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Summary

56 years have gone since the first well was drilled at the Norwegian continental shelf (1). Today, many of the installations are old and no longer in use, and according to the OSPAR Convention 98/3 (2) they shall be removed. Based on this, the Cessation Projects portfolio in Statoil was established late 2009/start 2010. The portfolio consists of 10 very different (both in size and complexity) removal projects, none of which per today are finished. Statoil has no significant previous experience with removal projects prior to the establishment of the Cessation portfolio, so this is a new area to Statoil.

Very few of these projects have been executed in the industry as a whole, and factors such as high oil price, new technology and maintenance cost extends the field lifetimes, resulting in removal projects being postponed, giving them a very volatile character. These projects also differ from development and modification projects, as there are no "first oil" calculations or lost money due to production stop. The current high investment level on the Norwegian continental shelf also represents a challenge for these projects, as they often compete over the same resources as in the supplier industry. In addition, the small amount of experience with removal projects among both suppliers and operators make these projects challenging.

The purpose of this thesis is to look into the choice of procurement strategy for removal projects in Statoil. 6 contracts for 3 different projects have been awarded in the Cessation project portfolio per today (11/2012). The total contract value for these 6 contracts is 1.253 billion NOK. And the total contracted value will only increase with the progress in the portfolio. As Statoil`s current execution strategy for these projects is to award a EPR (D) -contract (Engineering, Preparation, Removal and Disposal) to one supplier, the procurement strategy and well designed contracts becomes crucial to cost efficient spending and effective project execution. The challenges represented in the section above and the little experience in the industry with removal projects makes the establishment of a procurement strategy complex. But, the task is no less important as the allocation of risk and design of incentive mechanisms is an important tool for Statoil to be able to reach its goal of "safe and cost efficient (3)" execution of these projects.

Preface

This thesis is the closure of my master degree in Industrial Economics at the University of Stavanger. The object of this thesis has been to do an independent research and work that covers my educational background with regards to my master's degree. My interest in contract strategy and procurement increased through my last year of master studies. This topic is very relevant, especially with the high degree of outsourcing in the offshore oil and gas industry.

From knowing absolutely nothing about removal projects, to be able to present a sober discussion on the issue "the choice of procurement strategy for removal projects in Statoil", really challenged my ability to adapt to and get an overview of new information quickly. The learning curve was not only steep, but had to be climbed fast! In addition I felt that whenever I got one question answered, I always ended up with two new ones…….

I want to express my gratitude to Tone Bruvoll and the people working at the Cessation Portfolio in Statoil. They have been very helpful, friendly and welcoming through this semester, as well as good discussion partners!

I also want to send my gratitude to my husband and the rest of my family for supporting me and motivating me through these 5 (8) years of studies in Stavanger.

Last, I send my thankfulness to my tutor for this thesis, Petter Osmundsen, for constructive guidance through this process.

Stavanger, 20.12.2012

Karin Anita Svindseth Aaserud

Definitions and Abbreviations

The definitions are primarily collected from Statoil`s material or contract theory.

Agent: The contractor or supplier, the unit that are delivering/selling a service (product) to the Company

Cessation: Business case consisting of wells plugging and abandonment, decommissioning, dismantling, removal and disposal

Cold platform: No hydrocarbons and (normally) all utility, control and instrument systems decommissioned

Company: Statoil (and/or other operator/company or equivalent that are buying services)

Condeep: Concrete deep water structure

Contractor: Supplier of Engineering, Preparation, Construction, Removal and Disposal services (or equivalent).

CoP: Cease of production

Decommissioning: Prepare the facility and the facility systems from an active state to a deactive state (released from operation and ready for removal)

EPRD: Engineering, Preparation, Removal and Disposal

FEED: Front End Engineering Design. The FEED is basic engineering which comes after the Conceptual design or Feasibility study. The FEED package is used as the design basis for bidding for the Execution Phase Contracts (EPC, EPCI, EPRD etc.)

EMS: Extended Method Statement

ITT: Invitation to tender, letter sent by Company to potential Contractors in order to start the bidding process

NCS: Norwegian Continental Shelf

Net Present Value: The sum of the present values (PVs) of the individual cash flows of the same entity.

P&A: Plugging and Abandonment of wells

PEOPS: Project Execution and Overall Procurement Strategy

PP&A: Permanent Plugging and Abandonment of wells

Principal: The Company, the unit that are buying a service.

Removal project: A term used for a project within a decommissioning business case. Dismantling and transportation of all kinds of facilities and structures to a location for further dismantling and disposal work, or to other installations in case of reuse.

1.0 The approach to the problem

More than 40 years ago oil was found on the Norwegian continental shelf, and the development of an offshore oil industry began. Now, 40 years later, a lot of these offshore facilities are old and no longer in use, and according to the OSPAR Convention 98/3 (3) they must be removed.

The Cessation project portfolio is the first portfolio with this kind of removal projects in Statoil. Statoil do not have noticeable previous experience with removal projects, and none of the 8 projects in the portfolio is as of today finished. Only 6 different contracts for 3 different projects have been signed (2 EPRD, 2 EPR and 2 D).

The experience with removal projects in the industry is not extensive.

The very first "Category strategy for Removal and Disposal" was finished a couple of months into this thesis, and several of the stakeholders interviewed within the portfolio admitted that these projects will contain "learning by doing-curve" for many years ahead. The projects in the portfolio are of very different size and character, and may not always be easy comparable in some aspects. The estimation of costs up front is difficult due to lack of benchmarking numbers. The conditions and information about the facilities to be removed is not always well documented, and the existing documentation may turn out to be wrong.

These projects represent only expenses for Statoil, there is no generated income, and the main goal for the Cessation portfolio is to get these projects executed in the safest possible manner, and at lowest possible cost.

The goal for this thesis is to look into the challenges and opportunities with the procurement strategy for removal projects for Statoil, and herby highlight central themes that are of importance for Statoil to be able to reach its stated goal of executing these project to the lowest cost possible. Examples of important themes that will be highlighted and discussed are; the procurement strategy, risk allocation and compensation format.

The method used to elucidate the topic of procurement strategy in removal projects is a combination of semi-structured interviews with stakeholders inside and outside the Cessation Project Portfolio with experience on the field, literature study on contract theory, studies of the

existing challenges and characteristics within the decommissioning and removal field, studies of existing procurement strategies for the projects in the Cessation portfolio and studies of contracts already awarded for Cessation projects in Statoil.

1.1 Method

The main method used in this thesis to highlight the topic of procurement strategies in removal projects is a qualitative research method, conducted by using semi-structured interviews with stakeholders.

Qualitative research method

A qualitative method is used when the goal is to understand a phenomenon, not to measure it. The method gives data of the type; what, how and why, not; how many (4).

Semi structured interview

The qualitative research method used in this thesis, was semi-structured interviews. This type of interview is best described as a conversation between the researcher and the respondent, where the theme of the conversation is managed by the researcher. Prior to the interview, the researcher make an interview guide, - a plan for which themes she wants to talk about. The interview guide is made on the basis of the topic to be investigated (5).

The drawback with a quantitative research method is that one will never be able to get a representative sample, so it can be possible to generalize the results. The sample will not be representative for the population, but they will be category representative. That means that they will be representative within the categories we expect to find the information with (4).

The method was combined with literature study on contract theory, studies of the existing challenges and characteristics within the decommissioning field, studies of existing procurement strategies for the projects in the Cessation portfolio and studies of contracts already awarded for Cessation projects in Statoil.

1.2 The importance of procurement strategy

6 contracts for 3 different projects have been signed in the Cessation project portfolio per today. The total contract value for these 6 contracts is 1.253 billion NOK. And the total contracted value will only increase with the progress in the portfolio. As Statoil's main strategy is to subcontract the execution of these projects, the procurement strategy and well designed contracts becomes crucial to cost efficient spending and efficient project execution. The contract between the operator and the supplier also determines the allocation of risk and design of incentive mechanisms, which makes contracts an important tool aligning interests and goals between operators and suppliers.

It is important to state that outsourcing is not specific just for the area of removal projects, but for many areas of operations in Statoil. Statoil's suppliers cost for the area Drilling & Well represents 95% of the total operation cost. For Construction & Modification and Operation & Maintenance the respectively spending is 90 % and 60 % of the total operation cost (6).

And the fact that ten of Statoil's suppliers (Aker Solutions, Transocean, FMC technologies, Aibel, Schlumberger, Seadrill, Halliburton, Technip, Acergy and Pieter Kiewit Sons Inc.) represented 31 % of the **total spend** in Statoil in 2009 highlight the importance of this theme, not only just within the Cessation project portfolio, but in the industry as a whole (6).

2.0 Contract Theory

Well-designed contracts are essential to effective procurement, and by fixing obligations and promises, contracts protect each party in a procurement transaction against the risk of unexpected changes in the future behavior of business partners, thereby allowing safe and efficient planning, investing and production (7). Dimitri, Piga and Spagnolo (7) consider the most important dimensions influencing companies choice of procurement contract is "contract flexibility, the incentives for quality and cost reduction, and the allocation of procurement risk".

The compensation format is important in order to set the correct incentives in a contract. Choosing the right compensation format is also critical to align interests between the parties, and to determine the allocation of risk, and therefore it is essential to understand the aspects of this tool.

One basic principle when designing contracts and incentive mechanisms is that optimal contract design should be highly context-specific. The contract should be tailored to the particular circumstances of the transaction/project and the contracting parties (8). According to Osmundsen (9) these characteristics are;

Characteristics of the transaction/project:

Level of complexity. Level of complexity refers to the degree that an overview of relationships between parts and processes in a project exist. Many of the removal projects in the Cessation portfolio can be seen as complex as nobody is able to foresee or give a precise definition of the scope of work or all connections between processes in the project up front. This is important to bear in mind when designing contracts, as it makes the allocation of responsibility and risk more challenging.

Level of repetition. Level of repetition refers to the number of times similar projects or processes have been executed. If the same project has been executed several times by the same people, there should be reason to expect a learning curve effect, with subsequent cost and time savings. Regarding removal projects, the level of repetition is considered very low, as so few projects in this field have been executed.

Distribution of information. Distribution of information refers to which part holds important information about the execution of the project. E.g. Statoil claims that the suppliers hold the best knowledge and information on how to remove these facilities (3), and thereby the best contracting strategy is to put this responsibility on the suppliers. This can also be related to e.g. information about project costs or the number of hours needed to complete a job.

Degree of accurate definition. Degree of accurate definition refers to the ability to describe a project in a precise and complete manner. This is often related to technical details. If there are a lot of unclear aspects about the project, this need to be taken into account when designing contracts. The more precise definition, the easier it is to define the scope of work to be done, and thereby the final cost. The lack of accurate technical definition is a challenge for the Cessation project portfolio.

**Level of client`s involvement.** Level of client`s involvement refers to the degree the client intend or needs to be involved in the project during execution. If the client want strict control over the project during execution e.g. due to environmental reasons, or need to be able to make changes along the process, this will need to be taken into account when designing the contract, as opposed to if the client (operator) only needs to get the job done without any changes. The need for clients' involvements in Cessation projects is primary related to emissions or other things that may have negative impact on Statoil's reputation.

Characteristics of the contracting parties:

Equity/imbalance. Equity or imbalance refers to the general balance of power between the parties. If there is imbalance between the parties, it is important that this is taken into account when designing contracts. Misuse of power can be seen if the suppliers really need the job to stay in the market, and operators try to take advantage of this by putting pressure on the price and the risk allocation in the contract. The opposite can be seen if the market is heated; suppliers can put pressure on the operator to accept high prices and a lot of risk.

Risk aversion. Risk aversion refers to the ability or willingness to accept (procurement) risk. If the supplier is a lot smaller than the operator, and is dependent on only a few projects, he is not that able to handle risky projects with potential large cost overruns. A large operator with numerous projects are more diversified, and is often more able to handle cost overruns from some projects. This needs to be taken into account when designing contracts, as putting all the

risk on a supplier may in worst case lead to the supplier going bankrupt, which in turn will harm the operator.

Financial strength. Financial strength can in this case be seen as the ability to handle cost overruns, and must be taken into account when allocating the risk in a contract and deciding contract strategy. It is important that if e.g. the operator decides to hand out large, complex turnkey contracts compensated by Lump Sum, he needs to make sure that suppliers are able to handle these. Else, in the case of huge cost overruns, the supplier may go bankrupt, and the operator is left with an unfinished project.

Confidence/trust. Confidence/trust refers to the trust between parties that they will not be deceived by the other part. This is important when designing contracts and incentive mechanisms, as one will never be able to design a contract that accounts for every possible situation, and both parties can always try to take advantage of this. The less one trust a supplier, the more he needs to cover the holes in the contract that a supplier can use to his benefit.

2.1 Winners curse and learning curve effects

"Winners curse" and "learning curve effects" are two relevant aspects to consider when designing removal contracts.

Winners curse

The phenomenon is often generated when there is a common uncertainty in the item to tender for. A common uncertainty is present when tenderers are not completely informed about the whole composition of the item they are bidding for (7). This can be e.g. the true amount of hours needed to complete a job, or the true condition of a facility to be removed.

Winners curse is especially relevant when working with removal contracts where the total scope of work, and therefore the true cost of the project are unknown. This makes it difficult to set the bidding price for the suppliers, and the risk of winners curse is enhanced.

From the buyers point of view winners curse may generate two kinds of problems:

1. *Underbidding*. If participants are aware of the winners curse and are afraid of ending up suffering losses, they may adopt too a cautious bidding strategy, which in turn generates high awarding prices.
2. *Overbidding*. If participants are unaware of the winner`s curse, they elaborate their bidding strategy on the basis of their cost estimates only. Hence, they may end up bidding too aggressively, thus submitting too low prices. Although this might benefit the buyer in terms of low awarding prices, it may also deteriorate the contractor`s financial stability and induce the latter to adopt opportunistic cost-reducing actions that would result in a bad quality service. Or worse, the contractor may go bankrupt (7).

Learning curve effects

The theory of the learning curve or experience curve is based on the simple idea that the time required to perform a task decreases as a worker gains experience. The basic concept is that the time or cost of performing a task (e.g., producing a unit of output) decreases at a constant rate (10).

This needs to be taken into account when estimating costs and establishing procurement strategies as the cost should be expected to go down with the repetition of a task.

This is also important to consider because the low level of repetition on these projects can make it tempting for suppliers to wait to enter this market segment, until someone else have executed the first projects, and gained experience useful for a whole industry.

The different size and characters of removal projects also represent a challenge for one to establish a learning curve as the removal of one facility may require totally different methods and represent different challenges then another one. The removal of Statfjord A will contain other challenges than the removal of a template, which makes it challenging to establish and gain learning curve effects.

2.2 Compensation format

As mentioned, the compensation format is an important tool in contracts in order to set the correct incentives, align interests between parties and allocate risk.

There are two most common categories of compensation formats used in contracts, fixed-price and cost reimbursement. But many procurement contracts are in fact a combination of these two categories, specifying incentives on some aspects and fixed-prices on other aspects. You can combine compensation formats in order to adapt the contract to the specific characteristic of the project.

Fixed-price

The owner pays the fixed price stipulated in the contract regardless of what cost the supplier is incurring. Financial risk is borne entirely by the provider (11). There are two formats of fixed-price contracts, Lump sum and Schedule-of-bid-items:

Lump sum contract. Payment is made in a total fixed monetary amount. Usually it is paid monthly as progress goes on.

Schedule-of-bid-items contract. Contract work is broken down into a series of bid items, each for a discrete element of the work of the project. Each bid item contain a title or a name that describes the particular element of work involved, and an estimated quantity and unit of measurement for the units of work in the item, an agreed fixed unit price and the estimated

quantity of units of work. The total contract price paid to the contractor is the monetary sum of all unit price extensions and Lump sum amounts for the quantities of work actually performed.

Cost-reimbursable

The owner periodically reimburses the provider for these incurred costs, usually on a monthly basis (10). There are four common formats of cost-reimbursable contracts, cost plus percentage fee terms, cost plus fixed fee, guaranteed maximum price terms and target estimate/(cost plus incentive fee);

Cost plus percentage fee terms. The owner agrees to reimburse the costs incurred by the provider of the services and, to pay a fee equal to a fixed percentage of incurred costs that is stipulated in the contract. There is no incentive for the provider to control costs. The more spent, the more money earned.

Cost plus fixed fee. The owner reimburses all of the service provider`s costs and pays a fee that is fixed at the beginning of the contract. This ensures that, the provider of the services will not benefit by an increased fee as is the case under cost plus percentage fee terms.

Guaranteed maximum price terms. When the owner has paid out funds equal to the guaranteed maximum price, no further payment is available. The provider must then continue to perform at her own expenses until all of the agreed-upon services have been performed according to the contract terms. If it goes under the guaranteed maximum price, the owner receives the total benefit of the savings.

Target estimate/ (cost plus incentive fee) The target estimate is the most probable cost of providing the contemplated services. A fee as payment for the services is also agreed to be based on the magnitude of the target estimate with the provisio that the parties will share the benefits or penalties of any underruns in the actual cost incurred in providing the services, compared to the target estimate. Often it has a top roof of overruns. Else it is a 50/50 percent share. The compensation format gives no incentives for the provider to save cost after the bottom roof is achieved (11).

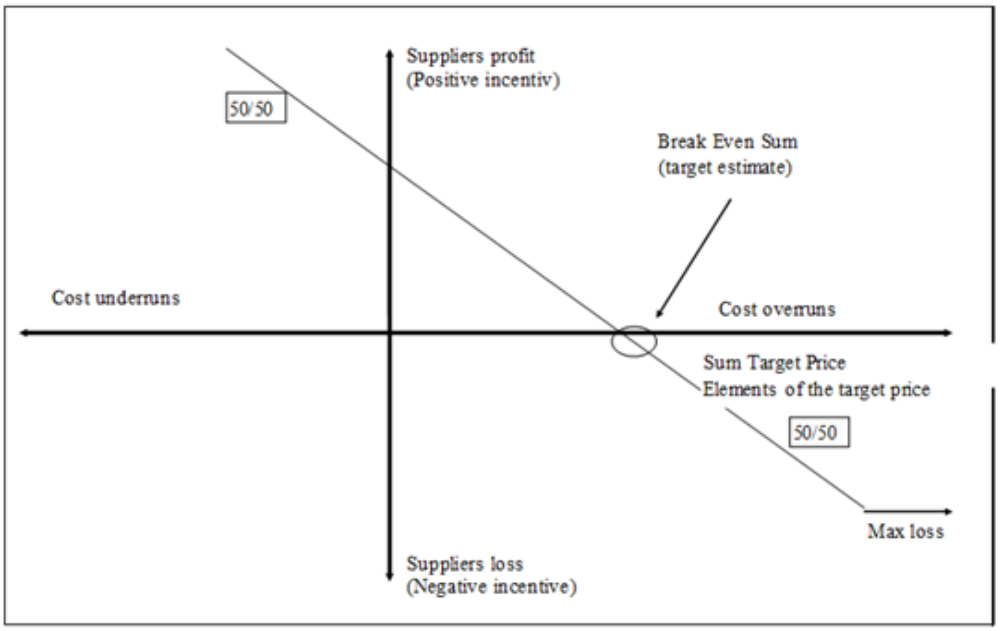


Figure 1: Osmundsen P: Complex procurement to the Petroleum industry, Lecture notes MIN 130 Contract Strategy. University of Stavanger spring 2012

Provisional sum

The contracts signed in the Cessation portfolio contains is a combination of different compensation formats. The compensation formats used in the Cessation project portfolio are presented in section 5.4. A compensation format used in the Cessation project portfolio contracts, which were not presented in the section above, is Provisional sum. In general, it refers to a price

for work that may not be required, or whose scope is undefined. In either case, the parties do not try to price it accurately but simply include a provisional sum as their “best guess”.

