

Market Report on the Norwegian EPC Market

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1. Executive summary

Political Framework

- Most important drivers for EPC
 - Official Norwegian Standard for EPC, NS6430
 - County and municipal energy and climate plans
 - Market support from the Norwegian energy agency, Enova SF
- Most important barrier for EPC
 - Most market support (information, training, capacity) focused around central parts of the country
 - Low energy prices (low interest rates and less public debt)
- Most relevant support schemes
 - Bank loans with "green interest rates"
 - Enovas grant program for EE measures

EPC market

Public sector

- Most relevant opportunities
 - Large maintenance lag in public buildings
 - Exemplary role of public sector
 - EE and CO₂ reduction targets in county/municipal energy and climate plans
- Most relevant barriers and threats
 - Lack of incentives for energy efficiency measures (low prices, no regulations).
 - Capacity – only one or two active EPC facilitators and just a few EPC providers

Private sector: Industry and tertiary

There are only a few known EPC projects in this sector in Norway and too little available information to make a proper market assessment.

- Most relevant opportunities
 - Results/savings will be competitive advantages
 - High cost-consciousness, openness to outsourcing
 - Understanding of good business deals
 - Significant energy cost saving potentials; potential to combine energy services with facility management

Most relevant barriers and threats

- Hard to map
- Contracts and results viewed as trade secrets
- Energy efficiency in industry requires highly specialised know-how/ESCO expertise
- Often short project duration/payback period is being accepted
- The split incentives dilemma for rented facilities
- "Closed" market, hardly public tenders
- Skilled ESCOs concentrating on the large public market only

Private sector: Residential Buildings

There are no known EPC projects in this market segments in Norway.

- Most relevant opportunities
 - Openness for and interest in EE among tenants might exist
- Most relevant barriers and threats
 - Low energy prices means low incentive for EE in general and low interest in investments in EPC projects in particular
 - The split incentives dilemma and consequently the need for difficult contractual solutions between owner, tenants and ESCO

2. Framework conditions

2.1. Relevant national legislation and regulation

No legislative enforcement (0)

There is no legislative enforcement of energy efficiency or EPC in Norway. There are no demands on energy use in existing buildings, only in new buildings through building regulations. Public administrations have had few formal incentives to implement energy saving or climate measures. Strained economies, lack of knowledge and time and organisational issues have resulted in little focus on energy.

Due to low energy prices and excess hydro power energy saving in Norway has not traditionally been high in focus. After the deregulation of the energy market in 1991 various efforts have been put into energy saving, but there are still large potentials. In 2001 the national energy agency Enova SF was funded. They have introduced several campaigns and grant programs aimed at both heat production and energy saving. No major focus has however been put on EPC as a tool, but over the last couple of years Enova has supported training and marketing of EPC as a model.

The Climate Agreement settled by the Norwegian Parliament (+)

In 2012 the Norwegian Parliament passed a motion to ban all fossil fuel in private household and fossil fuel as base load in all other buildings from 2020. This was followed by support schemes from 2013 (Enova grants) and other policy instruments in a transitional period.

This agreement paved the way for coming laws and technical regulations for buildings. Both public and private building owners are considering this in their planning (e.g. municipal energy and climate plans) and refurbishments.

The Norwegian energy agency, Enova SF (+)

Due to low energy prices and excess hydropower, energy saving in Norway has not traditionally been high in focus. After the deregulation of the energy market in 1991, various efforts have been put into energy saving, but there are still large potentials. In 2001 the national energy agency Enova SF was funded.

Enova has recently stated¹ that EPC is essential if the Norwegian municipalities are going to fulfil their goals on energy reductions as stated in energy and climate plans by 2020.

Enova has introduced several campaigns and grant programs aimed at both heat production and energy saving. No major focus was however put on EPC as a tool, but over the last couple of years Enova has supported training and marketing of EPC as a model and taken an

¹ Presentation of the survey, April 2016 and input from with preliminary findings from recent survey among EPC clients, Øyvind Moe, Enova SF

increasingly more active role in EPC promotion through hosting of EPC seminars and dissemination of information.

Enova has contributed through participation on training events and seminars hosted by EU projects². They have also produced promotion videos³ of best practice EPC projects. As an example of recent promotion activities Enova hosted a seminar targeting potential EPC Facilitators in cooperation with KS⁴ in April 2016.

County and municipal energy and climate plans (+)

All Norwegian municipalities are obligated by law (since 2008) to develop energy and climate plans. These plans set goals for reduction of energy and climate gas emissions. Enova grant financial support for development of energy and climate plans. The plans are often an important driver for EE and EPC as they describe tangible objectives for energy saving in public buildings. Some newly developed plans even point out that EPC can be a tool to reach these objectives.

ESCO network (0)

There is no ESCO network or association in Norway. Up until now a network or association has not been discussed or regarded as a need, by the ESCOs themselves. The reason is probably that the market is relatively small and transparent.

² EESI 2020 and Transparens

³ Promotion videos: <https://www.youtube.com/watch?v=t3l80K3SOxs>, <https://www.youtube.com/watch?v=H25uqjoWCh4>, <https://www.youtube.com/watch?v=YYMBMaNERHc&list=PLEHiuLJU7irrq388c5HNEEpbTo9uPD9oT>

⁴ Kommunenes Sentralforbund, www.ks.no (The Norwegian Association of Local and Regional Authorities)

2.2. Relevant public support schemes

Funding / support scheme	Open to client and/or ESCO	Effect on energy services / EPC
<p>National Standard for EPC The main legislative framework for EPC in Norway is the national standard (NS6430) for EPC contracts. This is originally based on model documents and guidelines developed in former EU-projects and later strongly promoted by KS. The Norwegian Standard is now in use in almost all public tenders.</p>	Client, ESCO & Facilitator	+
<p>Bank loans with "green interest rates" The financing of EPC projects is done by the public clients themselves in Norway through a financial model offered by the KBN⁵ (state owned municipal bank) with "green interest rates" for energy efficiency investments.</p>	Clients	+
<p>Enovas grant program Enova SF has grant programs for general energy efficiency measures.</p>	Clients	+
<p>Information/promotion Activities The national energy agency Enova SF has in the last years taken a successively more active role implementing dissemination activities (see next section).</p>	Client, ESCO & Facilitator	+
<p>Public energy and climate plans The county and municipal energy and climate plans are important as they usually describe objectives for energy saving in public buildings. EPC can be a tool to reach these goals.</p>	Clients	+

Table 1: Funding/support schemes

⁵ Kommunalbanken, www.kbn.no

2.3. Available financing options for energy services

Bank loans with "green interest rates" (+)

The financing of EPC is done by the public clients themselves in Norway through a financial model offered by the KBN⁶ (state owned municipal bank) with “green interest rates” for energy efficiency investments. This financial model has proven very successful. Neither the financial sector nor the ESCOs have been able to compete with this solution, which is used by all projects tendered over the last few years.

As a result, there are no significant financial barriers for public building owners in Norway with relation to project investments. The administrative costs (project identification/preparation, procurement, management and evaluation) can however still be an issue in strained municipalities.

Enovas grant program (+)

Enova SF has grant programs for energy efficiency measures in general. These present no major driving force for EPC, but is seen as a positive element in decision-making processes (politicians are positive towards national grants). The grant program focuses on non-profitable measures and market development, which can influence the selection of measures in the EPC project towards including more “high hanging fruits”.

2.4. Development of energy prices in Norway

Energy prices and price relations strongly influence the attractiveness of EE investments in general and EPC projects in particular, as the investments are large and the commitment and payback period is long lasting.

