduces the need for other forms of energy. Conversion from fossil fuels to renewable energy will reduce CO₂ emissions.

Enova's large number of projects will have an impact on the environment through a change in the emissions of NO_x, CO₂, methane and other gases. The projects differ, and likewise the resultant emissions. Here we will focus particularly on the possible impacts of CO₂ emissions. Many of Enova's energy efficiency and heat energy projects result in reduced consumption of both electricity and fuel oil, and in some cases other energy carriers, too. The share of oil used in industry and buildings is not constant over time, but varies with factors such as fluctuating oil and electricity prices.

The emission of CO₂ from oil heating depends on the efficiency of the equipment that is used and will usually vary among different sectors and facilities. Emissions related to the use of electricity depend on how the electricity is generated; coal-fired power stations produce high CO₂ emissions, whereas hydro-power does not result in any CO₂ emissions.

Enova's contractual energy result for 2006 is 2.1

TWh. The aggregate result for the period 2001-2006 is 8.3 TWh. The change in CO₂ emissions as a result of these projects is dependent on the extent to which energy saved from energy efficiency projects or energy generated from heat energy projects will reduce oil or electricity consumption. It also depends on the type of power generation that was not put into effect as a result of the reduced demand for electricity and as a result of the increased output of renewable power from Enova's projects.

Increased output of wind power, for example, may postpone or reduce the need for construction of gas-fired power stations, or lead to a reduction in the need for importing electricity based on coal.

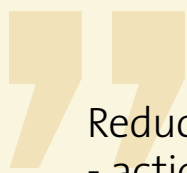
Since the oil consumption in boilers and burners in Norway typically vary from year to year, it is difficult to calculate exactly how much Enova's projects will reduce oil consumption. Estimates made on the basis of Enova's project portfolio indicate that about half of Enova's contractual results related to energy efficiency and renewable heat energy can be expected to lead to a reduction in oil consumption. On this basis, the estimated reduction in the annual oil consumption is around 0.4 million tonnes/year, see table 3.

Table 4 shows how much Enova's projects can reduce CO₂ emissions given different assumptions. In order to illustrate how CO₂ emissions are affected by the share of oil/electricity in Enova's energy efficiency and heat energy projects, three different cases are shown: one where it is assumed that the savings only reduce the need for electricity, one where it is assumed that the reduction is divided 50/50 between oil and electricity, and one where it is assumed

	2006	2001 – 2006
Reduced oil consumption (tonnes/year)	123 500	400 100

Table 3: Annual reduction in oil consumption as a result of projects supported by Enova¹³

¹³The estimate for saved oil in this table constitutes more than 50 per cent of Enova's contractual energy result. The reason for this is that the oil savings are calculated as gross reduced oil consumption, whereas Enova reports contractual energy results in the form of net energy. Moreover, part of the reduced oil consumption will be replaced by electricity used for heat pumps. This reduced oil consumption is not reported as an energy result by Enova. It is only the renewable energy share (heat obtained from the surroundings) that is included in the results from Enova's heat pump projects. In the calculation of reduced CO₂ emissions, net figures have been used.



Reduction of CO₂ emissions - actions do have an effect!

During the last year the focus on the world's climate challenges has increased considerably. The UN Intergovernmental Panel on Climate Change (IPCC) has recently submitted its fourth main report, which concludes that it is very likely that mankind's emissions of greenhouse gases have caused most of the increase in global temperatures during the last 50 years. The report also points out that continued emissions of greenhouse gases at the present or higher levels will cause further warming and many changes in the global climate system. It is highly probable that climate change will be greater and have far more serious consequences in the next 50 years than those that have been observed during the past 50 years.

The gravity of the consequences of the climate challenges was also pointed out in the report presented by Nicholas Stern, former chief economist at the World Bank, in October 2006. It shows that man-made climate changes may result in both ecological and economic disaster. The impact of climate change may shrink the world economy anywhere from 5 to 20 per cent in 2050. Even with these dramatic prospects, the message in the report is that much can be done to avoid this development. Provided that the work to reduce emissions starts now, the report estimates that the costs of implementing the measures will be much lower than the costs resulting from climate change.

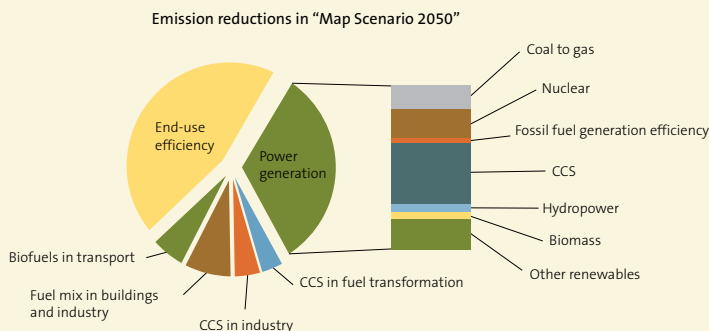
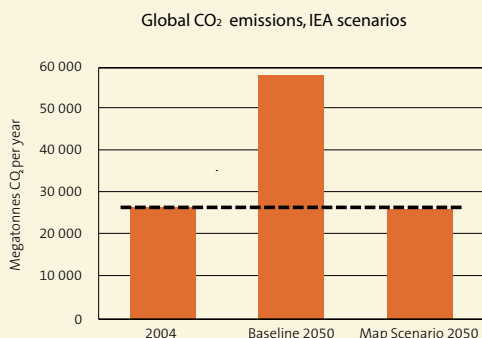
These conclusions are concurrent with the conclusion drawn by the Norwegian Commission on Low Emissions, which also submitted its recommendations last autumn. The Norwegian Commission concluded that it is possible to reduce Norwegian emissions by two thirds by 2050 without incurring unreasonable high costs. The Commission points out that it will be possi-

ble to carry out a number of measures, such as CO₂ capture and storage, the phasing in of biofuel, increased concentration on renewable energy and energy efficiency measures in industry and buildings.

Climate change is now also firmly established on the agenda of the top leaders of the G8 countries, which launched an Action Plan on Climate Change during their summit in Gleneagles in July 2005. As part of this plan, they asked the International Energy Agency (IEA) to develop scenarios and strategies for a sustainable energy future. In response, the IEA initiated the study "Energy Technology Perspectives: Scenarios and Strategies to 2050" for the G8 leaders' meeting in St. Petersburg in the summer of 2006.

The IEA study shows that with today's policies the world's energy consumption and CO₂ emissions will be more than twice the current level by 2050. This is displayed in the figure below as "Baseline 2050". Through a number of scenarios presented in the book, IEA shows that it is possible to avoid this development by utilising energy solutions that are available today, or that can be made available over the next 10 to 20 years. By employing these solutions, the world's CO₂ emissions can be reduced to the current level by 2050, and the growth in the consumption of both oil and electricity can be halved. In the figure this is shown as "Map Scenario 2050". IEA's scenarios show that in 2050 the emissions in the OECD-countries can be reduced to 32 per cent below the current level.

The other figure below shows how emission reductions are broken down among various types of measures. The IEA points out that increased efforts to improve the energy efficiency of buildings, industry and transport will be absolutely necessary in order to obtain these results. Other important measures include stronger deployment of renewable power generation, the introduction of biofuel and the development of solutions for CO₂ capture and storage.



that all of the projects reduce only the oil consumption. These three cases are combined with three different assumptions about which alternative power generation the reduced need for electricity and the output of renewable energy replace: conventional gas-fired power stations, gas-fired power stations with CO₂ sequestration or the import of coal-based power¹⁴.

The assumption resulting in the largest reduction in emissions is the case where it is assumed that all of the savings only reduce the electricity consumption, and that the alternative power supply is the import of coal-based power. In that case the reduction in emissions resulting from all of Enova's projects totals 8 million tonnes of CO₂ per year. By comparison the Norwegian private car fleet emitted 7 million tonnes of CO₂ in 2004. In the case where the savings are equally distributed between oil end electricity, the reduction in emissions amounts to 6 million tonnes of CO₂, whereas in the case where the savings only reduce oil consumption, the reduction is about 4 million tonnes of CO₂.

If it is assumed that the alternative power output comes from conventional gas-fired power plants, the reductions will be about 3 million tonnes of CO₂ per

year. By comparison the total Norwegian emissions of greenhouse gases increased by 4.5 million tonnes of CO₂ equivalents between 1990 and 2005. Since the emission coefficient for electricity generated from gas power is in the same order of magnitude as the end use of oil, the electricity/oil share does not substantially affect the results in this case.

In 2005 the Norwegian emissions of greenhouse gases measured as CO₂ equivalents totalled 54 million tonnes¹⁶. On the assumption that the savings are distributed between electricity and oil, and that the alternative electricity output is from gas-fired power stations, the effect of Enova's projects constitutes almost 6 per cent of those emissions.

Million tonnes CO ₂ per year	2006 projects		2001-2006 projects		
	Heat energy and energy efficiency projects replace oil and electricity 50/50	Heat energy and energy efficiency projects replace electricity only	Heat energy and energy efficiency projects replace oil and electricity 50/50	Heat energy and energy efficiency projects replace oil only	Heat energy and energy efficiency projects replace electricity only
Conventional gas power	0,74	3,1	3,0	3,0	3,0
Gas power with CO ₂ sequestration	0,37	0,5	1,5	2,5	2,5
Imported coal-based power	1,4	7,9	5,8	3,9	3,9

Table 4: Estimated annual reduction of CO₂ emissions resulting from Enova's projects based on different assumptions¹⁵

¹⁴ Emissions from conventional gas-fired power stations vary, among other things, with technology and heat utilization. In these calculations the assumed emission coefficient for gas power equals 378 kg CO₂/MWh. This estimate is taken from one of the documents underlying SFT's (Norwegian State Pollution Control Authority) analysis: National Climate Action Analysis, Civitas (2005). There will also be emissions of CO₂ from gas-fired power stations with carbon sequestration. These emissions are assumed to be equivalent to 15 per cent of the emissions associated with conventional gas power. The assumed emission coefficient for coal-based power is taken from the US Department of Energy. The Norwegian Petroleum Institute provides figures for emissions of CO₂ from oil heating: in the industrial sector 331 kg CO₂/MWh, in other sectors 378 kg CO₂/MWh. Here an average value of 350 kg CO₂/MWh has been used.

¹⁵ In the same way as for the energy results from the projects, the CO₂ effect will also be realized at a later time than the date when the contract is signed.

¹⁶ Preliminary figures from Statistics Norway (SSB)

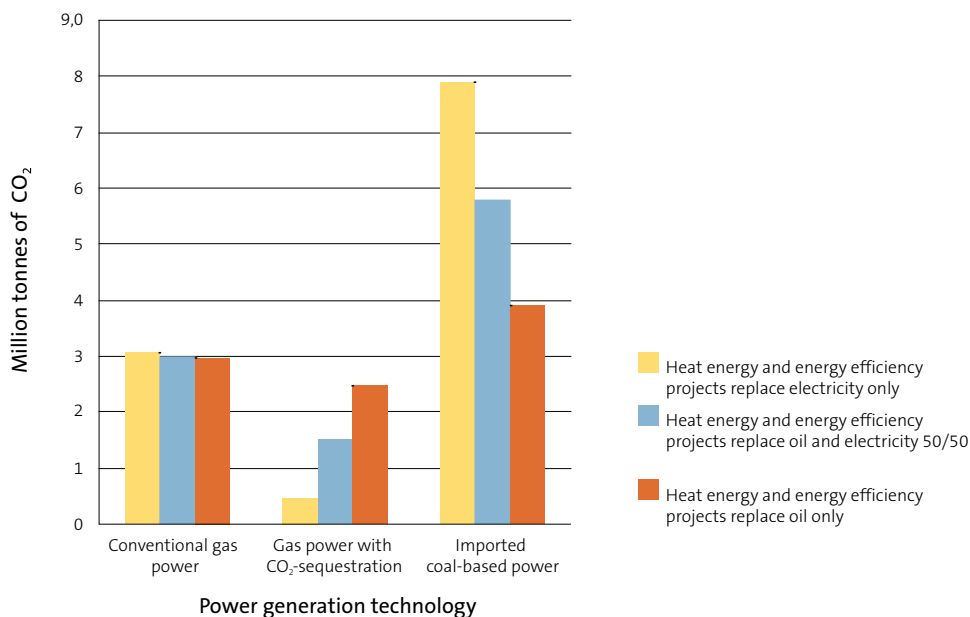


Figure 3: Estimated annual reduction in CO₂-emissions resulting from Enova's projects under different assumptions.