Provisional sum are often used in situations where the precise details of the work cannot be fully described up front, or when the need for new technology is present and this makes it impossible to price accurately in advance (12).

2.3 Selection of compensation format

Selection of the compensation format can be challenging for many projects. A brief overview on how to select compensation format is given in this figure from Rikard Kinn and Svein Gjerakers (13); "TIKO II, Contract Execution Models for Norwegian Offshore development project, 1998."

Selection Criteria (simplified):

Level of technical definition	High	High	Medium	Low	Low	Low
The client's involvement	None	Low	None	High	High	High
Market capability	High	High	High	Medium	Low	Low

Compensation Format:

	Lump Sum	Target Sum	Unit Rate	Neutral	Daywork	Reimbursable

Effects:

The client's QxNxR risk:	N/A	50% of Quantities Norms	Quantities	Quantities Norms	Quantities Norms	Quantities Norms Rates
The contractor's QxNxR risk:	Quantities Norms Rates	50% of Quantities Norms + Net Rates Profit & Overhead	Norms Rates	Net Rates Profit & Overhead	Rates	N/A
Risk for commercial disputes	High	High	Medium	Low	Low	Low
Contractor's incentives to work efficiently	Positive	Positive	Positive	Neutral	Negative	Negative
Contractor's incentives to optimise design	High	High	Low	Neutral	Low	Low
The client's quality risk	High	Medium	High	Low	Low	Low

Figure 2: Contract Execution Models for Norwegian Offshore Development (13)

The first box with the heading "selection criteria" has three dimensions; The "**Level of technical definition**" refers to the extent that detailed and correct technical information about the project exist. If the technical definition is high, i.e. all technical details, technical solutions and materials to be used are known and correct; the recommended compensation format to be used is Lump Sum, but the lower this definition, the compensation format to be used tends towards reimbursable.

The **client`s involvement** refers to how much the client needs to or intends to be involved in the project during the execution. The less the client intends or needs to be involved, the recommended compensation format to be used is Lump Sum, and the more the client needs to be involved, the compensation format to be used tends towards reimbursable.

The "**Market capability**" refers to two things. One is the *competence and the experience* that exists in the market in delivering the project. If the market has executed similar projects for several years, they know the challenges and pitfalls, and they are therefore not exposed to the same risk as taking on a new project. As with removal projects, there is not much experience in executing these, since no suppliers have executed similar projects for years.

The second is related to the *availability of contractors* in the market. If the market is over heated due to great demand, it is possible that the Lump sum that they offer will be higher than it would be in a less heated market. If there is a surplus of contractors in the market, there is a greater chance of getting someone to do the job for a much lower price than in a heated market. Another fact is that it can be harder to get contractors to commit to Lump sum contracts when the market is overheated, since then all the risk lies with the contractor. The risk is also higher that in a heated market contractors take on too much work, and a fixed price deal may fall apart faster if the contractor starts to struggle. The higher the market capability, the recommended compensation format to be used is Lump Sum, and the lower this capability, the compensation format to be used tends towards reimbursable.

From these three dimensions explained, it can be a good indication of which compensation format to use.

(Q x N x R is abbreviation for Quantity – the amount of components that is needed in the project, Norm – is reflecting the quantity unit of work (e.g. hours, days, tons), Rate – is reflecting the price of producing one unit of work.)

Effects of compensation format

The **effects** of the chosen compensation format can be seen from the third table on the figure, and can be a good starting point for an early discussion of which compensation format that could be the best alternative to use.

The risk for **commercial disputes** is higher the closer the compensation format gets to a total Lump Sum (high risk for variation orders etc.), and lower as you move towards reimbursable. The supplier can be entitled to request variation orders for things that are not explicitly included in the Lump Sum contract, and if the scope of work were not well defined, there is a bigger chance that commercial disputes will happen.

The incentives for **contractors to work efficiently** are higher (more positive) the closer you move towards Lump Sum, and lower (more negative) as you move towards reimbursable. For reimbursable, the contractor will get compensated for the hours used, so he has no incentives to work efficient, as he has with Lump Sum, where he gets the same amount no matter how efficient he works.

Contractor's **incentive to optimize design** is higher the closer you move towards Lump Sum, and lower as you move towards reimbursable.

The client's quality risk is high for Lump Sum and Unit Rate, medium for Target Sum, and low for the rest. When the contractor is paid only a Lump Sum, he has no incentives to put in extra effort on the quality into the project, as he is not compensated for it (at least not by extra money). But for Reimbursable, he is compensated for everything, and has few incentives not to put in extra effort.

It is important to state that there is no such thing as a "perfect" compensation format. The use of each compensation format has its pros and cons. The most important is to choose the compensation format that is best suited for the particular circumstances of the transaction/project

and the contracting parties, so that incentives are correct set and allocation of risk is well distributed.

2.4 Contingent contract design and compensation format

When designing contracts, the compensation format must be seen in close relation with contingent contract design. In the article "Building and Construction projects –optimal design of incentives and contracts" (14) Osmundsen states criteria's that should be taken into account when combining contingent contract design and compensation format. The most relevant criteria regarding removal projects are rendered below.

a) **The extent to which the principal needs to influence the execution of the project, i.e. whether the principal needs the flexibility to make changes during the execution of the contract.**

   If the principal needs influence during the execution of the project - reimbursable will be more appropriate than fixed-price contracts. In theory, the need for changes should be minimal during the execution of removal projects.

b) **To what extent the project implementation is time-critical**

   If project implementation is time-critical, it is important to find flexible organizational solutions to avoid unnecessary antagonism and conflict. Reimbursable may be more appropriate than fixed-price contracts in this case, notably with the disadvantage that it is generally more expensive and that the final realized costs are then more difficult to predict. Removal projects are not time-critical in most aspects.

c) **To what extent the scope of work is well defined**

   If the job description is not sufficiently detailed, traditional fixed-price contracts are not applicable. In these cases it is also difficult to implement target incentives, where the parties share cost overruns and savings. According to Bajari and Tadelis (1999) (15) the principal will in these cases be best served by account work, since the agent may always find ways to argue that the realized costs above budget is due to inadequate requirement specification. One of the challenges with removal projects are that the scope of work is often difficult to estimate up front.

d) To what extent the agent is capable of handling turnkey – deliverables.

If there are suppliers that have technical and organizational implementation capacity to handle turnkey deliverables, the principal has a greater scope of opportunities for administrative arrangements between the parties. With turnkey deliverables, costs might be reduced if the turnkey provider holds the necessary expertise in project management. Moreover, the design can be tailored to the agents engineering abilities. For larger deliveries, high financial strength of the supplier is a prerequisite for turnkey contracts. If this is not satisfactorily met, the principal can be better off by splitting the total project into modules. This may also be the optimal solution if the demand for turnkey-deliverables reduces the number of relevant suppliers to such an extent that competition becomes too weak. Statoil has as its strategy for the execution of the removal projects in the Cessation portfolio to hand out turnkey contracts. (3)

e) Contracts and incentive schemes used by competing principals

A provider often holds simultaneous contracts with several companies (i.e. a multiprinsipal-agent relationship). Contractor holds scarce resources and must allocate them between the various customers. One can see this as the different principals compete to obtain a good level of service from the provider, even *after* signing the contracts. Each company must take into consideration the competing contracts when they are designing their own incentive-schemes towards the supplier. An example of this is when a vendor removes installations for two companies, one with a fixed-price contract and the other with bill payment (cost plus). If detailed cost control is expensive or difficult, the supplier has an incentive to ascribe an over proportional share of the common costs to the contract with reimbursable scheme. Incentive schemes and contracts used by other principals are presented in section 5.6.

f) **The relative risk aversion of the contracting parties**

To establish incentive schemes for the agent, it is necessary that he carries risk. The reason is that incentives will make the agent's compensation contingent on actual costs or profits and these measures are normally stochastic and partially outside the agent's control. The agent's aversion to risk-bearing can limit the incentive intensity.

According to incentive theory, the incentive intensity in the agents` contract should be high (i.e. agent compensation should largely be dependent on financial performance of the project) when;

(i) **The risk aversion of the agent is low**. If the agent has low risk aversion, he will accept an incentive-based (risky) compensation format without demanding high risk premiums. The higher the risk aversion of the agent, the higher the risk premium the agent will put on the contracts price. This risk premium needs to be evaluated against the cost of using other compensation formats. As will be seen later in thesis, the risk aversion of an agent can be so high that he refuses to take on Lump Sum format as this is the most risky format for him.

(ii) **Additional investment from the agent is very profitable for the principal**. In the case of removal projects, finishing the projects ahead of schedule adds no particular value to the operator. But discharge of oil during operation could have significantly impact on the operator's reputation. Here, the operator is best served if the area of HSE gets additional investment from the agent, and must therefore take this into account when designing contracts.

(iii) **The principal is able to measure the agent's performance with high precision**. If it is difficult to measure performance, the agent is in addition faced with "measurement risk" and will therefore require additional risk premium. This can be seen as a challenge in the case of establishing HSE incentives in these contracts, which will be discussed later in the discussion section. Possible errors - as perceived by the agent - can also result in conflicts.

3.0 Background for removal of disused offshore facilities

The subject of removal of offshore facilities became a public issue with the Brent Spar platform owned by Royal Dutch Shell. In February 1995, Shell announced their plans of deep sea disposal of the platform. The plan was to tow the platform out, and sink it on 2.5 km deep water. The UK government had approved the plan for the deep sea disposal (16).

In April, Greenpeace activists occupied the Spar platform, claiming that Spar contained 5500 tons of oil. In May the activists removed from Spar, but called for Shell boycott in continental Europe. By June 1995 - eleven states called for a moratorium on sea disposal of decommissioned offshore installations. The moratorium was opposed by Britain and Norway. The Brent Spar was at the end towed into Erfjord in Norway, and parts of it were reused at the seabed at Mekjarvik as part of a ferry quay (16).

After the uproar with Brent Spar, regulations were made in order to control the removal of offshore facilities. These regulations are the main drivers of the offshore removal projects today.

3.1 Regulations

Disposal and decommissioning of offshore facilities are regulated mainly by the following international and national regulations (3);

- The OSPAR (OsloParis) Convention 98/3, Feb 1998
- The Norwegian Petroleum Act (Chapter 5)
- Guidelines of the International Maritime Organization (IMO) (resolution A.672)
- Stortingets preposition No.47 (1999-1997)

It can be difficult to establish an overview of the different regulations, as they sometimes overlap, and they protect different areas of the removal work. Like for instance the IMO guidelines purpose is to safeguard considerations for shipping, but will still have an impact on the removal of offshore facilities.

Excerpts of the most important regulations regarding removal projects are presented.

International

The central international framework is set by the OSPAR (OsloParis) Convention and the guidelines of the International Maritime Organization (IMO).

OSPAR 93/8

The OSPAR convention 93/8 entails that "dumping and abandoning all or parts of disused offshore facilities in marine areas are prohibited" (2). However, the decision does not include:

- parts of a facility that are beneath the seabed
- concrete anchor foundations that do not present an obstacle to fisheries
- drill cuttings
- pipelines

National authorities can consent to exemptions from the OSPAR decision for the respective facilities. Exemptions can be granted for all or parts of facilities following consultation with the other OSPAR countries if there are weighty reasons in favor of alternative disposal (2). Exemptions relate to**:**

- jacket bases for steel facilities weighing more than 10 000 tons in air and deployed prior to 9 February 1999
- gravity-base concrete facilities
- floating concrete facilities
- concrete anchor piles that disrupt or will presumably disrupt other lawful use of the sea
- any other facility when exceptional and unforeseen circumstances that are due to structural damage or deterioration, or other causes that entail similar difficulties, can be proven (2)

IMO guidelines

The IMO guidelines (MSC/Circ. 490, 4 May 1988) are instructive guidelines whose primary purpose is to safeguard considerations for shipping. Pursuant to these guidelines ;(2)

- Facilities shall be removed down to a minimum depth of 55 metres below the sea surface.
- Facilities that are in less than 75 metres of water, and that have a structural weight of less than 4000 tonnes, shall be removed.
- For facilities deployed after 1st January 1998, the stated depth is increased to 100 metres.

National regulations

The central national framework is set by the Petroleum Act and the Storting preposition No.47 (1999-1997)

Petroleum Act

Pursuant to Section 5-1 of the Petroleum Act, licensees must submit a decommissioning plan two to five years before a production license, or consent for installation and operation of a facility expires or is relinquished, or use of the facility is terminated permanently. Section 43 of the Petroleum Regulations deals with the content of a decommissioning plan. The decommissioning plan shall consist of a **disposal part** and an **impact assessment part**. The disposal part shall include proposals as regards continued production or shut down of production and suggested disposal of the facilities. Such disposal can include continued use in the petroleum activities, other use, complete or partial removal or abandonment. In the plan, the licensee shall examine various disposal alternatives. The decommissioning plan shall recommend a comprehensive solution. The regulations do not stipulate practical requirements as regards the actual removal (2).

Receiving facilities for disused offshore facilities on land must have permits under the (Norwegian) Pollution Control Act (2).

§ 5-3

"If a license or interest in a license is transferred, see § 10-12 first paragraph, the transferor licensee are secondarily liable to the other licensees for the costs of implementation of the decision on disposal. The transferring licensee must also be secondarily liable to the state if expenses related to the Ministry's decision on removal and disposal is not covered by the licensee or other person responsible." (17)

This means that if an operator sells a license, and if the existing license is unable to take the cost of the removal and the disposal, the previous license holder will be held responsible for the removal cost.

Storting preposition No.47 (1999-1997)

The application of Storting preposition No.47 (1999-1997) (Decommissioning of redundant pipelines and cables) is that

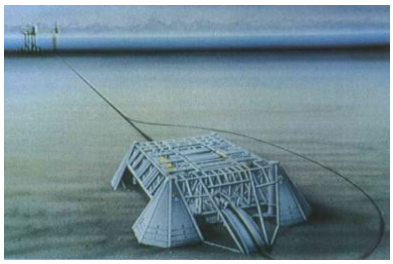
- As a general rule, pipelines and cables may be left in place when they do not obstruct or present a safety risk for bottom fishing, with costs of burial, covering or removal taken into consideration.
- If pipelines and cables cannot be left in place, they should be trenched.
- In either case, the pipelines and cables shall be cleaned and material hazardous to sea life shall be removed (2).

4.0 Cessation Project Portfolio

The Cessation Project Portfolio was established late 2009/start 2010. About 30 people from Statoil are involved in these projects on a permanent basis. Today it consists of 8 different projects, plus 2 projects that are currently set on hold. The slogan of the Cessation Portfolio is (18); "Expect the unexpected, and plan for it!" A brief description as well as a short status of each project in the portfolio is rendered below:

Troll Oseberg Gas Injection (TOGI) Template Removal Project

Description: TOGI consists of a subsea template with six well slots of which five production wells are drilled and remotely controlled from Oseberg A, a 20" pipeline and three service lines and one control cable plus topside facilities on Oseberg B. The TOGI facilities were installed during 1989 and `90 and have delivered gas from the Troll field for injection into the Oseberg field to enhance oil production at Oseberg (19).

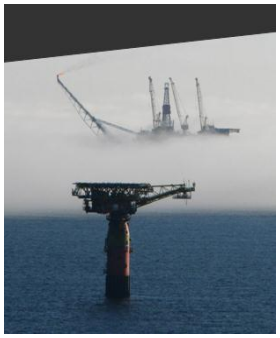


Picture 1: TOGI Template (20)

Status: The EPR Contract was awarded to Saipem in April 2011. The Disposal Contract was awarded to Kværner Stord in March 2012. Project completion is expected by mid-2013 (20).

SPM-C Loading Buoy Removal Project

Description: Statfjord C loading buoy is an articulated column structure, SPM type, located at block 33/9 with a water depth of 145, 5 m. It is 181 meters tall, and has a weight of more than 8000 tons. The loading buoy was installed at the Statfjord Field on the 1. May 1984 (21).



Picture 2: Statfjord C Loading Buoy (20)

Status: The EPRD contract was awarded to DeepOcean in August 2011. The project completion is expected by mid-2013 (20).

H-7 and 2/4-S Removal Project

Picture 3: H-7 platform (20)

Description: The H-7 platform is located in the German sector of the North Sea. In the period 1977 to 1999 it was used to maintain pressure in the pipeline transporting gas from the Ekofisk Centre to the terminal in Emden, Germany. The platform was disconnected from the pipeline four years ago (2007). The 2/4-S riser platform is located in the Norwegian sector and came on stream in 1985. It was used to transport gas from Statpipe to the Ekofisk Centre. The 2/4-S topside was removed in 2001, and the remaining jacket will now be removed (22).

Status: Project was sanctioned in December 2011. The EPRD Contract for H-7 was awarded to AF Decom. The EPR Contract for 2/4-S was awarded to Saipem. The Disposal Contract was awarded to Kværner Stord in March 2012. Project completion is expected by mid-2015 (20).

Statfjord A Removal Project

Picture 4: Statfjord A platform (20)

Description: A 3-legged Condeep platform, built in 1974 at Stord, and towed out offshore. Has a topside weight of 41 500 tons, a concrete substructure weight of 200 100 ton, a total height of 270 meters and living quarters that can accommodate 206 people. Statfjord A has been in production since 1979 (23).

Status: Cease of production is expected end 2016. The study work is ongoing. Pre-sanction and sanction dates are being evaluated (20).

Huldra Removal Project

Picture 5: Huldra platform (20)

Description: A wellhead platform which ranks as the first Statoil offshore installation designed for normally unstaffed operation. Aker Verdal in mid-Norway built the platform jacket. The topside was constructed at Kværner's Rosenberg yard in Stavanger and later shipped out and installed on the jacket in the spring of 2001 (24).
Status: Cease of production is tentatively planned for 2Q 2014**.** The topside and jacket is currently for sale. The pre-sanction and sanction dates are being evaluated (20).