The following graphs are retrieved from the official Statistics database in Norway, SSB⁷. They illustrate the price development for electricity (industry and households) and oil and gas (industry and households) from 2005 to 2015. The index year is 2000.

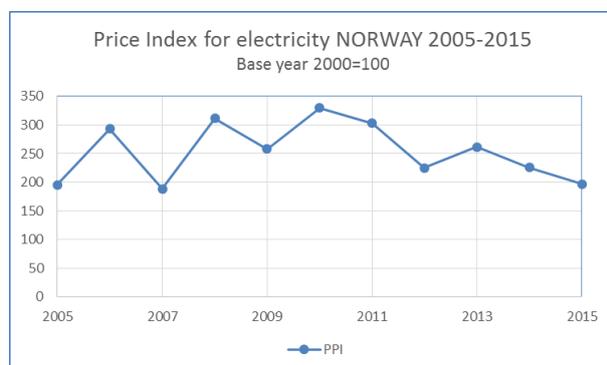


Table 2: Price index Electricity

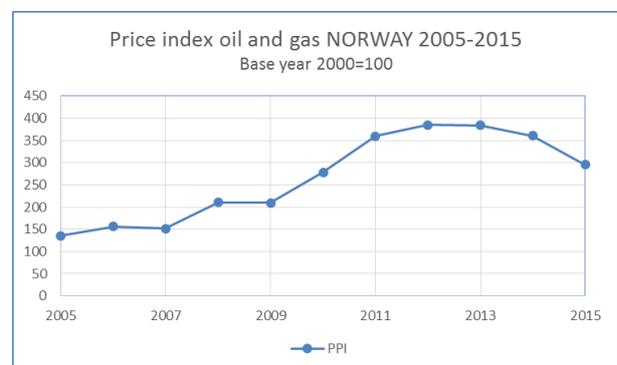


Table 3: Price index oil and gas

⁶ Kommunalbanken www.kbn.no

⁷ Statistisk Sentralbyrå (Statistics Norway, official statistics about Norwegian society since 1876)

Electricity prices has varied some. During the last two years, the prices have gone down to 2005 level. Even though the prices per kWh for household electricity is higher (due to taxes and grid costs) than the price for private business premises and industry, the energy cost constitute less than 5 % of the average income for Norwegian households. Hence, for households energy use is a small part of the "capital turnover".

For business premises and industry, the factor for energy costs and turnover will vary considerably based on the various business sectors. Even though the electricity prices in Norway are low, costs for energy (electricity and oil), still constitute 38 % of joint costs⁸ in business premises. EPC projects reducing energy use can hence reduce these joint costs and be a competitive advantage for building owners and tenants.

2.5. Critical assessment

Energy prices

Low energy prices in Norway result in low interest in energy measures in general, and the finance crisis in 2012/13 led to less interest from the banking sector. However, focus on climate both in media and in municipalities through climate plans over the last 5 years resulted in increased focus on energy use in public buildings, where EPC can be a strong tool. In addition, some EU projects (Eurocontract and EESI) were in place to promote knowledge on EPC, conduct training, initiate pilot projects and develop tools. In addition, the "Green municipalities" initiative by The Norwegian Association of Local and Regional Authorities, KS⁹, has played an important role in spreading information about the EPC concept and model, and in developing model documents.

Norwegian Standard

In 2013 development of a Norwegian Standard for EPC was started, with a working group consisting of representatives from energy authorities, market actors as well as legal representatives. The official standard for EPC was launched in April 2014. The standard covers the entire process from analysis of the buildings, the implementation of measures and regulation of parties' relationship in the guarantee phase. Having an official standard is important in promotion of EPC as it counteracts many of the barriers related to trust, public procurement and "outsourcing". Most EPC projects introduced to the market since then have used the standard and its use is expected to increase in the future.

Enova SF

The Norwegian energy agency, Enova SF, has since 2002 had a grant scheme for EE measures in buildings. Over the last years, they have seen that EPC projects cover larger pools of buildings, are more certain to be implemented, have higher savings and are implemented faster than other EE building projects in Norway¹⁰. Hence, Enova have taken a successively more active role in promoting EPC as this increases their overall saving results. Besides

⁸ Basale, www.basale.no

⁹ Kommunenes Sentralforbund – www.ks.no

¹⁰ Presentation by Øyvind Moe, Enova SF (May and June 2015).

arranging their own information events on EPC they have cooperated with KS and also participated on EPC seminars arranged by the EU-projects Transparens and EESI2020 and ESCOs all over the country.

Financial support schemes

Financial incentives for energy savings in general and EPC in particular seem to have made a positive difference to strengthen the EPC market in Norway. Both grants for measures and green interest rates have undoubtedly been strong drivers, making the decision to go forward with the EPC process much easier for the public clients, even though the projects are "self-financing" because savings cover the costs.

The psychology of the governmental support for EE measures, which can be used for EPC, in addition to making the projects even more profitable, seems to be that clients perceive these grants as a quality stamp of the EPC concept itself. Hence, they help remove the uncertainties due to the complexity of the model.

As a result of the combined efforts described above the Norwegian EPC market has developed considerably over the last 3–5 years and continuous growth is expected.

3. Key actors

3.1. Description of key actors

ESCOs/EPC providers

There are currently 6 active and experienced EPC providers on the Norwegian market with running contracts, and usually around 5 bidders for each contract. Some local actors have also shown interest, but so far not been able to win a project. The ESCOs have a limited number of EPC personnel – and even less EPC experts, which is currently a barrier as the ESCO capacity for new projects run out. The lack of ESCOs has been an issue particularly in remote geographical areas. The building owners have complained that the competition is not sufficient. The ESCOs who have limited capacity are only interested in the best projects (most profitable, short travelling distances, highest potentials etc.). In the last few years, some new actors have entered the market and there are now approximately 10 bidders in total.

The following 6 ESCOs offer EPC in Norway and has running EPC contracts:

- AF Energi og Miljøteknikk AS, www.afgruppen.no
- GK, www.gk.no
- Caverion, www.caverion.no
- Siemens, www.siemens.com
- Schneider Electric Norge AS, www.schneider-electric.no
- NEE (Norsk Enøk og Energi AS), www.nee.no

EPC facilitators

In Norway, there has been one active EPC facilitator in the market since the start of the first EPC projects. The EPC clients in Norway are contacted by the EPC facilitator or contact him directly after having heard his presentations or been referred by other municipalities. The facilitator offers to assist in all necessary preparatory activities, prepare the tender documents, lead the negotiations with the ESCOs and prepare and set up the final contracts. He is also acting as a mediator in the implementation phase of the projects when needed.

During the last years one more facilitator has assisted one of the largest municipalities in Norway to start an EPC project and several energy consultants have shown interest and participated in facilitator training workshops.

Norwegian EPC Facilitators:

- Kjell Gurigard, Siv. Ing. Kjell Gurigard AS, www.gurigard.com
- Tor Mjøs, Norconsult AS, www.norconsult.com

Public EPC clients

Almost all known EPC projects in Norway have been in the public sector and mainly in municipalities or pools of smaller municipalities. Norwegian counties have also been among the EPC clients. Some counties have also been active in promoting the EPC model for their municipalities in the form of information and training activities and even financial support for facilitation of new EPC projects.

Private EPC clients

There have been EPC projects in the private sector in Norway, but they are not well known or publicly documented. We believe the reason for this is that the public sector seems to be more promising in terms of saving potential, customer demand and project volumes, and also, the public sector is better monitored by the energy authorities for obvious reasons.