If it is assumed that the electricity is generated in gas-fired power stations with CO₂ sequestration, the reduction in emissions due to Enova's project portfolio is considerably less, since in this case each kWh of reduced demand for electricity or generated renewable power replaces power generated with emissions amounting to only 15 per cent of the emissions from conventional gas-fired power station. In this case, the most important contribution to the reduction in emissions comes from a reduction in oil consumption. This means that the reductions in emissions increase with the share of oil used in energy efficiency and heat energy projects. This is also illustrated in figure 3, which shows the reduction in CO₂ emissions in the different cases that are discussed in this chapter.

1.6 Funding and application of the Energy Fund

Available funds in 2006 totalled NOK 970 million, of which NOK 825 million have been allocated as project support for the purchase of goods and services and other projects. At year-end, the balance in the account of the Energy Fund was NOK 1 813 million,

of which 92 per cent have been assigned to a portfolio of 930 active projects.

The management of the Energy Fund is subject to a number of requirements, such as the rule that no more money can be spent than the Fund has accumulated¹⁷. This entails that when a decision is made to support an application for a project or to purchase a service, budgeted funds must be simultaneously allocated to the project in question. For this reason, there will be a considerable amount of money allocated to specific projects in the Fund's account at any given time.

It is a requirement that the support granted by Enova must trigger the implementation of the project. Thus, promises of support are given to marginal projects, and in most cases the investment decision is made after the promise of support has been given. For some projects this may entail that they will not be initiated or that they are interrupted or cancelled. Payment to projects is only made after progress has been documented so that Enova experiences almost no loss of funds in real terms. If for various reasons an approved project is not started as planned, Enova will withdraw the approved promise of funding. Allocated funds are thus made available for use in other pro-

¹⁷ Exceptions to this rule can be made in fiscal years when a grant authorization has been given. In such cases the additional commitment to the Fund may be less than or equal to the grant authorization.

jects. Thus, the risk taken by Enova in connection with projects cannot be compared with the risk taken by private financial players. For Enova the inherent risk is that results are postponed.

Figure 4 illustrates how funds are transferred to and from the Energy Fund during the year. The Energy Fund is primarily funded through a surcharge to the tariff for the withdrawal of power from the distribution network. The surcharge to the network tariff is NOK 0.01/kWh, which means that a household with an annual consumption of 20,000 kWh pays NOK 200 annually to the Energy Fund through its electricity bill. Since a large part of the revenue is based on a surcharge to the network tariff, the exact total available amount is not known until the end of the year, and hence Enova has to operate with a certain mar-

gin for error. Thus, the main rule is that funds are transferred to the next fiscal year. The size of this transfer varies from year to year and is partly dependent on whether large projects are cancelled at the end of the year.

Figure 5 illustrates the breakdown of interrupted and cancelled projects by the year for which a contract for the project was originally signed. The figure shows that a relatively large percentage of the projects from 2003, measured in contractual kWh, has later been interrupted, the major part related to a large wind project and several large heat energy projects. Interrupted projects must be added to the 8.3 TWh that Enova reports as a contractual result. This means that Enova has entered into contracts for more than 9.6 TWh, of which 1.3 TWh,

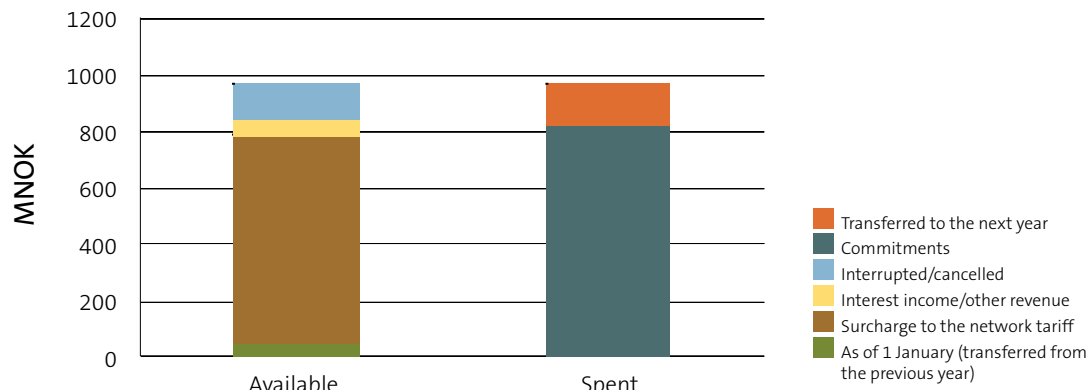


Figure 4: Financial framework for the Energy Fund in 2006

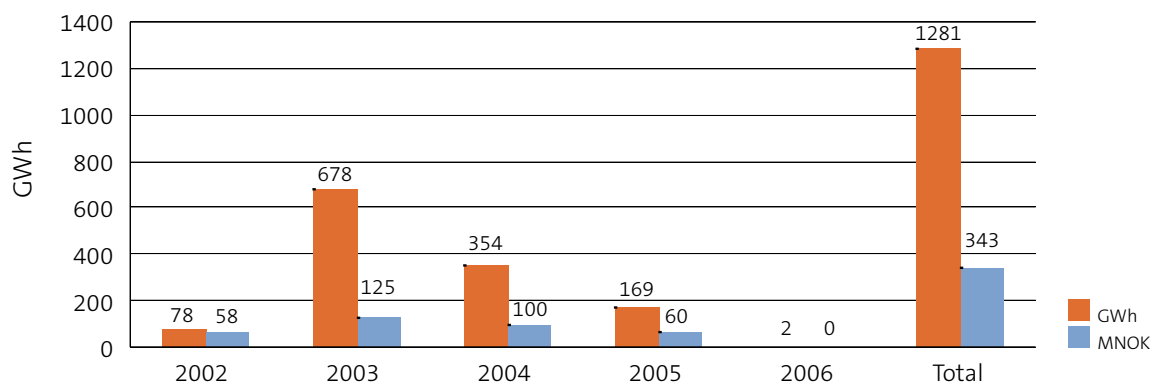


Figure 5: Interrupted/cancelled projects in GWh and MNOK per year¹⁸

¹⁸ The year refers to the year a contract for a project is signed.

corresponding to 14 per cent, have been interrupted or cancelled.

Tables 5 and 6 show the number of applications and the funds associated with approved applications and activities initiated by Enova itself. In 2006 a total of 327 applications for Enova's programmes were received. Decisions have been made to support 66 per cent of these applications in 2006. In areas with activities initiated by Enova itself, a total of 135 projects were conducted in 2006, with corresponding funds totalling NOK 128 million. Disregarding Enova's administration fee, which amounts to NOK 47 million including Value Added Tax, 90 per cent of the funds have been allocated the programmes at Enova to which applications may be submitted.

	Number of applications in 2006	Projects receiving support (per cent)	MNOK
Heat generation	104	55%	351
Biofuel processing projects	14	21%	4
The built environment	71	82%	122
Industry	52	81%	204
New technology	21	43%	10
The municipality Programme	65	74%	6
	327	66%	697

Table 5: : Summary of allocated funds for approved projects and funds for programmes to which applications may be submitted

	MNOK ¹⁹
Households	36
Information and communication	19
International programmes	15
Analyses/studies	11
Administration fee Enova (including VAT)	47
	128

Table 6: Summary of allocated funds for activities initiated by Enova itself

¹⁹ Total funds employed per area. This includes the administrative costs for the programmes not included in Enova's administration fee.

1.7 Funding and the allocation of funds – other activities

In addition to the Energy Fund, Enova is responsible for managing some other projects through special separate grants. In 2006 these projects included natural gas, the EU programme Intelligent Energy Europe (IEE), the IEA programme ETDE and grants for electricity saving in households. This section deals with the funding and allocation of these funds. Chapter 3 contains a broader review of these areas.

In the autumn of 2006, the Ministry of Petroleum and Energy (MPE) initiated a grant programme to limit electricity use in households. Enova was requested to manage the programme and develop criteria for granting support. The grant for 2006 totalled NOK 71 million. No support was paid out under this programme in 2006, but letters of commitment were sent out.

In addition to the Energy Fund, another important project in 2006 was natural gas, where the funds are intended to help realize the Norwegian government's goal of increased domestic utilization of natural gas. Available funds in 2006 consisted of a grant of NOK 30 million along with a renewal of the authorization

to commit transfers worth NOK 20 million. After deducting the utilized authorization to commit transfers from 2005, available funds in 2006 totalled NOK 32 million, NOK 2.5 million of which were earmarked for Norsk Gassenter, a resource centre for end-user technology at Haugalandet, Norway. In the course of the year, funds of about NOK 0.3 million were returned from interrupted/cancelled projects, along with accrued interest. Altogether NOK 15 million were allocated to natural gas projects in 2006.

The grant for Norway's participation in the IEA's multinational information programme Energy Technology Data Exchange (ETDE) totalled NOK 1.7 million in 2006. The full amount was spent in 2006.

MPE also contributed to the funding of a selection of projects within the EU programme Intelligent Energy – Europe (IEE) in cases where the projects were outside the framework for the use of the Energy Fund. The grant for 2006 was NOK 1.5 million. With the addition of funds from previous years that had not been spent, available funds in 2006 amounted to NOK 3.7 million. A total of NOK 1.9 million was employed in 2006.



Eli Arnstad, Executive Director, Enova

Satisfied with the evaluation of Enova

A thorough evaluation report gave Enova a ringing vote of confidence that the organization is doing a good job of executing its responsibilities and that adequate instruments are used to address the challenges it faces. In addition, the results reports for 2004 and 2005 were audited in 2006.

"We find it very useful to be assessed by external players in a normal operating situation," says Eli Arnstad, Executive Director of Enova.

The head of Enova has reason to be pleased with the main conclusions in two reports prepared in 2006: Statskonsult carried out an evaluation at the request of the Ministry of Petroleum and Energy (MPE), and Ernst & Young conducted an audit ordered by Enova itself. Both reports point out that in just a short period of time Enova has managed to develop an efficient organization that executes the responsibilities with which it has been entrusted by its owner in a satisfactory way, though there is still room for improvements.

"The reports show that we execute our responsibilities in an efficient and result-oriented way at the same time as we have everything under control. In addition, it gives us an indication of what measures we can implement in order to improve even further," says Arnstad.

Statskonsult calls attention to efficiency

Statskonsult performed an evaluation of Enova's activities and the Energy Fund. Among other things, Statskonsult concludes that in a relatively short period of time Enova has developed an organization that manages the Energy Fund in an efficient way at the same time as the need to control the use of the funds has been taken care of.

The reorganization of the set of instruments available to Enova and the establishment of a new management model have resulted in a highly goal-oriented management and more binding efforts to restructure energy than was the case prior to the reorganization.

"The users are satisfied with the transformation and find that the different roles are more clearly defined than before. Enova has close relationships and good contact with the users, but still it is possible to make this even more systematic."

The report from Statskonsult was submitted to MPE in October 2006 and will form the basis for the Ministry's total review of Enova's operations.

Ernst & Young audited the results reports

During the summer of 2006, the accounting and consulting firm Ernst & Young audited Enova's annual reports for 2004 and 2005 in the same way that Enova's previous results reports have been audited.

The assignment had a dual objective. The content of the reports and the results were reviewed to ascertain that they were in correspondence with the Agreement with MPE; and the second objective was to reveal any errors, shortcomings and potential for improvement.