Removal of H-11:

Description: Similar platform to H-7. The option to remove H-11 lies in the B-7 contract.
Status: Project sanction was in December 2012. The option was executed in May 2012 (20).

Glitne FPSO Removal Project

Picture 6: Glitne (20)

Description: A Floating Production Storage Unit (FPSO), owned by Teekay. Cessation will be responsible for removal of subsea installations and pipes connected to the FPSO.
Status: The Pre-sanction and sanction dates are being evaluated. The Cease of production is tentatively planned for 1Q 2013 (20).

Gullfaks loading buoy disposal

Description: Comparable to Statfjord C loading buoy, (SPM-C)
Status: Contract award is being planned for 2Q 2013 (20).

Volve and Tune

Volve Removal Project and Tune Removal Project are set on hold (20).

4.1 Decommissioning process

The process of decommissioning offshore facilities will not be explained in details here, but is worth to mention.

The decision of closing down a facility will be a business case, and can depend on many factors such as oil price, new technology or maintenance cost. And for the same reasons, the lifetime of an installation can be extended.

The authority demands that 2-5 years prior to end of use, there has to be submitted a decommissioning plan, containing both a disposal part and an impact assessment part (Section 5-1 of the Petroleum Act). (17) So before the actual removal of the facilities, there is often extensive work that needs to be done. The planning and study of the facilities to be removed will need to start years ahead of the actual removal; depending on the size and complexity of the project. When the decision to shut down production is taken, the wells need to be plugged, all hydrocarbons need to be removed and all pipes needs to be disconnected, before one can start the removal and dismantling work.

The figure below shows 3 phases in a decommissioning project; Definition, Decommissioning and EPRD (Engineering, Preparation, Removal, Disposal), and the expected work within each of the phases. Note that this is just a simplified model of the process, not an established model necessarily used by Statoil.

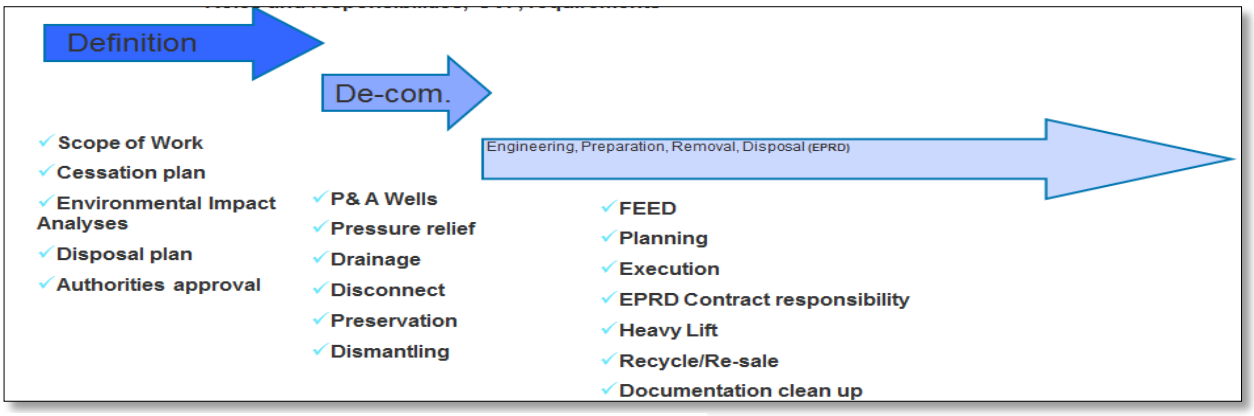


Figure 3: Decommissioning process (18)

The figure below show a more extended version over the process used by Statoil; the process starts years ahead of the actual removal, and goes through several phases before the disposal is completed.

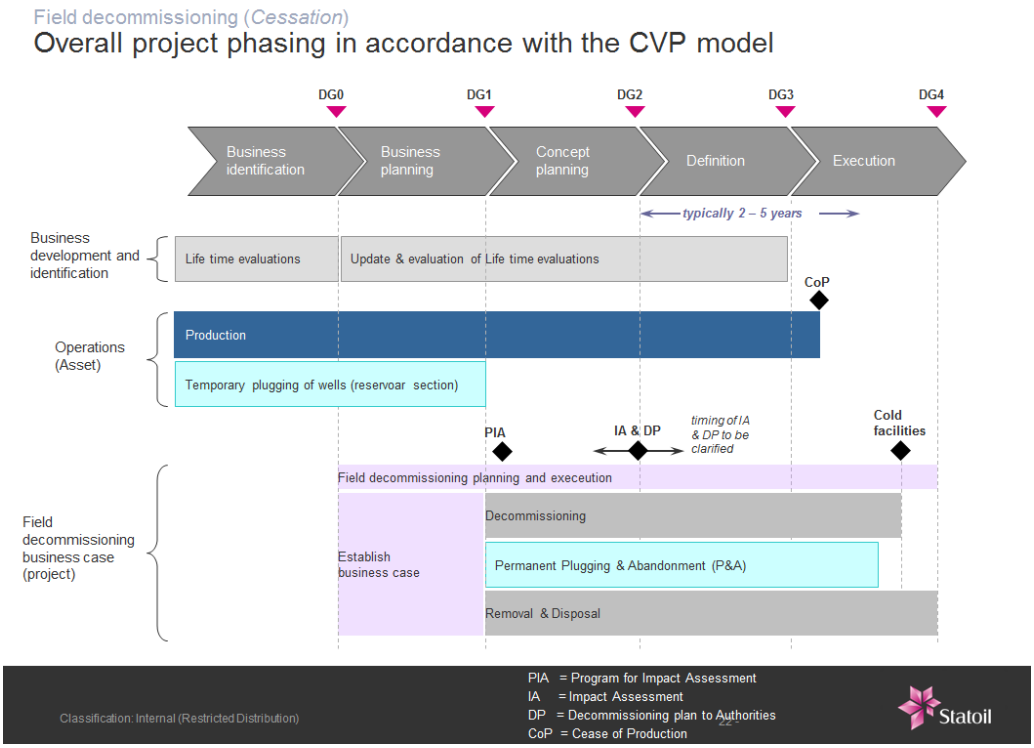


Figure 4: Overall project phasing, Statoil (3)

4.2 Removal methods

The removal method plays a central role in the execution of these projects, as the suppliers choose the removal method and the removal method varies for each project. Typical removal methods for offshore facilities are; Single lift, reverse installation (heavy lift), piece small (piece medium) and re-float. These four methods are described below.

Single lift

Lift entire units with heavy lift vessels. The method can be used on topsides, jackets and subsea structures. The method requires a special heavy-lift vessel.

Picture 7: Single Lift (3)

Picture 8: Single Lift (18)

Reverse installation (Heavy lift)

Split topside into modules and lift with heavy lift vessel. The method can be used on topsides, jackets and subsea structures.

Picture 9: Heavy Lift (3)

Piece small (piece medium)

Cut topside in small/medium size pieces and transport onshore. This method contains high degree of manual work. The method can be used on topsides and jackets.

Picture 10: Piece small (3)

Picture 11: Piece small (3)

Re-float (tow/wet tow)

Used to re-float the facilities with buoyancy tanks and then towed to shore. (Successfully used by Aker Solutions on Maureen A GBS). The method can be used on jackets and templates.

Picture 12: Re-float (18)

Picture 13: Maureen A GBS (3)

4.3 Cessation project challenges

The Cessation project portfolio is faced with several challenges when planning and executing removal projects (18). These challenges are essential to be aware of when designing contracts, as they represent important characteristics of these projects. These main challenges are divided into; operational challenges, contractual challenges, market challenges and project control challenges. The challenges are described below.

Operational challenges

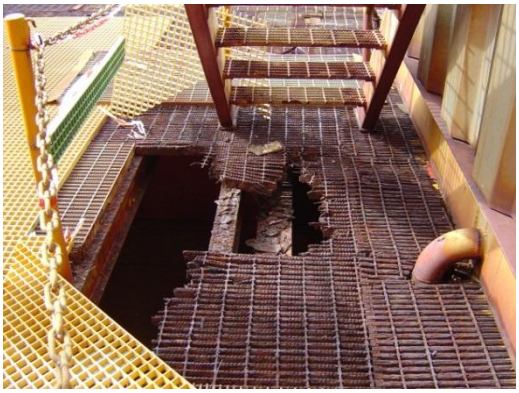
Cold and "worn-out"

Platforms and facilities can be "cold" and "worn-out". This means that all the utility, control and instrument systems are decommissioned. Systems are not working, and equipment needed, such as cranes and helidecks are not present or in a condition to be safely used. Living quarters are shut down, and often in a condition that is unsafe for further use. The amount of corrosion can be extensive after years in harsh environment.

Picture 14: Platforms left for years (Frigg) (25)

Make safe

Rebuilding is often required before removal to ensure structural strength. After years offshore in harsh environment, the facility needs to be strengthened for safe access. One cannot place an excavator or a helicopter on a platform that has been left offshore for years, where the corrosion has had huge impact. Pieces and modules to be lifted may need to be strengthened as later work on the module made it heavier than original designed or it is hurt by corrosion.



Picture 15: From Frigg removal (25)

Incomplete and/or missing documentation for materials, certification, procedures etc. The documentation on construction, equipment and materials can after years be non-existent or wrong. Later modification work on the facility may have changed it from original documentation. The existence and amount of hazardous materials can be unknown. For the oldest facilities on the Norwegian Continental Shelf, removal was not part of the original design and construction.

Contractual challenges

Varying contract documents

The contract documents allow for the use of very different removal methods and removal schedule, as the suppliers propose their method and timeframe in the tender. This makes the scope of work, the price format and the schedule (with large windows and varying duration), vary from tender to tender, which again makes it challenging to compare tenderers and to establish benchmarking numbers for the items/work to be procured.

"Inconsistencies" in documentation

Statoil`s documentation of the facility that are handed over to the supplier before a tender process may be inconsistent. The relationship between map and terrain due to age, wear and tear and modifications makes exact documentation a challenge. The company will hand all tenderers "the same wrong information", and the information is not easy verified prior to a tender. This makes the contract establishment challenging, as there is a significant amount of risk to be allocated related to physical conditions and "hidden" circumstances.

Market challenges

Heavy Lift

Heavy lift is traditional and safe, but there is limited capacity. There are only two vessels in the market today that can do this, "Thialf" owned by Heerema and "S7000" owned by Saipem. And it competes with development projects.

Single Lift

A vessel that can do a very heavy single lift (for e.g. the topside of Statfjord A) is per today not built. The vessel Pieter Schelte will be big enough, but is under construction – it is not ready until early 2014. Other contractors are waiting for commitments (Mammoet, Twin Marine, Global Maritime) before building.

Piece Small (or Medium)

Dismantling offshore is challenging and labour intensive, but feasible.

Disposal

There is limited capacity in Norway, and there are strict regulatory requirements for the disposal sites.

Project control challenges

Experience/benchmarking

There is a lack of experience numbers for planning and estimating these projects. This makes the project costs challenging to estimate up front. Cessation benchmarking numbers are currently not available.

4.4 Decommissioning industry experience transfer to Statoil

According to the Norwegian Petroleum directorate`s fact pages (26) the number of removed or partly removed facilities in Norway per today is 46. 22 of these are characterized as jackets (4, 8, 12 -legs and tripods), 10 of these are subsea templates and 7 are of them are loading systems.

On the Norwegian Continental Shelf, Aker Solutions in partnership with Saipem removed the first platform in the North Sea; Odin for Esso in 1996. Aker also removed the platform Maureen A for Phillips (1996- 2003) (27). ConocoPhillips has removed a substantial amount of bridges, flares and tripods on Ekofisk and Cod field (28). Perhaps the most familiar decommissioning project on the Norwegian continental shelf is the removal on the Frigg field owned by Total, consisting of 5 fixed platforms, one damaged jacket, a flare stack and one Manifold & Compression platform.

On the UK side, Shell has several decommissioning projects ongoing; the Brent field, the Infatigable field and Brent Anchor blocks and Brent Flare. Only some of them are finished. The number of removal projects finished on both Norwegian and UK side are not extensive. According to "Oil and Gas UK 2012 Decommissioning Insight" (29), released in October 2012, only 39 platforms have been decommissioned in the UK since UK oil and gas activity began.

Statoil has no previous decommissioning experience prior to the Cessation Project portfolio, except from a removal on the Yme field in 2001, which has not been well documented.

During the interview process with stakeholders in the project, one finding was that valuable experience with decommissioning projects from outside Statoil was very hard to get. Information sharing (especially with regards to numbers), among operators in the industry is not common, as this kind of information is seen as company property and business information. So the experience transfer is limited. But, Statoil have had some experience transfer, which is rendered below.

4.4.1 ExxonMobil, Odin Decommissioning

The following experience was shared with Statoil from ExxonMobil (Esso Norge AS, an ExxonMobil subsidiary), at a Gassled Partner Meeting August 27, 2008. (30) The report from ExxonMobil (30) regarding the decommissioning of Odin concluded with the following:

7 alternative removal and disposal solutions for Odin were evaluated. The removal contract was awarded April 1996 to Aker/Saipem (partnership) and reversed installation methodology was used. The contract format used was Lump Sum, with schedule flexibility, which worked well and gave few interfaces. The project was executed with good cost control and few change orders. Nevertheless, a few operational problems were identified, such as downtime during winter operations, and that the pile cutting took longer than planned due to not well suited tools for the conditions.

4.4.2 Aker Solutions, Frigg decommissioning

Aker Solutions presented the following experience to Statoil from their work on the Frigg & MCP01 Cessation project (27):

The project was completed 2 years prior to contract completion date and all platforms that were well defined were a success. All heavy lift campaigns were also successfully completed offshore and inshore. The challenge with these projects was the offshore preparation. MCP01 and CDP01 were nightmares; these facilities were left unmanned for years. Platforms should not be left unmanned after close-down; engineering should be performed whilst platform is operational and it is important with site surveys before selecting methods and sequencing. Also, EPRD Lump sum contracts do not reflect the inherent risks in Cessation projects.

4.4.3 Experience transfer summary, The 11th NPF North Sea Decommissioning Conference

From the 11th NPF North Sea Decommissioning Conference, Statoil representative made an experience summary "Experience Transfer, Top Ten from Peers" (31), stating the following conclusions;

Engineering hours have in previous projects been heavy underestimated (Frigg went from 500.000 to 2.500.000 engineering hrs.) and became bottlenecks for the projects. Much more time should be spent on engineering before mobilizing offshore, because offshore man-hours have in previous projects been heavily underestimated. Focus on interfaces is important and a common Cessation project web site with all the data of the facilities collected in one place is very useful when working on the projects.

Regarding the cost development, there have been a 300% cost increase since 1996. And for all the involved (oil companies, main contractors, sub-contractors), the learning curve working with these projects have been steep.

Regarding HSEQ, Cessation projects are seen as more risky than traditional offshore construction projects. So increased safety awareness on decommissioning projects (audits, safety reviews, risk assessments & simultaneous operations) should be established. The huge number of lifts by platform cranes represents a particular HSE challenge (piece-small). Due to the high risk in these projects, it might be an idea to prepare risk meetings with contractors prior to the contract award. The timing and the offshore schedule of the execution of these projects will mainly be governed by flotels and Heavy Lift vessels commitments.

4.5 Conclusions from Oil and Gas UK Decommissioning Insight 2012

It would have been interesting to look further into the experiences with decommissioning in the UK, as they could be comparable with Statoil's projects. But, due to time constraints, that must be left for a later study.

However, regarding the offshore removal industry and the supply chain, the report "Oil and Gas UK 2012 Decommissioning Insight", released in October 2012 (29) highlighted that with only 39 platforms decommissioned since UK oil and gas activity began, the UK supply chain has not yet been tested to a great extent in terms of its capability to meet decommissioning requirements in the North Sea. The data in the report highlight the increasing need for the current UK supply chain to adapt to the challenges that will be presented as the industry gears up for a steady increase in offshore infrastructure removal post 2014.

The report (29) further states that decommissioning will typically be a collaborative effort and make use of the same supply chain services employed in the installation of infrastructure. The expertise currently available in the UK oil and gas industry should stretch to cope with the demands of the emerging decommissioning market. However, it is expected that the supply chain may take time to adjust and there may be specific challenges such as lifting capacity, availability of equipment, vessels, rigs and specialist crews to carry out such work. This may require particular focus from the whole supply industry to innovate, drive costs down and improve efficiency (29).

5.0 Cessation procurement strategies

The Cessation project portfolio consists today of 8 projects (plus 2 projects on hold). For the 3 different projects; Troll Oseberg Gas Injection (TOGI) Template Removal Project, SPM-C Loading Buoy Removal Project and H-7 and 2/4-S Removal Project , 6 different contracts, (2 EPRD, 2 EPR and 2 D) have been signed. Prior to awarding these contracts, Statoil had to establish three procurement strategies; one "Category strategy for Removal and Disposal" that counts for all the projects in the portfolio, "Project Execution and overall Procurement Strategy (PEOPS)" and a "Specific procurement strategy" which both are outlined specific for each project.

The "Category Strategy for Removal and Disposal" draws out the major guidelines for the procurement strategy for all of the projects in the Cessation portfolio. For each project, a "Project Execution and overall Procurement Strategy" (PEOPS) needs to be made. The goal for this document is to establish plans for project execution, estimate projects costs, identify project risks, and set goals for the overall procurement strategy to be used in each specific project.

After the PEOPS is outlined, prior to the tendering process, the operator has to present a "Specific procurement strategy" for a purchase (above a certain amount) on behalf of the license to the other license members. This Specific procurement strategy also includes information about the tendering process, the evaluation criteria for the bids, and the value estimate of the project as well as suppliers descriptions. The purpose of the specific strategy is to secure that the most favorable supplier is selected for the performance of the work.

The Category Strategy for Removal and Disposal as outlined by Statoil will be presented next.

The PEOPS for Troll Oseberg Gas Injection (TOGI) Template Removal Project and SPM-C Loading Buoy Removal Project, and the Specific strategy for the 3 different projects; Troll Oseberg Gas Injection (TOGI) Template Removal Project, SPM-C Loading Buoy Removal Project and H-7 Removal Project will be summarized in the 2 next sections. After that, the compensation formats used in these contracts will be presented.

In the last section of this chapter contract strategies in removal projects used by 2 other operators and one supplier will be presented.

5.1 The Category strategy for Removal and Disposal

The philosophy behind the category management approach is that a company need to have one common overall approach to the supplier markets, based on the total needs for the company (32). The idea is that for a specific category of goods to be procured, (e.g. steel, offshore drilling rigs, chemicals etc.) a company will obtain better prices and conditions if it establishes an overall approach towards that specific supplier market.