Energy authorities

The Norwegian energy agency, Enova SF was established in 2001 in order to drive forward the changeover to more environmentally friendly consumption and generation of energy in Norway. They have taken a successively more active role in the promotion of EPC and has recently carried out a survey among EPC clients in Norway.

The background for the survey is low achievement of energy saving targets in the public sector. Since the adaptation of the municipal energy and climate plans around 10 % of the 2020 energy saving goals have been reached, which means that there is now only 3,5 years left to fulfill the rest. This calls for volume and quick results. Since 2010, 252 energy reduction projects have been initiated in Norwegian municipalities (numbers collected from Enovas grant programs). 208 of these were traditional projects, while the remaining 44 were EPC projects. 80 % of the municipalities implementing EPC have reached their energy reduction

goals, while only 13 % of the others have done the same. From a recent survey¹¹ among these EPC clients Enova highlights the following main findings.

Comparisons of EPC projects to more traditional methods where the municipalities implement energy measures themselves shows that traditional projects have lower energy results at a higher cost, the results take longer time to achieve and all risks lays with the building owner.

In traditional projects 27 % of the municipalities move on to investments after mapping of the building stock, when as many as 96 % of the municipalities move forward with EPC projects. They invest in 15 % of the mapped area for traditional projects and as many as 88 % of the mapped area in EPC projects. Energy reductions are around 5 % compared to mapped potential of around 32 % for EPC, investments are 0,75 Euro/kWh and for EPC the investments are 0,59 Euro/kWh. The traditional projects takes 22 months from mapping to investments in average, whilst the average for EPC is around 5 months.

The survey also shows that the municipalities' experience of good projects diminishes as the EPC facilitator "finishes" their assignment. Hence, Enova think it is important that the facilitator takes part in all phases of an EPC project, to a higher degree than what is currently common in the market.

As much as 9 out of 10 municipalities would recommend EPC to other municipalities and the 10th would recommend EPC in general, but have some issues with their ESCO. In EPC – as in all other projects – communication between customer and provider is essential.

Enova concludes that EPC is essential if the Norwegian municipalities are going to fulfil their goals on energy reductions as stated in energy and climate plans by 2020.

3.2. Critical assessment

EPC facilitator

The one experienced Norwegian EPC facilitator has been a driving force since the start of the first EPC project in Nedre Eiker municipality in 2006. This facilitator has taken part in several European EPC projects such as Eurocontract and EESI and has adapted the resulting model contracts and documents for Norwegian conditions making them steadily more trusted over the years. The facilitator has, in cooperation with Enova¹², KS¹³, EESI 2020¹⁴ and Transparens¹⁵, promoted EPC through several seminars and presentations aimed at counties and municipalities.

¹¹ Presentation of the survey, April 2016 and input from preliminary findings from recent survey among EPC clients, Øyvind Moe, Enova SF

¹² The Norwegian energy agency.

¹³ The Norwegian Association of Local and Regional Authorities.

¹⁴ www.eesi2020.eu

¹⁵ www.transparens.eu

As a result, almost all the project processes, from start to end have been unified and foreseeable for both clients and EPC providers. All EPC project model documents and later the official standard have been tested and adjusted according to experiences over several years. Tender documents used are the same for all and it is easier and less time consuming for ESCOs to design new project proposals and calculate the guaranteed savings. The selection criteria are also well known and respected by all parties. From 2005 until the spring of 2016 this one facilitator had prepared 57 of totally 60-70 EPC projects on behalf of Norwegian municipalities.

The lack of more than one experienced facilitator has become increasingly more of a bottleneck as the EPC market is growing and more information and training activities are being carried out. Any sort of "monopoly" on these services is never good. Some interested municipalities are forced to wait until the facilitator has the capacity to assist. Central parts of Norway have been prioritised with regards to information, assessment of economic and technical suitability and eventually starting up the EPC process.

New energy consultants are now showing interest and educate themselves to become future facilitators in the market by actively seeking information and participating in facilitators training seminars hosted by EESI 2020 and information events hosted by Enova.

There has been no public tenders on the facilitator's job so far. This is however in the loop. One municipality is now planning to launch a tender for an EPC facilitator with the assistance from the guarantEE project.

Relationship between ESCO and client

The clients trust the ESCO to make the right choices regarding the purchase of equipment and implementation of measures, since the main risk rests with the ESCO. The takeover procedures are hence not very complex. There has been very few disputes and so far, and the few that have happened were solved amicably. Generally, one can say that a good business culture has been and still is an important driver of the Norwegian EPC market.

EPC providers

There are a limited number of experienced ESCOs who offer EPC in Norway. They are mostly situated in central parts of the country. Some tenders launched in less urban areas have had only one or two bidders and some municipalities even withdrew the tenders due to lack of good offers from experienced ESCOs. This is of course becoming more of a problem as the demand for EPC projects has increased considerably over the last few years.

Some positive signs have been detected; some newcomers have been among the bidders and are expected to be among the EPC providers soon. In some regions of Norway information and training events are planned to attract both potential facilitators and providers.

Energy authorities

The Norwegian energy agency has stated that EPC is essential if the Norwegian municipalities are going to fulfil their goals on energy reductions as stated in energy and climate plans by 2020 and are expected to scale up their market support further.

4. Market volume

Figures on the size of the Norwegian EPC market are based on information from the main facilitator and public tenders on the Doffin¹⁶.

4.1. Number of EPC projects

	2005 - 2008	2009 - 2011	2012 - 2013	2013 - 2015	2016
Number of EPC projects with public clients in Norway*	(4*)	1 (4*)	14	23	19
Number of EPC projects with private clients in Norway	Not known/available				

Table 4: Number of EPC projects. The years are when phase 1 of the EPC project is finished and correspond with the size of the projects in table 5. (Source: Siv. Ing. Kjell Gurigaard AS and tenders published on Doffin)

*Projects before the launching of the KS templates.

There are between 60 - 70 registered public EPC projects in Norway since 2005. One characteristic of EPC in Norway is that small municipalities tend to pool together to launch one common public EPC tender. The municipalities then contract one EPC-provider for one EPC project per municipality. The municipalities will enjoy the scale benefits of joint procurements. When counting tenders one will then get a lower number than when counting EPC projects – e.g. during 2014-2015 there were 17 EPC projects and 26 EPC projects finishing phase 1 in Norway. (As mentioned below the table the projects are placed below the year when phase 1 is finished to correspond with the size of the projects in table 5.)

In addition to the registered projects, two or three municipalities have launched and contracted EPCs by themselves with no use of KS¹⁷ templates or an EPC facilitator (no statistics available).

There are known public EPC projects in the period of 2000-2004 using contract models developed by the EPC-providers. There were even EPCs or projects resembling EPC in the years before that, but with no public tenders or model contracts.

¹⁶ Doffin: official national portal for public tenders – www.doffin.no

¹⁷ Kommunenes Sentralforbund, www.ks.no (The Norwegian Association of Local and Regional Authorities)

In connection with the EU projects Eurocontract, there were four-five EPC pilot projects in 2007. These projects were forerunners and the contract templates used were further developed by KS that launched their EPC-templates in 2009. All EPC projects have used the KS templates since then.

4.2. Size of EPC projects

The size of the EPC projects are based on calculations from 56 of the EPC projects from 2011 to 2016. All numbers are collected from the tender documents.