The general assessment from Ernst & Young is that, on the whole, the content of the results reports meets the requirements set by the Ministry, and that no substantial errors in the reported results for 2004 and 2005 have been revealed.

"The results reports have been significantly improved during the last few years. Improvements based on the audits and on Enova's own experiences have been implemented. Nevertheless, there is still some potential for developing the results reports further to improve the value of the information," maintains Arnstad.

Recognition from IEA

Towards the end of 2005, the International Energy Agency (IEA) gave Enova credit for its activities in the area of energy restructuring in Norway since Enova's establishment in 2001. At the same time, IEA points out that Norway faces a number of challenges with respect to achieving the targets of the Kyoto Agreement because, among other things, energy consumption is increasing faster than domestic production. IEA makes the following statement about Enova: "The underlying structure with Enova operating as an independent enterprise with long-term funding and distinct goals is exemplary. The programme for financial support to the household sector in 2002/2003 (heat pumps, pellets heaters and control systems) has shown that it is possible to obtain good results."



Leidulv Gagnat, Energy Director, TrønderEnergi

The starting point for TrønderEnergi was the best – wind is an important element of Norway’s natural environment, and the company was well equipped with both generating capacity and manpower in the coastal areas.

TrønderEnergi concentrated on wind power as early as the late 80’s. They gained valuable – or rather hard-earned – experience based on the technology that was available at the time, according to Energy Director Leidulv Gagnat.

“The next stage in our wind power efforts started in the autumn of 2001 when we decided to start planning for the Bessakerfjellet wind park. Until then, we believed that the technology had obvious limitations, and it was also difficult to make such projects financially viable. We resumed our development of wind power because we believed that it would just be a matter of time before it would be worthwhile to invest in this form of alternative energy in Norway.

A good starting point

“The basis for what TE intended to do was the best – the coastal areas of Trøndelag have ample wind resources, and the company already had hydroelectric power stations and manpower in coastal areas. Thus, the idea was that it had to be possible to develop synergies between the operation of hydroelectric power stations and wind power stations. In the autumn of 2004, the company was granted a licence to develop the wind park at Valsneset and Bessakerfjellet. The technology had been improved, but funding the projects was still a problem,” says Gagnat.

“We were fortunate enough to receive grants supporting 25 per cent and 20 per cent of these projects respectively. This support was crucial in enabling us to reduce the financial risk to an acceptable level.”

Valsneset in operation, Bessakerfjellet under construction

The wind park at Valsneset is situated in the Municipality of Bjugn. The surrounding area is mainly zoned for industrial development in addition to a test station for wind power. The park consists of five windmills of 2.3 MW each. The total installed effect is 11.5 MW with an assumed mean annual output of 35 GWh. All the windmills became operational in the autumn of 2006.

Bessakerfjellet is located in the coastal municipality of Roan in the county of Sør-Trøndelag, and in the municipal development plan the area has been designated as suitable for wind power development. A development plan consisting of twenty-five 2.3 MW windmills with a total output of 57.5 MW has been adopted with an estimated mean annual output of 176 GWh. The whole wind park will be completed in the autumn of 2008.

Bessaker Windmill Park

Number of windmills:	ca. 25 each with 2.3 MW capacity
Total installation:	57.5 MW
Mean annual output:	176 GWh (mill. kWh)
Direct space requirements:	ca. 125 – 140 000 m ²
Development cost:	ca. NOK 500 million

Valsneset Windmill Park

Number of windmills:	5 each with 2.3 MW capacity
Total installation:	11 MW
Mean annual output:	ca. 35 GWh (mill. kWh)
Direct land requirement:	ca. 13 000 m ²
Development cost:	NOK 113 million

2 Results and activities related to the Energy Fund

2.1 Wind power

Enova had no call for proposals for investment support for wind power projects in 2006. One of the reasons for this was uncertainty regarding the future framework conditions for renewable power generation. In November 2006 the Government submitted Report no. 11 (2006-2007) to the Storting on support schemes for the generation of electricity from renewable sources of energy (renewable electricity)."

Enova's main objective in the area of wind power is to meet the national target of an increase in the output of wind power of at least 3 TWh by 2010. Enova had no call for proposals for investment support for wind power projects in 2006 because it was a specific goal to establish an electricity certificate market starting January 2007. During 2006 it became clear that instead of an electricity certificate market a feed-in tariff would be introduced starting in 2008. Enova decided to await the political process related to new instruments for renewable power generation and to postpone a call for proposals for investment support for wind power until 2007.

Table 7 shows the contractual results and funds related to the wind power projects supported by Enova. At the beginning of 2006, Enova's contractual amount of wind power was nearly 1.6 TWh. During the period 2001-2005, a total of 13 projects were granted support, of which one grant has been revoked. At the end of 2006, five projects are in operation, three projects

are being completed, and two projects are under construction. It has been decided to carry out one of the projects, and one project is awaiting the result of an appeal procedure in the Ministry of Petroleum and Energy (MPE). The anticipated power output for the projects that are in operation, being completed and under construction is about 1.1 TWh.

In 2006, Trønderenergi Kraft AS decided to develop Bessakerfjellet Wind Park. In December 2006 Nord-Trøndelag elektrisitetsverk (an electrical utility) decided to develop the first phase of Ytre Vikna Windmill Park. The uncertainty related to the future framework conditions for wind power as well as rising costs of equipment for wind power generation, have affected the willingness to invest in new wind power generation projects in 2006. Several turbine suppliers report that their order books are full until 2008-2009. Favourable framework conditions for wind power in the USA and Europe, and higher raw materials costs are the reasons for the rise in the prices of wind power technology.

Nevertheless, there is a great interest in developing wind power in Norway. The Norwegian Water Resources and Energy Administration (NVE) has received 41 applications for licences to develop wind power. The total capacity of these applications amounts to about 4,700 MW. In addition, NVE has been notified of 66 projects.

One of the concerns of the authorities is to avoid a halt in investments in new wind power plants while

Contractual	GWh	MNOK granted	MNOK paid out
2002	80	35	35
2003	124	27	23
2004	645	294	111
2005	585	287	37
2006	0	0	0
TOTAL	1 554²⁰	643	206

Table 7: Wind power (GWh, MNOK)²¹

²⁰This includes 120 GWh from the Norwegian Water Resources and Energy Administration's (NVE) projects from 2001.

²¹The year refers to the year when a contract for the project is signed and does not necessarily say anything about when the results for the projects in the form of kWh will be realized.



Per Kristian Olsen, Group Senior Vice President, Hafslund ASA

“Public support for district heating should be targeted to trigger important development projects that are not sufficiently profitable from a business point of view.”

In Norway only 3 per cent of the energy needed for heating is generated in district heating plants, compared to more than 50 per cent in Sweden and Denmark. The Government's ambitious plan for restructuring energy and district heating has been approved. Enova and the Energy Fund are the Government's tools for contributing to the restructuring of energy. The most critical success factor, however, is the willingness of business and industry to go in for district heating in the way Hafslund and its subsidiary Viken Fjernvarme AS in Oslo do.

Support from Enova triggers a new district heating network

The by far largest district heating network is owned and operated by Viken Fjernvarme with an output of a little more than 1 TWh in 2006. The energy from the district heating plant, however, covers only 15 per cent of the need for heating in Oslo, whilst the potential is more than twice as high. The main challenge is to succeed in a rapid but at the same time profitable development of the distribution network. A condition for this, among other things, is that it is possible to attract new customers more quickly than before.

“The new district heating line from Klemetsrud to the centre of Oslo will connect the two large district heating networks in Oslo, which will enable us to utilize the full production capacity at Klemetsrud,” says Per Kristian Olsen, Group Senior Vice President of Hafslund ASA and Chairman of the Board of

Directors of Viken Fjernvarme AS. In total the development costs for this project are close to NOK 390 million, and without the NOK 133 million in support from Enova the project would not have been profitable, maintains Olsen.

Think long range – think big

The new district heating connection also makes it possible to utilize the heat from the adopted extension of the waste incineration plant at Klemetsrud, says Olsen, who is pleased that the size of the investment has not limited Enova's possibilities of supporting this important project. Public support for district heating developments should be targeted to trigger important development projects that are not sufficiently commercially profitable. By contributing to these otherwise unprofitable projects, a great deal of additional profitable district heating projects will be triggered, thereby increasing the pace of such developments. Hafslund and Viken Fjernvarme see interesting business opportunities in district heating in the years to come, adds Olsen.

Covers Oslo's heating needs for the future

Viken Fjernvarme also has plans for a new biopower plant at Klemetsrud. This plant will have a capacity of 100 MW heating effect and 40 MW electricity. When this project has been realized Oslo's need for district heating will be covered by renewable energy for the foreseeable future, says Olsen.

waiting for the support scheme for renewable electricity to become operable. The transitional arrangement that was established in connection with the preparations for a Swedish-Norwegian electricity certificate market will therefore be continued in 2007. Under this arrangement, up to 25 per cent investment support may be granted. Projects receiving support under the transitional arrangement may elect to repay the grant and then avail themselves of the new support scheme for renewable energy.

In November 2006, the government submitted Report no. 11 (2006-2007) to the Storting on support schemes for the generation of electricity from renewable sources of energy (renewable electricity)". This Report specifies criteria for a new support scheme for renewable electricity, a feed-in tariff. The scheme includes wind power, biopower, hydroelectric power generated from the first 3 MW of installed capacity and immature technologies for renewable power. Additional information about this scheme is available on MPE's web site.

2.2 Renewable heat energy and biofuel processing

Compared to previous years, Enova substantially increased its investments in the heat energy area in 2006. In the course of the year contracts were signed for energy results totalling 681 GWh divided among 59 projects for renewable energy, with a total support of about NOK 350 million. The aggregate contractual energy result for the period 2001-2006 amounts to 2 TWh. The biofuel processing projects received a total of NOK 4 million in support for 3 projects. The total contractual energy result for these projects is 100 GWh. Since the start in 2001 contracts for a total of 800 GWh from biofuel processing projects have been signed. The heat energy programme was carried on

from 2005 without any changes simultaneously with a considerable bolstering of the marketing activities. Early in 2006, an evaluation report of Enova's activities related to heat energy prepared by Vista analyse AS was submitted.

Renewable heat generation

The objective of Enova's concentration on heat energy is to reach the national goal of 4 TWh of central heating based on renewable energy, heat pumps and energy recovery by 2010. Table 8 shows the contractual results and funds associated with the heat energy projects supported by Enova.

Enova's main tool in the heat energy area is investment support for heat generation and distribution. In the autumn of 2005, Enova carried out a programme revision that resulted in the joining together of several individual programmes into one heat energy programme, and adding support for the conversion of minor local energy centres to biofuel and heat pumps. The programme was continued in the same form in 2006. The programme has been evaluated and the evaluation report was completed in 2006. One of the main conclusions of the report was that the programme is well organized with an efficient case flow and project follow-up, and good results.

Enova has decided to continue the course "Business development and the planning of bioenergy plants" that was held for the first time in 2005. The feedback regarding the course has been good. The activities in 2006 were carried out by Norsk Bioenergiforening (Norwegian Association for Bioenergy), and new courses will be held in February and March 2007.

Enova notices that there is an increased involvement in renewable and environmentally friendly heating solutions among Norwegian municipalities and energy

Contractual	GWh	MNOK granted	MNOK paid out
2002	166	51	43
2003	262	41	22
2004	262	93	33
2005	296	116	15
2006	681	351	8
TOTAL	1 995²²	652	121

Table 8: Renewable heat energy (GWh, MNOK)²³

²² This includes 328 GWh from NVE's projects from 2001.

²³ The year refers to the year when a contract for the project is signed and does not necessarily say anything about when the results for the projects in the form of kWh will be realized.



Troms kraft (Troms Power) goes in for district heating

“We are now expanding our network connected to our district heating plant at Breivika,” says Alf Petter Benonisen, Section Manager of Troms Kraft Varme. The heating central has the largest bio-incineration plant in northern Norway and the only plant that generates steam from chipped birch.