The purpose of the Category Strategy for Removal and Disposal is to (3); "Ensure safe and cost efficient performance of the removal and disposal portfolio. It will provide recommendations that shall apply to purchases of services required to execute a removal and disposal project." (3)

Background for the category strategy for removal and disposal

The Statoil Book , Statoil`s governing document states the following; "We are committed to securing the best value through optimum use of in-house and supplier resources to provide products and services with the right quality, delivered on time. We develop, integrate and implement sourcing strategies to achieve the best contracts for the benefit of our group through a category approach to goods and services, based on aggregated demand management, the global market position and robust analysis to minimise execution risk."(33)

Validity

Due to the relatively limited experience Statoil has in this type of projects, the validity of the category strategy is set to 3 years. New information will be harvested with every new project and this new information will continuously be implemented in an updated category strategy (3).

Characteristics of the Removal and Disposal Portfolio

The Category Strategy for Removal and Disposal outline these 7 characteristics that are specific for removal projects in Statoil;

1. The removal and disposal of offshore facilities is a new business to Statoil. Statoil do not have significant experience in executing these types of projects.

2. There is a high risk that the media exposure during onshore disposal could weaken Statoil's (and other stakeholders) reputation. This is due to environmental aspects of a lot of the materials in the facilities.

3. Fields/facilities that are planned for removal can «live» longer than first expected due to high oil price, maintenance costs and new technology that extends the lifetime of the production. This makes the Cessation a very volatile portfolio, i.e. it is difficult to assess future market, especially beyond the next three years.

4. The projects are "schedule independent". There are no «first oil» considerations to be taken into account. There are no NPV (Net Present Value) that starts to run if the project is delayed as it is in new development projects. There is also no "lost" money due to shut down of production as in maintenance projects.

5. Projects contain a re-use component. Offshore facilities often contains high quality steel with second-hand value that are included as discount in tenders.

6. The current contracts seem to be shifting towards a favorable sentiment to EPR&D «bundling».

7. "Expect the unexpected and plan for it". The facilities that are to be removed are often old, and there is often limited information about both the state and condition of the facilities. It might not exist any drawings or there is limited documentation on the facilities. The installations were initially not designed to be removed, or the documentation that exists could be wrong. The conditions of the facilities after 30-40 years in harsh environment could also be difficult to predict. The presence and amount of hazardous material is unknown (3).

Regulations

The removal and disposal of disused offshore facilities is regulated by the following national and international requirements.

-The OSPAR Convention 98/3, Feb 1999

-The Norwegian Petroleum act (§5-1, section 30 and 43)

-Guidelines of the International Maritime Organization (IMO) (resolution A.672)

-Pipelines: Stortingsmelding nr. 47 (1999 - 2000)

The OSPAR convention 93/8 (2) entails that "dumping and abandoning all or parts of disused offshore facilities in marine areas are prohibited. "

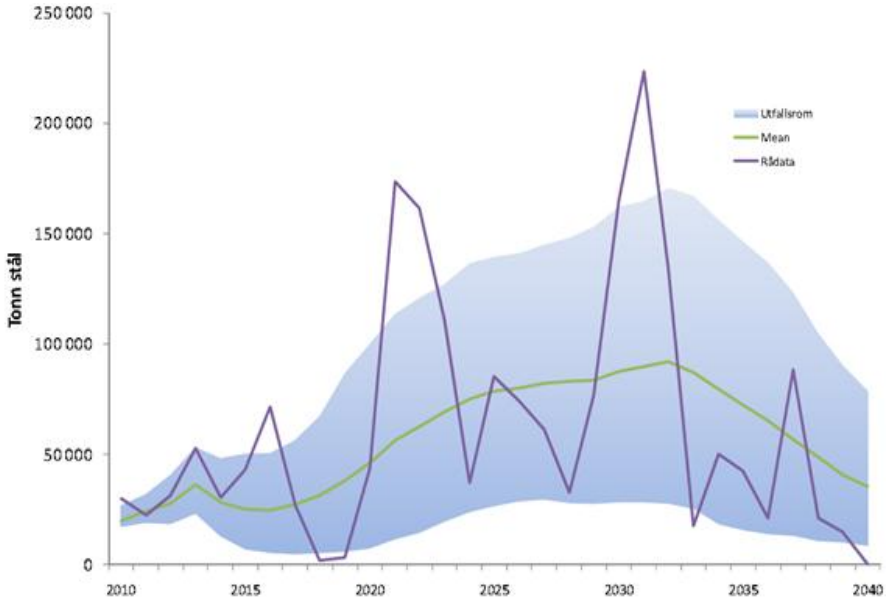
Framework conditions

The framework conditions the Cessation project portfolio needs to work within are; Regulations (mentioned above), The Statoil book (Statoil`s governing document, mentioned above), the market and Statoil`s corporate goals. The relation to Statoil's strategic goal to increase its production to 2, 5 boe / day in 2020 may not be obvious. But the Cessation portfolio needs to contribute to this goal as well. Cessation projects will need to align with this goal in its procurement processes, as it needs to make sure that it does not compete over the same resources (suppliers, rigs, vessels etc.) that Statoil needs to reach its overall stated production goal.

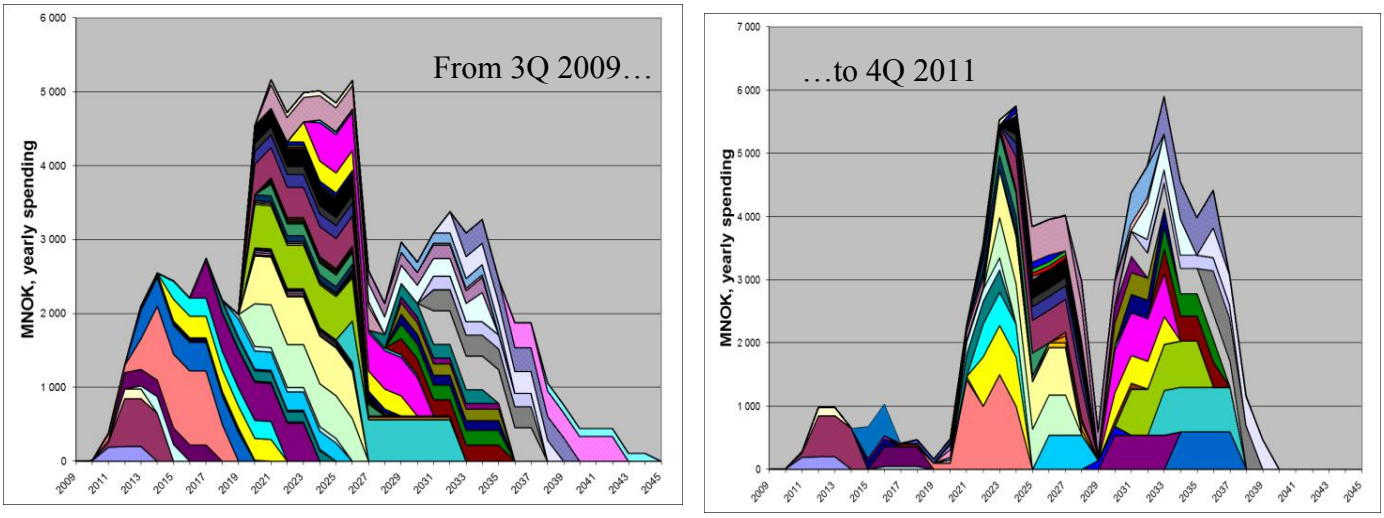
Figure 5: Framework conditions (3)

Demand

There are currently 500 structures on NSC. The yearly steel weight to disposal yards in Norway is expected to be 50 – 80 000 MT up to 2020 and 200 000 MT Beyond 2020. After this, new disposal yards may be required. The estimated total cost for the removal of these is estimated to be 160 billion NOK (Excluding 14 Condeep structures) (3).



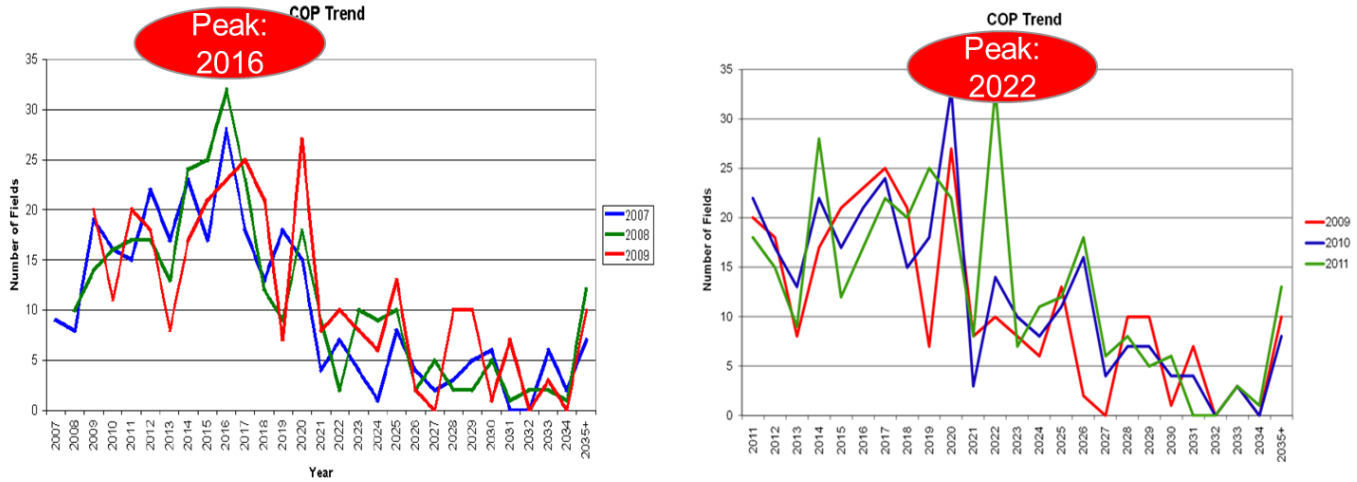
Graph 1: Tons of steel per year. (Numbers from «Avvikling av utrangerte offshoreinstallasjoner», Klif 2010) (3)



Graph 2: Statoil demand changes, NOK yearly spending (3)

The future demand is considered to have a very volatile character. As an example; the dates for Cease of Production (CoP) of the assets in the portfolio has in the period from 2009 to 2011 been postponed by 2 to 6 years. The graphs above show the changes in the future Statoil demand for yearly spending for removal projects in the period from 3Q 2009 to 4Q 2011(Peak moved from 2019 to 2023).

The situation in the UK sector shows similar results. The two graphs above show how the forecasting from the UK sector changed from 2010 until 2012, with an extension of the lifetime of the fields resulting in a postponed Cease of Production-peak from 2016 to 2022.



Graph 3: Changes in yearly spend, UK sector (3). (Numbers from "Avvikling av utrangerte offshoreinstallasjoner "Klif 2012 and UK Dept. of Energy & Climate Change, 2012)

Several factors as high oil price, new technology and maintenance cost contribute to postpone the Cease of Production of existing fields making it challenging to forecast the exact demand.

Relation to other Statoil projects

The demand must also be seen in relation to the current Field Development portfolio in Statoil. The figure below shows expected field development projects per year the next five years. It is important to take this into account when planning removal projects.

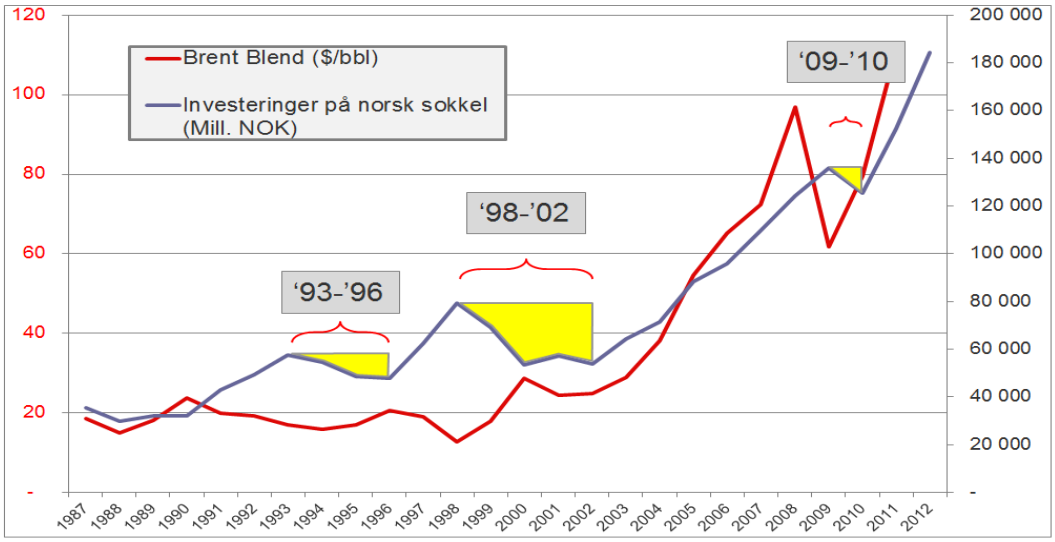
2013	2014	2015	2016	2017
Fram H-North	Alfa Sentral	Dagny & Eirin	Astero	Frigg Gamma Delta
Fram Phase 3 C-East	Gulfaks Subsea Compression	Erlend Øst and Kristin South	Bressay	Snorre Subsea WAG
Grane/Svalin Polymer Ass. Water Fl.	Gullfaks Sør Statfjord IOR	Lavrans	Krafla	Skrugard (including Havis)
Gudrun	Sigrun	Luva	Nøkken	
Snøhvit CO2	Delta S2	Mariner	Snøhvit Future Development	
Svalin C	Trestakk	NSGI		
Valemon	Smørbukk South extension	Peon		
Åsgard Subsea Compression		Peregrino II		
Vilje South		Snorre B Template (Snorre 2040)		
Snorre og Grane seismikk		Heidrun Oil Export		
Visund North				
Riser Replacement	Riser Replacement	Riser Replacement	Riser Replacement	Riser Replacement

Table 1: Identified Future Statoil Projects (3)

Flexible Timeframe

In order to capitalize on lower prices that potentially can be obtained in the market place in periods with less greenfield/brownfield activities the removal and disposal contractors is allowed a large degree of flexibility w.r.t choosing the time for execution of the work. This means that a part of the procurement strategy is that the contractors can propose the time for the execution of the work within a certain timeframe, i.e. that Statoil will not put specific dates for the removal, but will strive to use the available times of the contractor, so that they will not compete over the resources needed in development projects.

A good solution to avoid competing over the same resources is to undertake the projects when the investment on the Norwegian sector is low. This can be seen as the "yellow fields" in the graph 4 below. These periods often happens after a downturn in the price of Brent Blend.
The only problem here is to foresee when the oil price will decrease. Anyone who can look into the future of the oil price will be of great help to the Cessation team!



Graph 4: Investments on Norwegian sector (NCS) (3)

Supply

When it comes to heavy lift, there are currently only 2 vessels in the market that can do the job. (There are some new builds coming into the market, i.e. Pieter Schelter in 2014) The two contractors Saipem and Heerema are the only two holding these vessels that can be used. So even if there are other suppliers that are willing to take on an EPR (D) contract in the market, they will still need to subcontract the vessels from these two suppliers if they are to use the heavy lift capacity. Else they will need to choose a different removal method.
When it comes to the Disposal part of the contract, there are only three land facilities in Norway that are currently in operation and have permission from the environmental authorities to scrap facilities from the petroleum activities; AF Miljøbase Vats, Scanmet (previously Scandinavian Metal AS) and Kværner Stord AS (previously Aker Stord). In addition to these players, Lutelandet Offshore AS has also secured permission to operate a facility in Fjaler municipality in Sogn and Fjordane (2).

These will have a surplus capacity prior to 2020. It may also be possible to ship it to the UK or Europe, but an application for export has to be submitted 2 – 6 months prior to export (18).

Potential Contractors	Vessels	Comments
Saipem	Saipem 7000	Castoro 7 as possible accommodation unit.
Heerema	Thialf/Hermod/ Balder	
Allseas	Pieter Schelter	New build
Seaway Heavy Lifting	Oleg Strashnov	
Troll Lifter	Semi submersible	Not completed 2 x 1800 MT
TDC	Twin lift	2015 (earliest)
AFDO	Jack-up vessels, mono-hull vessels	

Table 2: Examples of Removal Contractors (3)

Project risks

The three main risks identified for the execution of these removal projects are; Reputational risk to Statoil and the supplier, unknown condition of facilities and the risk of occupational accidents. The reputational risk to Statoil and the supplier are especially related to environment issues as these facilities often contain hazardous materials that can be difficult to discover and keep track on. Bringing these old facilities into fjords near communities exposes Statoil and the supplier to the risk of being harmful to the environment.

Unknown conditions of the facilities make the scope of work difficult to predict, and thereby difficult to estimate exact costs and schedule for the projects.

The risk of occupational accidents is also present when the condition of the facilities is unknown.

Project opportunities

The three main identified opportunities for these removal projects are; re-use of facilities and equipment, flexible schedule and cost optimization as a result of allowing the market to propose sequencing and removal methods. Many of the facilities to be removed contains for instance high quality steel that can be re-used, and give Statoil an income. Statoil aim to give the suppliers a flexible schedule for the removal, in order to get the lowest price possible. The idea of giving the suppliers the opportunity to propose their own removal method will attract more suppliers into the tendering process, as not all contractors have the ability to provide all the different removal methods.

Contracting Strategies

Alternatives:	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Project management	Statoil					
E – Engineering	PM Contractor					
P – Preparation	EPR&D Contractor				P Contractor	
R – Removal					R Contractor	
D – Disposal		Option	D Contractor			Option
No. of contracts	1	1/2	2	3	4	3/4
Key advantages	• Allows for lean Statoil project organisation • Few interfaces for Statoil follow-up • Contractor is in better position to develop method and optimize interfaces			• Higher degree of competition • Less risk for each Contractor		
Key disadvantages	• Contractor(s) carries most interface risks (may lead to higher contract price) • Risk of limited competition			• Increased number of interface risks carried by Statoil (may lead to increased cost) • Larger Statoil project organisation		
Base case	• **Base case will for most projects be Alternative 1, 2 or 3 above.**					

Table 3: Contracting Strategies removal projects (3).

Statoil has in its "Category Strategy for Removal and Disposal" outlined these 6 alternative strategies for contracting within the Removal and Disposal area. From Alt.1 the whole project will be given as one single EPRD contract, until alternative 6 where all the different categories of work are split into different contracts.

Statoil aims to use alt. 1, 2 or 3 as base case for most projects. This means that they will aim to get one EPRD contractor (Alt 1), split the contract into EPR with the Disposal part as an option (Alt 2), or give out one EPR contract and one for the disposal bit (Alt 3).

Statoil does this with the identified risk of limiting the competition, and placing most of the interface risk on the Contractor, which in turn can lead to a higher contract price. The key advantages of choosing these strategies will be that it will allow for a lean Statoil organization. There will be fewer interfaces for Statoil to follow-up. Statoil also claims that the contractor is in better position to develop the removal method and optimize interfaces.