Size of EPC projects in Norway	2005 - 2008	2009 - 2011	2011 - 2013	2013 - 2015	2016
Average baseline in €/a ¹⁸ (mill €/a)	N/A	0,35	0,66	0,77	0,81
Average investment in € ¹⁹ (mill €/a)	N/A	0,53	1,31	1,65	1,81
Average guaranteed savings (in %) ²⁰	N/A	31	27	33	37
Average contract duration	N/A		7 – 18 years		
Average total investment	N/A		3-6 MEUR		

Table 5: Size of projects from phase 1 (Source: Siv. Ing. Kjell Gurigaard AS and tenders published on Doffin)

For the majority of Norwegian EPC projects the size increase after the audit phase (phase 1), as most municipalities want to include less profitable measures to increase comfort, reduce maintenance gap and fulfil legal obligations and environmental requirements in the municipal buildings – e.g. shifts to renewable energy sources. This is included in the projects by higher investments and hence prolonging the payback period.

4.3. Other important energy services

Many ESCOs and energy-consulting companies offer systems for Energy Monitoring, Energy Labelling and Energy Audits in both public and private sector. We have no in depth knowledge of the numbers, size, savings, contract models or investments.

¹⁸ Based on exchange rate of 9 NOK per EUR and 0,75 NOK/kWh excl. taxes.

¹⁹ Based on exchange rate of 9 NOK per EUR

²⁰ Tender phase 1

4.4. Critical assessment

There are 428 municipalities in Norway and some of them very small in way of inhabitants but large in area. Only between 60 - 70 have implemented EPC. Hence there is a large potential for continuous growth in the EPC market.

The national public procurement law is limited to MEUR 6. Hence, large or medium sized municipalities typically launch one EPC projects in their municipality. Some have also launched two projects. Smaller municipalities tend to pool together to launch one common project.

Norway has a good developed business culture. This has been the corner stone for the cooperation between the client and the provider with the experienced facilitator as a control mechanism for the client resulting in a uniform and foreseeable process. After having negotiated the contract, agreed on measures, investments and the resulting savings, most of the risk for achieving the contracted savings is placed with the EPC provider. Subsequently the ESCO in question is given the necessary freedom to implement the measures. When implementation of measures is over, the takeover process is most often done by certifications from the ESCO. The ESCO guarantee the savings throughout the lifetime of the project that varies from 7–18 years – most projects from 7–12 years. If overachievement occurs, in most projects, the savings are shared between the client and the provider in a prearranged split. This ensures that both parties have a strong incentive for good performance.

Characteristic for EPC in Norway is that the EE measures also include improvement of the building envelope, energy management systems, automation, HVAC, heating and lighting. Street lighting is also included in some recent contracts.

In the outskirts of Norway there has been too few EPC-providers bidding for EPC-projects, resulting in less competition and in some cases withdrawal of tenders. Information and training activities has also been concentrated to central parts of the country.

The EPC market in Norway is expected to increase further in the years to come. Good experiences and documentation of results is likely to increase the demand. The market actors and procedures have become more professional. The national energy agency Enova has taken a leading role in increasing knowledge and promoting EPC-projects to potential public and private clients all over Norway.

4.5. Best Practice examples

There are several best practice examples of EPC projects in Norway – most of which have been presented over the last one or two years. The Norwegian energy agency, Enova has recently published three promotion videos featuring both facilitators and clients presenting success stories from implementing EPC in public buildings:

- EPC in Åmot municipality: www.youtube.com/watch?v=t3l80K3SOxs
- EPC in Skien municipality: www.youtube.com/watch?v=H25uqjoWCh4
- The EPC model – Too good to be true?:
www.youtube.com/watch?v=YYMBMaNERHc&list=PLEHiuLJU7irrg388c5HNEEpbTo9uPD9oT

Nine Norwegian EPC projects are also presented in the European Best Practise database on EPC, gathered through the EU-project EESI 2020, currently to be found here:
www.eesi2020.eu/bestpractice/bestpracticeexamples/terms/18/search_type/and/order/default/

4.5.1. EPC in Kongsberg municipality

Kongsberg in Buskerud County is a municipality situated in the east and central parts of Norway. It has a little over 27 000 inhabitants, which makes it a large municipality both in a Norwegian and EU context²¹.

The EPC provider and Kongsberg kommunale eiendom KF (KKE) entered into the EPC contract in 2013. KKE is a municipal property organisation owned by the municipality and responsible for managing, operating, maintenance and development of most of Kongsberg municipality building property.

Background – Initial Situation

The municipal buildings were in need of an energy efficiency upgrade. To do so little by little is not very efficient but costly. Thus, the municipality decided to use an Energy Performance Contract (EPC).

The municipality also had a maintenance backlog of about 5 million €. Some of which could be eliminated by EPC. Kongsberg municipality launched the public tender for EPC in 2012.

Challenge

The challenge was to implement over 300 measures in 36 different buildings within one year while all buildings were continuously being used as customary. Besides that, we faced the technological challenge of matching new equipment, namely heat pump systems requiring low temperatures to be effective, with old central heating systems dimensioned for high water temperatures.

²¹ Average inhabitants EU: 5530, Norway: 11.022. Source: Høyskolen i Hedmark (2008 numbers).

Solution | Measures

70 % of the municipal buildings were included in the contract. That corresponds to 70.000 m². The main measure undertaken was the installation of 14 ground to water heat pumps which provide heat in the winter and free cooling from the ground in summer. Over 30 km of wells were drilled in the bedrock mountain to supply reservoirs for the heat pumps. Furthermore, many smaller measures like the changing of old ventilation systems by more efficient ones and the replacement of old lighting by efficient LED lighting were undertaken.

Results

Duration of the contract:	10 years
Investment:	5 M€
Guaranteed savings:	5,7 GWh/a
Achieved savings:	6,4 GWh/a
Reduction of CO ₂ emissions:	290 t/a
Saved energy costs:	500.000 €/a

Kongsberg municipality was one of the first municipalities in Norway to pursue a holistic approach regarding energy efficiency measures to this extent, focusing on guaranteed savings. This EPC project has therefore drawn some attention and been replicated in dozens of other municipalities during the last few years.

The contract document used in the EPC-contract was used as an example for the Committee developing the official Standard for EPC that was published in 2014.

The project leader for the municipality has given presentations on the project in several other municipalities and seminars on EPC in Norway, as well as in Belgium and Japan. All middle grade teachers of Kongsberg schools have been educated on energy use and energy efficiency and provided with teaching material. Every year, there is also a big energy contest, called the Energy Challenge, for all the 7th graders held in one of the hydropower stations in Kongsberg.

In addition to the quantifiable savings (see above), this project raised public awareness on energy efficiency, increased technical knowledge within the municipality and increased the number of renewed buildings in the municipality portfolio.

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EPC in Kongsberg municipality is presented in the European Best Practice database:

<http://eesi2020.eu/bestpractice/kongsberg-norway/>

5. Market assessment of EPC sectors

Expert feedback collected from market stakeholders combined with own experiences is shown in the following SWOT analysis regarding EPC.

5.1. Public sector

STRENGTHS

- Official Norwegian Standard for EPC
- Involvement/promotion of EPC by the authorities (e.g. Enova, KS).
- Financial grant scheme for EE measures.
- Marketing and training seminars for EPC.
- Success stories.
- Experienced project facilitator.
- Uniform and foreseeable process.
- Standard contract documents/guidelines tested and adapted for many years.
- Climate focus.
- County/municipal energy and climate plans with EE targets.