The focus on renewable and environmentally friendly energy is a strategic decision for Troms Kraft.

“Even during periods when it would have been cheaper to use electricity for heating purposes we choose to use chips,” says Benonisen. In the future Troms Kraft will concentrate further on utilizing refuse incineration and other environmentally friendly and renewable sources for the generation of energy. “In 2006 we estimated the potential for district heating at Tromsøya to be about 125 GWh. Our goal is to develop this by 2020,” Benonisen reveals. Today the Breivika Varmesentral (Breivika Heating Central) has an annual output of 40 GWh district heating, of which about 25 GWh is based on biofuel.

The map shows all plants in Norway. Not all of these plants have received support from Enova.

companies. This is an important reason for the increase in the use of new heating solutions. Soaring prices for electricity and oil have also contributed to improved competitiveness for renewable energy. At the same time Enova sees that the investment costs in connection with the building of central heating plants and district heating plants have gone up, and it appears this development will continue. Among other things this is due to increased prices of raw materials and a very tight market situation in the supply and construction sectors.

Eastern Norway is the most important growth region for a change to renewable heat energy. In 2006 in excess of 20 district heating plants were in operation, three times as many as in 2001. A further six district heating plants are under construction and about 15 new district heating projects are under planning. If this trend continues, there is reason to believe that within a period of five years, district heating plants will have been established in all of the most densely populated areas and towns and cities in Eastern Norway. In 2007, in addition to carrying on the investment support for heating plants, Enova will plan and develop a separate infrastructure programme for district heating. Enova will focus on developing the market for smaller heating centrals through measures aimed at both the supply and demand side. In connection with this Enova will consider what measures can be taken to secure the supply and quality of fuel. (See also the discussion on biofuel processing.) Increased knowledge related to planning, construction and operation is a prerequisite for reducing the risk connected to investments in such plants, and to gain experiences that in the next turn may contribute to increased efficiency and reduced costs. In 2007 Enova will give priority to following up the existing courses in bioenergy

and consider new measures to develop competence for planning engineers, plumbers and heating equipment fitters.

Biofuel processing

Table 9 shows the contractual results and funds related to the processing projects supported by Enova. In many cases the availability of biofuel is a condition for increased output and use of renewable heating. Consequently, Enova has granted investment support to plants for processing and handling of biofuel in areas where the availability of fuel has constituted a growth limitation in the heating market.

Up to now the pellets market has been dominated by Eastern Norway, but today pellets are available all over the country. In 2006 about 42,000 tonnes of pellets were produced in Norway, and of this about 18,000 tonnes were exported (Nobio's Market Report 2003 – 2005). Wood briquettes are also available from Trøndelag and farther south. It appears that wooden chips may become an important fuel in Norwegian district heating plants. As of 2006 large-scale value chains for wooden chips exist in Eastern Norway, Agder and Troms. In Central Norway the prices of wooden chips seem to be considerably higher than in Eastern Norway, creating a major obstacle to an increased number of district heating projects in the region.

In 2007 there will still be a focus on the fuel market. The processing and handling of biofuel will be supported in areas where availability is a limiting factor to growth in the heating market. When a minimum of fuel availability has been established, the focus will be turned to the development of an efficient market and increased predictability and reliability as regards both supply and quality.

Contractual	GWh	MNOK granted	MNOK paid out
2002	0	0	0
2003	295	9	5
2004	255	14	12
2005	162	6	5
2006	100	4	2
TOTAL	813	33	24

Table 9: MNOK paid out ²⁴

²⁴The year refers to the year a contract for the project is entered into and does not necessarily say anything about when the results for the projects in the form of kWh will be realized.



Olav Thon, hotel proprietor and property developer

Thon Hotels save more than NOK 20 million in annual energy spending and gain a valuable environmental image on top of that. This means a healthy bottom line and good PR.

For a number of years the Olav Thon Group has focused on energy saving. We joined Enova's building network at an early stage, and when the 2002/2003 energy crisis came as a surprise to the rest of Norway, our systematized energy efficiency activities were already well under way.

For me energy saving is not just a matter of economics and money but just as much a wish to take the environment and the situation with respect to resources seriously. Through active participation in, among other things, Enova's model project I want to demonstrate that leaders and owners must themselves place energy saving on the agenda. For the Olav Thon Group this has been a success factor, and the results show that we have actually contributed to improving the situation regarding resources in this country.

Through systematic mapping and analysis, continuous monitoring of the energy consumption and effective implementation of measures, Thon Hotels have annually saved millions of NOK. This strengthens competitiveness in many ways. Not only are operating costs reduced, but Thon Hotels are looked upon as an environmentally conscious and responsible hotel chain.

Our original goal was an energy savings of 15 per cent for the whole hotel chain. For some hotels the saving potential turned out to be less, whereas other hotels saved more. On average we obtained savings of well above 20 per cent.

The project has taught us that in order to save energy we need knowledge about energy consumption, that there is a close connection between energy consumption and maintenance, that energy saving also improves comfort, that we have to impose stricter demands on our suppliers, and that today's legislation does not have the intended effect on the consumption of energy.

The Thon Hotels energy efficiency project has involved people at all levels in the organization. Large investments have been made and routines have been changed. We know, however, that it is easy to lose touch. The challenge for the time to come, therefore, will be to keep the focus on making operations as efficient as possible from the point of view of energy consumption, so as to ensure that the savings we have achieved will be sustained.

The project has taught us that results can be obtained, and that other properties, as well, have an unrealized saving potential. The experiences we have made will be used actively in our continued energy efficiency activities in the Olav Thon Group.

I wish Enova good luck in its work for the benefit of society and business and industry in general.

2.3 The use of energy in the built environment

The programme for the use of energy in the built environment is a joint programme for a large and complex market. Energy efficiency measures and the conversion to new renewable energy carriers within the programme contributed to a contractual energy result of 380 GWh in 2006. The market in 2006 was strongly marked by the high level of activity, which reduced the focus on energy efficiency, and that will continue to create big challenges for Enova's work in this area.

Table 10 shows the contractual results and funds related to building and construction projects that have been supported by Enova. Attainment of goals is achieved through three main categories of projects: comprehensive energy agreements with major developers and building proprietors, project agreements related to individual buildings and actions, as well as model projects. Comprehensive energy agreements with leading players will trigger large projects over the next five years, and are thus expected to have an impact in the market beyond the contractual energy results. The purpose of the model projects is to serve as good examples of energy-efficient housing and buildings, with future-oriented solutions that have a great potential in the form of a larger share of the market. The main purpose of these projects is to create effects beyond themselves. Future-oriented solutions may imply the use of known technology and the testing out of new solutions.

The experiences from 2006 are that the triggering support level has risen somewhat due to reduced interest in energy efficiency in the market. Enova will still have an increased focus on new buildings

through increased concentration on comprehensive energy agreements, model projects and the development of new instruments.

In Enova's opinion some of the important challenges in the time ahead are that an increasing share of commercial buildings are offered for rental and that therefore the owner's interest in the building is only related to the investment and the rate of return. Moreover, a number of municipalities have a considerable investment lag, and the municipalities are faced with great challenges with respect to meeting Enova's requirements for the self-funding of projects.

Within the detached housing area Enova has contributed to a considerable market change towards low-energy houses. This has taken place through direct support for projects, but also through other actions such as co-operation with the Association of Housing Producers, where the goal is to develop housing that is increasingly energy friendly. In the course of 2006, 80 per cent of the members of the Association will be able to provide home buyers with so-called low-energy houses. This is a considerable increase compared with the level in 2005, which amounted to 40 per cent. The consequence of an expected high level of activity in the construction sector is that there will be a large supply of buildings with simple technical solutions, accompanied by a large need for energy. New and energy-efficient technology is not applied to the desired degree, and there is a great potential associated with this.

The lack of interest in energy efficiency during the planning and building phase makes it a challenge for Enova to trigger good projects. Direct contact with the players in the market has turned out to be the most efficient way of triggering new projects.

Contractual	GWh	MNOK granted	MNOK paid out
2002	150	57	54
2003	284	72	58
2004	276	75	34
2005	559	127	29
2006	380	122	2
TOTAL	1 693²⁵	453	177

Table 10: The use of energy in the built environment (GWh, MNOK)²⁶

²⁵ This includes 44 GWh from NVE's projects from 2001

²⁶ The year refers to the year a contract for the project is entered into and does not necessarily say anything about when the results for the projects in the form of kWh will be realized.



Torgeir Brun-Svendsen, Property Manager, Aker Verdal AS

Good results from goal-oriented energy project

When Aker Kværner at Verdalsøra started an energy project in 2002, the ambition was to reduce energy consumption by 8.8 GWh per year. The result at the end of 2005 was savings totaling 13.2 GWh per year.

Property Manager Torgeir Brun-Svendsen of Aker Verdal AS describes the energy project as very successful. "We achieved good results, almost surprisingly good," he says. "Energy consumption per man-hour has been cut from 41 kWh/hour to just over 20 kWh/hour. Adjusted for the price of energy this means that the energy costs per man-hour have been reduced from about NOK 14 per hour to a little more than NOK 7 per hour. On an annual basis this means great savings, about NOK 10 million. This contributes to making us more competitive," says Brun-Svendsen.

In the energy project "Energy efficiency Network Aker Kværner Verdal", all aspects of the use of energy in the enterprise were assessed.

"We took the task seriously. In addition to allocating sufficient resources internally, we employed an external energy adviser who provided analyses, strategies, work schedules, quality assurance and, not least, follow-up routines. We have also worked closely with Enova the entire time. The latter has also provided project support," says Brun-Svendsen.

Expensive welding

Aker Kværner Verdal offices, storehouses and manufacturing facilities cover an enormous area, 830,000 m². Its core activity is the manufacture of various steel structures for the oil and gas industry. Welding constitutes a central, and energy-intensive part of the construction work, and by looking at the welding

devices and their operating time a specific result with respect to energy saving was achieved.

A modern energy focus

A total of 43 different energy efficiency measures, particularly related to light, heating and ventilation control, have been implemented on this area. An ambition for all new buildings to be equipped with central heating has also been introduced, as well as preparations for the use of bioenergy.

Specific measures such as these, together with staff training, have raised the energy consciousness to a high level among the employees.

"A change in attitude has taken place, and the programme has been very positively received by the employees. We receive new proposals for improvements all the time. The challenge in the time to come will be to keep the motivation to save energy at a high level," he says.

"At a period when there is a lack of power in Central Norway, we have been very happy to be able to contribute in a positive way."

Project facts:

- The energy project was carried out in 2002 – 2006.
- The final report for the project was submitted to Enova in 2006.
- 43 energy efficiency measures have been implemented.
- Annual savings of 13.2 GWh achieved.
- Energy costs reduced by almost 50 per cent annually.
- Energy consumption has become part of the decision-making criteria in connection with purchases and manufacture.
- Energy follow-up routines introduced at all levels.
- Energy experiences shared with other industrial enterprises in the municipality

2.4 Industry

Enova's activities aimed at improved energy efficiency and conversion to renewable energy carriers in industry have contributed a total contractual energy result of 891 GWh in 2006. It is Enova's goal to contribute to strengthening the competitiveness of Norwegian industry through environmentally friendly and efficient use of energy. In 2006 Enova has adhered to its main programme aimed at the Norwegian onshore industry. Through the programme "Reduced Use of Energy – Industry" all enterprises with projects with a potential total energy result of 0.5 GWh may apply for investment support. Support is given to energy-efficient solutions, measures for energy recovery and conversion to new energy sources.

Table 11 shows the contractual results and funds related to the industrial projects Enova has supported. Different projects will have different costs depending on what type of action is taken. There are

considerable differences between energy efficiency, energy recovery and conversion, see table 12.