The alternatives the “Category strategy for removal and disposal” sets as base case do not differ between different projects (e.g. platforms, subsea installations, loading buoys etc.) or comments on the compensation format to be used.

5.2 Project Execution and overall Procurement Strategy (PEOPS)

The "Category Strategy for Removal and Disposal" draws out the major guidelines for the procurement strategy for all of the projects in the Cessation portfolio. For each project, a "Project Execution and Overall Procurement Strategy, (PEOPS) needs to be made. The goal for this document is to look into each of the projects, and establish plans for the project execution, estimate projects costs, identify project risks, and set goals for the overall procurement strategy to be used in each specific project.

The procurement goals for TOGI removal project and the SPM-C removal project as stated in the PEOPS, is rendered below. A more extended version of the PEOPS for the projects is found in appendix 8.0.

5.2.1 Overall procurement strategy TOGI removal project

The goals and objectives for the procurement process for TOGI were (19):

- Invite suppliers offering diverse capabilities to propose their recommended removal method
- Split the work into suitable contract packages which secure sufficient degree of competitive bidding
- Select suppliers with relevant competence who can deliver the required quality and capacity
- Establish contracts with well-defined terms and conditions, scope and clear interfaces
- Use Lump Sum compensation format as appropriate
- Statoil`s Frame Agreements shall be considered utilized where relevant
- Secure experience transfer and synergies from previous and on-going demolition projects
- Seek synergies by optimizing schedules and utilization of vessel spread across internal and/or external projects, where relevant
- Seek optimal re-use of material and commercial outcome of facilities

Overall Procurement Strategy Summary TOGI

The figure below shows the overall procurement strategy summary as stated in the PEOPS for TOGI. The pink indicates the work that Statoil aims to get done by one main contractor.

Color code: Same color indicated same contract

	Subsea Template Removal
Project management	**Statoil**
Method studies	1. Saipem – Heavy Lift Vessel (HLV) and HLV Barge (2004) 2. Aker Solutions – Buoy system ans Wet-Towing (2008, cost estimate 2010)
FEED	**N/A**
Subsea Surveys	**EPR(D)**
Engineering	
Preparation/ Ready for Removal	
Decommissioning	**N/A**
Offshore removal	" Main Contractor" EPR(D)
Cutting	Option: Cutting of 20" Pipe and Service/hydraulic Lines & Electrical Cables
Rock-Dumping Free span- West Slope	**N/A**
Area Clean-up & Covering of Pipeline ends	**N/A**
Disposal	Option/separate contract EPR(D)

Table 4: Overall Procurement Strategy summary TOGI (19)

5.2.2 Overall procurement strategy SPM-C removal project

The goals and objectives for the procurement process for SPM-C removal project is to (34) ; Ensure selection of the optimal supplier(s) for performance of the work in a safe and cost efficient manner by driving competition in the supplier market, thus:

- Invite suppliers offering diverse capabilities to propose their recommended removal and disposal method
- Minimize critical interfaces
- Use Lump Sum compensation format where relevant
- Seek reuse and recycling of materials
- Secure experience transfer and synergies from previous and on-going cessation projects
- Seek synergies by optimizing schedules and utilization of vessel spread across internal and/or external projects

Overall Procurement Strategy Summary SPM-C

The figure below shows the overall procurement strategy summary as stated in the PEOPS for SPM-C. The pink indicates the work that Statoil aims to get done by one main contractor.

		Physical Objects	
		SPM C	Protection Frame
Services	Project Management	Statoil	
	E - Engineering		
	P- Preparation		
	R- Removal		N/A
	D- Disposal		N/A
	FI – Fabrication & Installation	N/A	
	Seabed clean up and survey	Frame Agreement	

Table 5: Overall Procurement Strategy Summary SPM-C (34)

5.3 Specific Procurement Strategy

After the Project Execution and Overall Procurement strategy is outlined, prior to the tendering process, an operator has to present a specific procurement strategy for a purchase (above a certain amount) on behalf of the license to the other license members. This specific procurement strategy also includes information about the tender process, the evaluation criteria for the bids, and the value estimate of the project as well as suppliers descriptions. The purpose for the specific strategy is to secure that the most favorable supplier is selected for the performance of the work. A summary of the specific procurement strategy for TOGI removal project and SPM-C removal project is rendered below. A more extended version of the specific procurement strategy for TOGI and SPM-C can be found in appendix 8.1.

For both the projects, the following strategy is outlined (35) (36);

"The removal window will be set flexible for the supplier, in order for Statoil to get the job done at a lowest possible cost" and "The supplier gets to propose and recommend the removal method, which in turn will increase the competition."

Specific procurement strategy TOGI removal project

The specific procurement strategy for the TOGI removal project states that the successful tenderer shall be selected from suppliers having removal (R) as part of their core business (not subcontracted). The strategy is to hand out an EPR (D) contract where the D is included as an option. This will give the necessary flexibility to secure selection of a Disposal supplier acceptable to Statoil, as this is regarded as an exposed area for poor reputation (35).

The engineering shall be compensated on reimbursable basis with target man-hours. Lump Sum format will, to the extent possible be used. Regarding the Disposal (D), to the extent possible, it will be compensated on a NOK/kg/fraction basis (35).

Specific procurement strategy SPM-C removal project

The specific procurement strategy for the SPM-C removal project outlines that one contract where disposal (D) part is included in the main contract (EPRD), as the close interface between the removal contractor and disposal site should be handed out. The Contractor shall be responsible for compatibility between removal method and disposal site. The chosen contractor

shall have capability to complete all aspects of the work, either by own resources or by use of subcontractor (36).

The compensation format shall be reimbursable for the engineering and for one site survey. The preparation, release, towing and offloading to disposal site will be compensated at a fixed price. The dismantling and disposal will be compensated as a fixed unit price per fragment (kg/fraction) (36).

5.4 Compensation formats in Cessation Project portfolio contracts.

As previously stated, only 6 different contracts, for 3 different projects have been signed (2 EPRD, 2 EPR and 2 D) within the Cessation Project portfolio. None of the 8 projects in the portfolio is as of today finished. A summary of the compensation format for the EPR- contract for TOGI, the EPRD-contract for SPM-C and the EPR –contract for H-7 is rendered below. A more detailed view of the compensation in the contract is given in appendix 8.2. When the compensation format is provisional sum, the following Quantities/volume, rates and unit rates are used in the contract:

Vessels: Estimated number of days to be used x Day x Price per day
Engineering: Target man hours; Estimated number of hours/days to be used x hours/days x Price per hour/day
Fuel for vessels: Estimated number used x mT x price per mT
Waste/materials reused: Estimated number kg/MT to be used x kg/mT x price per mT/kg

5.4.1 TOGI removal project, EPR contract

Summary of contract price

The TOGI EPR contract is predominantly on Lump Sum format. Only the travel cost and the working vessel is on a provisional sum basis (13 days of vessels x 100 000 EUR per day). A summary is shown below (37).

	EUR
Lump sum	11 362 797
Provisional sum	1 335 000
Contract price	12 697 797

Table 6: Summary of contract price, TOGI (37)

- Note, all numbers in EUR

5.4.2 SPM – C Removal Project EPRD Contract

Summary of contract price

All engineering, materials and fabrication are compensated by Provisional sums. The preliminaries, preparation, removal and transportation are compensated as Lump Sum. The summary of the contract price is shown below (38).

	NOK
Lump sum	139 047 024
Provisional sum	34 835 171
Contract Price	173 882 195

Table 7: Summary of contract price SPM-C (38)

5.4.3 H-7 EPRD Removal Project contract

Summary of the Contract Price

Engineering, pre/post survey vessel and jack-up rig fuels are compensated as Provisional sums. The materials and fabrication in the disposal part are also compensated as Provisional sum. The preliminaries, preparation, removal and transportation are compensated as Lump Sum. The summary of the contract price is shown below (39).

	NOK	EUR	USD
Lump sum	244 440 765	14 725 140	
Provisional sum	53 206 070		1 337 686
Contract Price	297 646 834	14 725	1 337 686

Table 8: Summary of contract price H-7 (39)

EPR (D) for contract 2/4 – S and TOGI Disposal contract

The EPR-contract for 2/4 – S follows the same compensation format as the EPRD- contract for H-7. The compensation format for the Disposal contracts for TOGI and 2/4 – S will not be discussed in detail in this thesis.

5.5 Summary contract strategy

The contract strategy for each project varies only to a lesser extent; so the overall contract strategy for projects in the Cessation project portfolio can be summarized as follows;

- Statoil wants to hand out the contract using an EPRD, EPR (D) or EPR + D format, where one contractor is awarded the whole contract. This is done as Statoil perceive contractor is the best part to propose the method and to handle the interface risk.
- Lump Sum will be used to the extent possible and appropriate. Provisional sums can be used on engineering, materials and pre-survey vessels and fuels.
- The suppliers will be given a timeframe where they can select the timing of the execution of the project. This is done in order for Statoil to obtain the lowest price possible, as the suppliers can put the removal work whenever they are available.
- The suppliers propose the removal method they will use in the tender. Having the suppliers selecting the removal method, enables more suppliers to compete over the contracts and increase competition, in order for Statoil to obtain lowest price possible.
- Statoil will hand over all its documentation regarding the facilities to the contractor, but it is the contractor's responsibility to verify this information. This is stated in the conditions of contract, art 6.1 (40); "Contractor shall search for defects, discrepancies and inconsistencies in Company`s Documents" and in art. 6.5 "Contractor is responsible for verifying and interpreting data and information made available to Contractor and which may influence the Work. Contractor shall incorporate the findings of such verifications and interpretations in all phases of the Work, including preparations for the Offshore Work".
- The tender will be evaluated by HSE, QRM, technical, operational, and commercial criteria, including such as; availability, experience and organization and resources. Each criterion will be valued and weighed in a ranking system to determine the most successful tenderer. The contract will, to the extent possible, be based upon Lump Sum and Suppliers proposed method for removal. The overall split between technical and commercial weighing will be 80% to 20%. (70 % / 30%). (35)(36)

5.6 Contract Strategy used by other companies

According to Osmundsen (9), one of the criteria's to take into account when designing contracts is contracts and incentive schemes used by competing principals.

5.6.1 Contract strategy used by Total E&P Norge AS on Frigg and MCP01 Cessation

Total E&P Norge AS removed from 2002 to 2011 5 fixed platforms, (2 drilling platforms named CDP1 & DP2, 2 Production platforms called TP1 & TCP2 and 1 Living Quarter platform called QP), 1 Jacket (damaged during installation) called DP1 , 1 flare stack, a 2-32 pipeline and 1 Manifold & Compression platform called MCP01 on the Frigg Field. Total first paid the tenderers on the bidding list a FEED, before an EPRD contract was handed out to one tenderer, compensated by Lump Sum. The process is described below (41).

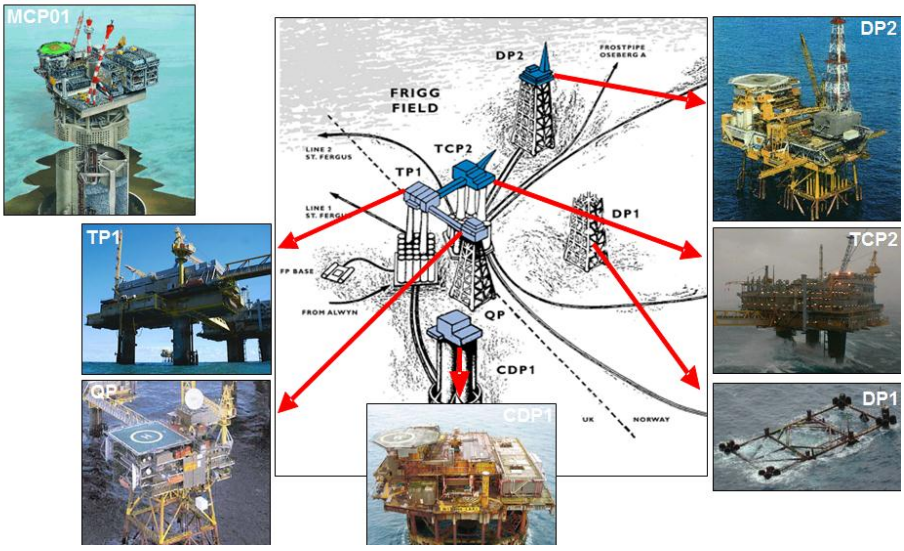


Figure 6: Frigg field (45)

FEED

Total Norge had a bidders list for the work consisting of 5 companies; Aker, Amec, Heerema, Subsea 7 and Technip for the job. A FEED study was launched for a period of 5 months to study the work related to the removal and disposal of the Frigg Field platforms and MCP01. The FEED study was compensated by Total. The main tasks and outcome of the FEED study were:

- Review Company supplied Basic Engineering reports
- Perform risk assessment (Total conducted a workshop with each contractor)
- Offshore surveys
- Establish Contractor`s own method statement for each Contract Package
- Cost estimate and plans

After the FEED period, all 5 consortiums delivered a FEED report, which in turn formed the basis for the technical part of the tender submission for an EPRD contract.

EPRD

The EPRD contract for the Frigg field was awarded to Aker. The scope of work in the contract consisted of; engineering, hook down, preparation, removal, transport and disposal. The compensation format was Lump sum.

Other awarded contracts on Frigg

Originally, the work related to removal of lines within the Frigg 500m zone was part of the EPRD scope in the tender phase, however when the tender documents were received, it was realized that this was very much outside the core business of the Main Contractors bidding for this type of work, so this work was handed out in a separate contract.
Make safe, flushing & cleaning of process & utility systems was more of an operational type of activity (hydrocarbon freeing and make safe), and Total decided to give this to the existing Elf Project & Operation Support Contractor –EPOS by Aker, well known to this type of work.

According to the Cessation Plan, Total had to remove all external steel protruding more than 1 meter outside the concrete columns on TCP2 and TP1, above and below water. This was work typically for a subsea specialist, and Total decided to keep this outside the main Contract (EPRD). Also timing wise, Total were able to start this work earlier than the main Contract, as this was independent of the decommissioning activity to be completed first. This contract was awarded to Deep Ocean (41).

Interfaces

The split of the work into different contracts as described above, meant that Total had to a larger degree take care of the interface themselves, however, it gave Total the opportunity to maintain a continuous operation offshore, and avoided "Cold Phase" to happen.

5.6.2 Contract strategy used by Shell (UK)

Brent field

Shell UK is currently working on a decommissioning project on the Brent field in the UK sector. The Brent field is situated 186 km offshore, north-east of Lerwick, Scotland, at a water depth of 140m and has four large platforms; Alpha, Bravo, Charlie and Delta.The Brent Delta platform reached cease of production (CoP) in December 2011. Brent Alpha and Bravo are currently scheduled to reach cease of production late 2014 and Brent Charlie has cease of production scheduled for late 2015. The first platform to be decommissioned is Brent Delta (42).

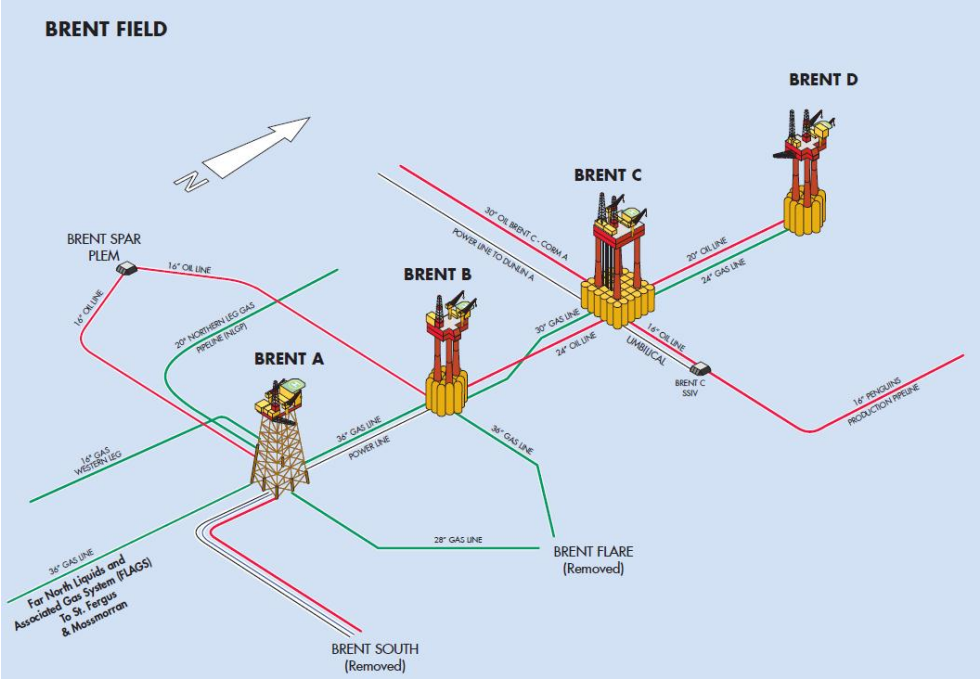


Figure 7: Brent field (42)

Contracts

The contracts are divided into 2 (3) contracts, a Decommissioning Service Contract (DSC) and a Removal Services Contract (RSC). (Disposal may be awarded as a single contract)

First, the Decommissioning Service Contract (DSC) is awarded. This contract contains the Basic Engineering and the Engineering Down work to be done on the platform. Then, later, a Removal Services Contract (RSC) is awarded. This consists of the engineering, preparation offshore and the removal work. The disposal part can be included in the RSC, or it can be awarded as a single contract. (42) An overview is shown in figure 8.

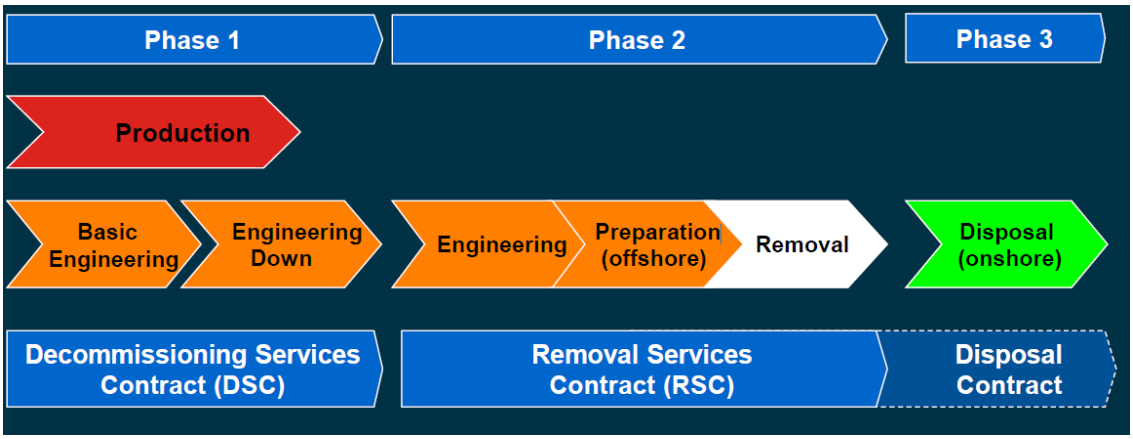


Figure 8: Content DCS and RSC Contracts (27)

The DSC and RSC are separate contracts, with different compensation structures, and Shell explains the following reasons for the different compensation format (43):

Decommissioning Services Contract (DSC)

The nature of the DSC scope (maintenance, engineering down, isolation, draining and purging) does not lend itself to Lump sum compensation, as the scope is almost impossible to describe in sufficient detail to permit Lump sum pricing. This, together with the impact of other platform activities by others (such as the plugging and abandonment of wells) and other uncertainties associated with offshore working has determined that compensation is made on predominantly reimbursable basis. The DSC contract has been handed out for the Brent Delta platform.