WEAKNESSES

- Lack of incentives for energy efficiency measures (low prices, no regulations).
- Lack of experienced project facilitators.
- Lack of available and experienced ESCOs.
- Lack of knowledge of EPC, both among municipalities and potential EPC providers.
- Complicated tendering and contracting process (legal/technical/procurement).
- Insecurity about legislation and framework (decreasing with new standard).
- No legal framework or regulations.
- Too good to be true?

OPPORTUNITIES

- Maintenance lag in public buildings.
- Promotion of success stories.
- Promotion of the official standard for EPC.
- Increased number of EPC facilitators and providers.
- Marketing of EPC in new regions.
- Joint national/international EPC website with information and overview of market actors.
- Increased climate focus.
- Exemplary role of public sector.

THREATS

- Lower energy prices.
- Lack of capacity (clients, facilitators, ESCOs).
- Bad influence from new actors entering the market (facilitators, ESCOs).
- Failing projects.

5.2. Private sector

We consider the information and data available for both the industry and tertiary part of this market segment to be too small and insufficient to make a valuable market assessment. No systematic evaluation of EPC projects are carried out in the private sector, hence no data is available.

There has been projects resembling EPC projects in the private sector – especially in the earlier days in the EPC market development in Norway (in the 1990'ties). Typically, there were some small projects in one office building or industry where the investments were to be covered by the energy savings.

Small EPC projects in privately owned buildings by large building owners are still known to take place, but as there have been no known public tenders or other public records of these projects, they are hard to map or confirm. Another aspect that complicates mapping of private EPCs is that the contents of the contracts are looked upon as trade secrets and the saving results as competitive advantages. Hence it is difficult to get access to the project details and evaluate whether the projects are "true" EPCs or not.

Now the trend in Norway is that public sector and especially municipalities have taken a solid lead on the EPC market.

Even though there has not been much activity in the private EPC market in Norway. We consider EPC to be a great possibility for future energy savings in private buildings and steps should be made to promote EPC in this sector.

A goal of the guarantEE project is to have at least one new EPC project in private sector publishing a tender following the Norwegian Standard for EPC, NS6430 - a goal that will be pursued in cooperation with the Norwegian energy agency, Enova SF and the Norwegian facilitator Siv. Ing. Kjell Gurigard AS.

The following SWOT analyses is made on a very general basis.



STRENGTHS

- High cost-consciousness.
- Lower energy costs seen as competitive advantage.
- Openness to outsourcing.
- More business oriented – sees a good deal when it is presented.

WEAKNESSES

- Hard to map.
- Reluctant to share success stories/Best Practise.
- Contract conditions viewed as trade secrets.
- Results viewed as competitive advantages.
- Normally only a short project duration/payback period accepted
- EE measures require highly specialised ESCOs (small supply market).

OPPORTUNITIES

- ESCOs/manufacturers/utilities can use their strong ties to private building owners.
- Possibility to develop/offer integrated energy services.
- Establishment tools and model documents for private sector.
- Marketing/promotion of EPC.
- EPC success stories "out in the open".

THREATS

- "Closed" market, hardly public tenders.
- Skilled ESCOs concentrating on the large public market only.
- Often only short project duration/payback period accepted.
- The split incentives dilemma for rented facilities.

5.3. Private sector: Residential buildings

There has been no known EPC projects in residential buildings in Norway so far.

- Most relevant opportunities
 - Openness for and interest in EE among tenants might exist
- Most relevant barriers and threats
 - Low energy prices means low incentive for EE in general and low interest in investments in EPC projects in particular
 - The split incentives dilemma and consequently the need for difficult contractual solutions between owner, tenants and ESCO

We assess a SWOT analyses to be too hypothetical.

6. Results from stakeholder survey

From June until August 2016 an online stakeholder survey was conducted in order to address EPC-market stakeholders. The questionnaire included a mixture out of quantitative as well as qualitative questions concerning the usage of energy efficiency services in Norway.

In Norway 29 respondents answered questions per relevance.

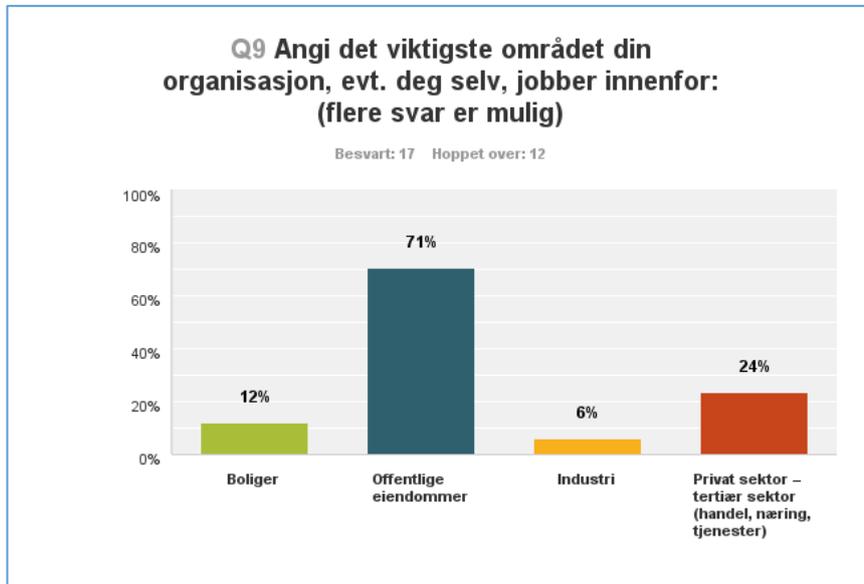
6.1 Basis of Survey

We asked the respondents to indicate which sector their organization is assigned to and what their personal assignment predominantly consists of. The respondents were mostly EPC customers in public sector, building owners in both public and private sector, energy service companies and project facilitators for energy services. One energy agency also participated in the Survey.



Please indicate to which sector your organisation is assigned to/what your personal assignment is predominantly (building administration, facility management, building owner, energy service company/ESCO, project facilitation for energy services, energy agency, other).

The main part of the respondents operates in the public sector, but private sector and residential buildings are also represented. (The question does not cover respondents representing ESCOs, energy authorities or EPC-facilitators.)



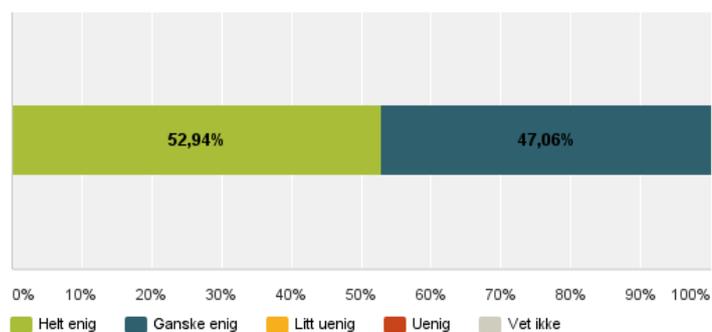
Please indicate the predominant field of operation of your organisation, respectively yourself: (residential buildings, public buildings, industry, tertiary sector).

6.2. Experiences with EPC

- 9 of 17 respondents strongly agree that reduction of costs is a high priority in their organisation (Q16) and the remaining 8 agree that energy costs has a high priority in their organization

Q16 Vennligst angi hvor enig du er i følgende påstander: Reduksjon av energikostnader er et høyt prioritert mål i vår organisasjon.