It is important for Enova that typical energy management activities are included in the projects. This means that the projects must be rooted in the enterprise's management group and that the investments are assessed in relation to other relevant energy-related investments in the individual enterprise or the group. To obtain this, it is advantageous to enter into comprehensive contracts where this is possible. It is advantageous to conclude a contract with a network of enterprises, for instance a group, instead of signing contracts with each individual enterprise. In addition to better aggregate results, the enterprises and the external advisers are better able to co-operate and to exchange experiences by doing it this way. A different way of obtaining economies of scale is to merge smaller projects in an enterprise into one larger project. In 2006 Enova has supported several major industrial projects in addition to a large number of smaller-scale projects. The

Contractual	GWh	MNOK granted	MNOK paid out
2002	177	19	19
2003	106	17	16
2004	355	62	46
2005	364	59	12
2006	891	204	3
TOTAL	2 192²⁷	361	96

Table 11: The use of energy in industry (GWh, MNOK) ²⁸

Type of action	No. of projects	GWh	Granted (MNOK)
Energy efficiency			
- Energy-intensive industry ²⁹	16	559	107
- Less energy-intensive Industry	14	66	13
Conversion to renewable energy ³⁰	10	48	12
Power recovery	2	218	70
TOTAL	42	891	202

Table 12: The use of energy in industry (GWh, MNOK) ³¹

²⁷This includes 300 GWh from NVE's projects in 2001

²⁸The year refers to the year a contract for the project is entered into and does not necessarily say anything about when the results for the projects in the form of kWh will be realized.

²⁹Energy intensive in this context means industrial enterprises with annual energy consumption higher than 50 GWh.

³⁰Power recovery means the utilization of the enterprise's own waste heat or waste gases to generate electric power.

³¹The NOK numbers in tables 11 and 12 are not fully comparable.



Paul-Erik Krogs vold, mayor of Moss

Thanks to Moss political authorities' support of district heating, Moss City Hall is now heated by oat husks from Lantmännen Mills.

"It is almost impossible to carry out district heating projects without the interest and determination of the politicians in the municipality," says Paul-Erik Krogs vold, mayor of Moss. The combined district heating and district cooling network in the centre of Moss was officially opened on 17 November 2006, and a number of major players are already connected to the 2.5 km pipeline. Krogs vold also says that the municipality requires all new establishments within the range of the network to connect to it.

Municipal initiative – private developer

The project is a direct result of a municipal energy and heating plan. Bio Varme As is responsible for the development of the project and the operation of the plant. The heat comes from the mill enterprise Lantmännen Mills, which delivers 3,000 tonnes of oat husk annually to the biofuel plant. This is biomass that was previously largely used as fodder. A pipeline from the heating centre at Lantmännen Mills also makes it possible to offer cooling. The support from Enova of NOK 4.8 million constitutes about 14 per cent of the total costs of NOK 33 Million.

Political consensus on continued focus on the environment

"To go in for district heating is to concentrate on the environment and the future. And in Moss the potential is there and the will to focus on the environment certainly exists. Many players outside the range of the network have expressed an interest, and large industrial enterprises such as Peterson Linerboard AS and Rockwool AS are potential partners. Then it is up to the municipality to do its part to facilitate this development in an optimum way," says Krogs vold.

The district heating plant makes it possible to phase out a number of old oil-heating plants, and both existing buildings and new establishments will have secure and reasonable heating and cooling. Krogs vold therefore has no doubt that this development project will have a positive effect on the development of the city centre of Moss and that it will create a positive opinion about the municipality.

amounts granted to such projects range from NOK 30,000 to NOK 50,000, and the contractual energy results vary between 120,000 kWh and 250,000 kWh.

The industrial area is faced with challenges that are common to the field of energy use in general. The boom in certain industries detracts attention from energy efficiency. This is the case for instance in the aluminium industry, whereas industries facing challenging competition and market conditions, particularly the wood processing industry, have a stronger focus on all cost elements.

Enova wants to have a good dialogue with the trade associations and close market contact with the players in the industry. In 2006, therefore, a special industry seminar was held in Trondheim, where industrial enterprises, counsellors and trade associations were invited. This will be an annual event.

Enova's extended programme for new technology is also considered to be a useful tool for the industry, and it has a close link to the heat energy programme due to the fact that an increasing number of industrial enterprises find it profitable to convert their heating demand from oil and electricity to renewable sources of energy.

2.5 Focus on the municipalities

The programme "Municipal Energy and Environmental Planning" was extended in 2006 to also include support for energy efficiency measures and conversion, in addition to support for preparing municipal energy and environmental plans, as well as pre-engineering reports for heat genera-

tion and infrastructure. The purpose of the programme is to support good initiatives that may later take the form of applications within the framework of other Enova programmes.

The municipalities are strategically important partners in reaching the objectives related to energy restructuring and energy efficiency activities in Norway. The municipalities play several important roles in energy restructuring efforts. They have planning functions, they are property developers and property owners, as well as energy producers through their ownership in district heating plants and power generation facilities. The municipalities own a quarter of all non-residential buildings in Norway and are responsible for one-third of the energy consumption in Norwegian commercial buildings, which means that there is a great potential for reduced energy consumption and good possibilities for restructuring energy in the municipalities.

Enova wants the plans that result from projects within the municipality programme to serve as a basis for decision-making related to the continuation of Enova's renewable heat programme and its programme for the built environment, thus contributing to developing good energy solutions in a local and national context.

Figure 6 shows the geographical distribution of municipalities that have received support through the municipality programme. In 2006 support was given to 48 projects comprising 62 municipalities, which is a strong increase from 2005 when only 13 municipalities and county municipalities received funding.

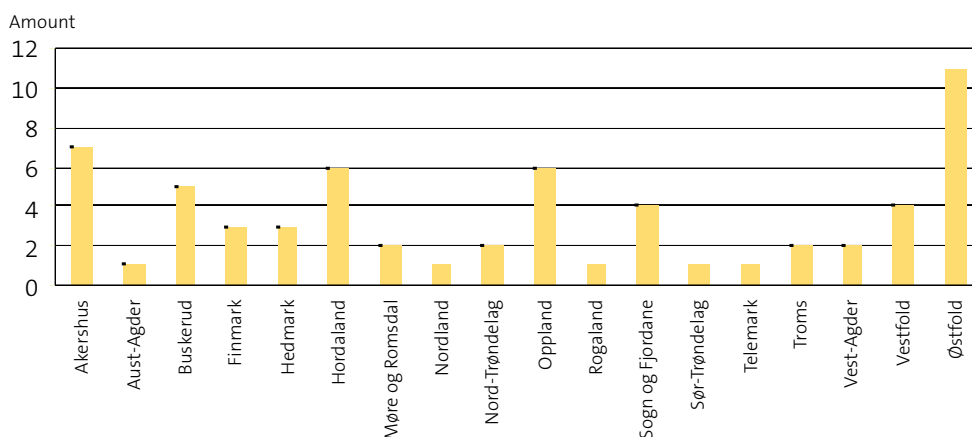


Figure 6: Municipalities that have received funding through the programme "Municipal Energy and Environmental Planning"



Monica Bakke, General Manager, WAVEenergy AS

Energy from waves

“Through three wave basins placed above one another we are going to extract energy from waves,” says Monica Bakke. She is the General Manager of WAVEenergy AS, one of the companies that received project funding through the programme for new technology in 2006.

After three years of preliminary work the company’s wave power technology is now to be tested out through a pilot plant at Kvitsøy, just outside Stavanger. The technology that is going to be tested is unique. It is called Seawave Slot-Cone Generator (SSG) and has been developed by a researcher from Haugesund. The patent was then bought and further developed through the company WAVEenergy AS.

“What is special about this technology is that it utilizes the energy from waves with different heights, which results in very high efficiency. The test plant, which is to be built at Kvitsøy in Boknafjorden in the spring of 2007, will consist of three wave basins placed above one another. These can utilize waves both one and a half, two and five metres high,” says Monica Bakke.

Heavy players on the team

The company has attracted a number of solid partners. The University of Ålborg, Technical University of Munich, Ganz Transelektro in Hungary and the University of Trondheim are all important contributors to the project. In 2006 the project received NOK 2.1 million in funding from Enova and EUR 1 million from the EU.

“There are many people together with us that have great faith in the project,” says Monica Bakke, who is very optimistic prior to the testing period. “The preparations have been thorough, which forms a good basis for success. We focus on marketing the technology and on building a good network in the international energy market to enable us to be at the forefront with respect to the commercialization of the concept,” she says.

The test plant at Kvitsøy will be built in the full-scale height of 8 metres. It is 12 metres wide and 20 metres deep. The plant will be completed in the autumn of 2007 and will be connected to the power network at Kvitsøy during the test period. The total costs for this pilot project, including development, design and construction costs, are NOK 30 million.

2.6 New technology

In 2006 Enova received 21 applications for the new technology programme, of which 9 applications are related to a joint programme with the Research Council of Norway called "Innovative Energy Solutions". A total of 9 applications were promised support in 2006 for the amount of NOK 10 million. The structure of the programme has not been changed in 2006.

Table 13 shows the contractual results and funds for the projects within new technology supported by Enova. Enova is to be a driving force for future-oriented energy solutions by providing funding for the use of new energy technology and the development of technologies that have previously only been tested under laboratory-like conditions or on a down-scaled size, with limited distribution and with no functioning market for the technology in Norway.

Several Norwegian energy companies are involved in various development projects aiming at demonstrating the use of new technology for the generation of energy. A number of investment decisions have been postponed due to uncertainty regarding the revision of the future funding regime, which has resulted in a reduced number of applications to the programme in 2006.

A goal for further efforts to introduce new technology in 2007 will be to further develop the two programmes that were implemented in 2005. The collaboration with the Research Council of Norway and Innovation Norway has been strengthened by the conclusion of a new agreement of collaboration for the introduction of new technology. The experiences from the pilot project in form of a joint programme, "Innovative Energy Solutions", in co-operation with the Research Council of Norway are positive, and from 2007 these joint efforts will be extended through the participation by Innovation Norway in the programme.

Contractual	GWh	MNOK granted	MNOK paid out
2002	1	19	19
2003	0	0	0
2004	35	35	8
2005	1	3	1
2006	7	10	1
TOTAL	72³²	67	29

Table 13: The use of energy within new technology (GWh, MNOK)³³

³²This includes 28 GWh from NVE's projects in 2001.

³³The year refers to the year a contract for the project is entered into and does not necessarily say anything about when the results for the projects in the form of kWh will be realized.



Bård Kringstad in the classroom together with Jørgen Kollin Blokkum (nearest), Anders Kristiansen and Ine Mariel Berg Johnsen

Bård Kringstad, teacher, Steindal School

Pupils teach academics a new dance

The vision of the Rainmakers is “to make the planet dance.” The Rainmakers at Steindal School have taken this vision seriously and have offered song and dance shows on several occasions. The audiences normally consist of stalwart middle-aged men with anything but dancing on the agenda. Surprisingly, however, they seem to be tempted to do some moves.

Bård Kringstad has seen that the Rainmaker concept really has an effect. As a teacher at Steindal School the starting point was far from the best when he took over a challenging class. Some of his colleagues were actually somewhat sceptical the first time the class travelled into the city to perform for hundreds of highly educated academics in suits. But the energy and enthusiasm that erupted like a volcano on the stage, and the self-produced rap made it difficult for old rock and roll fans in the audience to sit still.

The work creates conscious pupils

This made something happen to the class as well. It was carried forward by its success, which had a positive effect on the whole bunch. It is great of course that the class environment benefits from working with the Rainmakers, but for Enova it is even more important that the pupils derive good academic pro-

fit from the activity. Kringstad reassures us that this is much more than a school activity with some extra fun added to it.

“One of the most important things must be that the pupils develop a conscious attitude to energy and the environment, and I frequently get proof that the content makes an impression on the pupils. When we started to use a new digital blackboard they asked whether it didn’t consume a lot of electricity. The luxury of a toaster that we use during lunch is also subject to critical questions. They are very keen on this, and it is obvious that we are in the process of developing particularly conscious consumers.