Removal Services Contract (RSC)

This contract will be submitted on a predominantly Lump Sum basis, but is based on extensive removal FEED studies carried out by the tenderers in the two years prior to the tender, paid by Shell.

Although Shell's preference is to award one RSC Contract for all 4 platforms (e.g. to gain the benefit of repeatability), Shell acknowledges that there are circumstances in which a dual award (e.g. lack of vessel availability) might be in Shell's best interests.

5.6.3 Contract Strategy proposed by Aker Solutions

FMRD

Aker Solutions was the supplier that was awarded the EPRD contract on the Frigg field. After this experience Aker Solutions has suggested to use an FMRD (FEED, Modification, Removal and Disposal) model as an alternative to EPRD contracts for complex integrated topsides. Aker Solutions argue that the cost of removal is less than cost of modifications, and that heavy lift should be seen as a "commodity". The FMRD model is shown in figure 9.

Figure 9: FMRD Model by Aker Solutions (27)

Aker Solutions suggests this compensation format for the FMRD model:

The FEED should be compensated as by a Lump Sum. For the Modification, "standard modification" contracts should be used. The cost of the removal should be provided by the Company .The Disposal should be compensated by Lump Sum with reimbursable on hazardous materials and the overall Project management should be compensated either by Reimbursable or a Target estimate (27).

6.0 Discussion

By establishing procurement strategies for Statoil's removal projects, the goal is to "Ensure safe and cost efficient performance of the removal and disposal portfolio" (3). In addition, well designed contracts are important as it aligns goals between the operator and the supplier, allocates risk and reward and establishes responsibilities for both parties.

Bundling of projects

These projects are nothing but costs for Statoil, as there is no value creation coming from these projects. The Cessation portfolio consists of 8 "active" very different removal projects. There is one subsea template (TOGI), 2 loading buoys (SPM-C and Gullfaks), one wellhead platform (Huldra), one jacket (2/4 –S), 2 platforms used to maintain pipeline pressure (H-7 and B-11), subsea installations from Glitne, and one 250 000 tons, 3 legged Condeep platform with a 200 people living quarter (Statfjord A).

From a cost point of view, it might be an idea to try to bundle similar installations, so instead of removing them one by one, you wait until you have e.g. 3 subsea templates, to get a better price from a supplier when the job is bigger, and synergy effects within both engineering and mobilization of vessels can be achieved. The suppliers can also then put in a "learning-curve" effect, from the first removal until the next. Statoil has done this with the contract of H-7, where the removal of B-11 was an option in the contract. These platforms have comparable construction. The supplier in this contract identified the following synergies and cost reduction; (44)

- Reduced overall project duration , resulting in a reduced overall management cost
- Reduced overall engineering man hour expenditure, due to learning curve effects, already established engineering basis and effects related to similarity in the platform structures
- Potential reuse of equipment
- Reduced mobilization/demobilization costs associated with subsea survey activities, presuming the pre survey can be performed as a 1 off for both installations, and similarly with the post survey.

The above is believed to lead to a potential cost saving for removal and disposal of the H-7 and B-11 in the range of 5-10 % of the overall project costs." (44)

Although, there are several issues with this solution; it implies that in many cases one would have to let facilities be left for a longer time than originally planned. It is difficult to forecast when there will be similar removal projects available, and the time until the removal of the next can be difficult to foresee. (Volatility of these projects)

From an engineering point of view, it is explicitly stated from previous experiences that platforms should not be left unmanned and cold for years (27). If a platform stands for years, systems are disconnected, living quarter cannot be used, cranes and helidecks are unsafe, and corrosion can be extensive. One might have to rent a flotel when doing the engineering down, and the amount of work needed to make the platform safe if you are going to enter it, can be huge. As an alternative, maintenance and inspections costs will run for a cold facility until it is removed. According to numbers from Aker Solutions (45) from the Frigg experience, the man-hours used per ton removed are up to 5 times higher for platforms that were unmanned and cold for years, than for platforms that were removed straight after shut down. See table below.

	Topsides				
Installation	**Weight (tons)**	**Heavy Lifts**	**Trips HLV**	**Piece Small (% of weight)**	**Man-hours/ ton**
TCP2	24 000	29	5	6 %	11
TP1	7 800	10	3	6 %	25
DP2	4 100	5	1	20 %	33
QP	3 100	4	1	5 %	56
CDP1	6 600	23	3	20 %	53
MCP01	12 900	29	6	*42%	56
DP1 (wreck)					
	58 500	**100**	**19**	**16 %**	**31**

* by LDE

Table 9: Experience numbers from Frigg Cessation by Aker Solutions (45)

Another issue with letting platforms and facilities be left for years, can be seen from the new government regulation that entered into force only 2 years ago; Petroleum act §5-3 “If a license or interest in a license is transferred, see § 10-12 first paragraph, the transferor licensee are secondarily liable to the other licensees for the costs of implementation of the decision on disposal. The transferring licensee must also be secondarily liable to the state if expenses related

to the Ministry's decision on removal and disposal is not covered by the licensee or other person responsible." (17)

This can be seen as an expression of, that the Norwegian Government fears that they can be left with the cost of the removal for these installations, as they are obligated to be removed by international law. As of today, the oil industry has the financial strength to cover these costs. But, if many of the removal projects are postponed for years, the costs are not only postponed, but also accumulated, and the guarantee that oil companies will have the financial strength to cover these cost in the future, are not present. This may be one reason that the Norwegian government will not agree on postponing many of these removal projects, until they one day might be bundled to get bigger jobs and better prices from suppliers.

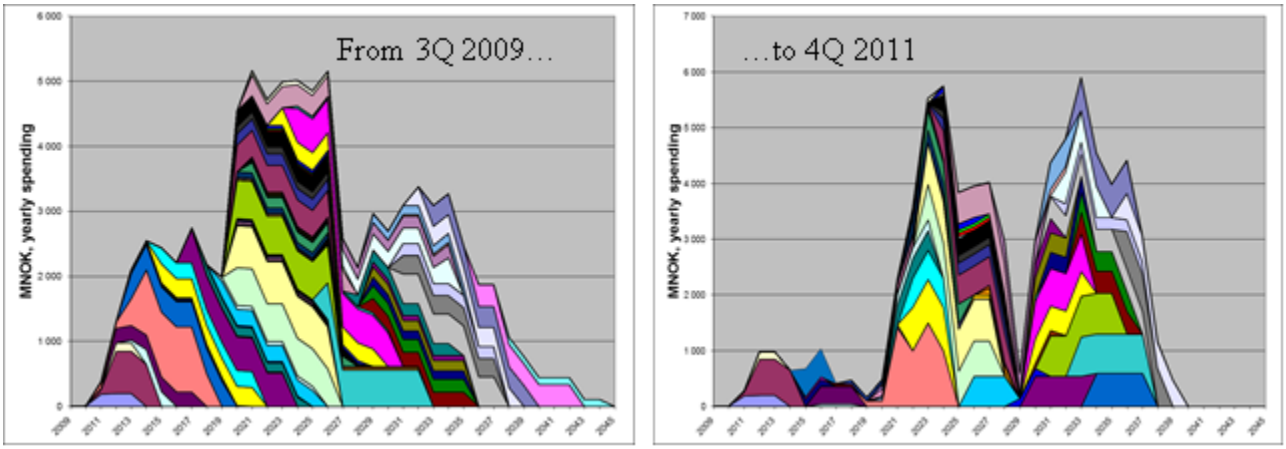
For the same reason, the Norwegian government may not agree to postpone the removal projects due to a currently high investment level on the Norwegian sector. An idea here is to postpone removal projects, so that it does not compete over the same resources in the supplier industry, when the investment level is high, - as it is per today. (Ref. Category strategy for removal and disposal (3)) Projects can be postponed until a recession, and thereby the prices obtained from the suppliers may be lower than in a heated market. An additional problem here is to forecast a recession, since removal projects can take several years to prepare before actual removal, the chance of timing the removal project to a recession may be very low. That would almost be the same as predicting when the oil price will be at a low level.

The idea of bundling bigger projects on a field, for instance the three Condeep platforms on the Statfjord field (Statfjord A, B and C), have an additional issue with it; a project with removing all three platforms would have become so big, that if it were handed out in one contract, it would have put constraints on supplier resources for so many years, that it might be an obstacle for other development projects. The project would also be so big, that the number of suppliers that are able to execute the whole project would be so few, that competition in a tender process may become almost eligible.

Forecasting and supplier investments

One issue that came through during the interviews is that there is not unwillingness in the supplier industry to invest in this new market segment, e.g. new heavy lift capacity. Per of today,

there are only 2 vessels in the market that can do a heavy lift job. (3) The problem identified is that the volume in the removal market per today is too low for any of the suppliers to defend their investment. Before they do any investment, they want commitment from customers. In addition, the dates of the cease of production of the assets are continually postponed. The graphs from the Category Strategy for removal and disposal shows how the forecasted yearly spending for removal projects for Statoil have changed just from 3Q in 2009 until 4Q 2011.



Graph 5: Statoil demand changes, NOK yearly spending (3)

Factors like high oil price, maintenance and new technology developments can extend the lifetime of a field with years. This makes it difficult to get suppliers to invest in the market segment of removal and disposal, so that Statoil can increase the competition. The same trend is seen in the UK sector, with the forecasted cease of production peak moving from 2016 until 2022 on just 2 years (3).

Contract strategy EPRD

Alternatives:	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Project management	Statoil					
E – Engineering	PM Contractor					
P – Preparation	EPR&D Contractor				P Contractor	
R – Removal				R Contractor		
D – Disposal		Option	D Contractor			Option
No. of contracts	1	1/2	2	3	4	3/4
Key advantages	• Allows for lean Statoil project organisation • Few interfaces for Statoil follow-up • Contractor is in better position to develop method and optimize interfaces			• Higher degree of competition • Less risk for each Contractor		
Key disadvantages	• Contractor(s) carries most interface risks (may lead to higher contract price) • Risk of limited competition			• Increased number of interface risks carried by Statoil (may lead to increased cost) • Larger Statoil project organisation		
Base case	• **Base case will for most projects be Alternative 1, 2 or 3 above.**					

Table 10: Contracting Strategies removal projects (3).

Statoil has in its category strategy (3) outlined 6 alternative strategies for contracting within the Removal and Disposal area. Statoil aims to use alt. 1, 2 or 3 as base case for most projects. This implies that Statoil wants all the Engineering, Preparation, Removal and Disposal to be done by one contractor.

E+P+R+D

The alternative is to split up the different packages, to have one contractor for each of the categories of work. This strategy would have given Statoil the key advantages that they would probably have a higher degree of competition. As seen by the table from the Specific strategy for SPM-C in appendix 8.1.2, there are numerous suppliers willing to tender for one or more parts of the work. The number in brackets reflects suppliers that will perform these services by the use of subcontractors.

	LB SFC
E- Engineering	11
P- Preparation	9+ (2)
R- Removal	6 + (4)
D- Disposal	4 + (7)
All Disciplie Areas	2 + (7)

Table 11: Number of suppliers willing to tender for one of more parts of the work for SPM-C (36)

When we look at the long-list of potential suppliers from the Specific strategy for the TOGI removal project in appendix 8.1.1 we can see that Statoil have declined lots of potential suppliers due to their lack of ability to work as a total EPR (D) contractor. So the possibility that Statoil would have gained higher competition by splitting the work can be seen as certain. The proposed tender list is shown in green.

Acknowledgement of Interest- TOGI			
Long List	Division of Work	Comments	Tender List
ACERGY NORWAY AS	1 E P R	Disposal to be clarified	
AF GRUPPEN NORGE AS	1 E P R D	AF Decom 1 EPRD disqualified for EPR small piece method	
AKER SOLUTIONS	1 E P R D		
HEEREMA MARINE CONTRACTORS NEDERLAND B.V.	1 E P R 2 D		
SAIPEM UK LIMITED	1 E P R 2 D		
SAR AS	3 PR 1 D	Excluded due to 3 PR	
SCANMET AS	3 E P 1 D	Excluded due to 3 EP	
SHETLAND DECOMMISSIONING	1 D	Excluded due to issues related to export of Disposal- not acceptable	
TECHNIP NORGE AS	1 E P R 2 D		
WOOD GROUP ENGINEERING (NORTH SEA) LTD	1 E 2 P R D	Excluded due to E as prime supplier and subcontracting of PR(D)	
GLOBAL MARITIME A/S	1 E 2 P R D	Excluded due to E as prime supplier and subcontracting of PR(D)	
SEAWAY HEAVY LIFTING ENGINEERING B.V.	1 E 3 R	Covered by Acergy	
BERGEN GROUP ROSENBERG	1 E P R D	R=1 Disqualified. Does not have its own vessel	
Alternative: Mammoet as Main Contractor	1 E P R D		
DEEPOCEAN AS	3 E P R	Excluded due to 3 EPR	
MASTER MARINE AS	3 E P 2 R	Excluded due to 3 EP and 2 R	

Table 12: Interested suppliers for TOGI, and tender list (35)

The splitting of the EPRD would also mean less risk for each contractor. But, the key disadvantages for Statoil would be that with 3(4) different suppliers, Statoil would have to take all the interface risks between the suppliers. So that would lead to the need for a larger Statoil organization following up these projects.

One of the strategies for Statoil to obtain low prices from the suppliers is to let them choose the removal time, so that the removal contractor can put in the work whenever he is available. If the scope were divided into four different contracts (E+P+R+D), this would not be as easy to conduct. The timeframe would then needed to be set up front, prior to the tender, or would need to be agreed by all four contractors after the tender. As these projects compete with other projects over resources, the prices may go up if the suppliers are not able to choose the timing.

Statoil have decided to use alternatives 1, 2 and 3 as base case for its projects. This has the advantages that Statoil can conduct the projects with a lean project organization. Awarding only one contractor gives Statoil few interfaces to follow up, as it only has to relate to one supplier.

The contract strategy also states that the contractor will be in a better position to develop the method, and to optimize the interfaces.

Statoil`s disadvantages with this contract format is that if one contractor undertakes the EPRD contract, he also carries the whole interface risk, which in turn may lead to a higher contract price as the contractor would need a risk premium. Statoil also sees the risk that this will limit competition, as we have seen; not that many suppliers can undertake the whole scope of work. In addition, if the compensation format is based on Lump Sum, it can be a problem if the supplier is not able to carry the total risk in the contract. As seen from the experience transfer summary from the 11th NPF North Sea Decommissioning Conference (31), the number of engineering hours on the Frigg Cessation project went from 500.000 to 2.500.000. In the contract for the H-7 removal project, the rate for an engineer is 1062 NOK per day, so the experience from Frigg with an increase of 2.000.000 more engineering hours would have corresponded to a 2.12 billion NOK cost overrun! Not all suppliers would have had the ability to handle such a cost overrun, and would in this case been bankrupt. This implies especially to decommissioning projects as they are characterized as poor documented and often complex. This also relates to the case of bundling projects together. As the scope of work becomes larger, the numbers of suppliers that is able to handle a turnkey, Lump Sum contract gets smaller, and the potential consequences of huge cost overruns increases. Worst case is that Statoil is left with an unfinished project and a bankrupt supplier.

Lump Sum

In the specific strategies for TOGI and SPM-C (35) (36) it is stated, that "Lump Sum format will, to the extent possible be used".

According to Osmundsen (8) "If the job description is not sufficiently detailed, traditional fixed-price contracts are not applicable." The overview of selection of compensation format from the "TIKO II, Contract Execution Models for Norwegian Offshore development project, 1998" (13), claims that the higher degree of technical definition of the project, Lump sum is the most appropriate compensation format.

Statoil wants to use Lump Sum format to the extent possible, and theory states that in the case of a sufficiently and detailed job description, this is the appropriate format to use. The discussion

here, are these, or to what degree can it be stated that these projects are sufficiently detailed? The communicated slogan of this project portfolio is; "Expect the unexpected – and plan for it". And with one of the biggest challenges identified with these projects being that documentation for the facilities can be both non-existent and wrong, the Cessation portfolio states that these projects are not likely to be detailed described up- front. Technical information can be missing, and later work on the facility makes the existing information wrong. The existence and amount of hazardous material can be unknown. The engineering is compensated Provisional sum (target man-hours), so the suppliers are compensated for all the work up front, and are compensated to verify and check all the technical details provided from Statoil (except for TOGI). But the question here is; is it possible to foresee all details up front? According to Aker Solutions that was one of the problems with the removal of the Frigg field (27), that it is not possible to foresee all technical details that may have a huge cost and schedule impact until you have begun the actual physical work offshore. That was one of their problems on doing e.g. the removal of the QP-platform on the Frigg field. The living quarter contained Asbestos, and could not be used during the removal, with the consequence that Aker Solutions had to rent an expensive flotel. The same with cutting of pipes that contained hazardous materials, and had to be postponed due to environmental reason, thereby postponing the project even further.

The issue was confirmed by internal personnel working on the Statfjord A removal project. It is in many cases not possible to foresee the correct condition of one module, until you are offshore and have physically removed the previous module. So, the answer to the question, if it is possible to state a detailed technical description of the facilities, and thereby planning the work, is no. It is not possible up front to be able to describe the whole platform. This should in theory be possible on construction projects, e.g. for rigs, and there are plenty of examples of this not being the case. So is it then a good idea to put all the technical risk on the supplier, as is done with the Lump Sum compensation format? Aker Solutions, being heavily "burned" on the Lump Sum compensated decommissioning project done on Frigg, has actively gone out and dissuaded suppliers to take these kind of projects on Lump Sum format, claiming that Lump Sum format does not reflect the risk lying in these projects.