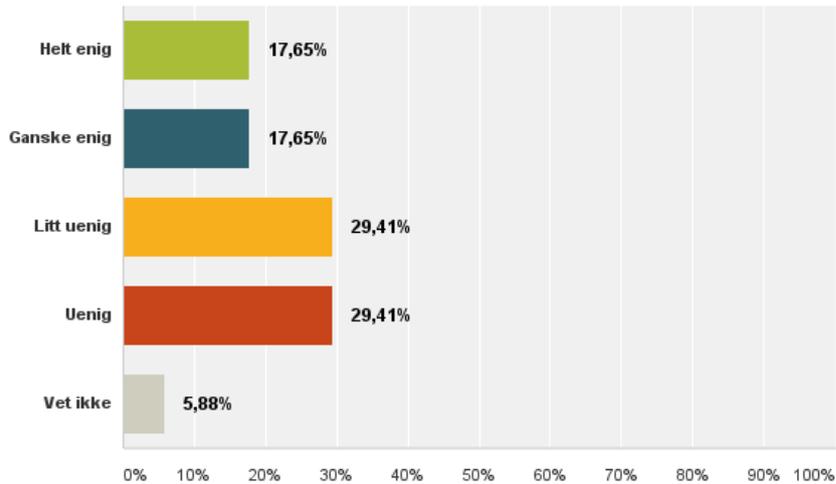
Besvart: 17 Hoppet over: 12



- 35 % of these respondents have already experiences with energy service providers

Q17 Vi har erfaring med bruk av energitjenesteleverandører (ESCOs).

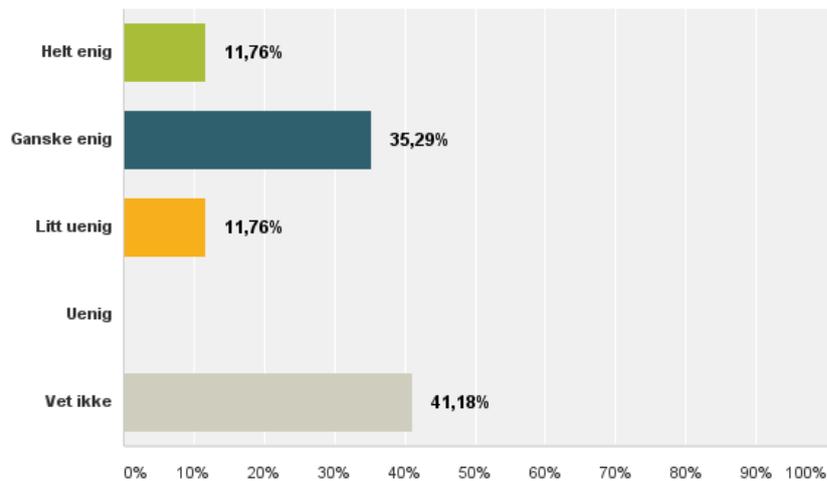
Besvart: 17 Hoppet over: 12



- 47 % evaluated these experiences as positive, whereas 12 % rather disagreed and as much as 41 % could not tell and answered "I don't know"

Q18 Vår erfaring med ESCO/leverandør av energitjenester/entreprenør var i hovedsak positiv.

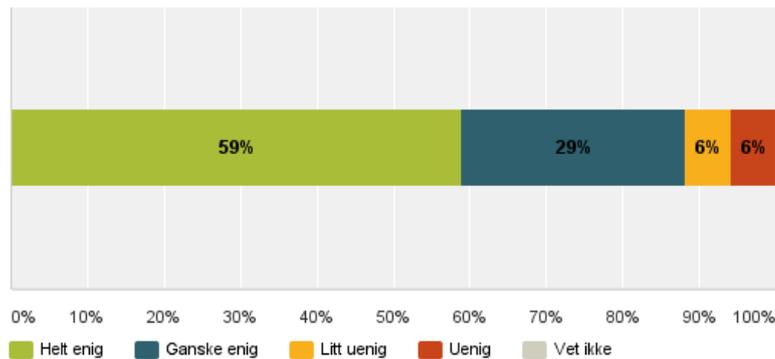
Besvart: 17 Hoppet over: 12



- 88 % of the respondents are familiar with the EPC concept (based on 17 answers). 6 % are somewhat unsure and 6 % say they are not familiar with the concept.

Q19 Vår organisasjon er kjent med EPC konseptet.

Besvart: 17 Hoppet over: 12

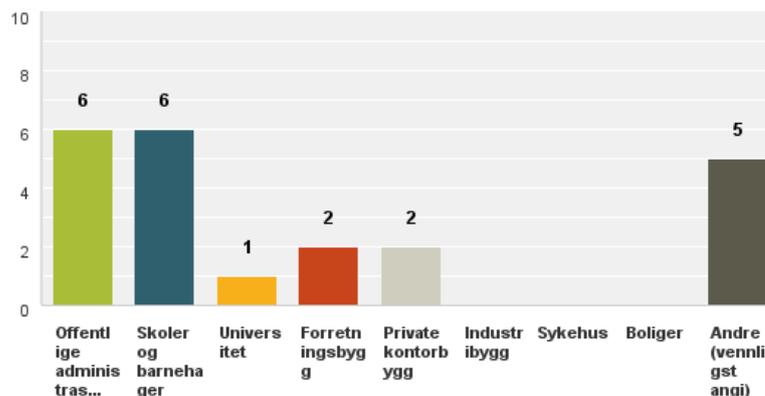


Our organisation is familiar with the EPC concept (strongly agree, rather agree, rather disagree, don't know).

- Of the respondents, familiar with EPC 75 % have experience with EPC in public sector.

Q23 For hvilke typer bygg har din organisasjon allerede gjennomført eller støttet EPC prosjekter? (flere valg mulig)

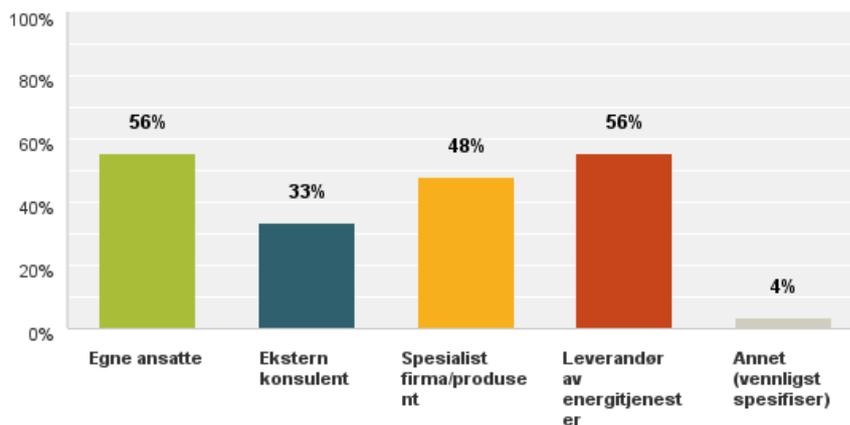
Besvart: 8 Hoppet over: 21



The following two graphs show that a little over half of measures are implemented by own staff in combination with energy service providers, external companies and specialist firms. The measures are afterwards maintained and operated mostly by in-house-staff (78 %). This might lead to risk on the side of the building owner that can be addressed/solved through EPC.