The school saves money on energy

Knowledge is now rising to a fairly high level and the pupils also carry out very specific energy projects. Once a week, among other things, they check the use of energy at the school, which they have been doing for almost two years. The result of this involvement is a 20 per cent reduction in the consumption of energy in one year, and last year the school was awarded the Electricity Saving Prize for its efforts. And as is often the case, simple measures are used, such as lowering the temperature during weekends and holidays, slightly lower temperature than previously in certain rooms, etc.

2.7 Households

The interest in energy restructuring and electricity saving has varied during the year. At the beginning of the year the interest was falling, but this changed during the summer when there was a lot of attention on an expected tight power situation. This led to a large number of enquiries for advice and guidance from households and the media. In August Enova launched a new webpage aimed at households – *minenergi.no* – and a new series of purchasing guides was completed. A comprehensive information campaign in the autumn of 2006 led to an increase in the demand for Enova's services. The knowledge of Enova's activities aimed at children and youth, the Rainmakers, went up from 40 to 46 per cent. A special concept for energy teaching in the primary school was introduced at *regnmakerne.no/larer*, at the same time as the third and last Rainmaker book was distributed.

In the private market results are measured in relation to the level of activity. Table 14 shows the activities for this area for 2006.

In 2006 Enova worked towards the establishment of a programme aimed at households that will give direct, measurable energy results. In September Enova was entrusted with the task of co-ordinating

work on a subsidy scheme for households. As a result of this assignment a separate programme for households will not be launched until 2007.

The target groups in the private market (adults) are those building new houses, those who renovate houses, those who move houses and those interested in electricity saving. Two campaigns were carried out during the year, of which one was aimed at those who build new houses, renovate or buy housing during the first six months of the year, and one campaign aimed at the target group "those who are interested in saving electricity" in the autumn. Enova has also produced an editorial insert with wide distribution.

An increasing number of people get in contact with Enova when they need information. In the past economic considerations were the most important motivational factor for saving electricity, but they seem to have become less important over time. Now it seems that for the first time environmental considerations have become more important. The number of visitors to the website, the number of distributed brochures and the number of enquiries to the help line have increased substantially.

Enova's help line has been established to provide advice and guidance to households and professional

	2003	2004	2005	2006
Number of enquiries to/from the help line	55 500 ³⁴	35 000	22 000	33 000
Average no. of page displays at <i>minenergi.no</i> per day	n/a	n/a	n/a	5 800
Distributed materials, number (exclusive of the Rainmakers)	n/a	124 000	137 156	262 000
Visitors at fairs	40 000	250 000	250 000	160 000
Number of new Rainmakers	1 200	2 800	6 500	4 900
Distributed Rainmaker material to primary schools	n/a	65 000	64 000	80 000
Average no. of page displays at <i>regnmakerne.no</i> per day	5 000	15 000	14 000	19 000
Number of news items about the Rainmakers	n/a	85	145	165
Number of school children on the Rainmakers' Friend Energy Day	n/a	4 000	4 000	4 500
Number of viewers per Broadcast in the Energy Match	250 000-350 000	340 000-560 000	270 000-330 000	263 000-413 300

Table 14: Activities overview for households

³⁴ The interest was very strong in connection with the subsidy scheme for households in 2003.

users. The help line has contributed to increased registration for events, orders for Rainmaker materials and identifying interest in the various programme areas. These types of activities will continue next year. The number of enquiries is increasing in step with other activities aimed at the target group and the general interest in saving electricity. Table 14 shows the number of enquiries to the help line. An evaluation of the service shows a customer satisfaction score of 70 out of 100, and that as many as 46 per cent of the households have implemented measures after the conversation in the form of investments or other major changes.

In 2006 Enova's activities aimed at children and youth, the Rainmakers, have been presented in children's programmes on television, at *regnmakerne.no*, in the primary school, at housing fairs and at the Energy Centre at Hunderfossen Family Park. In the course of the year the awareness related to the Rainmakers increased to 46 per cent in the target group aged 6-15. A holistic concept for energy teaching in the primary school, including materials both for pupils and teachers, was developed in co-operation with the Education Directorate, the Natural Science Centre and the Research Council of Norway. This was introduced in the autumn of 2006 simultaneously with the distribution of the final Rainmaker book, written by Klaus Hagerup, to all primary schools in Norway. *Regnmakerne.no* extended their service with a teachers' staff room, and the website, featuring news, energy topics, games and a separate Rainmaker club, is still popular. The Rainmakers' Vennergidag (Friendly Energy Day) was held in Bergen, and there has been weekly coverage of a variety of energy topics on the PysjPopBaluba programme on the NRK 1 TV channel. For the first time the Energy Match was broadcast as an international version with children from Norway, Sweden and the Netherlands.

Preparations and a basic sketch for activities aimed at youth in the secondary school have been made.

Various courses and seminars for teachers have been held as part of Enova's activities aimed at children and youth. Enova assists and provides funding for energy measuring in schools through the webpage of the Norwegian Directorate for Education and Training called "Network for Environmental Knowledge".

Twice a year Enova holds courses for teachers in connection with the Rainmakers' Vennergidag (Friendly Energy Day).

2.8 Communication

Interest in Enova increased significantly during 2006, and never before has there been a larger number of news articles related to company. At the same time Enova has focused strongly on marketing activities and been very visible in paid spaces in a number of channels. The popular awareness of Enova has increased significantly during the year, but there are still considerable challenges related to increasing knowledge about Enova both in the market and in public opinion.

Table 15 shows a list of communication activities. Enova's communication shall contribute to Enova reaching its energy targets, positioning itself as a driving force for future energy solutions and becoming a central player in society with stable framework conditions.

Twice a year an image and reputation survey is carried out where the purpose is to trace the development of the Enova brand, the effect of the company's communication, and to reveal how attitudes and conduct related to environmentally friendly energy restructuring have developed. These surveys are aimed at both professional and private target groups.

In the surveys for 2006, conducted in May and November, the figures show that the knowledge about Enova has increased significantly during the period. The November survey showed that 12 per cent of those who were asked had unassisted knowledge of Enova, whilst the corresponding figure from 2005 was 7 per cent. Total knowledge (unassisted and assisted) ended up at 68 per cent, whereas the corresponding figure for 2005 was 58 per cent. Awareness about Enova and knowledge in the market and in public opinion about the goals and programmes of the enterprise will be crucial to enable us to reach our energy targets. When we see a significant increase in these parameters, this can be taken as an indication that the development is moving in the right direction.



Line C. Larsen, Energy Adviser, Enova's help line

Increased interest in energy counselling

What source of energy is cheapest? Would it pay to install a heat pump?

In 2006 the energy advisers at Enova's help line for energy use responded to more than 30,000 enquiries!

Last year we received a total of 32,988 enquiries by telephone and e-mail. That represents an increase of 45 per cent on the previous year. A strong focus on the power situation and electricity prices, electricity saving and the environment in the media, as well as the subsidy scheme for households are the main causes of this increased interest, particularly during the autumn and winter of 2006," says Energy Adviser Line C. Larsen.

She is one of 13 energy advisers at Enova's help line working full time to answer questions from private consumers and businesses about the use of energy. The help line is a free nationwide service that has been in operation since 2003. Larsen has been employed here since the start.

"People are clearly more knowledgeable about energy issues now than before. This is a positive trend," says Larsen.

Changing attitudes

This trend is confirmed by Magne Rideng of TNS-Gallup, who assists Enova with analysis and market research.

"There is no doubt that over the last few years people have become more conscious about saving electricity. Among other things we can see this when we look at the number of actions that have been carried out, how many have been planned and

knowledge about what measures can be taken to save electricity," says Rideng.

"We also see changes as regards the motivation for saving electricity. There are distinct differences between the electricity crisis in 2003 and the crisis in 2006. In 2003 the main focus was on the price of electricity. Reducing the electricity bill was the main motivation for saving electricity. This winter we see that the use of alternative sources of energy, less dependence on electricity and environmental considerations are more important motivational factors, whereas money is less important," says Rideng.

The typical caller

Like many of her colleagues in Enova's help line Larsen is an engineer by education and training. A common characteristic of all of them is that they are engineers with bachelor's or master's degrees with backgrounds in civil engineering, electrical engineering or water, heating and ventilation systems. Many of them also have long experience from counselling, teaching or information work.

What are the most frequently asked questions?

"From households there are many questions as to what can be done to reduce electricity consumption, and many want to know what measures will be profitable for their type of housing and housing situation," says Larsen. The typical caller from the professional market is the operating manager for commercial buildings. Questions from this group are related to actions that can reduce energy costs and what opportunities there are for government funding, she adds.

Most of the enquiries to the help line are made by telephone. In 2006, however, most of the increase in the number of enquiries was by e-mail, and this constituted a clear trend.

Energy issues have had a predominant place in the media in 2006. Many editorial offices have followed up on issues such as rising electricity prices, green certificates, low reservoir levels and danger of a power deficit in Central Norway. Enova monitors the media coverage regarding energy matters in general and those concerning Enova in particular. In addition to the collection of figures at macro level an in-dept analysis is prepared every three months.

In 2006 a total of 2,463 articles related to Enova were recorded. This is the largest number of articles in one year that has been recorded about Enova so far, and the increase as compared to 2005 is very strong. The geographical spread of these articles is also much wider than before, and an increased interest in Enova is registered in all parts of the country. A large increase in the national television and newspaper media is also noted.

The increase in the amount of news coverage is a result of relevance in the news picture and proactive PR activities on the part of Enova. According to the media analyses Enova has profiled itself as a more distinct player in the media context, and in volume the company has surpassed a number of comparable institutions/companies. Due to increased interest in Enova its spokespersons have had a very active year. Topics related to the use of energy have attracted strong interest from the media in the past year. This was particularly predominant in the autumn of 2006 in connection with the launch of the subsidy scheme in 2006.

In 2006 Enova has carried out four major marketing campaigns. In the early summer a major recruitment and profiling campaign was conducted, and in the autumn campaigns aimed at households and the professional construction market were launched.

The household campaign focused on the possibilities for energy saving, counselling through Enova's help line and advice and ideas on the website *minenergi*.

no. The professional campaign concentrated on good energy efficiency projects that are carried out by Enova together with players in the market such as NSB (Norwegian National Railway), the Thon and Choice hotels and the Spar chain (supermarkets). Top executives Olav Thon, Petter Stordalen (Choice) and Einar Enger, NSB (Norwegian National Railway) stated that energy saving is both profitable and environmentally right. All four large campaigns have yielded positive results. The recruitment campaign led to a large number of applications for positions at Enova, whereas both the household and professional campaigns served to raise awareness and knowledge about Enova among the general public. The professional campaign, moreover, contributed directly to new energy efficiency projects at Avinor/Oslo Airport Gardermoen. The two large autumn campaigns centred around a joint motto: "It means something that you do something". This is an attempt to create a basis for a joint communications platform in a longer perspective.

In 2006 Enova's website, *enova.no*, began a process towards full restructuring, and in the autumn of 2006 the first action was launched to improve services to the general public. The households' needs for energy information on the web will be taken care of by *minenergi.no*. The target group of *regnmakerne.no* (the Rainmakers) are children and teachers, whereas the web service for professional players will be renewed at the beginning of 2007 through, among other things, a new design and a new application centre.

Another focus area for Enova has been to provide possibilities for ordering brochures on the web, and at the end of April a new publication centre aimed at the general public was launched. The experiences here have been good, and the development shows a high distribution level where the share of directly downloaded brochures is increasing strongly. In the middle of November a special application centre for the subsidy scheme in 2006 was set up, and this was linked to both *enova.no* and *minenergi.no*. During the

	2003	2004	2005	2006
<i>enova.no</i> – total no. of page visits	n/a	n/a	n/a	1 592 516
Campaigns	3	4	4	4
Articles about Enova	n/a	675	657	2 463
Energy stories	35	7	14	12
Press releases	n/a	n/a	23	26

Table 15: Communication-related activities

autumn of 2006 more than 15,000 applications were submitted through the webpage tilskudd2006.enova.no.