An analogy would be if the owner of an old house wanted the house renovated. The question is, who owns the risk of the current condition of the house, that you cannot foresee until the

renovation has begun; for instance, the condition of the timber frame, the insulation and the wooden floor. If it is an old house, with conditions you cannot foresee prior to the actual work is started, no master builder would give you a fixed price on the work. (This is from own experience!) The risk of the condition of the house would lie on the owner. But, by using Lump Sum format in the decommissioning contracts, the technical risk for what is impossible to foresee prior to the actual removal, is put on the supplier.

Theory states that the equity or imbalance between the parties in the contract must be taken into consideration when designing contracts (9). In general, Statoil is a big and important player on the Norwegian continental shelf, and in case of risk allocation, Statoil is a large operator with numerous projects, and are thereby more diversified and able to handle cost overruns from some projects, than a smaller supplier. It can be discussed if Statoil in this case are misusing their market power, handing out EPRD contracts with Lump Sum compensation formats, putting all risk for unforeseen offshore events on the supplier.

On the other hand, experience have shown that Lump Sum have worked well in some projects, such as the Odin Decommissioning owned by ExxonMobile (30), where the project was "executed with good cost control and few change orders." Also, Aker Solutions (27) reported that all platforms in the Frigg field that well defined were a success. It was the platforms that were left unmanned for a while that represented the problem.

Reimbursable

If the whole work of these projects were to be compensated on reimbursable, there would be no incentives for the supplier to finish the work with low costs and within a reasonable time-frame. Even if these projects are not schedule-driven, time is still money and resources for a company. Projects that are not completed keep driving resources and costs. Putting out the whole job on reimbursable, would also address the need for a very large Statoil organization to be present and follow up the supplier and his work to avoid sky high costs.

At the same time, Osmundsen states that (8); "If project implementation is time-critical, it is important to find flexible organizational solutions to avoid unnecessary antagonism and conflict. Reimbursable may be more appropriate than fixed-price contracts in this case, notably with the disadvantage that it is generally more expensive and that the final realized costs are then more

difficult to predict ". These projects are as previously stated, not time-critical, and therefore from this point of view, the more expensive solution of reimbursable cannot be defended.

In the "Conditions of contract, 6.5" in the EPR TOGI subsea template removal contract (40), it is stated that "The Contract Price and/or the Contract Schedule shall not be adjusted to take account of any unforeseen difficulties or costs presented later than 180 Days after completion of the pre-survey and in any event not later than Mobilization of the heavy lift spread for the Offshore Work." This was the first contract signed in the Cessation project portfolio.

In the "Conditions of contract, 6.5", for the EPRD SPM-C loading buoy contract (38), it is stated that "The Contract Price and/or the Contract Schedule shall not be adjusted to take account of any unforeseen difficulties or costs during the physical removal work that have been or ought to have been discovered in the engineering, survey and preparation phase. In the event that unforeseen difficulties or extra costs arise due to discrepancies, defects or inconsistencies with respect to Company issued information that could not be discovered by Contractor prior in advance, Contractor shall be entitled to a variation as per Art. 12-16."

For the H-7 EPRD removal project contract, In the "Conditions of contract, 6.5", it is only stated that (39);" The Contract Price and/or the Contract Schedule shall not be adjusted to take account of any unforeseen difficulties or costs during the physical removal work that have been or ought to have been discovered in the engineering, survey and preparation phase."

So, for the last two contracts, Statoil is acknowledging that the Contractor should not be held responsible for things that he is not "ought to have been discovered". The risk here is that what "ought to have been discovered" is in danger of becoming a subject of discussion, where the contractor can claim it was not possible to discover up front, and Statoil the opposite.

As mentioned, Osmundsen (8) stated that "If the job description is not sufficiently detailed, traditional fixed-price contracts are not applicable." In terms of the expression "job description sufficiently detailed", it can be argued that in these projects, compared to development projects, has a clear job description. The facility needs to be removed from its offshore destination and reused and/or dismantled in a safest possible way, in compliance with the current regulations. The method and the timeframe will be up to the supplier to decide, and it is also stated in the

conditions of contracts that “Contractor shall search for defects, discrepancies and inconsistencies in Company`s documents” (37) (38) (39). So, to determine when the job is complete should be a clear case, compared with a development project. So from that point of view, it can be argued that the job description is quite clear.

According to Osmundsen (8) “If the principal needs influence during the execution of the project – for example to ensure that new technologies or new information about the reservoir is taken account in the project, reimbursable will be more appropriate than fixed price contracts.” Compared to development projects, and as long as the HSE is safeguarded, Statoil should have no requirements and technical aspects that will need to be implemented other than what is stated by regulations, and thereby the amount of expected variation orders during the execution of these projects should in theory be zero. This can defend Statoil`s choice of using Lump Sum as compensation format.

Risk premium

Awarding the contracts with a Lump Sum compensation format, will lead suppliers to put a risk premium on their contracts. It is difficult to state how costly this risk premium is, it will probably depend on previous and coming results of Cessation projects, as well as if it is buyers or sellers’ market at that point. But Statoil will be the one that will have to take this expense in the end. Another aspect is what happens if the supplier suddenly is unable to cover its risk exposure in a Lump Sum contract. As seen with Aker on Frigg, the contract price went from 3.1 billion, to approximately the double (46). Many of the suppliers in the market would have gone bankrupt on such a project. This has probably had an impact on the risk premium in the industry.
It can also be discussed, if the risk premium will be lower if contracts were divided up (E+P+R+D), as the total risk carried by each supplier would be a lot less, in addition to the increased competition. (Since more suppliers can tender for the different jobs, ref. table 12)

Contract strategy and compensation format used by other operators

Shell is one operator that uses a different contract strategy than Statoil for their decommissioning projects. Statoil have chosen to award preferably one EPR (D) contract, while Shell has divided the scope into two separate contracts. The first part is the Decommissioning Scope Contract (DSC), which consists of maintenance, engineering down, isolation, draining and purging. The objectives here are shutting down and make safe the platform, once it has reached Cease of Production. This is awarded separately of the next contract, the Removal Services contract (RSC) , which is based on extensive removal FEED studies carried out by the tenderers in two years prior to the tender. The FEED studies are paid by Shell.

Shell compensates the contractor on the DCS contract on a reimbursable basis, and argues this with; "the nature of the DSC scope does not lend itself to lump sum compensation, as the scope is almost impossible to describe in sufficient detail" (43) The RSC will be compensated with a Lump sum.

By awarding two different contracts, Shell carries the interface risk between the contractor on the DSC and the RSC contractor. The compensation format is not very different from what Statoil have used on their awarded contracts. The engineering prior to removal is compensated by Shell as provisional sum. The difference is that the "Preliminary work" as project management and organization are in Statoil`s contracts compensated as Lump Sum. (SPM-C and H-7).

For the removal, the work is compensated as Lump sum in the Statoil contracts as well. The main difference is that no organized, paid FEED studies are executed by tenderers prior to the award.

One of the reason for Statoil not using this contract strategy, is that the scope of the project is not always easy dividable. For instance, on Statfjord A, it is not possible to have one contractor finishing all the engineering before a removal contractor enters. The engineering needs to be done along with the removal of lifting of modules on the topside, as you cannot with accuracy estimate the condition and removal method of one module, until you have removed the next.

Winners curse and learning curve effect

This phenomenon is especially relevant for removal projects. The Cessation projects are exempted from benchmarking in Statoil, due to lack of data. Statoil just don't have any historic data to compare it with, and one of the interviewees in Statoil even uses this as a reason to want as much as possible on Lump Sum, as Statoil don't have anything to compare the cost estimates with.

It is reasonable to assume that the suppliers face the same problems; lack of a clear scope of work and lack of experience numbers. This is the kind of uncertainty that can generate winners curse for suppliers. If Statoil faces challenges with estimating the costs of these projects, suppliers face the same, but their cost estimate, when submitted as a bid has a legal obligation attached to it. And if the contract is based on Lump sum, the consequences of overbidding (bids below actual costs of the project) can be substantial.

There has already been one example of this. Aker successfully removed the platform Odin for ExxonMobile and Maureen A for Phillips, and then they used the same estimate per ton removed for the "cold" unmanned platforms as for the "warm" ones, and by that found out that the cost of rebuilding the infrastructure on a "cold" platform was more expensive than the removal itself. The contract price went from 3.1 billion to about the double! (46) If this contract had been performed by a smaller firm, they would have gone bankrupt. This shows how difficult it can be to estimate and establish bids for the suppliers with the lack of experience and experience numbers, and thereby end up in the situation of winners curse. (And Aker Solutions even had some experience on the field) It is especially important to be aware of this if new or small suppliers enter the market, as the consequences of a potential winners curse may be huge.

This also shows that since removal projects often are of such different characters, a learning curve is not very quickly established.

Reputational risk and HSE

The HSE aspect of these projects has not been a focus in this thesis, but it is worth to mention a few things to keep in mind when designing contracts. The category strategy (3) outlines that one of the characteristics with these projects is that there is a high risk of media exposure during onshore disposal that could weaken Statoil`s and other stakeholders reputation, and that this is

due to environmental aspects of the materials in the facilities. Especially related to AF Decom`s disposal site in Vats, there have been numerous articles in media regarding the environment in Vatsfjorden. (47) In the contracts for these removal projects in Statoil, there are established penalty schedule milestones (see appendix 8.2). This is done even as these projects are not time or schedule critical. As previous stated time is still money and resources for a company. Projects that are not completed keep driving resources and costs. But, is this the right focus to establish regarding the vulnerability of HSE issues in these projects? According to Osmundsen (8), "the incentive intensity in the supplier's contract should be high when additional investment from the agent is very profitable for the principal." The question is to what extent it is profitable for Statoil that these projects are completed within the set schedule? This issue must be seen in close relation to HSE. With these penalty milestones, there will be incentives to avoid delays, as they give a certain economical loss. This can in turn give the supplier incentives to give less priority to other areas such as HSE, in order to avoid economic losses. This will in turn hurt Statoil if there is an accident or emissions of hazardous materials.
Per today incentives regarding HSE issues are not established in any of the contracts, although this is a very important area for Statoil. One view on this issue is that one don`t want to make incentive schemes for the suppliers regarding HSE, as this is viewed as something that is expected to be a main focus during execution regardless, and therefore suppliers should not be rewarded for what is already expected of them. This must of course be taken into consideration when designing incentives, so they don't turn out to have negative effects.

One example of an incentive could be to award a bonus if the project is finished without any emissions or accidents. This would give the supplier incentives to put effort into the HSE work, and is closely in line with Statoil`s procurement goal to execute these projects in a "safe and cost efficient (3)" manner.

The problem here is that it is no use establishing an incentive scheme for what is considered outside the supplier's control. It can be discussed if it in all situations is possible that the supplier can avoid accidents or emissions; especially with the poor documentation of these facilities.

A second aspect is if it is possible for Statoil to all times control the supplier, as theory states (8) "incentive intensity should be high, when the principal is able to measure the agent's

performance with precision". This would bring out the need for Statoil personnel present at all times during the suppliers operation and work.

A third aspect to consider is that this can leave the supplier an incentive to try to hide accidents or emissions, in order to receive the bonus award, which again can harm Statoil`s reputation.

7.0 Conclusion

The conclusion from this thesis is that it is highly important to tailor the contract to each specific removal project. The amount of technical risk and the risk of a major cost overrun which lies in the removal of e.g. Statfjord A is a lot higher than for a single subsea template, or a loading buoy. That counts for both the supplier and for Statoil. Since these projects differ to such an extent in size and complexity, this should be reflected in the contracts and compensation formats used.

The use of Lump Sum in the contracts is not dissuaded, as long as Statoil is prepared to be flexible to accept variation orders from suppliers where aspects regarding the condition of the facilities that could not be discovered prior to the actual removal work, and is considered outside the supplier's control, may have cost or HSE impact.

This flexibility of accepting variation orders from a supplier must be considered from the size and complexity of the project. The greater size and complexity of the project, the more Statoil would need to prepare to accept variation orders and vice versa. But if there are a lot of variation orders, it is normally more complex to handle these within the frame of a Lump Sum format.

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Appendix

8.0 Project Execution and overall Procurement Strategy (PEOPS)

In the following section follows an excerpt from the PEOPS for the TOGI and SPM-C removal projects. The most relevant regarding the procurement and contract are extracted. The PEOPS were not in the same format for the projects.

8.0.1 PEOPS TOGI

Procurement Goals and Objectives

The procurement has the following goals and objectives:

- Address both the project planning and execution phases
- Invite suppliers offering diverse capabilities to propose their recommended removal method
- Split the work into suitable contract packages which secure sufficient degree of competitive bidding
- Select suppliers with relevant competence who can deliver the required quality and capacity
- Establish contracts with well-defined terms and conditions, scope and clear interfaces
- Use Lump Sum compensation format as appropriate
- Statoil`s Frame Agreements shall be considered utilized where relevant
- Secure experience transfer and synergies from previous and ongoing demolition projects
- Seek synergies by optimizing schedules and utilization of vessel spread across internal and/or external projects, where relevant
- Seek optimal re-use of material and commercial outcome of facilities

Overall Procurements Strategy Summary

The figure below shows the overall procurement strategy summary as stated in the PEOPS for TOGI. The pink indicates the work to be done by main contractor.

Color code: Same color indicated same contract

	Subsea Template Removal
Project management	**Statoil**
Method studies	1. Saipem – Heavy Lift Vessel (HLV) and HLV Barge (2004) 2. Aker Solutions – Buoy system ans Wet-Towing (2008, cost estimate 2010)
FEED	**N/A**
Subsea Surveys	**EPR(D)**
Engineering	
Preparation/ Ready for Removal	
Decommissioning	**N/A**
Offshore removal	" Main Contractor" EPR(D)
Cutting	Option: Cutting of 20" Pipe and Service/hydraulic Lines & Electrical Cables
Rock-Dumping Free span- West Slope	**N/A**
Area Clean-up & Covering of Pipeline ends	**N/A**
Disposal	Option/separate contract EPR(D)

Method studies for the use of Heavy Lift Vessel have been performed by Saipem in 2009. Aker Solution performed a method study for Buoy System and wet Towing in 2008 with a cost estimate updated in January 2012. The studies are made for internal use only.

As the market proposes several methods for removal and the main objective is to secure real competition, it is regarded as essential that the various tenderers are allowed to respond with preferred solution by utilizing their existing tools and equipment. No FEED study will therefore be developed and included as basis for the tender invitation, but the tenderers will be requested to develop an Extended Method Statement (EMS) as part of their tender.
A lump sum compensation for the tenderer`s development of the EMS will be considered.

A contract will be established in competition for the Engineering, Preparation/Ready for removal and the Offshore Removal work. Cutting of piles will be included as an option. The main suppliers will be selected amongst the potential suppliers having Offshore Removal as their core

business. An ITT will be issued to potential tenderers for Heavy Lift/Single LIFT vessel as well as other methods.

The disposal will be included as an option. The Option should be evaluated against Company`s established Frame Agreements for Disposal Services (if possible) or other disposal contracts established for the ongoing and planned cessation projects.

8.0.2 PEOPS SPM-C

Overall Procurements Strategy Summary

The procurement has the following goals and objectives:

Ensure selection of the optimal supplier(s) for performance of the work in a safe and cost efficient manner by driving competition in the supplier market, thus:

- Invite suppliers offering diverse capabilities to propose their recommended removal and disposal method
- Minimize critical interfaces
- Use Lump Sum compensation format where relevant
- Seek reuse and recycling of materials
- Secure experience transfer and synergies from previous and ongoing cessation projects
- Seek synergies by optimizing schedules and utilization of vessel spread across internal and/or external projects

Contract Break Down

		Physical Objects	
		SPM C	Protection Frame
Services	Project Management	Statoil	
	E - Engineering		
	P- Preparation		
	R- Removal		N/A
	D- Disposal		N/A
	FI – Fabrication & Installation	N/A	
	Seabed clean up and survey	Frame Agreement	

Project management will be performed by Statoil.

Further work consists of engineering, preparation, removal and disposal of the SPM C Loading Buoy and procurement and installation of a protection frame following removal.

All this work (unless performed by Statoil) will be executed by one main contractor. Advantages of establishing one EPRD Contract is that Contractors will be responsible for compatibility for removal method and disposal yard.

Use of Statoil Frame Agreements

The seabed cleanup and survey activities are work where Statoil will utilize IMR vessel by use of existing Frame Agreements.

8.1 Specific Strategy TOGI and SPM-C

The operator has to present a specific procurement strategy for a purchase (above a certain amount) on behalf of the license to the other license members. The format of the Specific Procurement Strategy outlined for TOGI Template Removal project and for the SPM-C Cessation project was not identical.

8.1.1 Specific Procurement strategy for TOGI Template Removal project

Purpose

This strategy aims to secure that the most favorable supplier is selected for the performance of the work.

Projects Ambition

Remove and demolish the TOGI installation within 2012 (2013) , to the lowest cost and in compliance with applicable HSE & Q requirements.

Contracting strategy

The Overall Procurement Strategy outlines an EPR (D) contract where D is included as an Option. This gives the necessary flexibility to secure selection of a Disposal supplier acceptable to Statoil, as this is regarded as an exposed area for poor reputation. Execution of the Option will be evaluated against possible other alternatives in due time prior to the need for these services.

The PEOPS determines that the successful Tenderer shall be selected from suppliers having removal (R) as part of their core business (not subcontracted)

Procurement-Risks and Opportunities

Risks:

- Suppliers reluctant to undertake risk i.e. lump sum
- Cost and schedule due to lack of experience with cessation projects in the Market
- Reputation if unsuccessful performance
- Lifting and transportation delayed due to weather conditions
- Damage to 3rd party property/major accidents
- Ensure capacity to transport the installation to shore

Opportunities:

- Ample removal window 2012 (2013) => Increased flexibility/ Fill in job => Lower cost
- Supplier to propose and recommend removal method => Increased competition => Lower cost

Compensation format

The compensation format shall reflect structure and extent of scope of work.

Engineering will be compensated on reimbursable basis with target manhours.

Lump Sum format will, to the extent possible, be used.

Disposal (D) will, to the extent possible, be compensated on a NOK/kg/fraction basis.

Estimated contract values

The cost estimate for the EPR (D) subsea template removal is **MNOK 237**, including Option for the Disposal Services.

Market Screening and Tender List

The table shows the Long-list of potential suppliers for the EPR (D) work and their preferred role either as a:

- Main contractor (1)
- Main Contractor by the sue of Sub-contractor(s) (2)
- Subcontractor (3)

The table also shows the proposed Tender List, indicated with green, under column "Evaluation Results", as well as reason for selection/exclusion.