Q5 Gjennomføring av tiltak

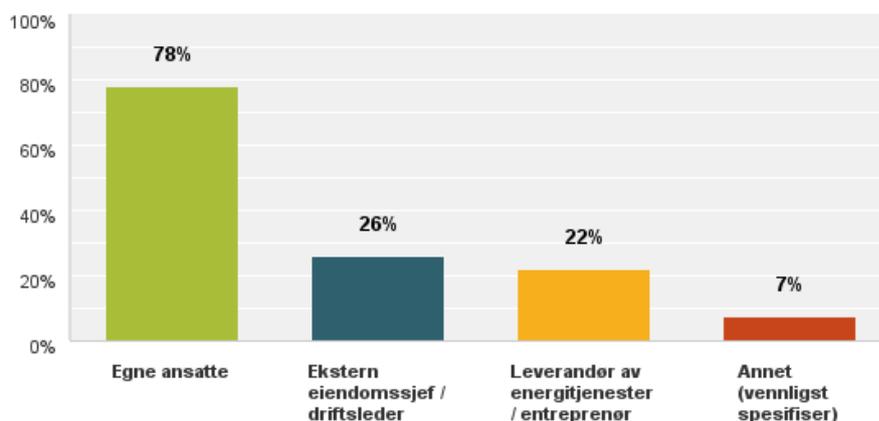
Besvart: 27 Hoppet over: 2



Implementation of measures (own staff, external consultant, specialist/producer, energy service provider, other)

Q6 Drift av bygninger etter gjennomføring av tiltak

Besvart: 27 Hoppet over: 2

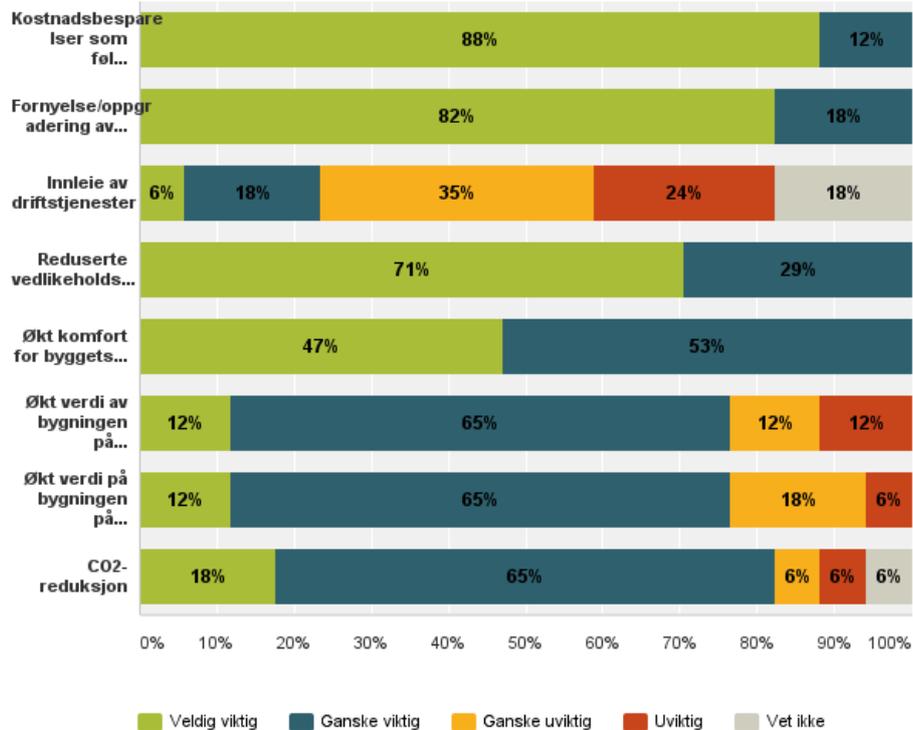


Operation of facilities after implementation of measures by (own staff, external consultant, specialist/producer, energy service provider, other).

Reduction of CO₂ emissions or increase of building value does not seem to be the driving forces for modernisation measures. Increased comfort, reduced energy use and maintenance costs and renewals of ventilation or electric systems however seems to be mayor door-openers for EE measures.

Q12 Det er mange grunner til energioppgradering. Hvordan vurderer du betydningen av de følgende aspektene?

Besvart: 17 Hoppet over: 12



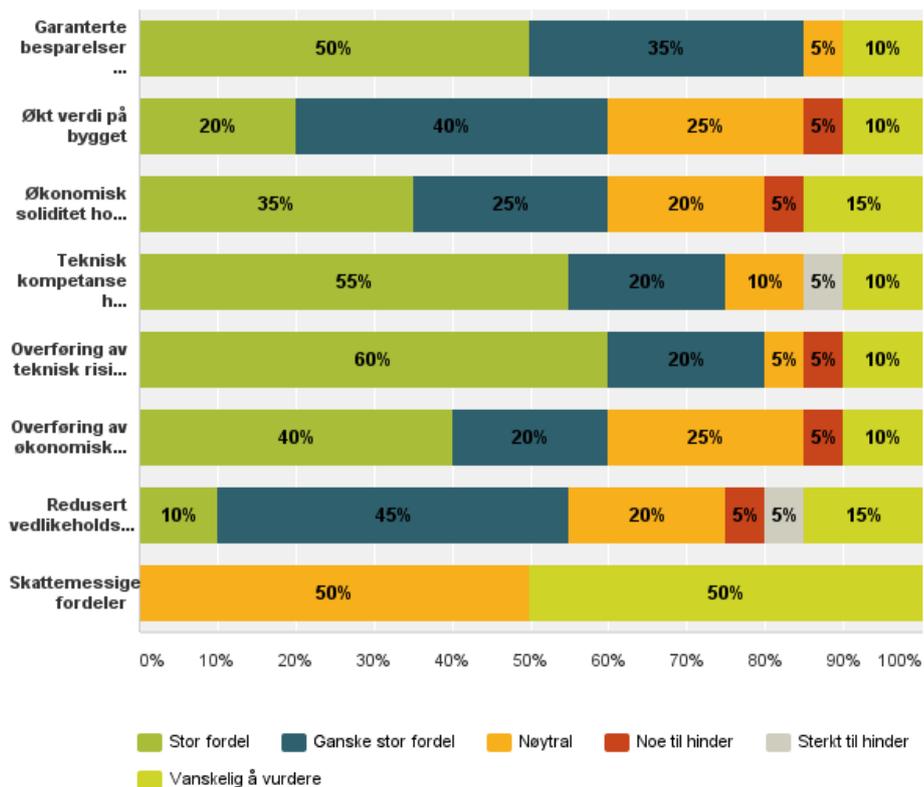
In addition to the reasons indicated above some respondents add the public responsibility and financial incentives from the authorities as good reasons to implement energy efficiency measures.



For the follow-up steps towards an EPC-project the reasons to choose EPC was mainly guaranteed savings by the ESCO (86 %), technical competence of the ESCO (75 %) and outsourcing of technical risk (80 %), as expected.