The production and distribution of brochures and reports dealing with Enova's field of work are important in order to reach certain target groups. There has been an emphasis on this in 2006, too, and both new publications and revisions of previous publications have been made during the year. One example of a new publication is a guide for outdoor lighting.

The production of publications in 2006 has been linked to the big campaigns. In connection with this great emphasis has been placed on identifying the relevant target groups for the distribution of publications.

Production of the publication "Energy Stories" ("Energihistorier") was continued in 2006. Work has been started to develop new forms of distribution. In the course of the year one energy story, for instance, has been produced in the form of a short video on the web (pellets production and information about pellets heaters.)

The Communications Department has provided direct support and counselling internally at Enova related to the individual market areas in 2006 and, among other things, been in charge of orders, and co-ordinated the deliveries to the different market areas. This has been

linked to active PR activities, fairs and other events, the production of materials and professional information counselling/day-to-day follow-up.

Enova's Communications Department has assessed the results of the activities carried out in 2006 and has found that the results are good and well in line with plans and expectations.

A major project linked to new tenders for Enova's provision of communication services was started in the autumn of 2006, and new agreements were concluded during the spring of 2007.

2.9 Training activities conducted by Enova

It is important to consider training activities conducted by Enova or associated with Enova as an integral part of the programme activities. Training is important to support Enova's work to reach the goal of an environmentally friendly restructuring of energy use. In 2006 a number of courses for which Enova has been wholly or partly responsible were held. It is also important for Enova to contribute in the form of speeches and presentations at courses, seminars and conferences. In 2006 special interest days/seminars have been held for industrial enterprises, the building and construction industry and players in the field of bioenergy and gas.

In 2006 ESA (European Surveillance Authority) appro-

Type of course	Target group	No. of participants
Teachers' conference on how to teach energy efficiency	College teachers (for engineering students and students of architecture)	86
The Rainmakers' Friendly Energy Day –Energy measuring in schools/the Energy Portal on the Network for Environmental Teaching	Primary school teachers	117
"Design related to Natural Materials", Oslo, 15.02 (NAL)	Architects and participants from the construction industry	37
"Design related to Natural Materials", Trondheim 09.03 (NAL)	Architects and participants from the construction industry	39
"Design for a Wet Future", Trondheim, 20.02 (NAL)	Architects and participants from the construction industry	44
"Concept and Communication", Oslo, 16.03 (NAL)	Architects and participants from the construction industry	43
"City Spaces for Everyone", Oslo, 04.04	Architects and participants from the construction industry	70
"The Facades of the Future", (NAL), Oslo, 04.05	Architects and participants from the construction industry	76

Table 16: Training activities, 2006

val of Enova training activities was carried out. In anticipation of a decision by ESA no new activities were started in the second half of 2006. A new programme for support for courses and training activities in line with ESA rules was worked on. The result of the process is that any training activities conducted by Enova must be carried out in the form of purchases in accordance with the applicable rules for public procurement. Consequently, no support for training activities will be available for applications in the time to come. This area of activity, nevertheless, is described separately in this report, since it has partly been dealt with as a separate activity at Enova. The activities that have been carried out have formed an integral and important part of the marketing activities in each programme area. The training activities related to each individual programme area are discussed in connection with each area.

A course that is not mentioned elsewhere in the report is aimed at teachers in higher education. The "Teachers' Conference on how to Teach Energy Efficiency – 2006" in Narvik was organized and carried out at Enova's initiative. The conference functioned as a co-operation forum for specialist teachers in energy-related subjects, and the objective was the exchange of information and experiences, as well as a discussion of relevant issues related to teaching in different educational institutions. This is intended to contribute to maintaining a high academic level in teaching energy-related topics to bachelor and master-level engineering students and to architectural students all over the country.

Table 16 shows training activities conducted by Enova, wholly or in part, in 2006.

2.10 Co-operation and counselling

The Agreement between the Ministry of Petroleum and Energy (MPE) and Enova contains specified requirements that Enova shall function as an adviser to MPE and represent MPE and Norway in various international forums. This is also important in order to reach Enova's goals in the best possible way.

In the course of 2006 Enova functioned as an adviser to MPE in matters related to Enova's responsibilities. Among other things, this advisory function applies to

answers and clarifications within Enova's area of responsibility, hearings and reports.

Enova stays in regular and good contact with the Norwegian Water Resources and Energy Administration (NVE), the Norwegian Petroleum Directorate, the Research Council of Norway, Innovation Norway and Statnett. Enova has co-operation agreements with NVE, the Research Council of Norway and Statnett. Moreover, Enova stays in regular contact with other government agencies that play a role in energy restructuring activities. Among others, this applies to the Norwegian Pollution Control Authority (SFT).

Enova has extensive contact with research and university environments, trade associations, financial institutions and non-profit organizations. In addition to this there is a continuous contact with the different market players. Participation in and presentations and speeches at meetings and conferences constitute a natural part of this work. Enova has participated in international forums within its area of activity and been active in arenas of strategic importance. In 2006 the objective of the international work has been to support Enova's analysis and programme activities through target efforts. In 2006 Enova took over the Presidency of the EnR (European Energy Network). At year end 2006 Enova was represented in or provided funding for participation and activities in nine IEA programmes. Enova has participated in, and followed up, the work on IEA's programme in the field of renewable energy "Renewable Energy Technology Deployment" (RETD). Enova is the Norwegian contractual party to the ETDE Agreement and represents Norway in the Executive Committee of ETDE. ETDE is the IEA's multinational information programme. On behalf of MPE Enova manages funds for IEE, EU's non-technological programme for renewable energy and use of energy. ETDE and IEE are described in separate paragraphs. Furthermore, Enova has contributed to the work of the "European Council for an Energy Efficient Economy" (ECEEE). In 2006 Enova participated in a number of international seminars and conferences, where Enova's representatives, among other things, made speeches and presented papers.



Håvard Solem, President of the EnR in 2006

“It has attracted attention in Europe that Enova is the only organization that has committed itself to reaching a quantifiable energy target.

The EnR – The European Energy Network – is an independent network of 23 organizations with national responsibility for renewable energy and energy efficiency, corresponding to Enova’s national responsibility. Up to now Håvard Solem has been co-ordinator for Enova’s international activities, and for the last year he has been the president of the EnR. “It has great value for Enova to play an active role in the EnR,” says Solem, and emphasizes the importance of Enova’s participation in international forums. Moreover, it is also useful for others to gain an insight into how the work to change the use of energy in Norway is organized.

Close dialogue with the EU Commission

International participation gives Enova an opportunity to discuss problems and challenges related to energy. “It is no doubt valuable for the participants to know what goes on in other countries. Through the exchange of experiences and knowledge Enova strengthens its ability to assess and implement effective measures. Another important task is to be in dialogue with the EU Commission, the highest executive body of the European Union, to be able to exert an influence on practical policies in the energy area,” says Solem. During Solem’s presidency, Enova, on behalf of the EnR has organized two working sessions between the EnR and the EU Commission. These meetings have constituted an arena for discussing relevant matters, e.g. EU’s action plan for the efficient use of energy and a possible new directive aiming at increasing the share of renewable energy used for heating and cooling. Thus, the EnR has succeeded in its strategy to interact with the EU Commission prior to the final formulation of directives. Furthermore, Solem emphasizes that it is important that the EU

Commission has a dialogue with the bodies that are to implement the adopted policies in the member countries, and who know the various challenges with which individual countries are faced.

Other international arenas

IEA (International Energy Agency) and IEE (Intelligent Energy Europe) are two other international arenas where Enova participates. “Our international activities are relatively comprehensive when you take the number of employees into account,” says Solem. “Our participation in the IEA serves our own interest in addition to our being the representative of Norway and the Ministry of Petroleum and Energy (MPE) in the Agency. The IEA’s “Implementing Agreements” focuses on research and development at a strategic level; this is an activity to which Norway contributes both financially and through the participation of relevant Norwegian environments in the projects.”

Being noticed

Håvard Solem says that Norway’s organization of its energy activities is being noticed in Europe. Enova has a national responsibility with quantifiable targets and has a relatively large degree of freedom regarding the choice of actions and initiatives. In Europe this work is often organized more bureaucratically and with a larger degree of government control. Norway is also different in the sense that about 99 per cent of the output of electricity is based on renewable sources of energy. “Not everybody understands why we spend money on energy efficiency and renewable energy given the fact that we have hydro electric power. This, however, only reflects that the European countries are faced with different challenges.”



Geir B. Garte, Development Manager, Amfi

AMFI thinks big!

“We are working on a large energy efficiency project for all our shopping centres with total investments of more than NOK 60 million,” says Geir P. Garte, Development Manager of Amfi. The goal is annual savings of NOK 12 – 15 million in energy costs.

“Amfi was already consuming less energy than the average for shopping centres in Norway, but we still decided to extend our energy efficiency activities. Initially we mostly focused on training and information, and on making our operating staff aware of these issues, and less on investments. Even so, this led to sensationally good results,” emphasizes Garte.

Measured by the number of centres AMFI is the largest shopping centre chain in Norway, and one of the reasons for the success of the project is that energy efficiency measures were introduced on a large scale.

“The total premises for the project consist of the 45 centres in the chain, which at year end 2006 will amount to a total of 775,000 m²,” says Garte. The project has received NOK 6.3 million in funding from Enova and is considered to be a perfect illustration of why as many buildings as possible should be included in the same project.

The biggest investments are related to the upgrading of technical facilities, the replacement of old ventilation plants, new automatic solutions, plant frequency control, new SD

plants, upgrading of entrance areas, carousels, new glass surfaces, sun screening and the like.

Focus on the tenants' overhead costs

“The tenants focus on the bottom line make them take energy efficiency seriously, but we also have to balance this against the customers' increasing demands regarding inside air and temperature, lighting and other factors affecting energy consumption. The only way to secure the best solutions regarding energy use is to make long-term and well-balanced investments,” emphasizes Garte.

New goals in 2006

“We set new goals in 2006 and will invest even more in energy efficiency in the future. At all the centres where renovation projects are carried out the use of energy will be part of the plans. This is cheaper than implementing energy projects separately. The tenants react positively to energy efficiency measures, and in the future they will increasingly be participants in the process,” says Garte, particularly with respect to how they themselves may optimize lighting in their own premises, the heat surplus and the need for cooling. The current projects will continue until 2009, but energy efficiency measures are here to stay.

“One of the things we will concentrate on particularly in the time to come is the large quantities of surplus heat generated in the grocery stores. Here it is possible to recover a lot of energy,” says Garte.

3 Other results and activities

3.1 Natural gas

As a special assignment from the Ministry of Petroleum and Energy (MPE), Enova has entered into agreements with developers of terminals and storage facilities for Liquid Natural Gas (LNG). This is organized in accordance with the guidelines for Public Service Obligations (PSO). In 2006 a contract was concluded for one project that all in all may provide the basis for gas sales corresponding to 200 GWh per year when the plant is in full operation. A total of NOK 15 million out of available funds of NOK 32 million has been spent.

Enova has at its disposal funds allocated through the National Budget related to infrastructure for natural gas. As part of this assignment Enova has developed a general model for the design of terminals and storage facilities for LNG, adapted to PSO requirements and Norwegian conditions.

Following a clarification and description of relevant service obligations, Enova published the first announcement of the arrangement in 2004. After the completion of the round of tenders and the negotiations on PSO agreements in 2005, an evaluation of the PSO arrangement was carried out. The results and conclusions from this evaluation have been taken into account in the further work on the arrangement. Following an announcement in 2006 Enova received tenders from three different bidders, covering a total of four different projects. This is a substantial reduction in the number of tenders compared to 2005, and is probably due to a limited supply of LNG in the market combined with increasing gas prices. Enova started contract negotiations with one of the bidders, Naturgass Møre, and a contract for a regional LNG terminal at Vedde has been concluded.