Acknowledgement of Interest- TOGI			
Long List	Division of Work	Comments	Tender List
ACERGY NORWAY AS	1 E P R	Disposal to be clarified	
AF GRUPPEN NORGE AS	1 E P R D	AF Decom 1 EPRD disqualified for EPR small piece method	
AKER SOLUTIONS	1 E P R D		
HEEREMA MARINE CONTRACTORS NEDERLAND B.V.	1 E P R 2 D		
SAIPEM UK LIMITED	1 E P R 2 D		
SAR AS	3 PR 1 D	Excluded due to 3 PR	
SCANMET AS	3 E P 1 D	Excluded due to 3 EP	
SHETLAND DECOMMISSIONING	1 D	Excluded due to issues related to export of Disposal- not acceptable	
TECHNIP NORGE AS	1 E P R 2 D		
WOOD GROUP ENGINEERING (NORTH SEA) LTD	1 E 2 P R D	Excluded due to E as prime supplier and subcontracting of PR(D)	
GLOBAL MARITIME A/S	1 E 2 P R D	Excluded due to E as prime supplier and subcontracting of PR(D)	
SEAWAY HEAVY LIFTING ENGINEERING B.V.	1 E 3 R	Covered by Acergy	
BERGEN GROUP ROSENBERG	1 E P R D	R=1 Disqualified. Does not have its own vessel	
Alternative: Mammoet as Main Contractor	1 E P R D		
DEEPOCEAN AS	3 E P R	Excluded due to 3 EPR	
MASTER MARINE AS	3 E P 2 R	Excluded due to 3 EP and 2 R	

Evaluation criteria

The most favorable Tenderer will be selected based on the information requested to be submitted with the Tender, and will comprise both:

•HSE
•QRM
•Technical
•Operational, and
•Commercial

Criteria, including such as;

•Availability
•Experience
•Organization and resources

Each criterion will be valued and weighed in a ranking system to determine the most successful Tenderer.
As the Contract will, to the extent possible, be based upon Lump Sum and Suppliers proposed method for removal the overall split between technical and commercial weighing will be 80% to 20%.

Instructions to tenderer

The instructions to tenderer will include requirements for an Extended Method Statement (EMS) and other relevant information. This will subsequently from basis for the detailed evaluation criteria and Contractor selection.

8.1.2 Specific Procurement strategy for SPM-C Cessation project

Purpose

This strategy aims to secure that the most favorable supplier is selected for the performance of the work.

Projects Ambition

Remove the SFC SPM Loading buoy within 2012, with disposal immediately thereafter, to the lowest cost and in compliance with applicable HSE & Q requirements.

Contracting strategy

The Overall Procurement Strategy outlines one contract where disposal (D) part is included in the main contract (EPRD), due to close interface between removal method and disposal site. Contractor shall be responsible for compatibility between removal method and disposal site.

The chosen contractor should have capability to complete all aspects of the work, either by own resources or by use of subcontractor.

Procurement-Risks and Opportunities

The main risks related to procurement are:

- Availability of vessel
- Suppliers reluctant to undertake total EPRD scope
- Price
- Lack of experience within Buoy Disposal (D)
- Reputation if unsuccessful performance

The main opportunities related to procurement are:

- Large removal window in 2012 ➡Increased flexibility
- Supplier to propose and recommend removal method ➡Increased competition ➡Lower cost

Compensation format

1. Survey- CPI for one Subsea Survey
2. Engineering –reimbursable
3. Preparation, release, towing and offloading to disposal site –fixed price

4. Dismantling and disposal –fixed unit price per fragment (kg/fraction)

Estimated contract values

Contractor	MNOK-2010
Removal of SPM C	47
Protection Structure	26
Disposal of Buoy	59
Prelim & Eng 19%	25
Contractor Cost	**157**

Supplier Market for the EPRD Work

The results of the market screening shows that numerous suppliers are willing to tender for one or more parts of the work as illustrated in the table below. Capable suppliers with Engineering, Preparation & Removal as core competences will be included on the Bidders List, while Disposal can be subcontracted.

	LB SFC
E- Engineering	11
P- Preparation	9+ (2)
R- Removal	6 + (4)
D- Disposal	4 + (7)
All Disciplie Areas	2 + (7)

- Note: The number in brackets reflects suppliers that will perform these services by the use of subcontractor(s).

Prequalification

The pre-qualification of potential Bidders was based on the following criteria:

- Valid and representative entry in the Achilles Joint Qualification System
- Implemented Quality Management System and status.
- Implemented HSE-system and status
- Ownership and Facilities for the work
- Financial capacity
- Recent, relevant and representative references as well as experienced risk
- Execution ability

- Total and available capacity
- Personnel resources, tools, facilities and vessel spread
- Disposal of hazardous waste
- Risk factor
- Contractual elements
- CISR/IDD
- Litigations and Proceedings

Evaluation Criteria

The most favorable Tenderer will be selected based on the information requested to be submitted with the Tender, and will comprise both:

•HSE
•QRM
•Technical
•Operational, and
•Commercial
Criteria, including such as;
•Availability
•Experience
•Organization and resources

Each criterion will be valued and weighed in a ranking system to determine the most successful Tenderer.

As the Contract will, to the extent possible, be based upon Lump Sum and Suppliers proposed method for removal the overall split between technical and commercial weighing will be 70% to 30%.

Bidders list

The table shows the Final List of potential suppliers for the SFC SPM Loading buoy EPRD work and their preferred role.

The table also shows the proposed Bidders List, indicated in green in the column to the right, as well as a reason for selection/exclusion under the column named “comments”.

Final List	SFC SPM Loading Buoy		
	Division of Work*	Comments	Bidders List
SUBSEA 7	1 EPR		1 EPRD
AF DECOM AS	1 EPRD	(EPR as 2)	
AKER MARINE CONTRACTORS*	1 EPRD		EPRD
HEEREMA MARINE CONTRACTORS NEDERLAND B.V.	1 EPR 2D		EPRD
SAIPEM UK LIMITED	1 EPR 2D		EPRD
SAR AS	1 D	Excluded due to subcontracting of EPR	
SCANMET AS	1 E 2 PR 1D	Excluded due to subcontracting of PR	
TECHNIP NORGE AS	1 EPR 2D		EPRD
WOOD GROUP ENGINEERING (NORTH SEA) LTD	1 EP 2RD	Excluded due to 2 R	
MAMMOET	1 EP 2RD	Excluded due to 2 R	
DEEPOCEAN AS*	1 EPR 2D		EPRD
GLOBAL MARITIME A/S	1 E 2 PRD	Excluded due to 2 P R	

Instructions to tenderer

The instructions to tenderer will include requirements for an Extended Method Statement (EMS) and other relevant information. This will subsequently from basis for the detailed evaluation criteria and Contractor selection.

8.2 Compensation formats in Cessation Project portfolio contracts.

As previously stated, only 6 different contracts, for 3 different projects have been signed (2 EPRD, 2 EPR and 2 D) within the Cessation Project portfolio. None of the 8 projects in the portfolio is as of today finished. A summary of the compensation format for the EPR- contract for TOGI, the EPRD-contract for SPM-C and the EPR –contract for H-7 are given below.

8.2.1 TOGI removal project EPR contract

Summary of contract price

The TOGI EPR contract is predominantly on Lump Sum format. Only the travels cost and the working vessel is on a provisional sum basis. The details are shown below.

	EUR
LS	11 362 797
PS	1 335 000
Total:	**12 697 797**

- Note, all numbers in EUR

Preliminaries:

Lump sum: **1 224 401**

Contractors` Project Management and Organization 1 199 434

Provision of all required documentation 24 967

Provisional sum: 35 000

Travel costs to be reimbursed by Company 35 000

Engineering

Lump Sum: 1 834 537

Engineering – Preparatory work 999 627

Engineering – Removal, Transportation and Back loading to shore 834 910

Preparations/ Ready for removal

Lump sum: 3 379 869

Procurement, logistics and material items and obligations as required by the Contract which are not covered by other sums included in this work package WP04. 349 870

Provision and Fabrication of all Materials and Equipment required for Preparatory work 102 866

Provision and Fabrication of all Materials and Equipment required for Removal, Transportation and Back loading 1 902 516

Mobilization for Preparatory Work 591 779

Demobilization after Preparatory Work 432 839

Provisional sum: 1 300 000

Working vessel including equipment 100 000 EUR per day x 13 Days.

Removal, Transportation and back loading to shore

Lump Sum: 4 923 990

Recovery of Contract Object from Seabed 1 070 602

Fuel 2 417 044

Taxes (CO2, SOX, NOX) 367 568

Transportation and back load of the TOGI template to shore. 131 000

Demobilization 937 775

Penalty milestones

Milestone M3, M7, M8 and M9 are penalty milestones

No.	Milestone	Date	Penalty per day in NOK
M3	Project master Documentation submitted and approved	60 days after Contract Award	5 000
M7	TOGI template dismantled, sorted and disposed in defined fractions	No later than 6 months after TOGI delivered at Disposal Site.	20 000
M8	Completion of the Work including delivery of relevant documentation	60 days after M7.	10 000
M9	Contractor`s Baseline (CBL) submitted and approved	14 Days after cut-off	5 000

8.2.2 SPM – C Removal Project EPRD Contract

Summary of contract price

All engineering are Provisional sums (target man hours), as well as materials and fabrication.

The preliminaries, preparation, removal and transportation are compensated as Lump Sum.

	NOK
Lump sum	139 047 024
Provisional sum	34 835 171
Contract Price	**173 882 195**

Preliminaries:

Lump sum: **11 530 230**

Contractor`s Facilities, project mobilization/demobilization, project management, Indirect Labour, Overhead, etc. for performing the Work 10 652 320

Guarantees 600 000

Insurance 278 000

Provisional sums: 495 000

Travel costs to be reimbursed by Company (Ref. Appendix B, Section 4, Business Travel costs) 360 000

Company Site facilities, Offices, Stationary and PC equipment, etc. at Contractor`s site 135 000

Engineering

Lump Sum: 3 528 033

Mobilization/demobilization (offshore subsea survey): 3 528 033

Provisional sums: 12 506 222

All engineering hours; Target man hours (Volume x Unit x Rate)

Subsea survey Spread (Volume x Unit x Rate) 4 152 533

Materials etc.;

Drilling unit & two clamps 884 160

Option to bleed gas, valves, etc. 30 000

Subcontractor`s personnel costs & misc. Travels in external meetings 20 000

Test Container, offshore for oil samples 80 000

Dummy test-pip, etc. 25 000

Preparation

Lump Sums: 17 736 944

Preparation work: 17 736 944

Provisional sums: 4 500 000

Permanent blind caps: 4 500 000

Removal and Transportation

Lump Sums: 36 959 485

Mobilization 7 175 738

Removal of SPM C Loading Buoy 13 656 401

Transportation of the Removal Object to Disposal Site 7 405 882

Area Clean-up and Final Survey, Incl. elsewhere

Demobilization 3 769 799

Mobilization 4 951 665

Disposal

Lump Sum: 56 843 012

Disposal Site`s Preliminaries 3 699 992

Site Preparation 53 143 020

Provisional Sum: -388 273

All hazardous Waste on EU waste list as well as Non-hazardous Waste are reimbursed (Volume x Unit x No) according to a set price.

The Engineering are Target man-hours (Volume x Unit x rate)

The reason that the Provisional sum is negative is that Aluminum and Steel are sold at the price of 60 788 NOK and 10 030 050 NOK.

Base Protection Structure

Provisional sum: 17 722 222

All engineering are target man-hours.

Materials and fabrication used and transport are also reimbursed.

Installation of Base Protection Structure

Lump Sums: 12 449 230

All mobilization, installation and demobilization, as well as fuel are lump sum.

Penalty milestones

The milestone M12-B is a bonus milestone

No.	Milestone	Date	Penalty per day in NOK
M3	Project Master Documentation submitted and approved	60 days after contract award (30.09.2011)	20 000
M5	All documents relevant to HAZOP shall be identified, specified, agreed and issued for Company review.	60 days prior to state of each Mobilization (except Mobilization for offshore subsea survey)	60 000
M6	Completion of construction/removal engineering, submission of Mobilization manuals, installation/removal manuals and Mobilization plans as IFC.	30 Days prior to start of each Mobilization (except Mobilization for offshore subsea survey)	60 000

	All Company comments and HAZOP findings closed and included in documents including Marine Warranty comments		
M9	Completion of Base Protection Structure installation	40 Days after completion of M8 of the Removal Campaign Spread	20% of main vessel day rate
M10	As Left documentation, LCI resume/Completion report	60 days after completion of M9	30 000
M12	Removal Object offloaded at Disposal Site	90 Days after start of towing	75 000
M12.B*	Removal Object offloaded at Disposal site	Less than 90 Days after start of towing – with a cap of 20 days	25 000
M14	Completion of the Disposal Work including delivery of final documentation	60 days after M13 (Removal object dismantled, sorted and disposed in defined fractions)	10 000
M15	Contractor`s Baseline (CBL) submitted and approved	14 Days after cut-off	10 000

8.2.3 H-7 EPRD Removal Project contract

Summary of the Contract Price

Engineering (target man hours), pre/post survey vessel and jack-up rig fuels are compensated as Provisional sums. The materials and fabrication in the disposal part are also compensated as provisional sum (Quantity x Unit x Unit rate). The preliminaries, preparation, removal and transportation are compensated as Lump Sum.

	NOK	EUR	USD
Lump sum	244 440 765	14 725 140	
Provisional sum	53 206 070		1 337 686
Contract Price	**297 646 834**	**14 725**	**1 337 686**

Preliminaries

Lump sum: 32 327 004

Contractors Project management and organization 29 549 805

Company offices, Stationary and PC equipment at contractors site 955 533

Provision of all required documentation 906 537

Insurance and guarantee 915 129

Survey

Lump sum: 2 799 931

Mobilization for subsea survey 2 051 663

Demobilization after subsea survey 714 343

Transportation for topside survey 33 925

Provisional sum: 6 551 603 + 78 388 (USD)

Pre survey vessel – transit to site (Quantity x Unit x Unit rate = 1, 08 x day x 1 077 336) 1 163 523

Pre survey vessel- operation (Quantity x Unit x Unit rate = 3, 92 x day x 1 077 336) 4 223 157

Pre survey vessel – Transit from site (Quantity x Unit x Unit rate = 1, 08 x day x 1 077 336) 1 163 523

Pre survey vessel –Fuel (Quantity x Unit x Unit rate = 85, 2 x mT x 920) 78 388

Topside Engineering

Topside engineering

Lump sum: 15 478 706

All engineering hours; Target man hours (Volume x Unit x Rate)

Topside – Onshore preparation and fabrication

Lump Sum: 6 481 638 + 331 740 EUR

Onshore preparation and fabrication 6 481 638 + 331 740 EUR

Topside – Offshore Preparation and Removal

Lump Sums: 56 653 510 + 7 217 200 (EUR)

Mobilization for removal work 4 543 544 + 905 000 (EUR)

Removal of H-7 Topside 50 392 313 + 6 312 200 (EUR)

Helicopter travel/Crew change H-7 topside removal 1 460 649

Demobilization 257 004

Provisional sums: 13 850 + 775 560 (USD)

Jack up rig – Fuel (Quantity x Unit x Unit rate) (543 x mT x 920) 499 560 (USD)

Supply vessel – Fuel (Quantity x Unit x Unit rate) (300 x mT x 920) 276 000 (USD)

NOx (Quantity x Unit x Unit rate) (843 x mT x 16, 43) 13 850

H-7 Jacket Engineering

Provisional sums: 15 110 370

All engineering hours; Target man hours (Volume x Unit x Rate)

All subcontractor engineering hours: Target man hours (Volume x Unit x Rate)

H7 Jacket onshore Preparation and Fabrication

Lump Sum: 8 130 763 + 1 222 000 (EUR)

Onshore preparation and fabrication 8 130 763 + 1 222 000

H7 Jacket offshore Preparation and Fabrication

Lump Sum: 110 204 777 + 5 954 200 (EUR)

Mobilization for removal work 21 655 785 + 495 000 EUR

Removal of H-7 Jacket 70 294 302 + 5 495 200 EUR

Helicopter travel/Crew change H-7 jacket removal 973 766

Removal of marine growth 254 434

Area clean-up and final survey 1 363 149

Demobilization 15 663 341

Provisional Sum: 2 113 800 + 483 739 USD

Post survey vessel – transit to site (Quantity x Day x Unit rate) (1, 08 x Day x 754 538) 814 901

Post survey vessel- operation (Quantity x Day x Unit rate) (0, 63 x Day x 754 538) 475 359

Post survey vessel – Transit from site (Quantity x Day x Unit rate) (1, 08 x Day x 754 538) 814 901

Post survey vessel – Fuel (Quantity x Unit x Unit rate) (46 x mT x 920) 42 369 USD

Jack up rig – Fuel (Quantity x Unit x Unit rate) (400 x mT x 920) 367 770 USD

Supply vessel- fuel (Quantity x Unit x Unit rate) (80 x mT x 920) 73 600 USD

H-7 Disposal Topside

Lump Sum: 20 911 865

Compensation to Company for H-7 Topside – 8 915 200

Preliminaries and facilities 29 827 065

Provisional sums: 7 787 696

All hazardous Waste on EU waste list as well as Non-hazardous Waste are reimbursed (Volume x Unit x No) according to a set price. 3 071 896

The Engineering are Target man-hours (Volume x Unit x rate) 4 715 800

H-7 Disposal Jacket

Lump Sum: 6 931 277

Compensation to Company for H-7 Topside – 4 052 475

Preliminaries and facilities 10 496 882

Removal of marine growth 486 870

Provisional sums: 6 149 771

All hazardous Waste on EU waste list as well as Non-hazardous Waste are reimbursed (Volume x Unit x No) according to a set price. 1 489 168

The Engineering are Target man-hours (Volume x Unit x rate) 4 715 800

Penalty milestones

Administration & general

No.	**Milestone**	**Date**	**Penalty per day in NOK**
A3	Issue quality plan, monitoring plan and Risk list	45 days after contract award (CCA)	2 000
A4	Issue HSE program	60 days after contract award	2 000
A5	Issue Master Document Register	60 days after contract award	2 000
A6	Issue of final Baseline update	15 days after cut-off	2 000
A9	Completion of all offshore work	30.09.2014	100 000
A10	Completion of the Disposal Work including delivery of	60 days after last milestone	10 000

	relevant documentation	(HJ21)	
A11	Completion of Work incl. Delivery of Closeout report	60 days after completion of all Onshore work	10 000

No.	**Milestone**	**Date**	**Penalty per day in NOK**
HT 12 (H-7 topside)	Submission of ready for offshore operation documentation H-7 topside	60 Days prior to first mobilization (HT 15)	10 000
HJ 14 (H-7 jacket)	Submission of ready for offshore operation documentation h-7 jacket	60 Days prior to mobilization (HJ 15)	10 000

8.2.4 EPR-contract 2/4 – S and TOGI disposal

The EPR-contract for 2/4 – S follows the same compensation format as the EPRD- contract H-7. The compensation format for the Disposal contracts for TOGI and 2/4 – S will not be discussed in detail in this thesis.