**Q25 Evaluer følgende aspekter med hensyn på hvordan de påvirker gjennomføring av EPC prosjekter ut fra følgende skala:
Merknad: Dersom du ikke kan angi et kriterium, ber vi deg bruke boksen "Vanskelig å vurdere". Økonomiske aspekter**

Besvart: 20 Hoppet over: 9



6.3. Problems and potential solutions

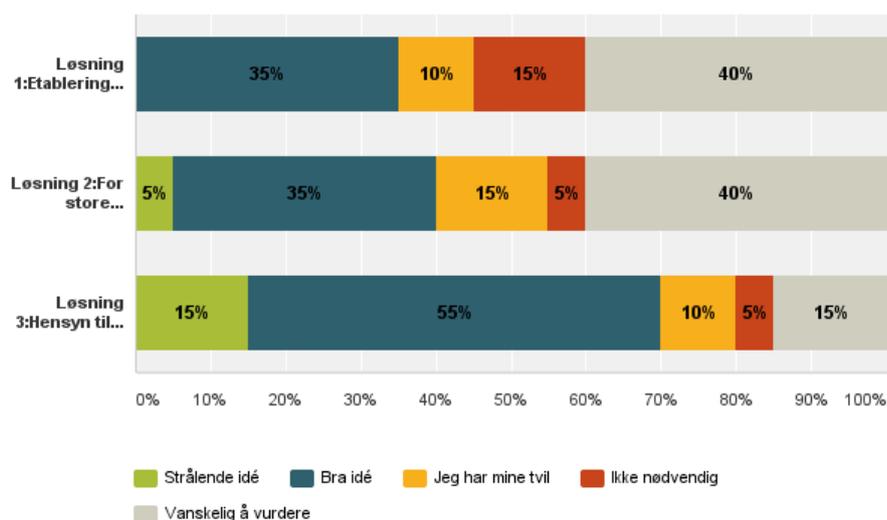
The development of EPC projects is facing specific challenges dependant on the customer group. Thowe problems were presented and potential solutions offered, which were assessed by the respondents.

Problem 1: Financial investment in energy efficiency measures for public institutions: The department/budget, which finances the measures does not benefit from the measures.

The most preferred solution (70 %): Consideration of non-monetary benefits, such as increased value an comfort and reduction of maintenance requirements (opportunity costs).

Q33 Utviklingen av EPC prosjekter møter ulike utfordringer avhengig av kundegruppe, som beskrevet nedenfor. Samtidig presenteres mulige løsninger. Angi din evaluering av følgende foreslåtte løsninger. Bruk kommentarfeltet hvis du har flere forslag. Problem 1: Finansiell investering i energiltak for offentlige institusjoner: Avdelingen/budsjettet som finansierer tiltaket får ikke nytte av tiltaket.

Besvart: 20 Hoppet over: 9



Problem 2: Tenancy in commercial properties: The landlord invests in energy efficiency measures but cannot refinance those by reduced energy costs, as only the tenants benefits from energy cost savings.

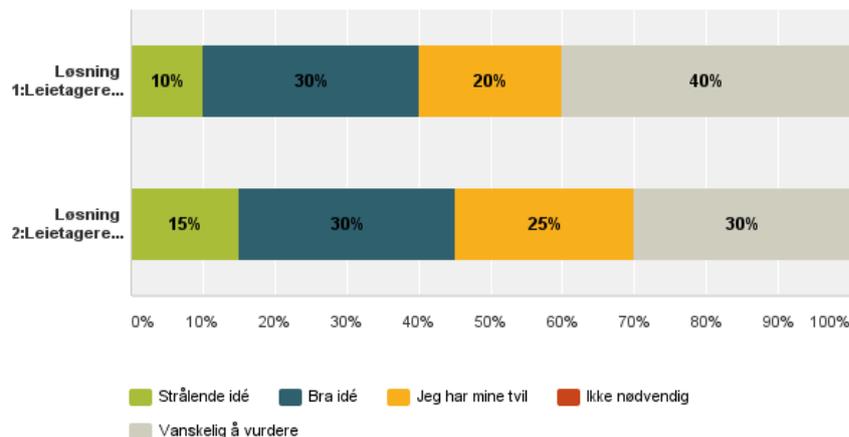
The most preferred solution (45 %): "The tenants receive guaranteed/increased comfort for guaranteed costs. At the same time they accept higher payments to the landlord in extent of the energy savings.

The other solutions, "Tenants pays fixed rent (includeing operational heating and electricity costs). The landlord can refinance the incestment through the savings was preferred by 40 % of the respondents.

(It is worth noting that the issue is strictly theoretical for most of the respondents as they are not involved with commercial properties.)

Q35 Angi din evaluering av følgende foreslåtte løsninger. Bruk kommentarfeltet hvis du har flere forslag.
Problem 2:Leietagere i kommersielle eiendommer: Byggeier investerer i energiltak, men kan ikke refinansiere disse med reduserte energikostnader fordi det kun er leietagerne som får disse fordelene.

Besvart: 20 Hoppet over: 9



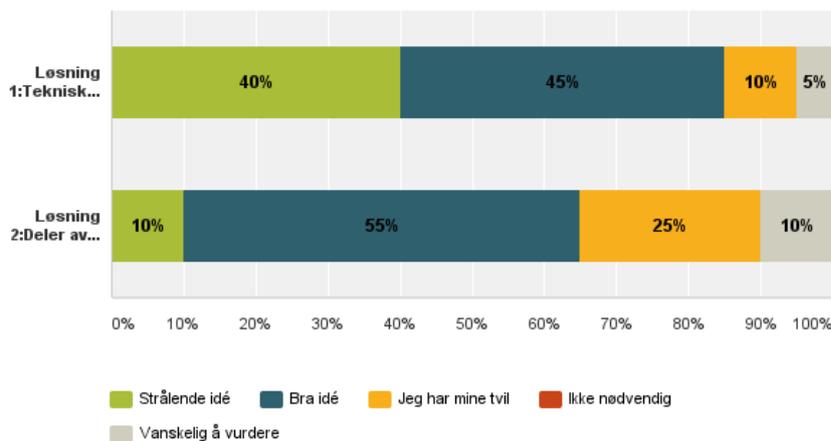
Problem 3: The behaviour of users in buildings influences the energy demand drastically. However, the change of behaviour of the users can turn out to be difficult.

The most preferred solution (85 %) is the use of motion sensors, window contract switches etc. for achieving savings without the necessity to influence behaviour of users.

The less preferred, but still valid solution (65 %) is to that part of the achieved savings is paid/accredited to the user as "profit sharing".

Q39 Angi din evaluering av følgende foreslåtte løsninger. Bruk kommentarfeltet hvis du har flere forslag.
Problem 4: Brukerne i bygg påvirker energibehovet drastisk. Å endre brukernes adferd kan vise seg å være vanskelig.

Besvart: 20 Hoppet over: 9



6.4. Highlights of the qualitative answers

Negative aspects of EPC (Q32)

The respondents were asked to finish the sentence: "I am critical of EPC in my sector, because"

The most common answers were along the lines of the following: (presented in order of most to less common).

- Building owners have the technical competence and capacity to implement energy efficient measures themselves. Fear that outsourcing will lead to lack of this competence.
- We don't trust the ESCO to have the necessary technical competence necessary for our facilities.

- The municipality is too small combined with complex contract models
- The technical equipment chosen by the ESCO are of poor quality

Positive aspects of EPC (Q31)

The respondents were asked to finish the sentence: "I believe there is a large potential for EPC in my organisation, because"

The most common answers were along the lines of the following: (presented in order of most to less common).

- EPC relieves the building owner for both work load, risk and need of technical expertise
- Replacement of old equipment and modernisation
- Lack of capacity in own organisation
- Simplification and scale benefits of purchases

The survey shows that EPC is a preferred energy efficiency solution for public sector. For private sector, there are too few respondents to draw any firm conclusion from this survey.

We want to sum up by offering a quote from one of the respondents:

"Through EPC I will be able to implement 15 years' worth of my maintenance budget in only one year".

Central Contacts and References

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- Enova SF, The Norwegian energy agency, www.enova.no
 - Contact person: Øyvind Moe
- Kommunenes Sentralforbund (KS), The Norwegian Association of Local and Regional Authorities, www.ks.no

Norwegian EPC Facilitators

- Kjell Gurigard, Siv. Ing. Kjell Gurigard AS, www.gurigard.com
- Tor Mjøs, Norconsult AS, www.norconsult.com

EPC providers

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