3.2 The management of Intelligent Energy – Europe (IEE)

On behalf of the Ministry of Petroleum and Energy (MPE) Enova has been entrusted with the management of IEE, the EU's non-technological programme for renewable energy and energy use for the implementation period 2003 – 2006. The management responsibility implies that Enova shall provide guidance and information for potential applicants, as well as offer preliminary planning support and national co-funding for project implementation.

Up to now, four application rounds have been completed for the programme with a submission deadline in 2006 for two of them. During 2006 Enova organized two national information meetings with information about the activities programme for IEE in 2006. The first meeting was held in Trondheim in June and was transmitted via web. Hosted by the Research Council of Norway, the second meeting was held in Oslo in August.

The national information meetings provide guidance about the application process and the formal requirements set by the EU. The meetings were well attended by a broad spectre of interested parties. Enova has provided continuous information on the programme and the application rounds on its website, and a special e-mail address has been established to respond to enquiries from applicants.

Information about the programme and the financial support and guidance provided by Enova has also been sent to 400 recipients by e-mail. In addition, Enova has provided information through participation in EU-related meetings in Kristiansand and Karmøy. Enova has also participated in the EU Commission's information meetings for national contact points. The follow-up of Norwegian applicants and the preliminary application processing has been carried out by Enova's programme co-ordinator.



Anne Guri Selnæs, Senior Adviser, Enova

32 per cent of the budgeted money already allocated...

Saturday afternoon, time for relaxation in the sofa and news surfing on the Internet. "Household subsidy scheme opened yesterday..." I go to *minenergi.no* and notice that more than 30 per cent of the support funding has already been allocated. 30 per cent – that's a lot. Maybe it is necessary to apply at once? I type in my name, the size of the house, number of occupants, but then – how much electricity did we use last year??? I start a hectic but unsuccessful search for last year's electricity bills. A new figure appears on the screen: "32 per cent of the support funding allocated..." 32 per cent, an increase of 2 per cent in just a little more than half an hour? How can we be in time to join this race?

The subsidy scheme was well received

The subsidy scheme was launched on Friday 13 October, and in the course of a few days more than 5,500 applications had been received. There was a great interest in the use of energy both among the general public and in the media. Senior Adviser Anne Guri Selnæs says that Enova monitored the development closely and was prepared to meet the ensuing challenges.

"Earlier in the year we had made thorough preparations by developing *www.minenergi.no*, a website for private electricity consumers. In addition to the website, purchase guides for a number of product groups were produced. Other brochures had been revised and updated earlier. The subsidy scheme was introduced for the first time almost simultaneously with the launch of *minenergi.no*. Thus, we were very well prepared to deal with enquiries, and we were in a position to distribute very relevant materials when the demand took off. With these things in place

we were able to concentrate on making the subsidy scheme as good as possible.

The use of the web has changed

Selnæs says that a large number of Enova's household clients are keen web users, which has several positive effects.

"We see that a constantly increasing number of the customers have visited the web before they call us. They are well informed and are able to ask more direct and detailed questions. It is worth noticing that as many as 85 per cent of the applicants for funding through the subsidy scheme receive the information in electronic form. This, no doubt, increases efficiency, as it saves both time and postage, and thus more money can go to the consumers."

Following the launch of the programme a spate of applications were received. It is obvious that people are very aware of what they need, and Selnæs is clear about why this is so.

"When energy saving becomes a topic in the public debate, we see that people proceed from thinking of doing something to actually doing it. The subsidy scheme is a clear recommendation from the government, and such recommendations are observed.

"Furthermore, Enova provides neutral information. We inform about both the positive and negative aspects of various solutions. If you consider purchasing equipment that produces fan noise or requires extra cleaning, you will know that this is part of the picture."

3.3 The subsidy scheme for households

The 2006 subsidy scheme for households was launched by the Government at the end of August 2006. The justification for the programme was that many households are considering alternative sources of energy that can limit the use of electricity. The Government wanted to use this situation to boost heating technology with limited distribution such as pellets heaters, heat pumps, except air-to-air heat pumps, and control systems for electricity saving. The programme is funded through the National Budget with an upper limit of NOK 71 million. Enova was entrusted with the task of designing and implementing the programme.

At the request of the Ministry of Petroleum and Energy (MPE), Enova has developed criteria, launched an application webpage and designed application processing tools for the programme. In November a separate application centre for the subsidy scheme was established linked to both *enova.no* and *minenergi.no*. The application pages attracted a lot of interest and after a few days the applications for support already summed up to more than the allocated budget. More than 15,000 applications have been submitted through the webpage *tilskudd2006.enova.no* in a simple way. On 31 December 2006 a total of 15,225 applications had been recorded. Of these a little less than 20 per cent were related to pellets heaters, almost 2 per cent to pellets boilers, 19 per cent applied to central control systems and the rest were applications for heat pumps. The first grant letters were sent out in December 2006, just after the

decision by the Storting. The implementation time for grants is up to eight months. It is expected that the work related to this programme will go on throughout 2007 and into 2008.

3.4 The management of Energy Technology Data Exchange (ETDE)

ETDE is the IEA's multinational information programme. Enova is the Norwegian party to the ETDE Contract and represents Norway in the Executive Committee (ExCo) of ETDE.

Enova is responsible for following up and funding the work related to the maintenance and operation of the ETDE database from the Norwegian side. The Institute for Energy Technology (IFE), in accordance with the assignment letter from the Ministry of Petroleum and Energy (MPE), has been assigned by Enova to be responsible for maintenance and operation of the ETDE database for Norway.

2006 saw continuous registration of relevant energy literature to the ETDE database to reach the goals of

1. Increased registration of energy literature from Norwegian projects and professional environments in the database
2. Increased awareness and use of the database nationally

Table 17 shows the activities related to the Norwegian activities in connection with ETDE in 2006.

Main goal no. 1	Target	Result
Number of Norwegian documents registered in the database in 2006	600	735
Number of new users registered in the database in 2006	40	79 individual users + 4 subnets
Main goal no. 2	Target	Result
Number of newsletters and comments on Enova's og IFE and IFE's web pages related to ETDE	2	2
Answers to and enquiries sent to relevant users	200	166 ³⁵

Table 17: The activities related to the Norwegian activities in connection with ETDE in 2006.

³⁵The target and result figures are not directly comparable, since in the course of 2006 automatic sending of certain types of e-mail messages was introduced.

4 Glossary

Energy restructuring

The contract between the Ministry of Petroleum and Energy (MPE) and Enova states that the purpose of the Energy Fund is to promote an environmentally friendly change in energy use and energy generation. This means that one of Enova's tasks is to stimulate less dependency on a single source of energy, and to stimulate a switch from non-renewable to renewable sources of energy.

The Energy Fund

Support for increased generation of renewable energy, increased availability of heat energy and reduced energy use is funded through the Government's Energy Fund. Funding is obtained through a surcharge to the distribution network electricity tariff. Starting 1 July 2004 this surcharge is NOK 0.01 per kWh. The operation of Enova is also funded through the Energy Fund. The legal framework for the Energy Fund is laid down in Act relating to the Amendment of Act of 29 June 1990 relating to the Generation, Conversion, Transmission, Trading, Distribution and Use of Energy, etc. (Energy Act), Section 4-4, cf. Proposition to the Odelsting no.35 (2000-2001) and Recommendation O. no.59 (2000-2001). The Ministry of Petroleum and Energy (MPE) determines the Articles of Association for the Energy Fund.

Energy results

One of the main goals of the Energy Fund is to contribute to energy results, either through reduced consumption of energy or by increased environmentally friendly generation of energy. This is an important element in Enova's Agreement with the MPE. In this Agreement two different concepts are related to energy results, i.e. contractual results and realized results respectively.

Other renewable energy

In this publication other renewable energy means renewable energy other than wind power or heat energy.

Renewable energy

Enova uses the definition of renewable energy that is

given in the EU Directive on new and renewable energy (2001/77/EC). In the directive renewable energy is defined as renewable non-fossil energy sources (wind, solar, geothermal, wave, tidal, hydro-power, biomass, landfill gas, sewage treatment plant gas and biogas). Biomass is further defined as the biodegradable fraction of products, waste and residues from agriculture (including vegetal and animal substances), forestry and related industries, as well as the biodegradable fraction of industrial and municipal waste.

Free-rider

Enova's definition of a free-rider is someone who receives support for projects that the recipient would have carried out in any event. This includes the cases where support from the Energy Fund was not required to trigger the project. See also the definition of triggering effect.

Contractual energy result

The support given to a project is linked to an expected energy result. This energy result forms part of the contractual basis between the beneficiary and Enova. If the result is not reached, this will lead to a corresponding reduction of the support funding. Contractual energy result is the expected realized energy result on the contract date.

Indicator

An indicator is a method to quantify something that is difficult to measure directly. In an energy efficiency context, an indicator is often linked to intensities that relate the use of energy to an activity that creates the need to use energy, e.g. kWh per m², kWh per refrigerator per year, kWh per produced ton of steel, etc. Other types of indicators may be market shares for new, energy efficient solutions, the share of renewable energy, etc.

Cost-effectiveness

One of the objectives for establishing Enova was to obtain more cost-effective activities related to renewable energy and energy use. Enova gives priority to projects based on how large the need for support is

in relation to the energy result (NOK/kWh), given the lifetime of the project and the targets that are specified in the Agreement with MPE. The projects for which support from Enova is applied for go through a three-step assessment process. Firstly, the energy specific content of the project is assessed; then the economies in the project and the need for support are considered. Finally, Enova's costs linked to the project (the support) are considered against the energy result (kWh). Projects where the energy result is too low in relation to the support will not be able to compete for funding.

Lifetime

An important issue related to new generation of energy and reduced energy use is how long we will be able to benefit from the results. Here it is possible to distinguish between technical lifetime and economic lifetime. Technical lifetime is related to how long the equipment can be in operation with normal maintenance, whereas economic lifetime is related to how long it will take until it is more profitable to replace the equipment with new and better technology. Enova bases its lifetime considerations on economic lifetime. This is also reflected in Enova's investment analysis. In addition to the fact that the lifetime of the projects is an important parameter for assessing the need for support, it also indicates for how long we will benefit from the energy result provided by the project. The lifetime of the project multiplied by the annual energy result (year*kWh) will express the total energy result of the project over its lifetime (NOK/(year*kWh)).

Programme

Enova has chosen to organize its activities in programmes. A programme is a measure aimed at one or more specific target groups for which application deadlines and application criteria have been specified. This form of organization has been chosen in order to make the actions targeted and to make it easier to prioritize between relatively similar projects.

Programme co-ordinator

Enova follows a practice of outsourcing part of the initial application processing to release internal capacity and ensure a quick procedure. The external executive officers are known as Enova's programme co-ordinators.

Realized result

As different from contractual result and final reported result, realized result is not based on expectations and is basically not an estimate. Realized energy result is based on a review/audit of the energy results actually achieved by the projects. In practice it may appear as a challenge to quantify realized results, and energy generation and energy use may pose different challenges. It may often take a long time to complete projects, and only then can realized results be reported. The realized results from Enova's activities also include the extended effects of the support that is given.

Final reported result

All projects with energy result submit final reports on the completion date for the project. The final reported energy result is an updated prognosis for realized results on the project's completion date. The energy results reported by the projects are evaluated by Enova as to whether they are reasonable or not.

Indirect effects

Whilst the contractual energy result is a direct consequence of the support given by Enova, the extended effects are indirect effects of this support. There are a number of different categories of extended effects, e.g. additional investments becoming profitable as a result of the initial project, market changes in the form of reduced costs, etc.

Triggering effect

As a manager of public funds it is important to Enova to make sure that the funds at its disposal are employed in the best possible way. This principle is also laid down in the Agreement between Enova and MPE. The support from the Energy Fund is intended to contribute to realizing projects that would otherwise not have been realized. Enova's allocation of funds shall trigger projects that contribute to reduced energy use or increased energy output. Projects with low costs per generated or reduced kWh will often be profitable in any event and should therefore not receive any support from the Energy Fund. The support is also considered to have a triggering effect if it leads to a project being moved forward or if the scope of a project is extended beyond its original scope.

